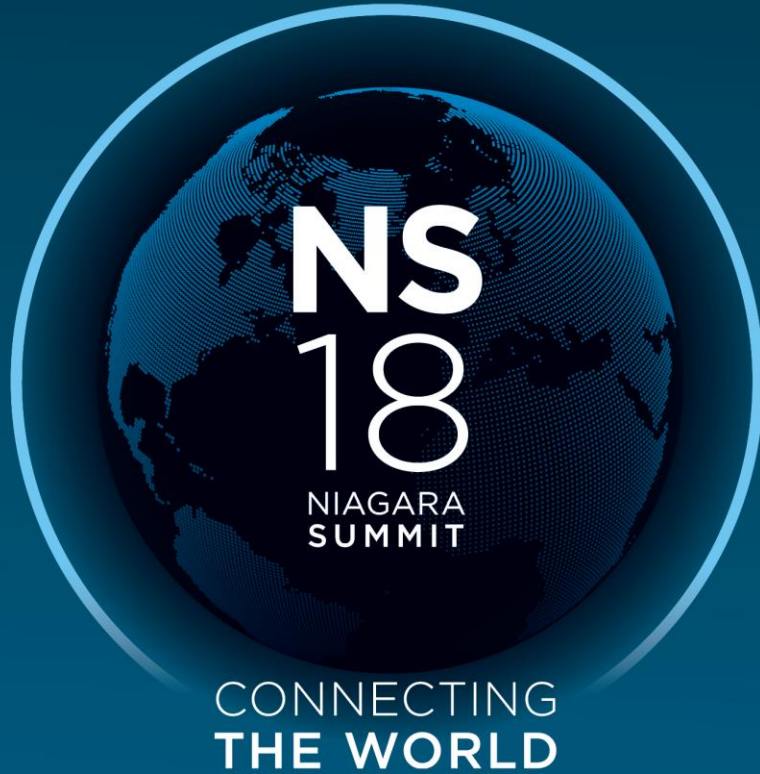




CONNECTING
THE WORLD



Disruptive Trends in Facility & Energy Management

Mike Parks

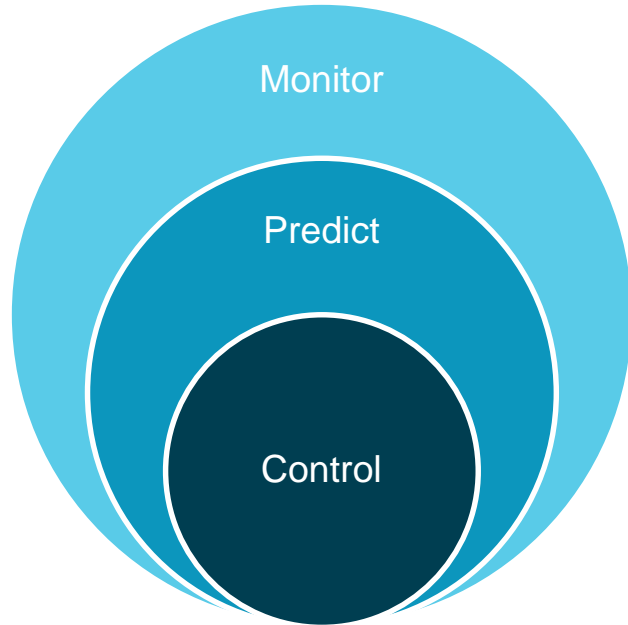
Senior Vice President

IoT Strategy @ Accruent

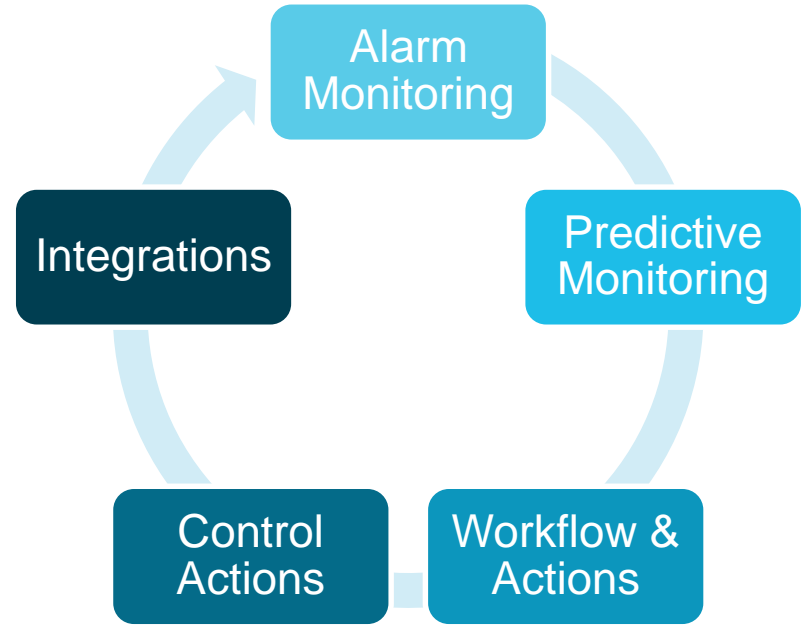
vx OBSERVE

Internet of Things Platform Pillars

vx Observe Platform Pillars



vx Observe Functional Blocks



Connect

React

Prevent

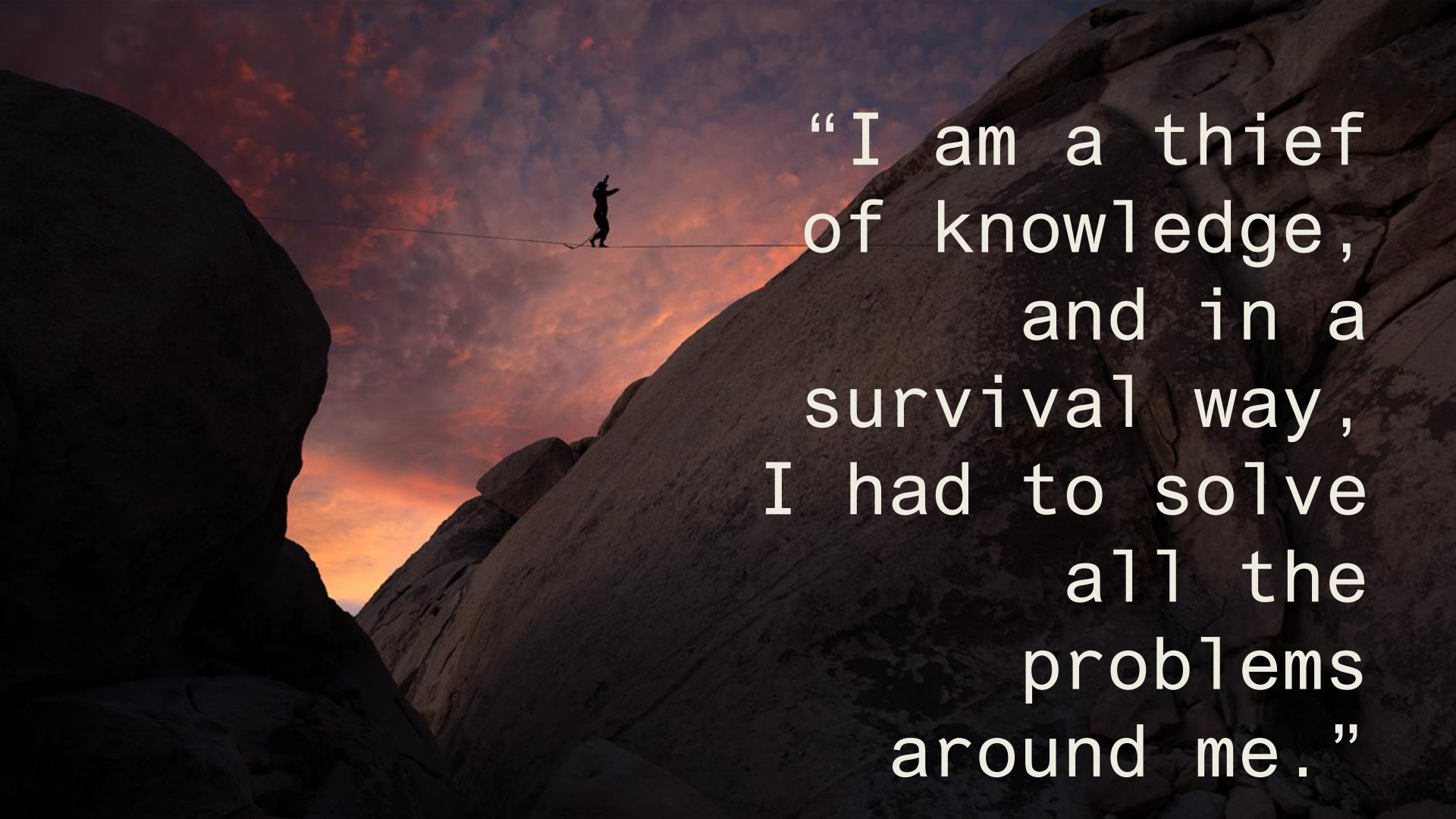
Restrict

Comply

Predict

Control

I am a Thief Of Knowledge and Information

A person is silhouetted while walking a tightrope between two large, dark rock formations. The sky is a vibrant mix of orange, red, and purple, suggesting a sunset or sunrise. The person is positioned in the center-left of the frame, balancing on a thin line that stretches across the gap between the rocks.

“I am a thief
of knowledge,
and in a
survival way,
I had to solve
all the
problems
around me.”



Disruption:

A disruptive innovation is an innovation that creates a new market and value network. It eventually disrupts an existing market and value network, displacing established market leading firms, products and alliances.





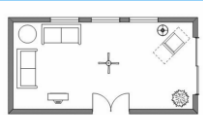
The rule of 10X

Ten times faster

Ten times cheaper

Ten times smaller...etc.

2011

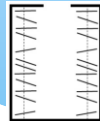


Living Room

2012



2013



2014



2017

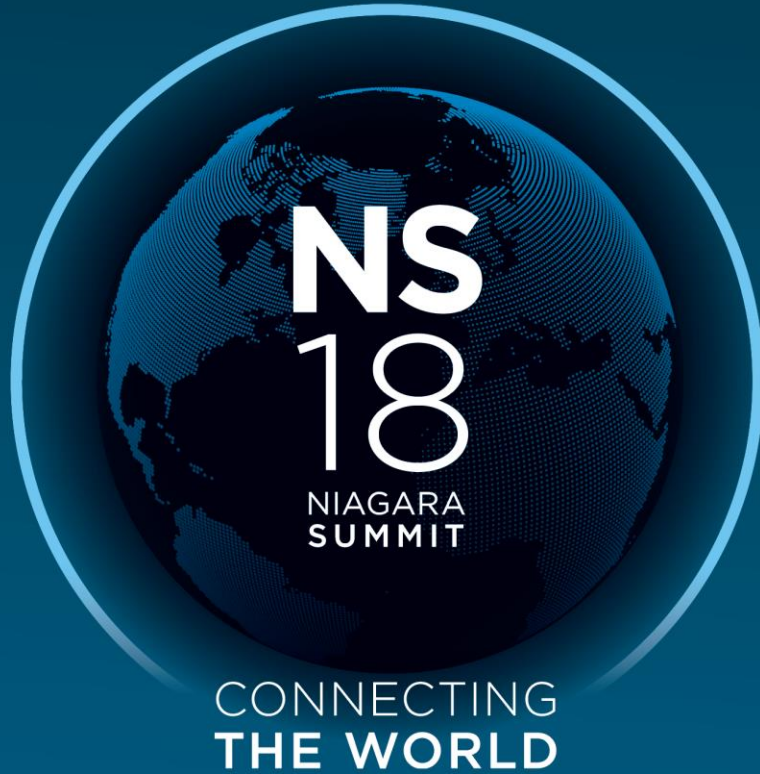


2020



2025





- Mobile devices are changing the way we work and live
- Ubiquitous connectivity will enable data from all assets and systems
- The need to mine and understand “Big Data” is not going away
- The impact of dramatic changes to the workforce

Mobile Devices Will Change the Way We Work

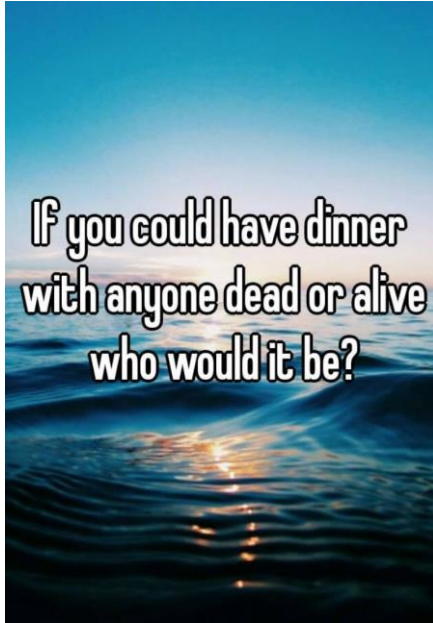


Mobile Devices Will Change the Way We Work

- Albert C. Sundberg
 - 1921 – 2006
 - Pancreatic Cancer
- iPhone release June 29th, 2007
 - Disruption?



What If?



Sadly



Perhaps More So...



The Desire To Go Mobile Is Not New



SHAPE

Decades

Years

DRIVE

Quarters

Months

MANAGE

Weeks

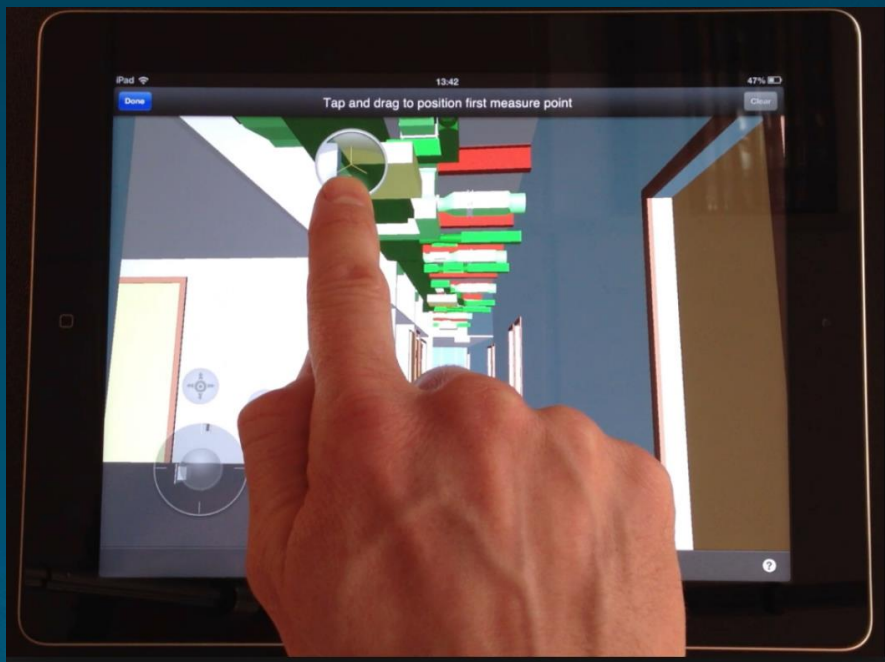
Days

CONTROL

Hours

Minutes

Seconds



SHAPE

DRIVE

MANAGE

CONTROL

Decades

Years

Quarters

Months

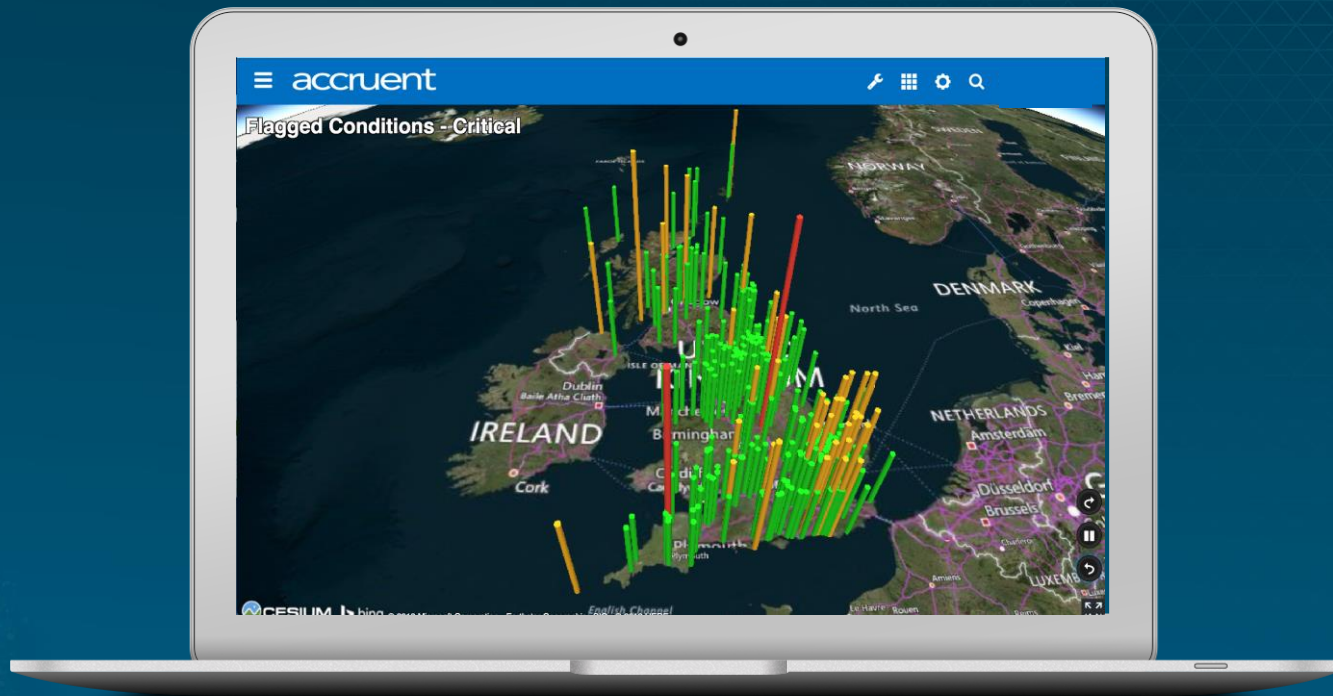
Weeks

Days

Hours

Minutes

Seconds



Mobile Devices Are Changing the Way We Live

Together, but alone

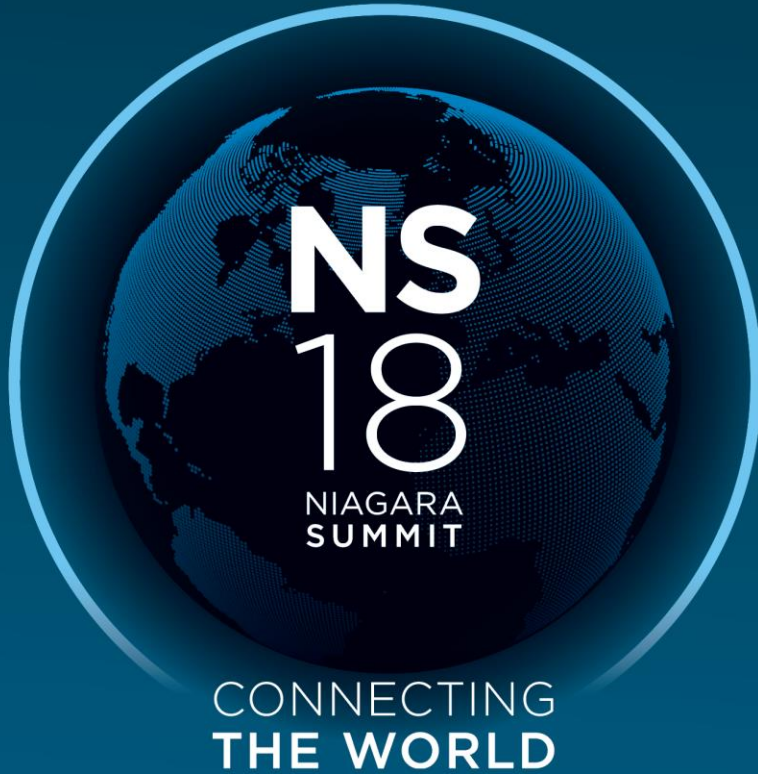


Too soon?



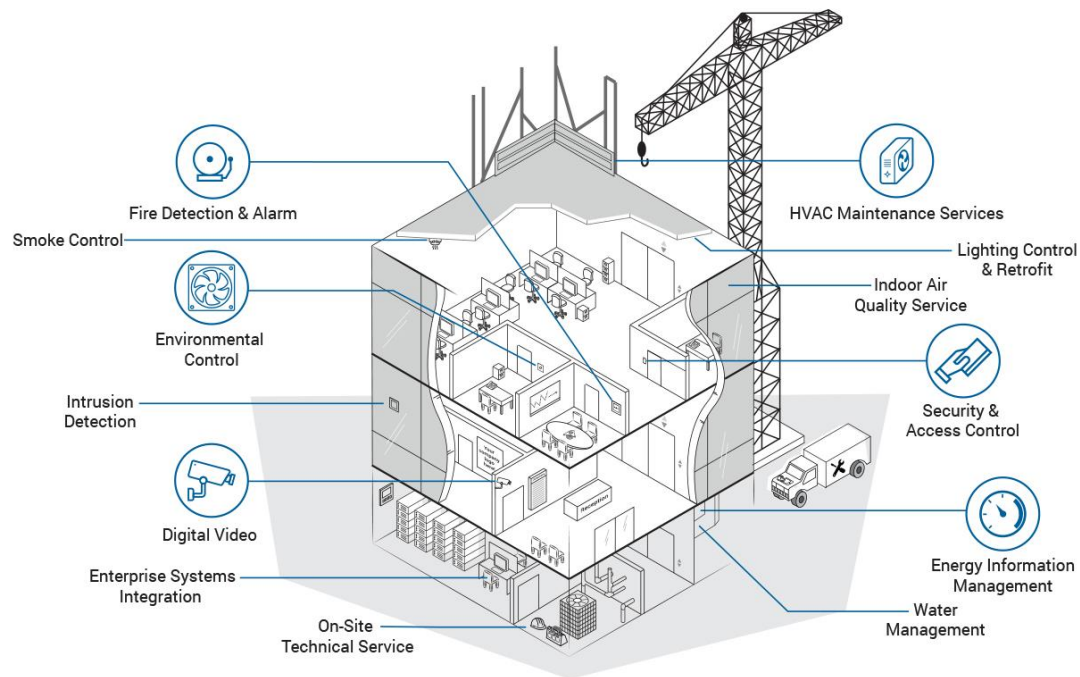
A shrinking world





- Mobile devices are changing the way we work and live
 - Ubiquitous connectivity will enable data from all assets and systems
-
- The need to mine and understand “Big Data” is not going away
 - The impact of dramatic changes to the workforce

Ubiquitous Connectivity Will Make Our Lives Easier



Ubiquitous Connectivity Will Make Our Lives Easier

HVAC

Energy

Elevators

Auto-doors

Platforms in silos and proprietary protocols are inhibiting the industries we service from progressing.

Waste

Security

A common platform is required to achieve **best-in-class** results

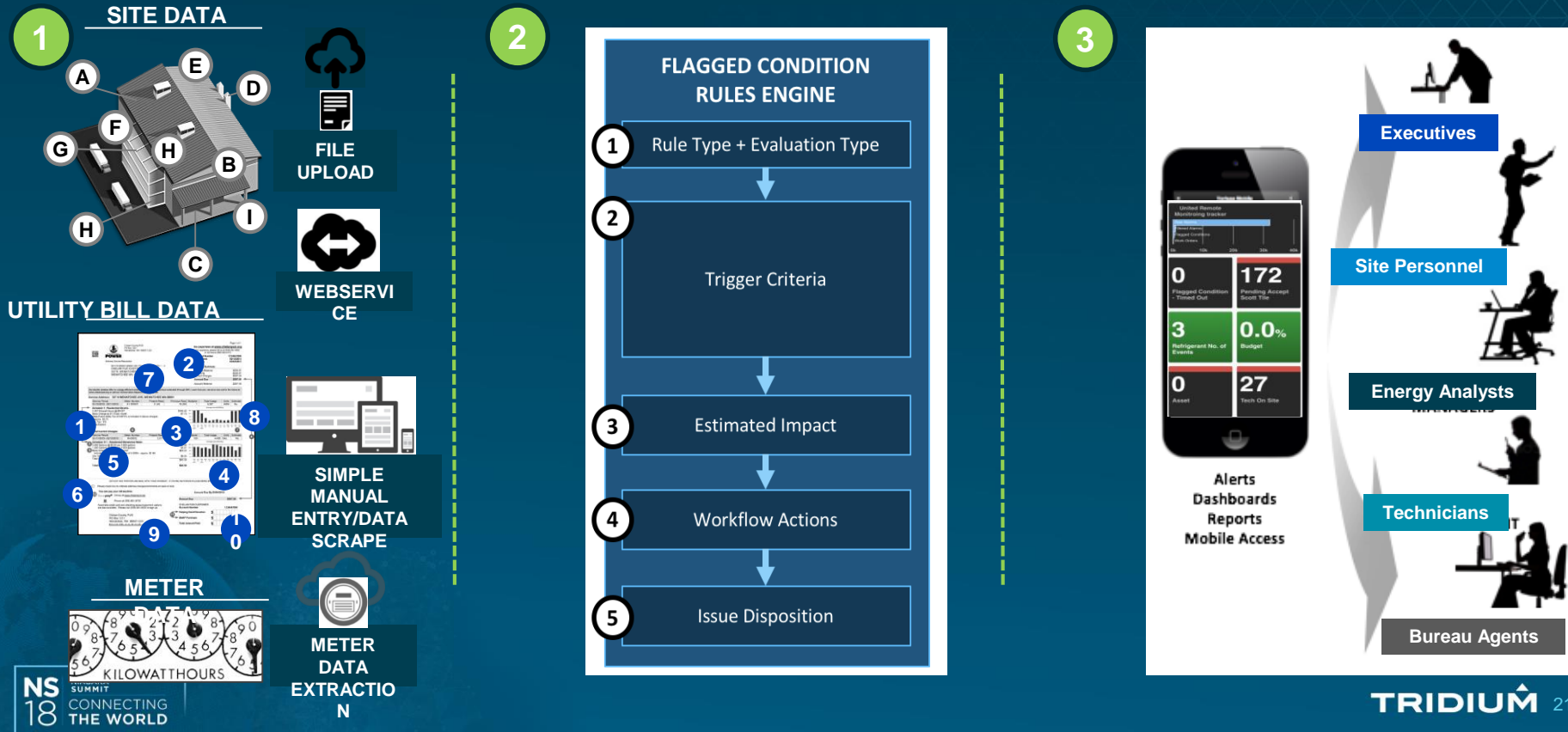
Waste

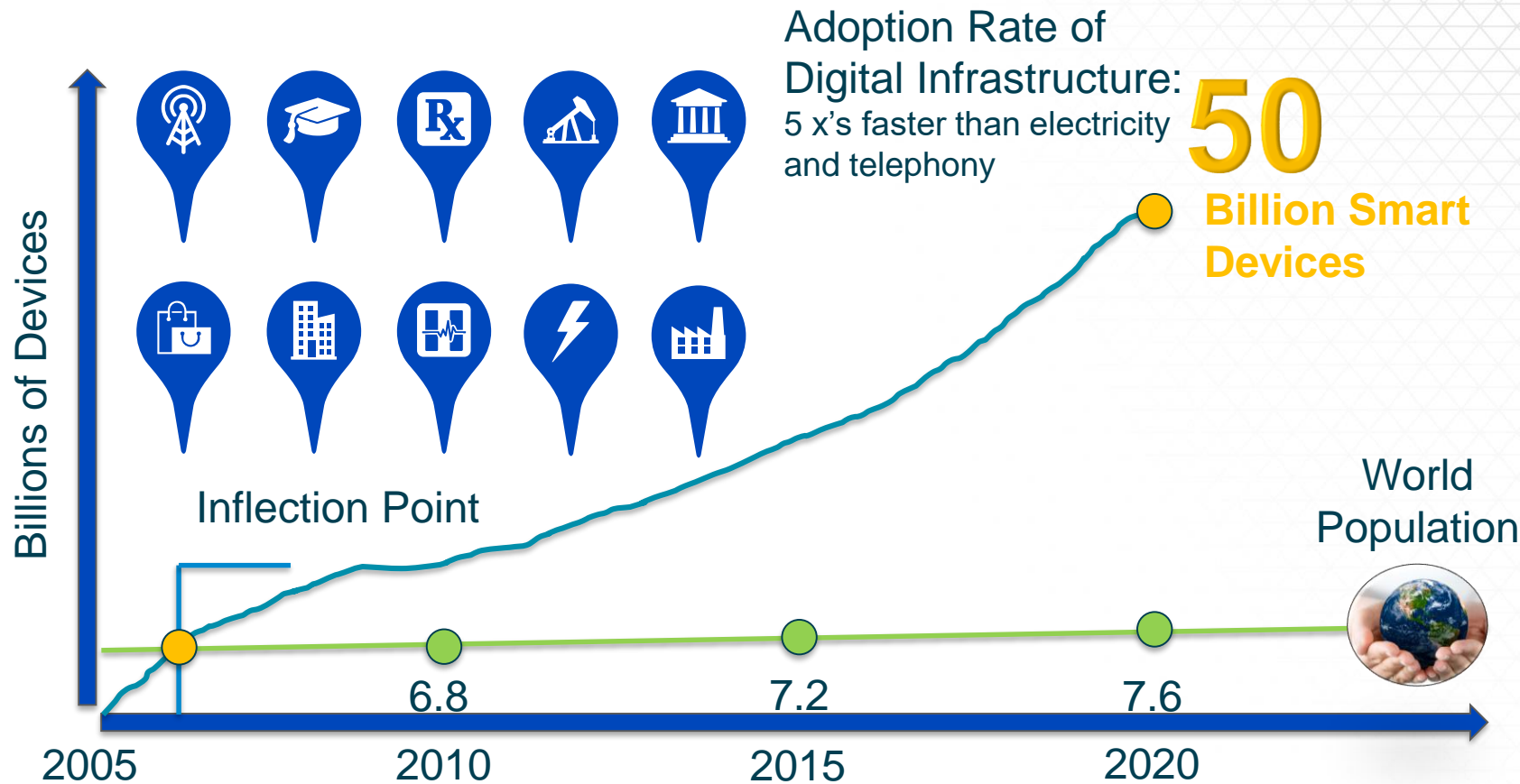
Occupancy

Parking

CO2

Ubiquitous Connectivity Will Make Our Lives Easier







HI, FRIENDS!

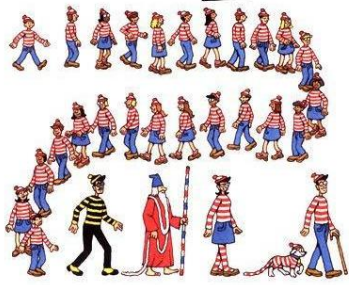
MY NAME IS WALDO. I'M JUST SETTING OFF ON A WORLDWIDE HIKE. YOU CAN COME TOO. ALL YOU HAVE TO DO IS FIND ME.

I'VE GOT ALL I NEED—WALKING STICK, KETTLE, MALLET, CUP, BACKPACK, SLEEPING BAG, BINOCULARS, CAMERA, SNORKEL, BELT, BAG, AND SHOVEL.

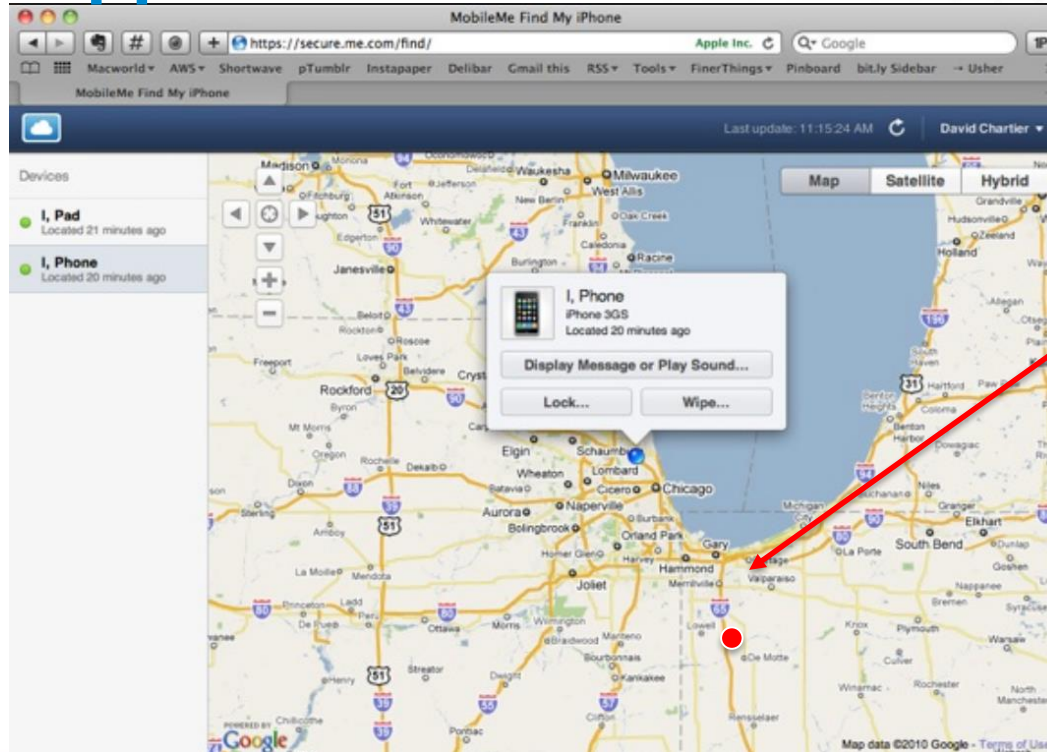
BY THE WAY, I'M NOT TRAVELING ON MY OWN. WHEREVER I GO, THERE ARE LOTS OF OTHER CHARACTERS FOR YOU TO SPOT. FIRST FIND WOOF (BUT ALL YOU CAN SEE IS HIS TAIL). WENDA, WIZARD WHITEBEARD, AND ODLAW. THERE ARE ALSO 25 WALDO-WATCHERS SOMEWHERE. EACH OF WHOM APPEARS ONLY ONCE IN MY TRAVELS. CAN YOU FIND ONE OTHER CHARACTER WHO APPEARS IN EVERY SCENE? ALSO IN EVERY SCENE, CAN YOU SPOT MY KEY, WOOF'S BONE, WENDAS CAMERA, WIZARD WHITEBEARD'S SCROLL, AND ODLAW'S BINOCULARS?

WOW! WHAT A SEARCH!

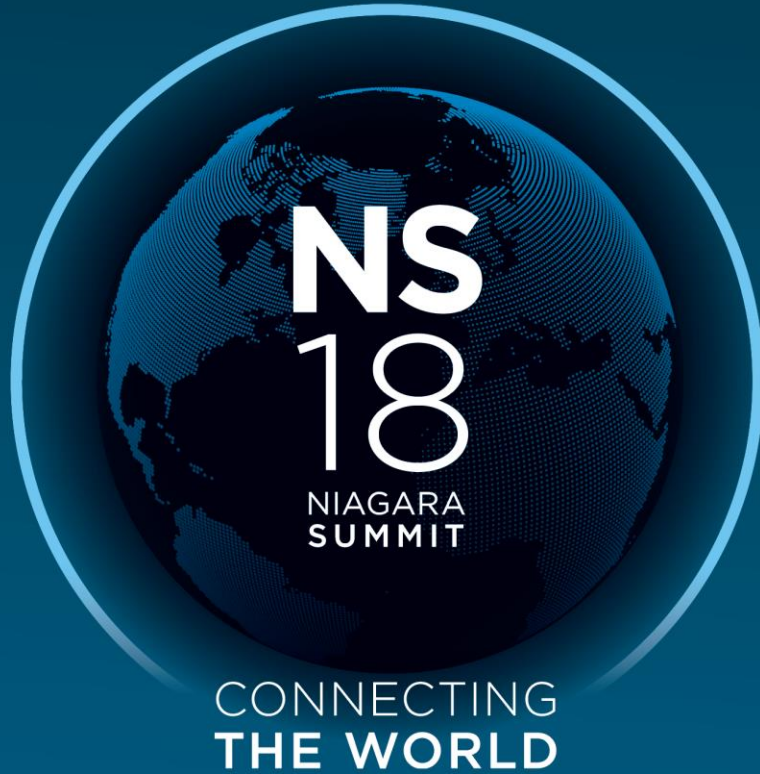
Waldo



Practical Applications For Connected Things



Max's
House?



- Mobile devices are changing the way we work and live
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Understanding Big Data

C-Level Execs Value Data, Have No Idea What to Do With It

Almost all C-suite executives at large enterprises believe data and analytics are important to their business, but most are struggling to become data-driven businesses. More than half say they don't even know what data to collect?

Thor Olavsrud - CIO

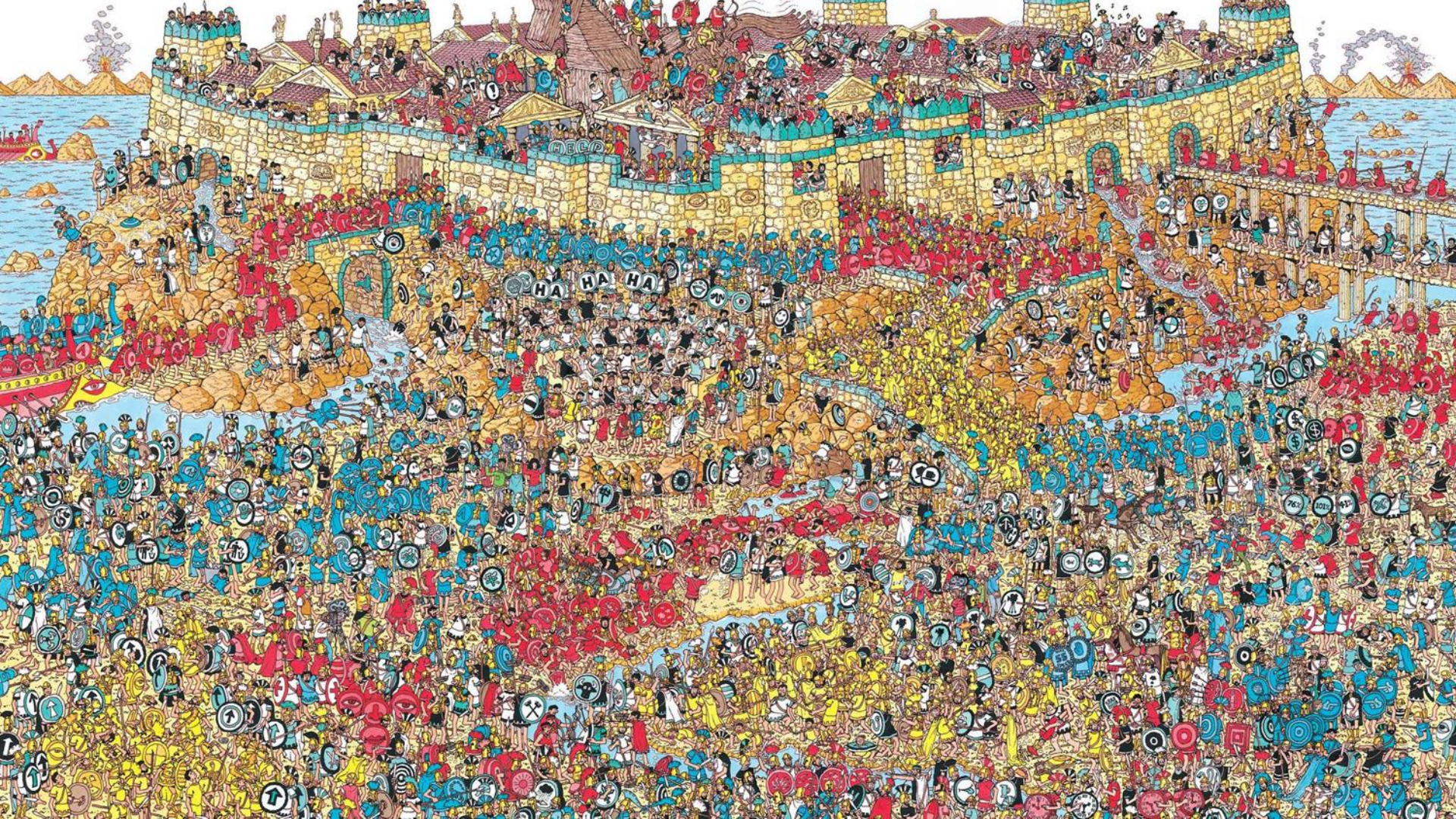


The need to mine and understand “Big Data”



IOE



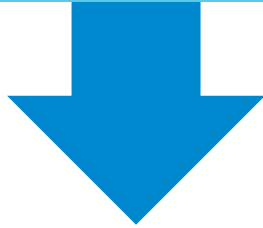




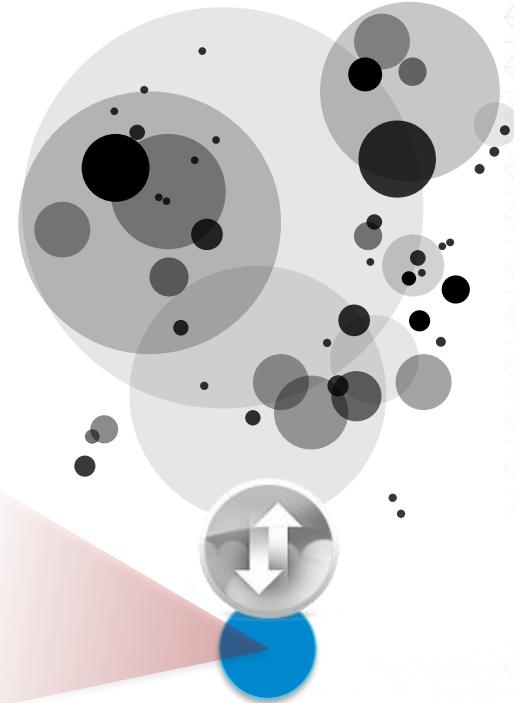
Making Big Data Small

Business Challenge:

To acquire, normalize and correlate data from as many relevant sources as possible and to then present targeted, actionable data that is meaningful to the end user



“Personalized Data”



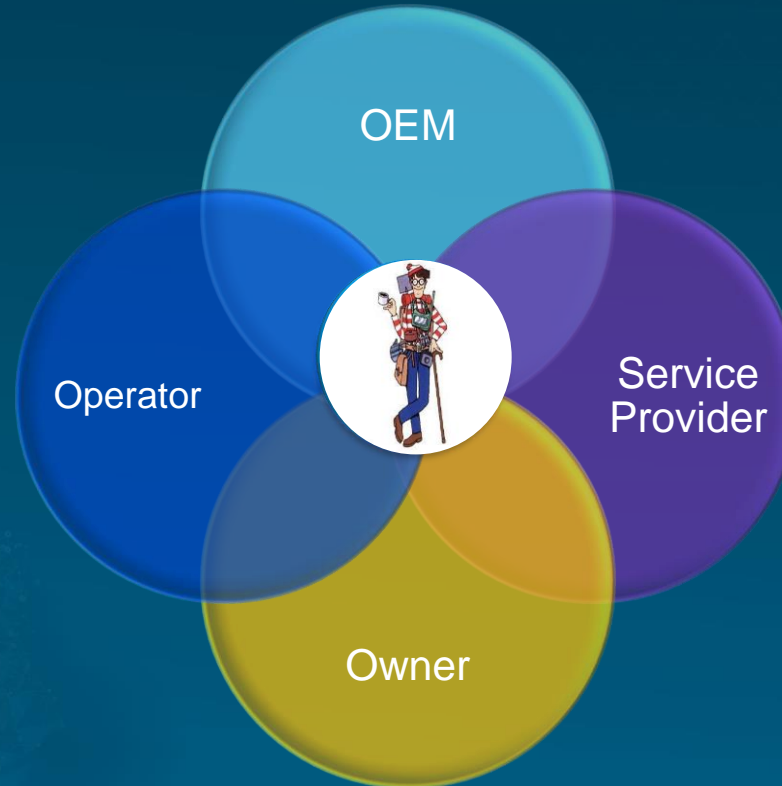


Equipment Type	Power	No of cycles per 24 hrs	Duration per Cycle	Hrs per 24 hrs	Ave Energy Intensity when running	kwh per day per Equip unit	% split of compo- nents	% Use in Peak Energy Tariff time	% Use in Off- Peak Energy Tariff time	Ave # of Equip Units per Store	Peak Energy Consum per store p.a.	Off-Peak Energy Consum per store p.a.	Total Energy Consum per store p.a.	Cost per Peak kWh	Cost per Off- Peak kWh	Peak Energy Cost per store p.a.	Off-Peak Energy Cost per store p.a.	Total Refrig Energy Cost per store p.a.	Number of stores	Total Peak Energy Cost p.a.	Total Off-Peak Energy Cost p.a.	Total In-scope Energy Cost p.a.
Units:	kW	Number	hrs	Calc	%	kW																
1																						
Cabinet MTType A (using Off Cycle Defrost)																						
Lighting	0.240	1.0	18.00	18	100%																	
Defrost Regulator	0.000	0.0	0.00	0	100%																	
Evaporator Fan	0.080	24.0	0.50	12	100%																	
Anti Mist Heater	0.000	0.0	0.00	0	100%																	
Electronic Valves	0.010	24.0	0.65	15.6	100%																	
<add 1>	0.000	0.0	0.00	0	100%																	
<add 2>	0.000	0.0	0.00	0	100%																	
<add 3>	0.000	0.0	0.00	0	100%																	
2																						
Cabinet MTType B (using Defrost heaters)																						
3																						
Cabinet LT																						
Lighting	0.240	1.0	18.00	18	100%																	
Defrost Element/Heater	2.000	4.0	0.20	0.8	100%																	
Evaporator Fan	0.080	24.0	0.50	12	100%																	
Anti Mist Heater	0.800	1.0	24.00	24	100%																	
Electronic Valves	0.010	24.0	0.50	12	100%																	





Data Ownership is a Challenge



Data Ownership is a Challenge

Controller

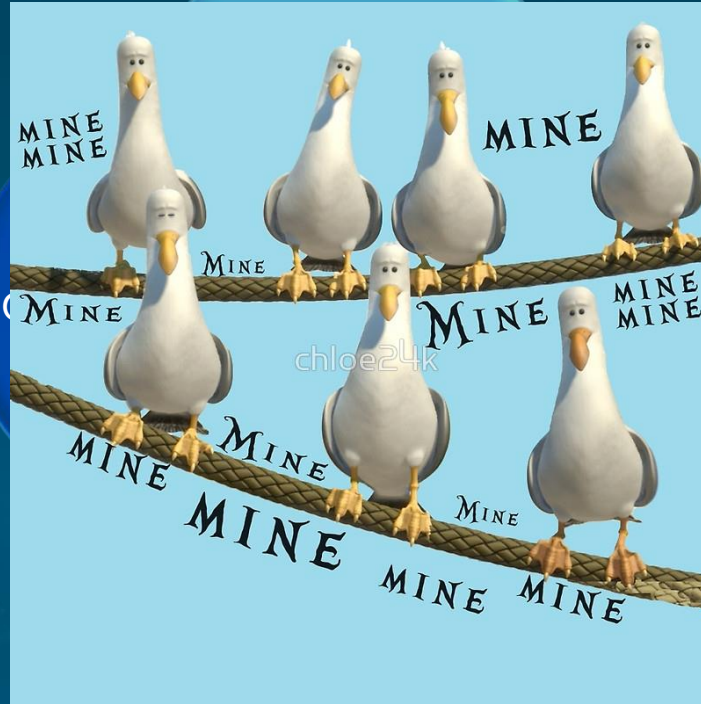
Equipment

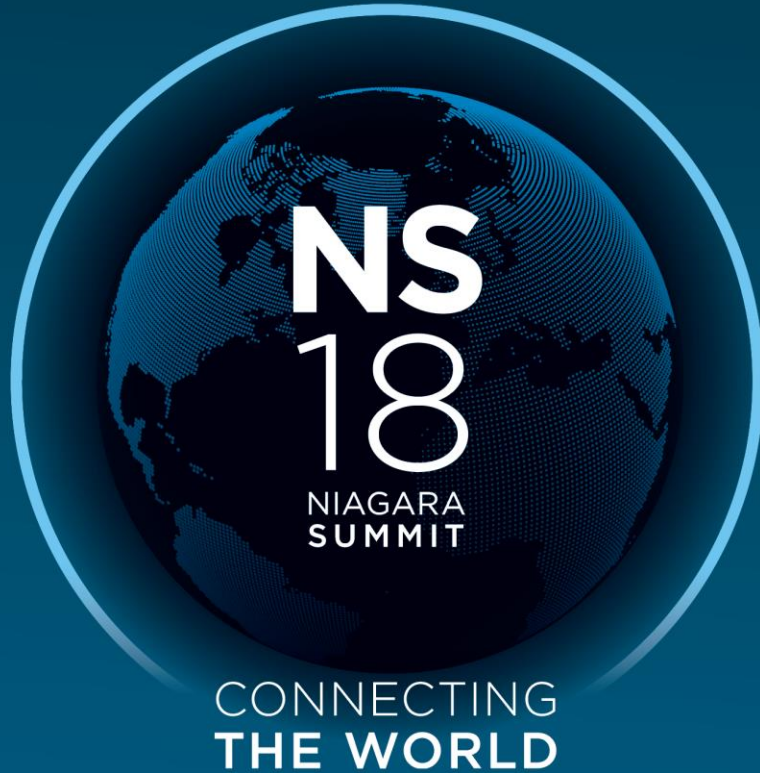
Tenant

Contractor

Landlord

Software Provider



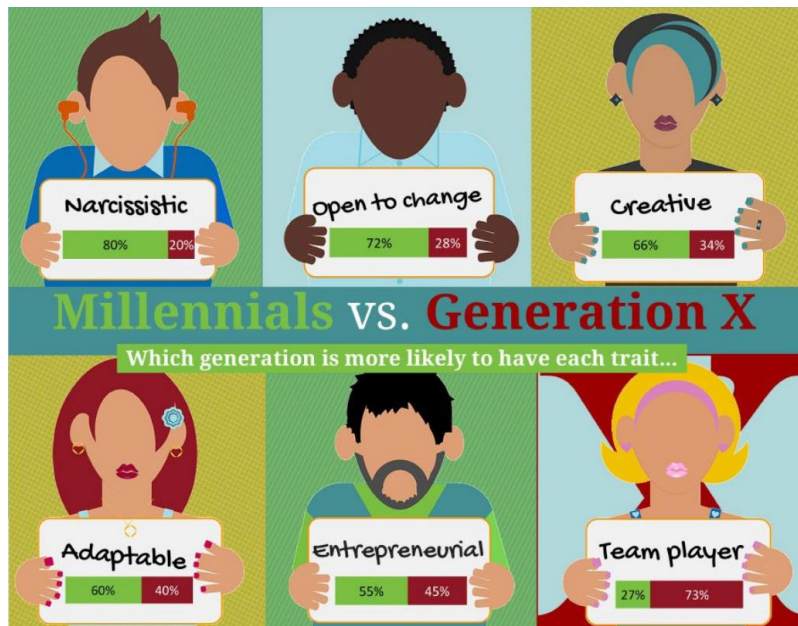


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Dramatic changes to the workforce



Millennials and the Workplace



Millennials will be the largest generation in the workforce in 2015...

—Bureau of Labor Statistics

53%

of hiring managers say it's difficult to find & retain millennials.
(Only 14% say easy, 33% say neither)

58%

of millennials expect to leave their jobs in 3 years or less.

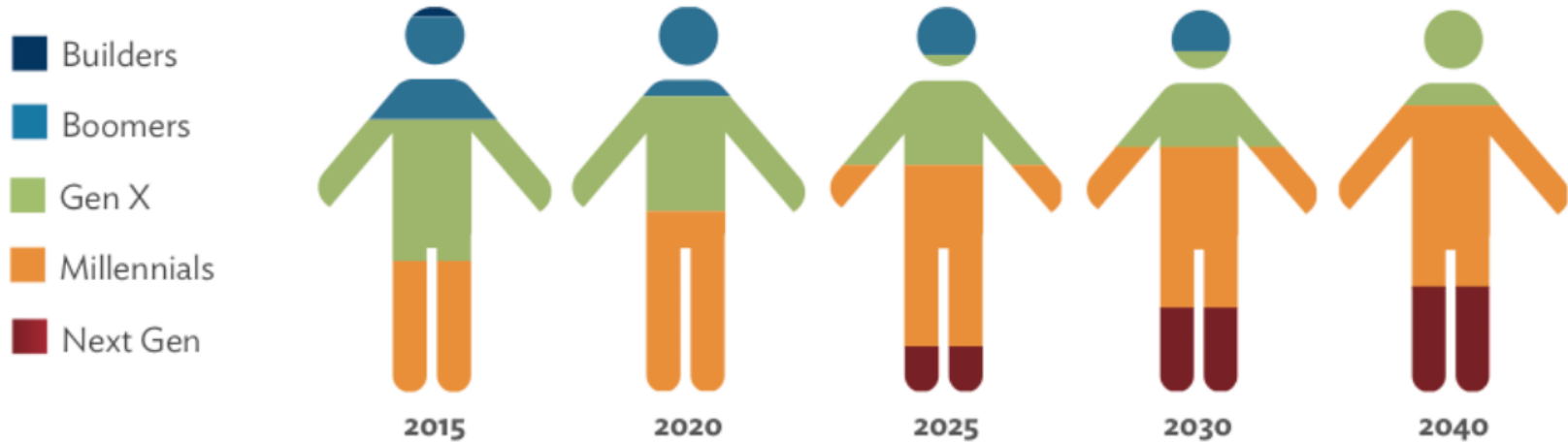
55%

of hiring managers prioritize hard skills over personality when hiring.
(Only 21% say personality, 24% say neither)

Millennials Are The Workforce of Today

World Population by Generation

Worldwide and in the U.S., Millennials are the largest generation yet – some 2.3 billion strong. (U.S. Census Bureau)



A New Way of Working

Data Scientist:

Someone who makes value out of data. ... Data Scientist duties typically include creating various Machine Learning-based tools or processes within the company, such as recommendation engines or automated lead scoring systems. People within this role should also be able to perform statistical analysis.





The Shortage of Skilled Trades Workers in the U.S.

An Examination of this Severe & Growing Crisis



Only 6% of students consider a career in the trades¹

1:2:7 True Ratio of Jobs in Our Economy²



For every
1 occupation
requiring a Master's
Degree or more



there are
2 professional jobs
requiring a
University Degree



and **7 jobs**
requiring a
one year certificate
or two year degree

FIGURE 1:

anticipated
in the indu:

20%

job growth in
PHCE industry over
the next 10 years.

Department of Labor
www.onetonline.org

58

average age of
an electrician in
Boston.

Workforce Investment
Center
Salem, Massachusetts

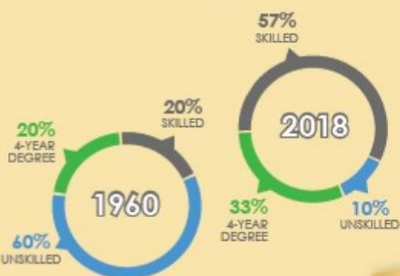
60%

turnover of
employees in the
next ten years.

Department of Labor
www.onetonline.org

The "College for All" Rhetoric

66% of high school students enroll in higher education, but only 33% of future jobs will require a 4-year+ degree³



The Alarming Shortage Figures

In 2014, ManpowerGroup spoke to over 37,000 employers in 42 countries to look at the extent to which they are having difficulty finding the right talent and what jobs are most difficult to fill.⁴

Difficulty Filling Jobs



36% of all employers
report difficulty filling jobs

54% of those experience a
medium-to-high impact on
their ability to meet the needs of
clients

Top 3 Jobs Employers Having Difficulty Filling



Skilled Trade
Workers



Engineers



Technicians

About Us!

Our Explore the Trades program provides employment prospects for young people, ages 15 to 25 in the PHCE industry.



Our Troops to Trades program offers career placement, training and grants for military veterans who are looking for a career in the PHCE industry.



323,800



115,070

208,730

267,600

estimated
of retireme

¹ RIDGD Survey, 2009

² Fleming, K. (2013). Success in the New Economy. <http://www.ketnotes.com>

³ Manpower Group (2014). 2014 Talent Shortage Survey.

2012

2014

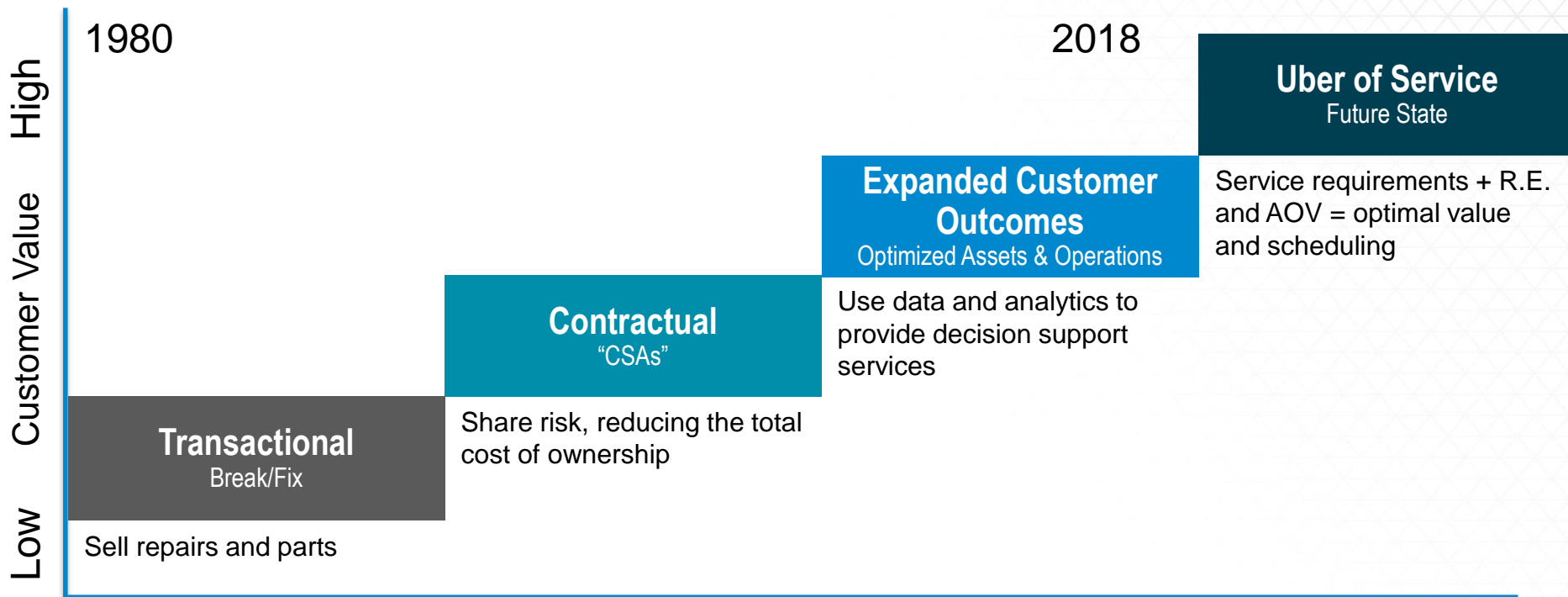
2016

2018

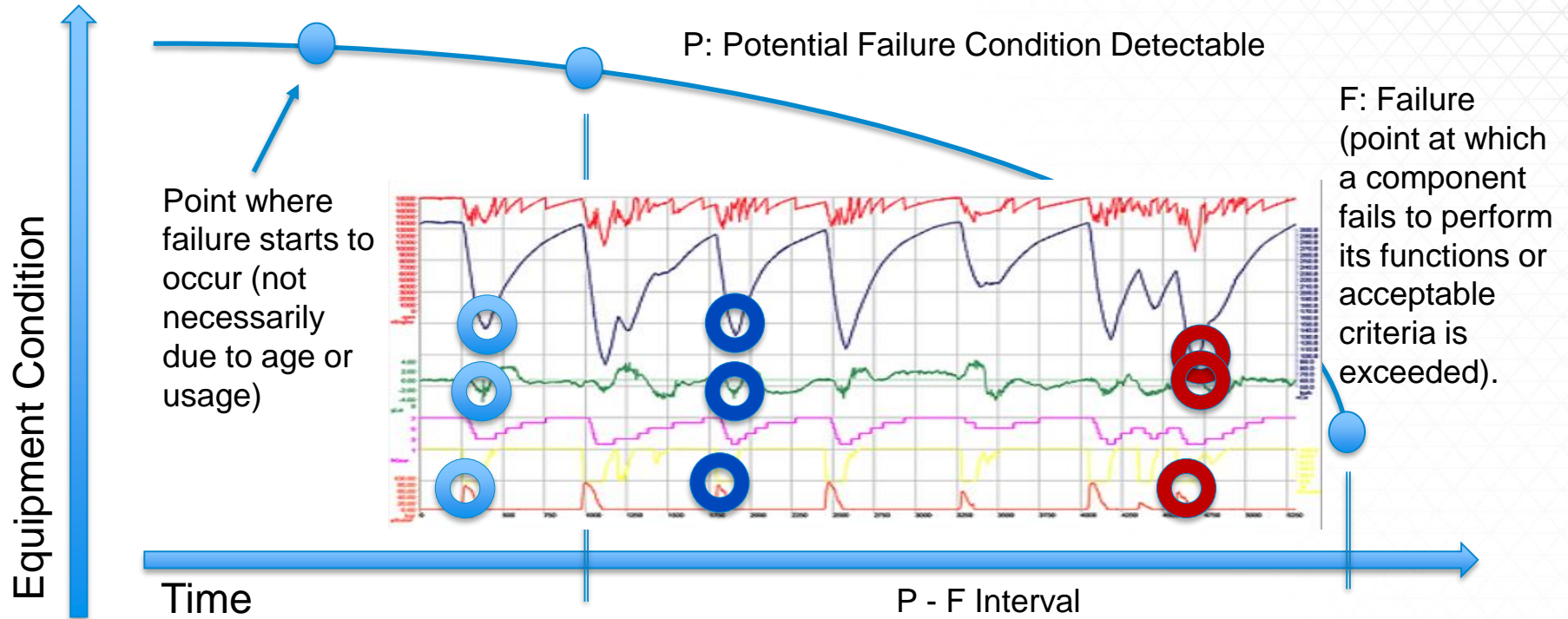
2020

2022

The Evolution of Service Models

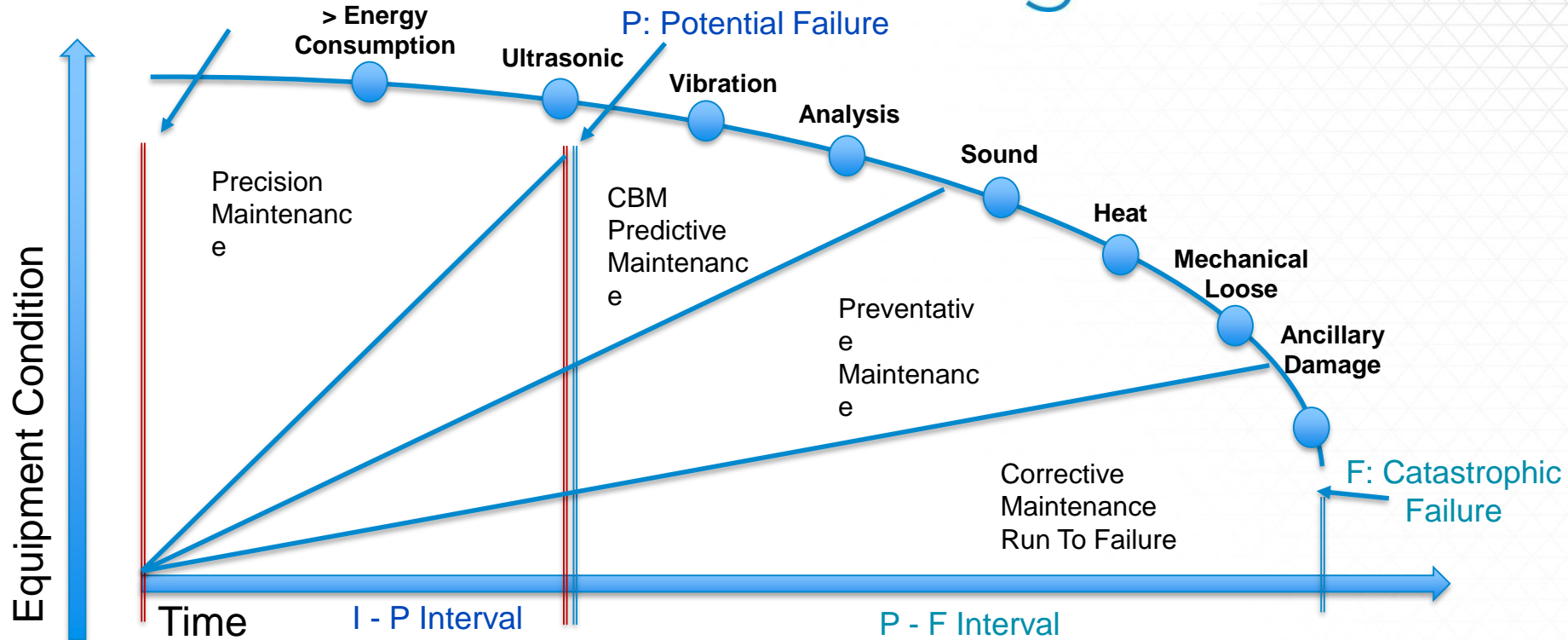


Types of Equipment Failure **niagara**⁴



Precision Maintenance

niagara⁴



\$10

0

to
repair

\$10

to
prevent

\$1

to
predict