loud, Big Data and Analytics: Driving Business Value

ociation of Metropolitan Water Agencies
Executive Management Conference

October 18, 2016

WATER AND WASTEWATER CIO FORUM

Agenda

- Welcome
- Introduction to the Topics
- Practical Examples
  - New York City DEP
  - Metropolitan Water District of Southern California
- Application to All Utilities
- Action in the Vendor Community
- Takeaways

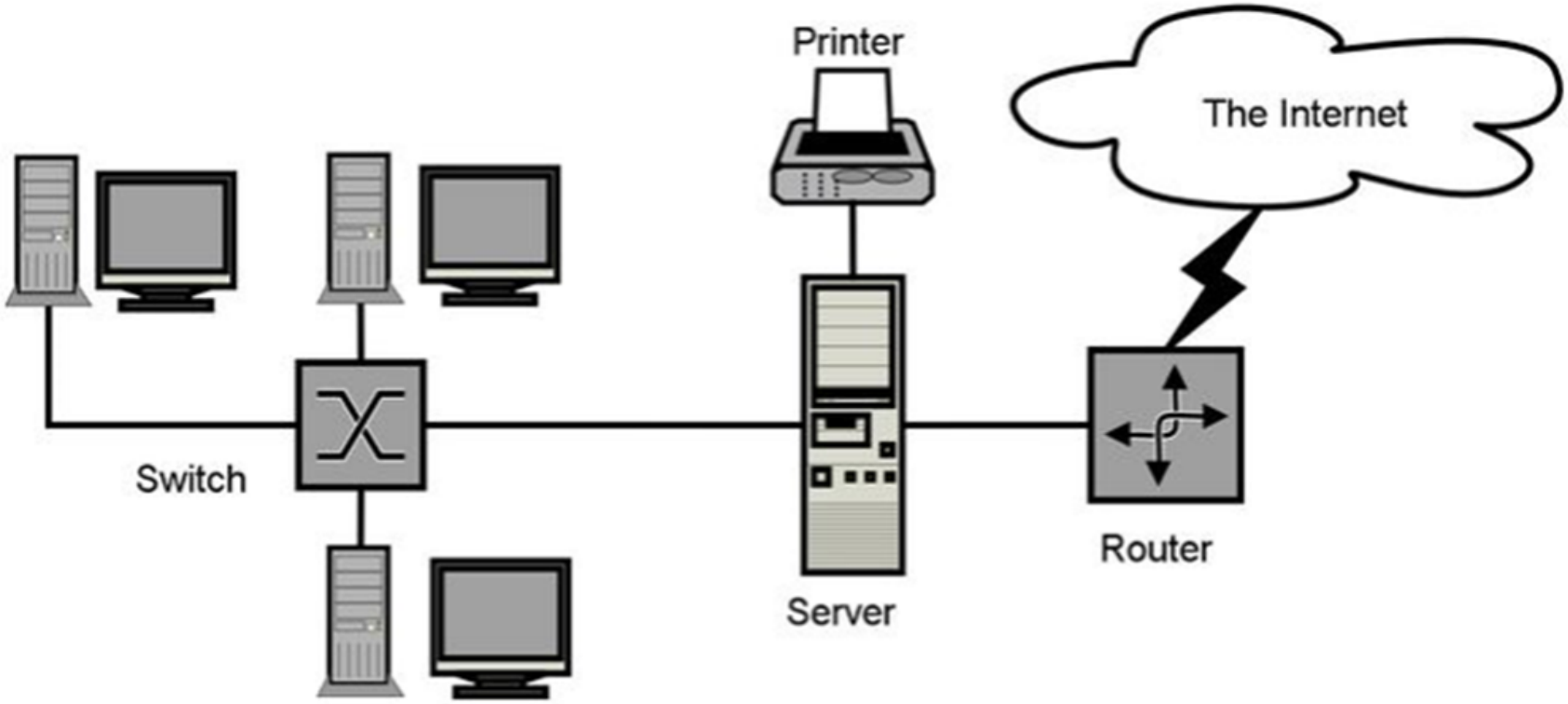
Welcome and Introductions

- Representatives of the Water and Wastewater CIO Forum
  - Chris Dermody
    - CIO of Denver Water and co-founder of the CIO Forum
  - Tom Miller
    - Director of IT, MWD of Southern California
  - Cecil McMaster
    - CIO of the New York City DEP
  - Corey Williams
    - President of Optimatics and co-founder of the CIO Forum
- About the CIO Forum
  - Created 2006 for “CIO’s” from large / progressive water & wastewater utilities in North America

troduction to Topics

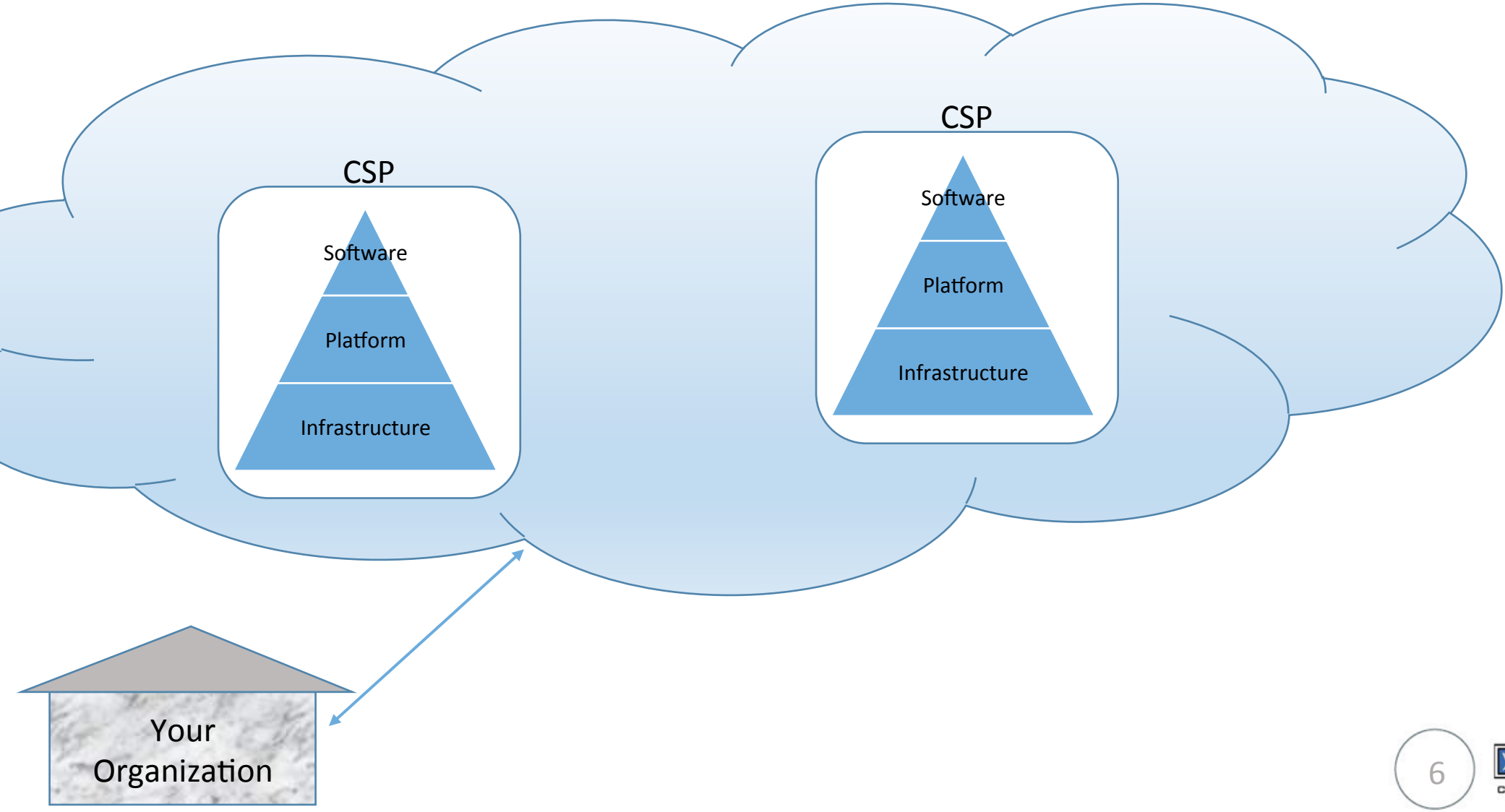
you explain this in plain English?

Cloud – it's just a metaphor…

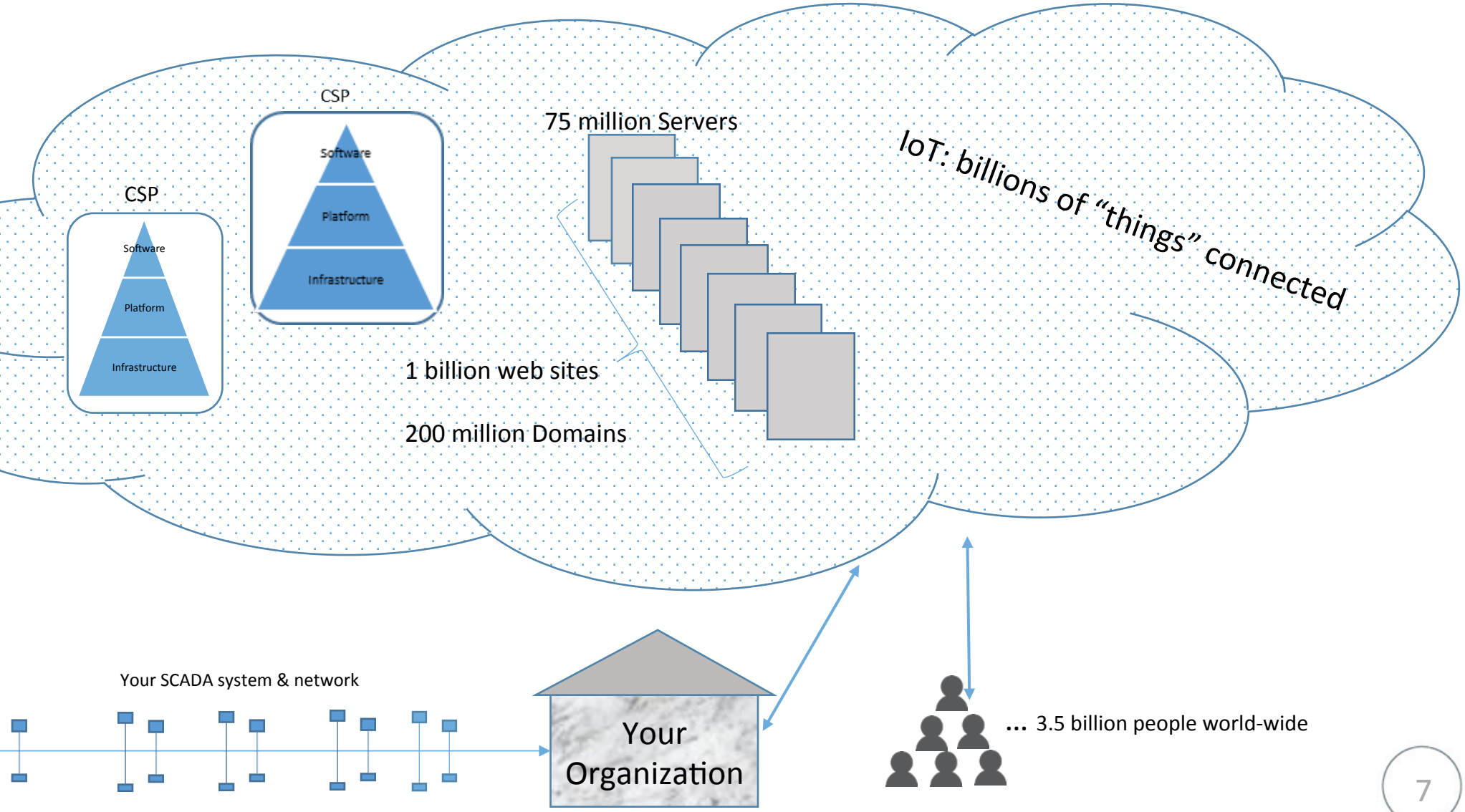


Circa 1990's

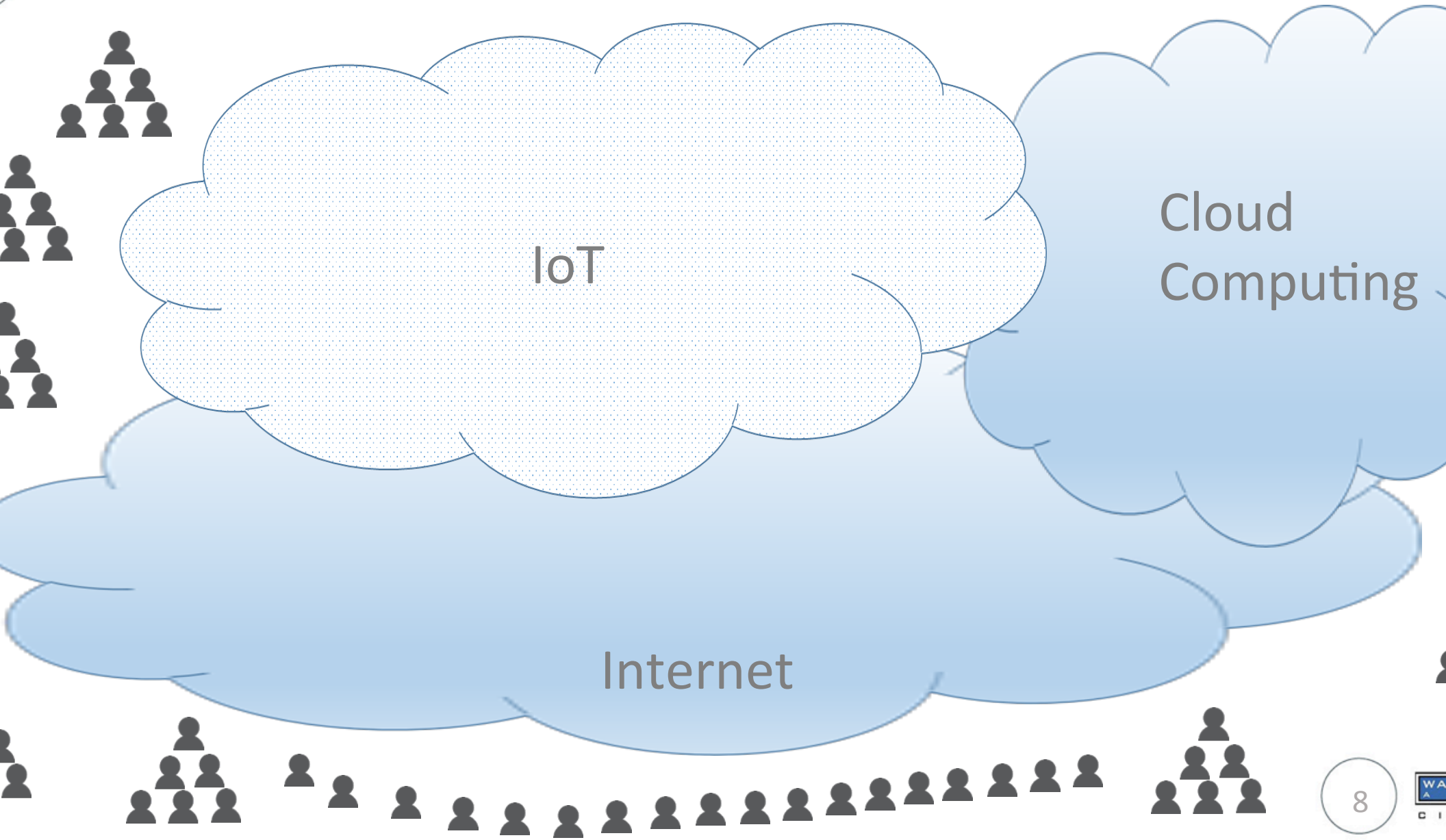
Cloud Service Providers



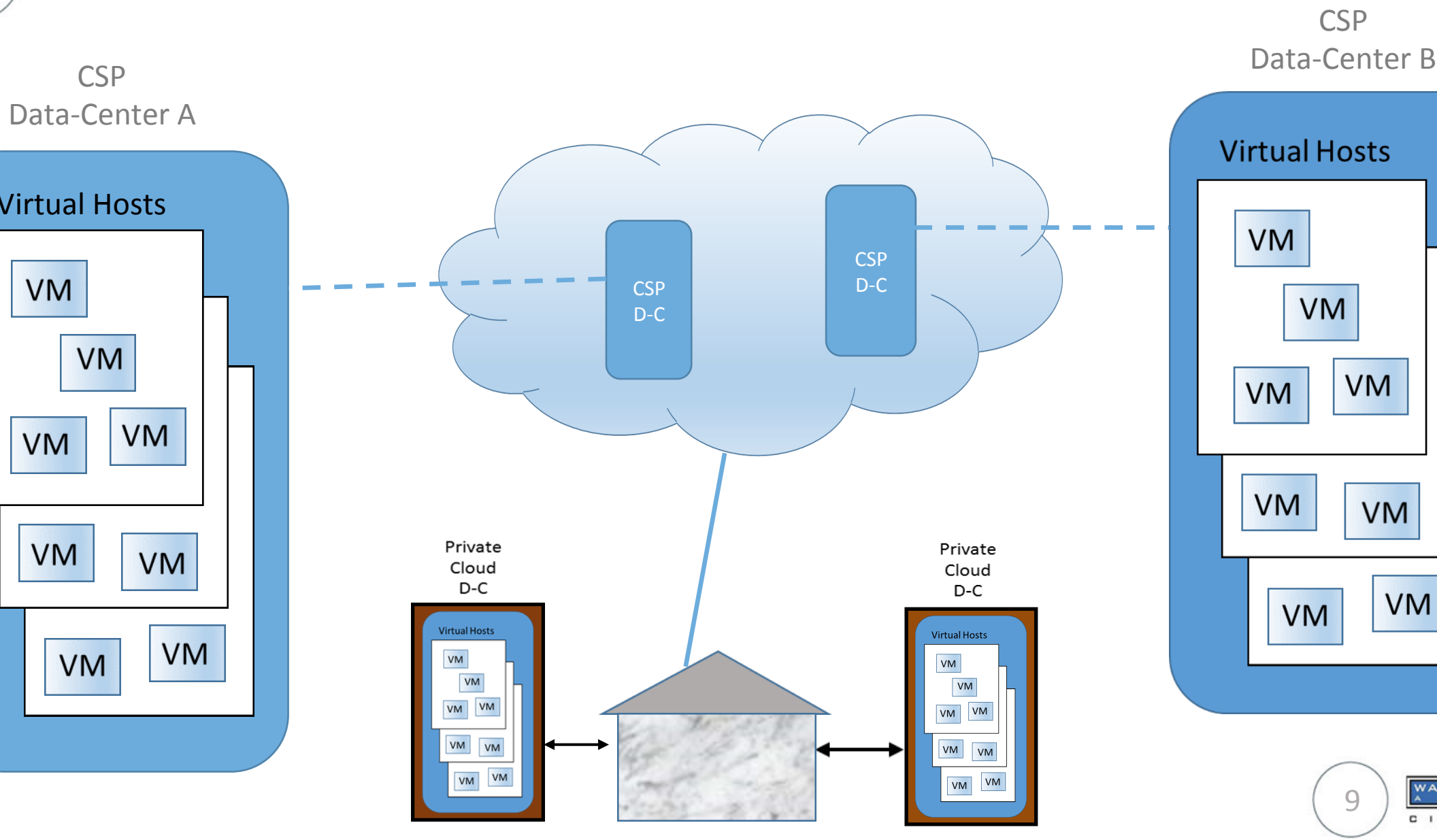
Internet, IoT and SCADA



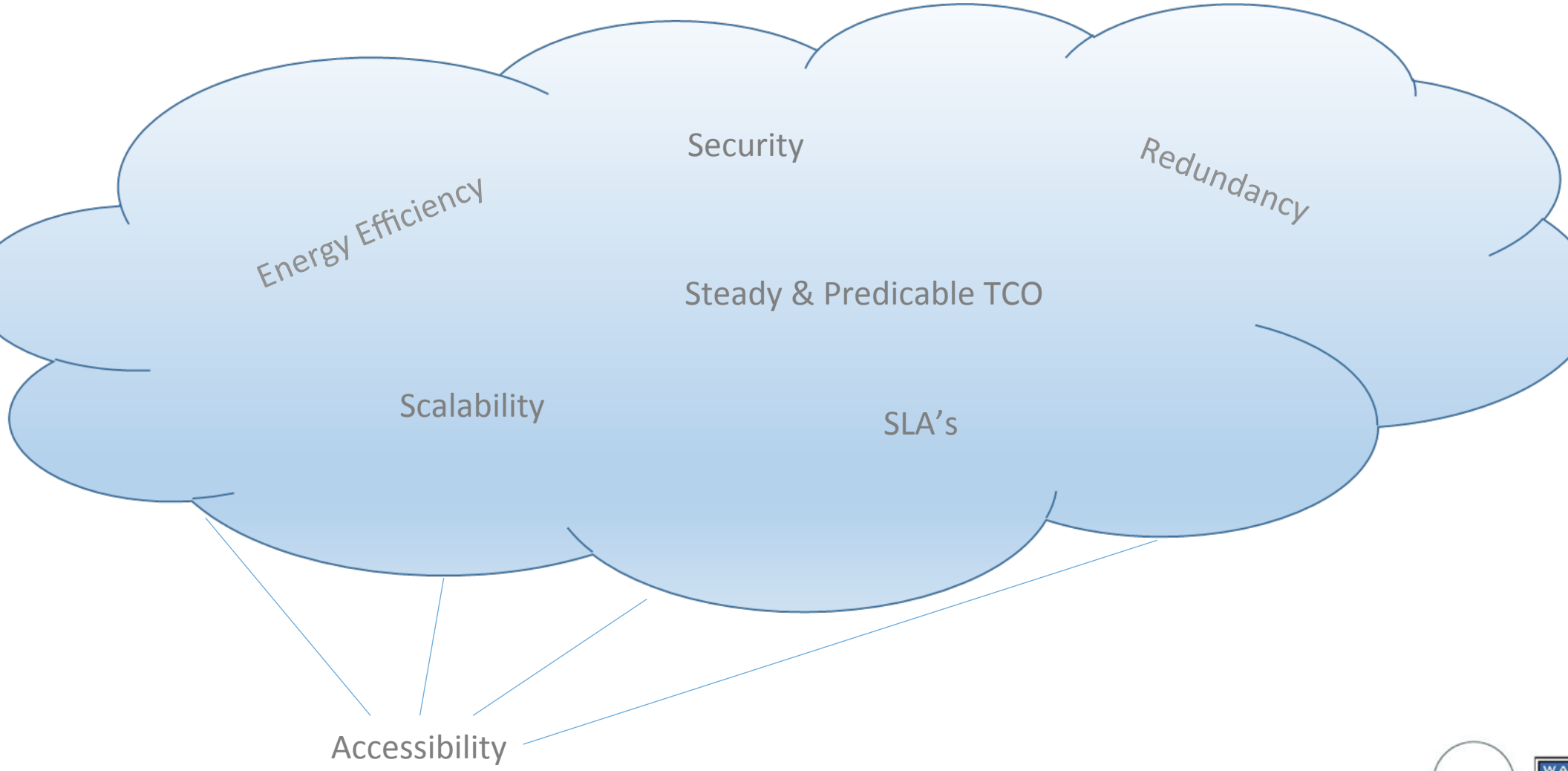
The Grand Overlap – It's All Connected…



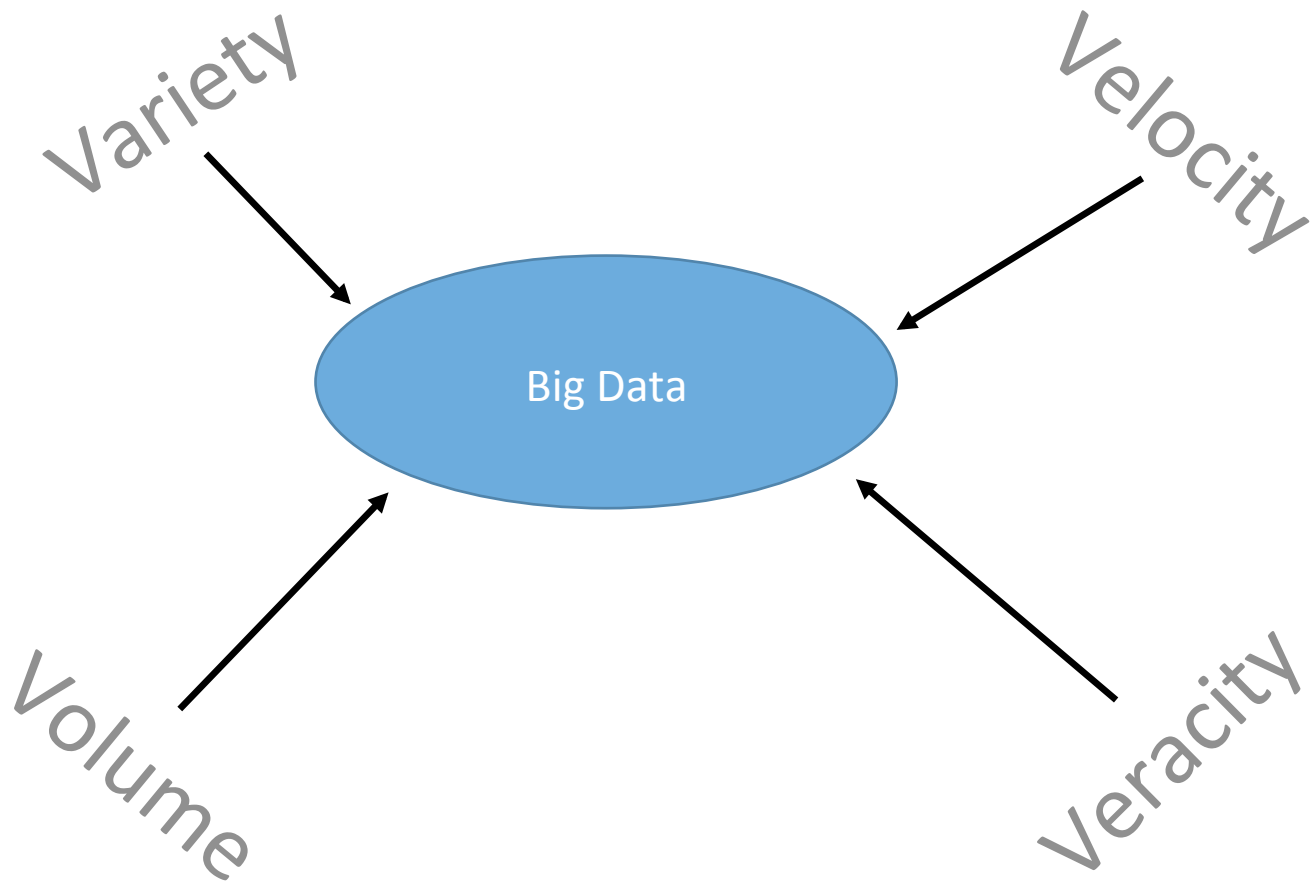
Virtualization



Cloud – Value Proposition



BIG Data - Characteristics



BIG Data – Simple Example

Metering of Water Consumption:

If your utility has 250,000 Customer Accounts (meters)

Velocity	Volume	Multiplier
Monthly Meter Reads (great for billing)	3 million reads/year	
Daily Meter Reads	91 million reads/year	30 X increase
Hourly Meter Reads	2.2 Billion reads/year	730 X increase
Quarter-Hour Meter Reads	8.8 Billion reads/year	3,000 X increase

w York City DEP

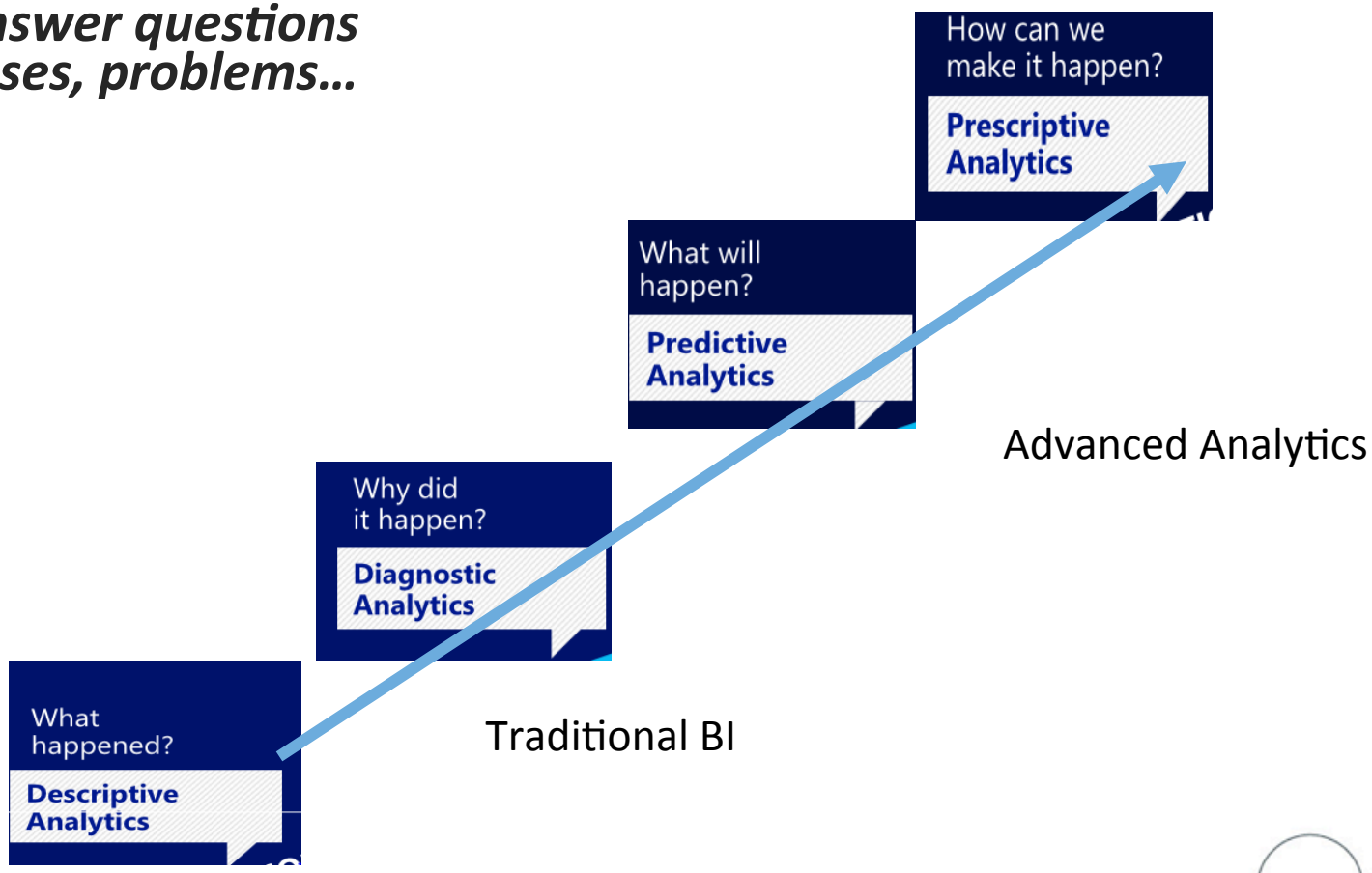
s Big Data Really Work for Utilities?

NYC - Big Data – "Buzzword"

Use of large data sets to answer questions about performance, processes, problems…

Two examples of data sets

- ***Water Meter data***
- ***311 Customer Service data***



NYC - Solution Story Board - Water Meters

Analyze, predict performance and respond

Data Collection

Repairs

Readings

ance

Consumption

Water Meters

Algorithms

Compute, data, storage

Property Owners

Reduce consumption, numbers of defective meter, save money

Inspectors

Replace Meter, service meters, efficient routes

Smart Customer Service

Communicate with users, Problem Solved

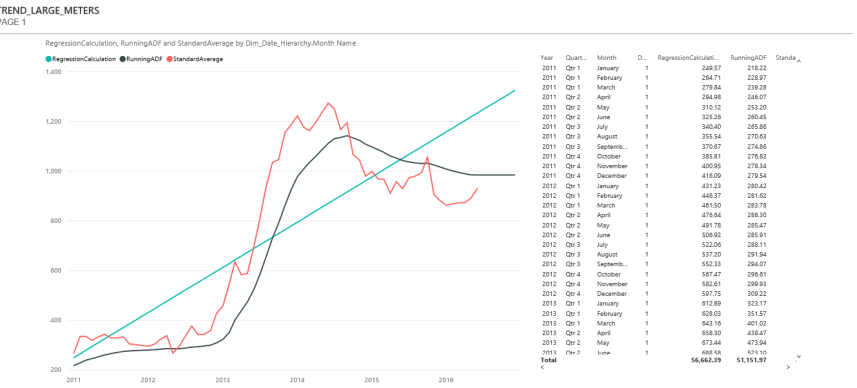
Management

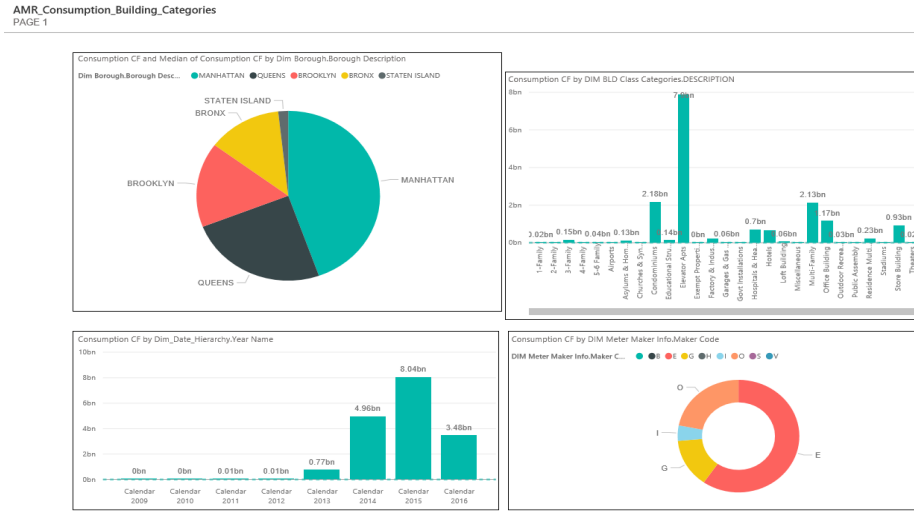
Make critical decisions

Predict consumption, con
infrastructure cost, increa

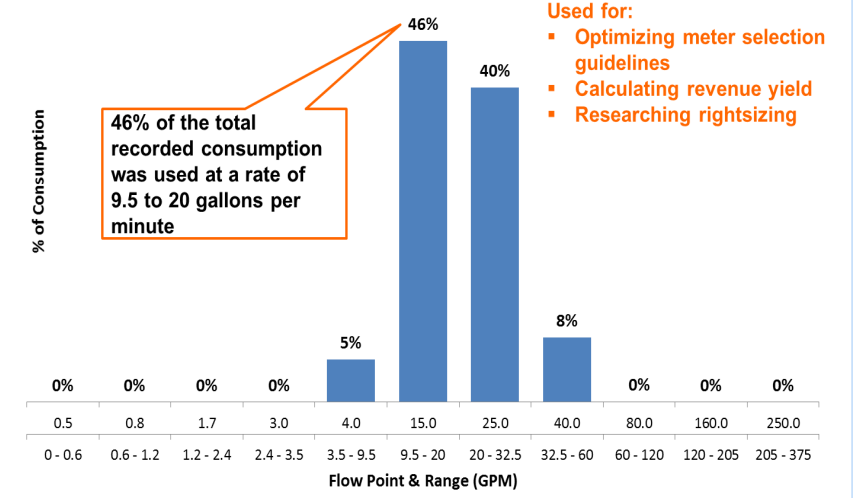
NYC - Large Meter Performance & Decision Making

AMR_Consumption



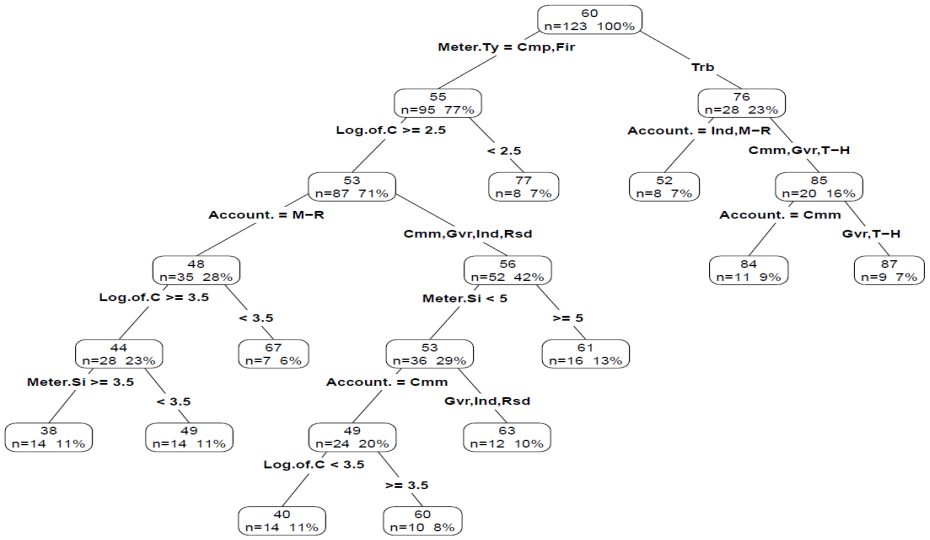


4" Compound Meter Residential Logging Profile Example



Used for:

- Optimizing meter selection guidelines
- Calculating revenue yield
- Researching rightsizing



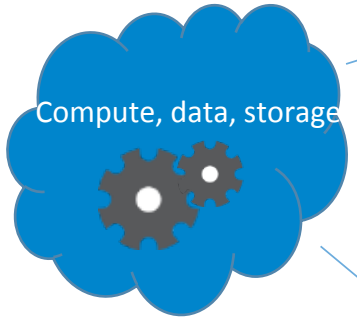
NYC - Solution Story Board - 311

Analyze, predict performance and respond

Data collection

omer Service requests

Algorithms



Public

Inspectors

Efficient Routes, track performance, and productivity

Smart Customer Service

Communicate with customers, and provide response promptly

Management

Make critical decisions based on feedbacks, problems, or complaints

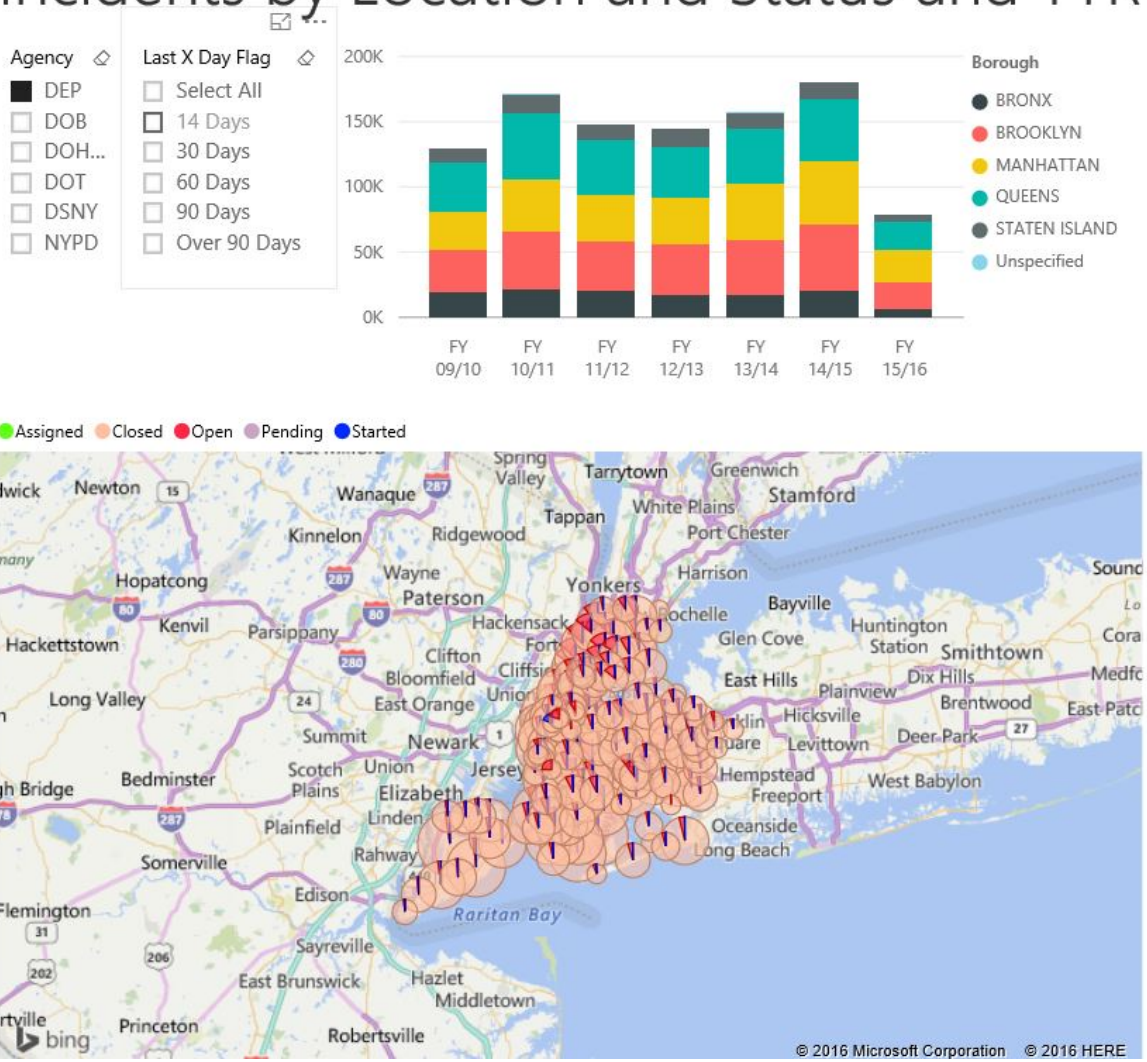
Improved response and re
time, improve customer s
alert customers, identify r
problems and solutions

Customer Ser

Develop solutions

NYC - Sample 311 Dashboard

Incidents by Location and Status and TTR (Time To Resolution)



Complaint Ty...	Descriptor	Inciden...	TTR (h)
Water System	Leak (Use Comments) (WA2)	74,116	164.04
	Hydrant Running Full (WA4)	58,108	88.31
	Hydrant Running (WC3)	48,236	129.31
	Dirty Water (WE)	45,550	121.32
	Fire Hydrant Emergency (FHE)	36,790	16.22
	Hydrant Leaking (WC1)	24,944	283.16
	Hydrant Defective (WC2)	18,976	444.78
	No Water/Low Pressure (WA5)	17,336	70.82
	Possible Water Main Break (Use Comments) (WA...	10,691	73.27
	Other Water Problem (Use Comments) (WZZ)	9,958	793.60
	Hydrant Knocked Over/Missing (WC)	9,484	465.90
	Excessive Water In Basement (WEFB)	7,407	130.65
	NO WATER - WNW	6,788	56.35
	Hydrant Locking Device Request (Use Comment...	5,646	542.66
	Defective Street Cut (WZZ1)	3,504	871.71
	LOW WATER PRESSURE - WLWP	1,819	102.38
	NO WATER (WNW)	1,194	20.22
	LOW WATER PRESSURE (WLWP)	573	63.65
	Request To Open A Hydrant (WC4)	487	200.59
	Hyd Valve Box Cover Missing (WV2)	486	177.01
	Service line termination *FOR DEP INTERNAL US...	342	869.13
	High Water Pressure (WHP)	313	96.65
	Remove Hydrant Locking Device (WC6)	269	571.58
	installation of hydrant side post (WHFP)	142	777.54
	Plate Missing/Moved-Exposing Hole (WF4)	91	262.98
	No Water(WNW)	76	15.41
	Low pressure(WLWP)	43	48.24
	Plate Noisy/Sunken/Raised (WF5)	27	1234.39
	Open Excavation (WZZ2)	5	107.91
	Other complaint (facility) *FOR DEP INTERNAL U...	1	
	Total	**383,402**	**179.74**
Noise	Noise: Construction Before/After Hours (NM1)	93,669	149.28
	Noise, Barking Dog (NR5)	42,817	124.75
	Noise: Construction Equipment (NC1)	34,763	134.47
	Noise: Jack Hammering (NC2)	19,425	148.51
	Noise: air condition/ventilation equipment (NV1)	16,845	216.54
	Noise: Alarms (NR3)	13,239	108.85
	Noise, Ice Cream Truck (NR4)	9,423	170.45
	Noise: Private Carting Noise (NQ1)	6,113	734.53
	Noise: Air Condition/Ventilation Equip, Commer...	5,157	351.88
	Noise: Air Condition/Ventilation Equip, Residenti...	3,547	333.38

NYC - – Lessons Learned

- Technology is a moving target – prepare to rework
- IT needs to Know your business
- Anticipate the future – problems, solutions
- Develop your people
- Start with relevant data sets

etropolitan Water District of Southern Californ

n't Clouds in the Sky?

MWD - Data Center Background

rimary Data Center

Several issues cannot be practically remediated:

- Located in liquefaction zone
- Proximity to major transit hub
- Proximity to freeway
- Water risk from floors above
- Other TIA 942 risks addressed in the report

ackup/DR Data Center

- Several seismic upgrades needed & Limited access roads
- The backup generator & UPS is non-redundant
- Data center cooling rooftop had reliability problems

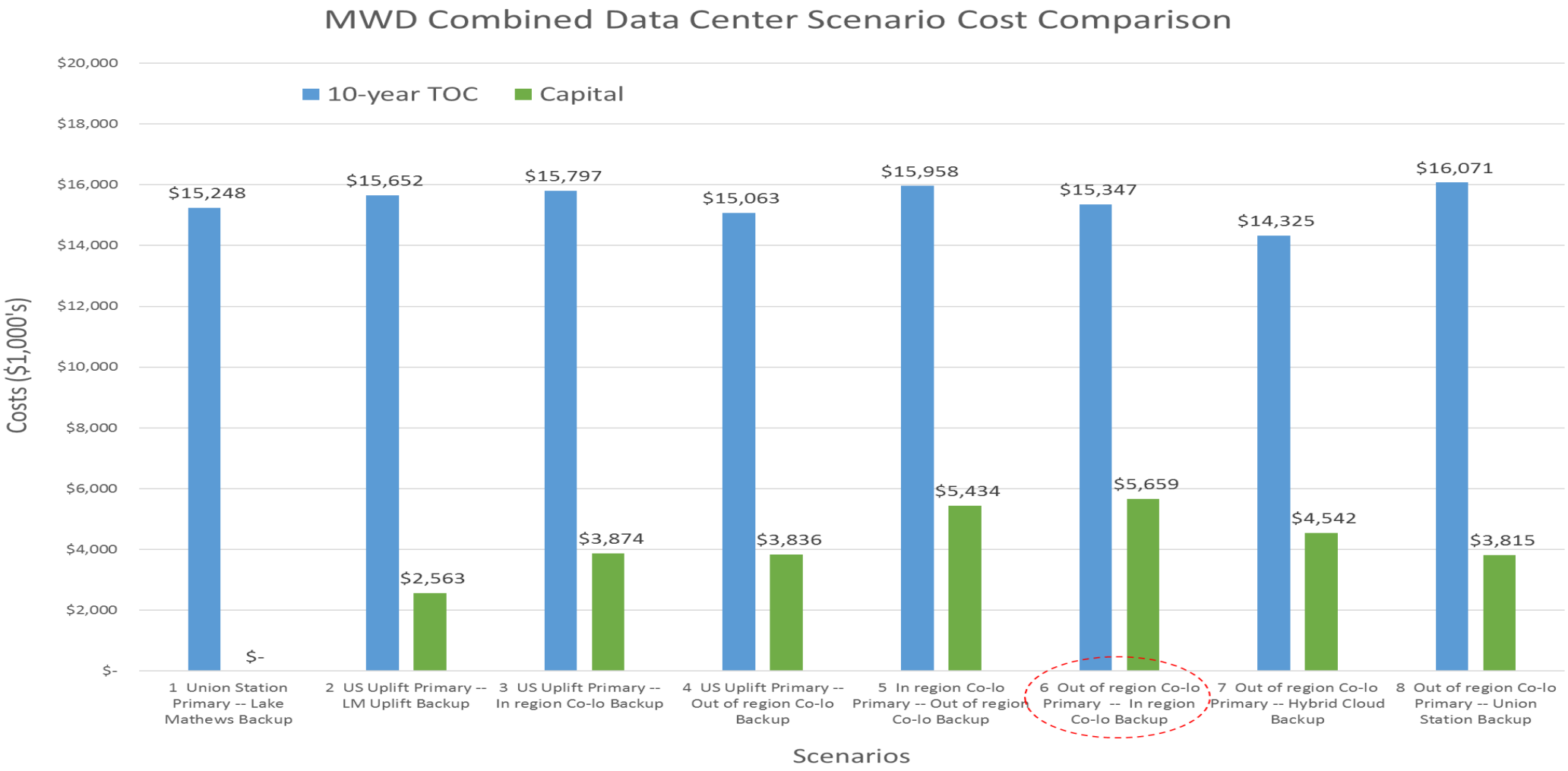
MWD - Data Center Location Risks

TIA 942 preferable distance from:			Notes
chemical plants, high risk business operations	0.25	mile	
landfills	0.25	mile	
dam	0.25	mile	
river	0.25	mile	**Los Angeles River 0.5 mile**
coastline	0.25	mile	
nuclear plant	20.00	mile	
munitions/defense plant/rail storage yard	1.00	mile	
military base	0.50	mile	
railway	0.50	mile	**Adjacent to freight/light rail hub**
major interstate hwy	0.50	mile	**Adjacent to US-101 freeway**
airport	0.25	mile	
flight paths	1.00	mile	
foreign embassies	*not adjacent*		
Not adjacent or within proximity of a parking garage			**Building includes garage**
Outside 100 yr. flood plane (incl any tidal impacts)			
Not on earthquake fault, hillside slide or nearby high-rise buildings if Zone 2+			**Building within liquefaction zone**
Not downstream of dam or water tower			
General access - multiple access pathways			
Access to Police / Fire (less than 4 min response)			

MWD - Data Center Development Scenarios

Scenario	Primary Site	Backup Site
1 Baseline	Union Station As-is	Lake Mathews As-is
2	Union Station Uplift	Lake Mathews Uplift
3	Union Station Uplift	In-region Co-location
4	Union Station Uplift	Out-of-region Co-location
5	In-region Co-location	Out-of-region Co-location
6	Out-of-region Co-location	In-region Co-location
7	Union Station Uplift	Hybrid Cloud
8	Out-of-region Co-location	Union Station As-is

MWD - Data Center Scenarios Financial Analysis

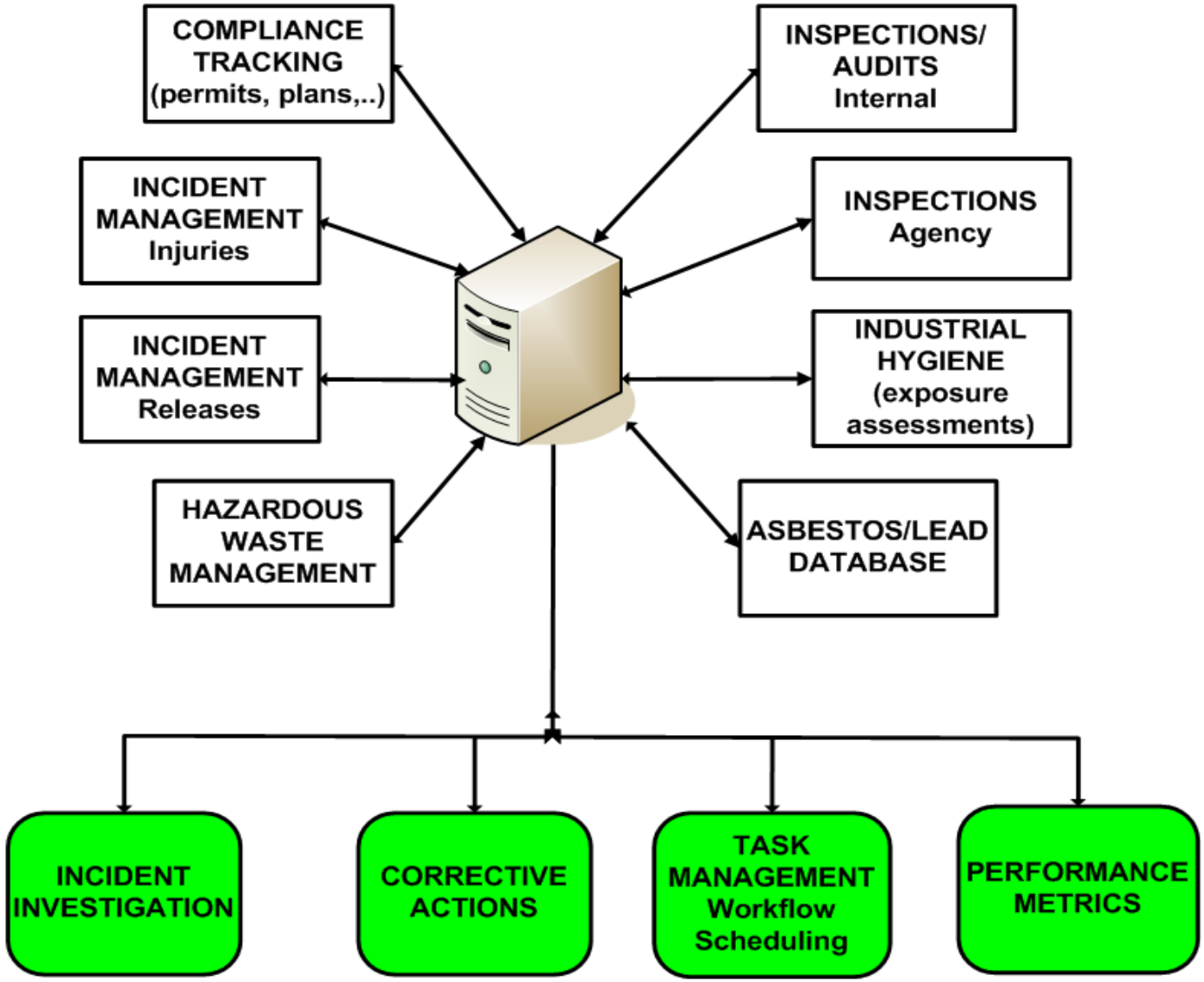


MWD - Data Center - Recommendations

Recommend MWD's primary Enterprise IT data center should be deployed at out-of-region co-location

Backup/DR site should be deployed at in-region co-location (Scenario 6).

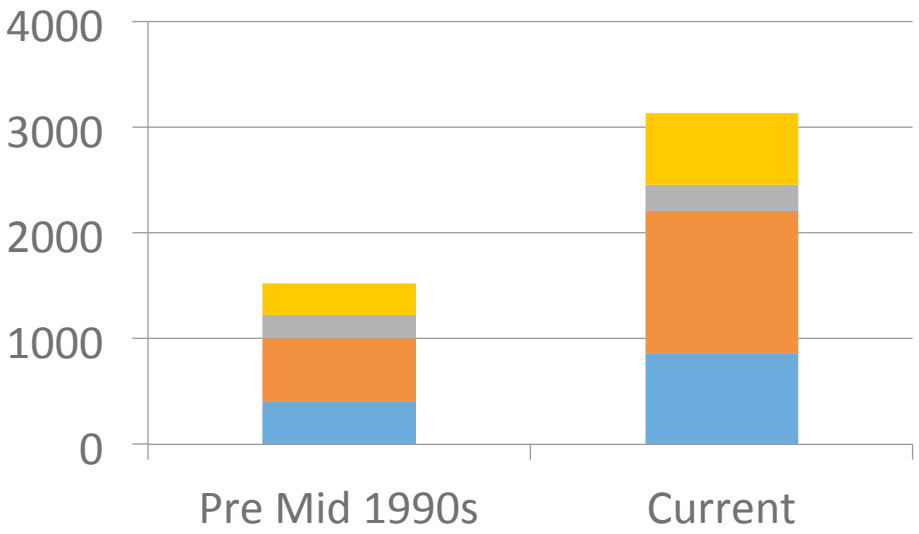
MWD – Cloud based EMIS System



MWD - Why the Need for EMIS?

onditions

- Increased regulations
- Additional permits
- Aggressive enforcement policies
  - Penalties :$1,000 to $75,000 per day (air quality)
- More frequent reporting



Consistent with audit & IT Strategic Plan Recommendations

Benefits

- Reduce risk by managing compliance obligations
- Satisfy need for internal performance metrics

MWD - What will EMIS Provide?

	EMIS	Current
Incident management	✓	✓
Compliance task management (automated)	✓	
Corrective action tracking	✓	
Compliance calendar	✓	✓
Reporting (flexible and automated)	✓	
Performance metrics (automated)	✓	
Customized Dashboards	✓	

MWD – Lessons Learned

Give higher priority to cloud software that provides some User Extensibility

Evaluate data exchange between cloud and on premise software

Negotiate ongoing subscription fee increases as far out as possible

Negotiate use of other customer developed enhancements

pplication to All Utilities

s this stuff level the playing field?

Application to All Utilities

Does this stuff level the playing field?

- Yes it does, and more…

Size Matters, but not the way it used to…

- Significant On Premise Technology & In-House IT Staffing
  - Large Utilities: historic Advantage → future Disadvantage
  - Small Utilities: historic Disadvantage → future Advantage

- It's so much easier to Adopt something that doesn't involve having to Replac something else…

Evolving Opportunity Assessment, Strategy & Planning…

tion in the Vendor Community

's Driving the Bus?

Are You Being Dragged Into This?

- Only 15% of water utilities similarly claim ‘Smart’ initiatives
  - According to the American Society of Civil Engineers unreliable water infrastructure will cost the average American household $900 annually
- Utilities report many barriers to entry in ‘Intelligent Water Systems’ / ‘Smart Water’
  - Skill sets of personnel
  - Constantly evolving set of underlying technologies
  - Trust in existing data
- Federal funding for water was $16.9B in 1976 and only $4.3B in 2014

Support fro
vendor comm
critical to rea
benefits of Cl
Data, and An
on an Intell
Water Systen

Is It Just Your Imagination?

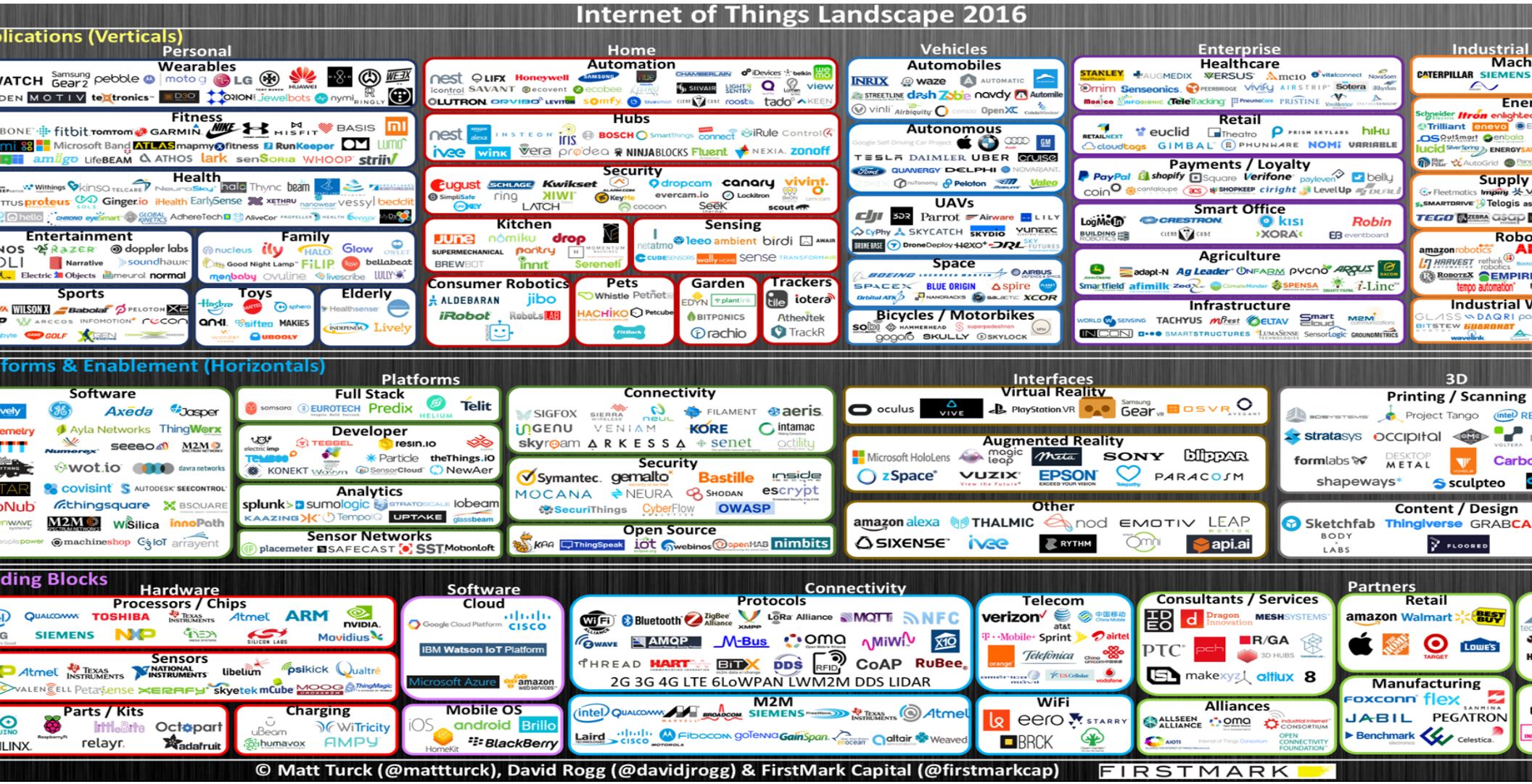
The Smart Water Management market is estimated to grow from $8.46B in 2016 to $20.10B by 2021

Bluefield Research cites shift from niche/vendor-driven market to multi-segment/utility-driven; expanding innovation impact

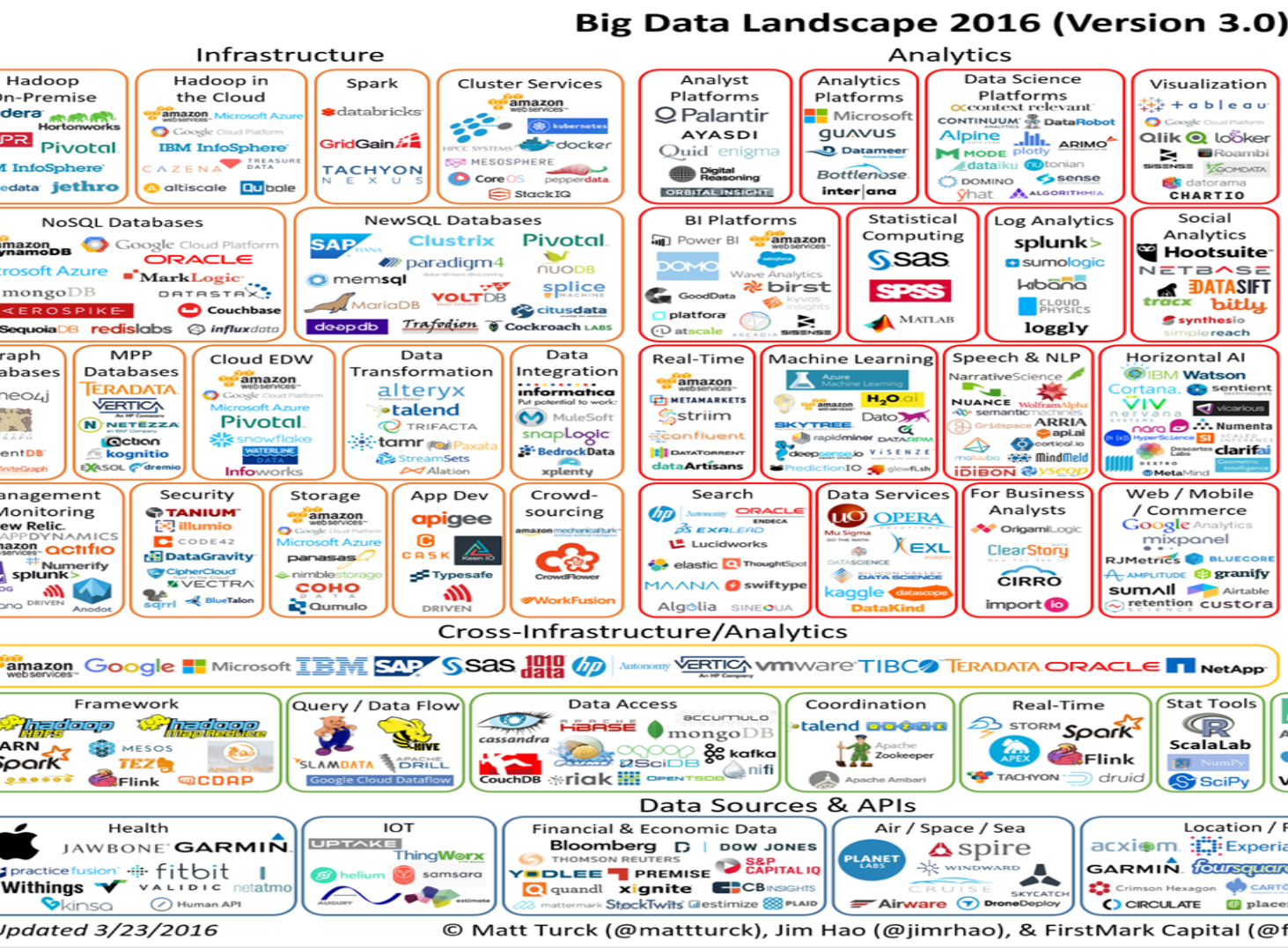
Imagine H2O and BREW accelerator program are water focused initiatives to connect creative and innovative technologies to the market

"It is a long-term play. There's no silver bullet technology. There's no Uber for water industry, no killer app. The rate of adoption of new technology is slow,"
- Matthew Dickerson, Managing Director, Summit Global Management

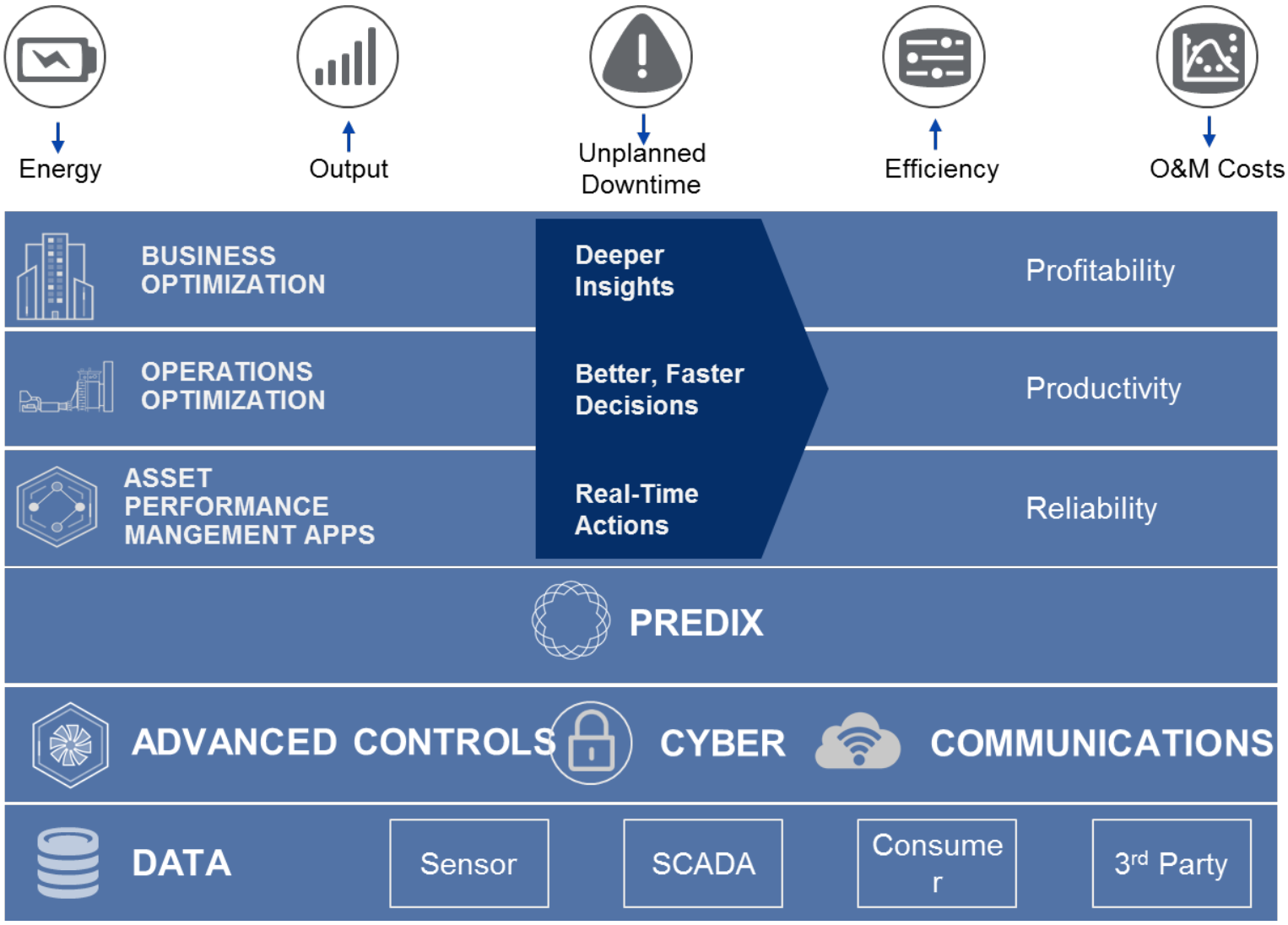
But Here's What You are Up Against…



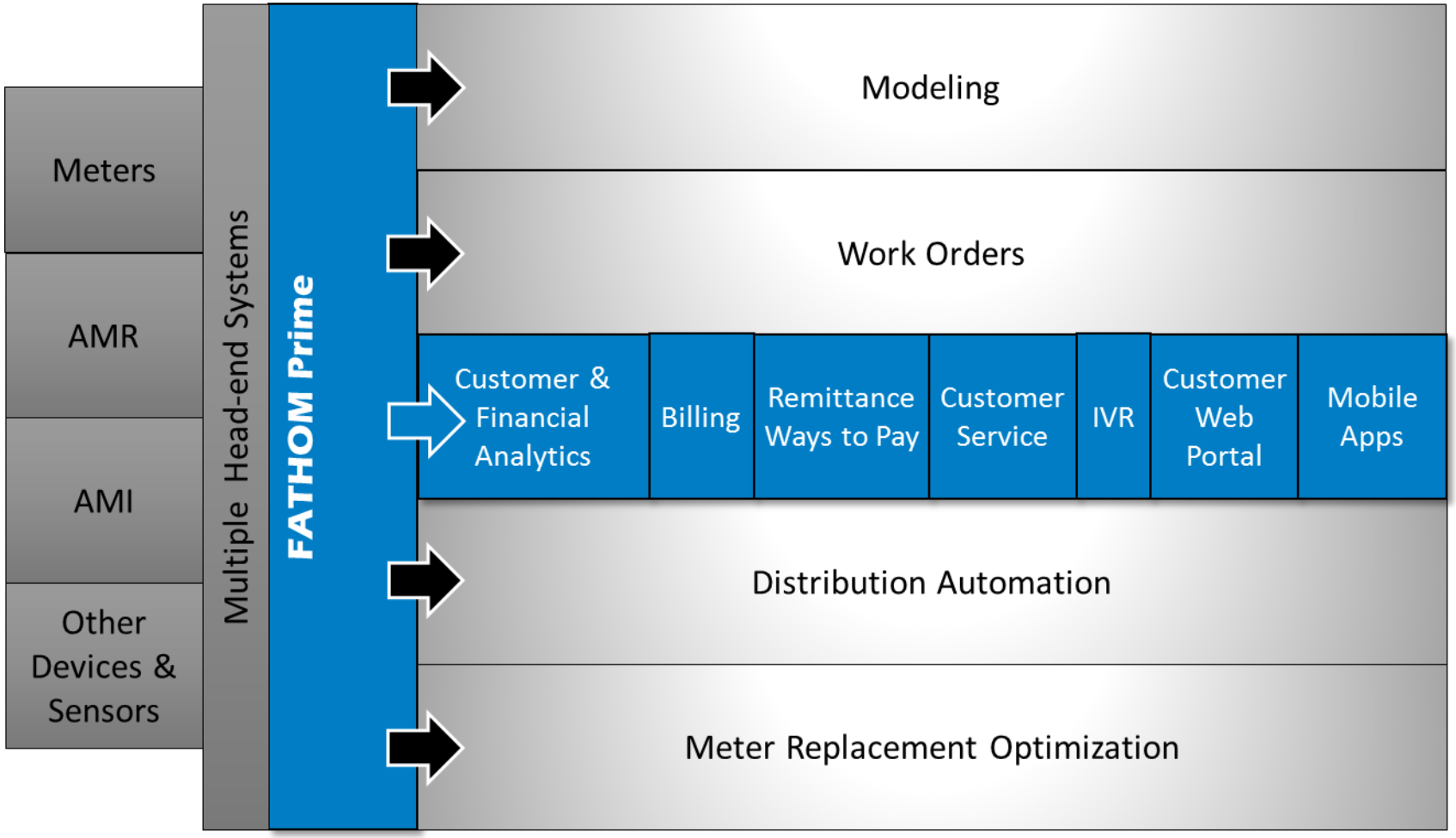
And If You Think it Ends There…



Moving the Market

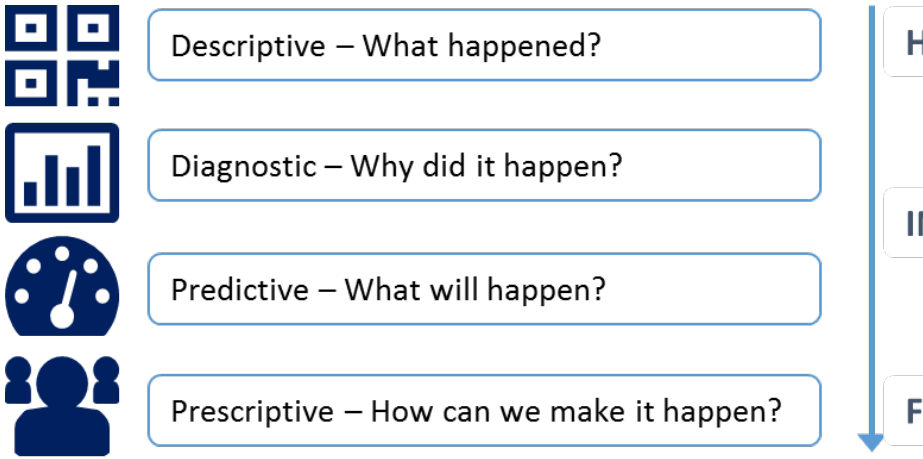


Moving the Market



So What Do I Do With All This?

- Don't allow your current condition to define your future state
- Look beyond the services sector and at the technology providers themselves
- Recognize financial realities will require unique and innovative solutions
- Identify short-term, high-value activities as an initiation point



keaways…

it to me in Plain English again.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