



Flash Memory Summit

Old, Out of the Way and All Over The Place

The Future of IoT and Industrial Devices

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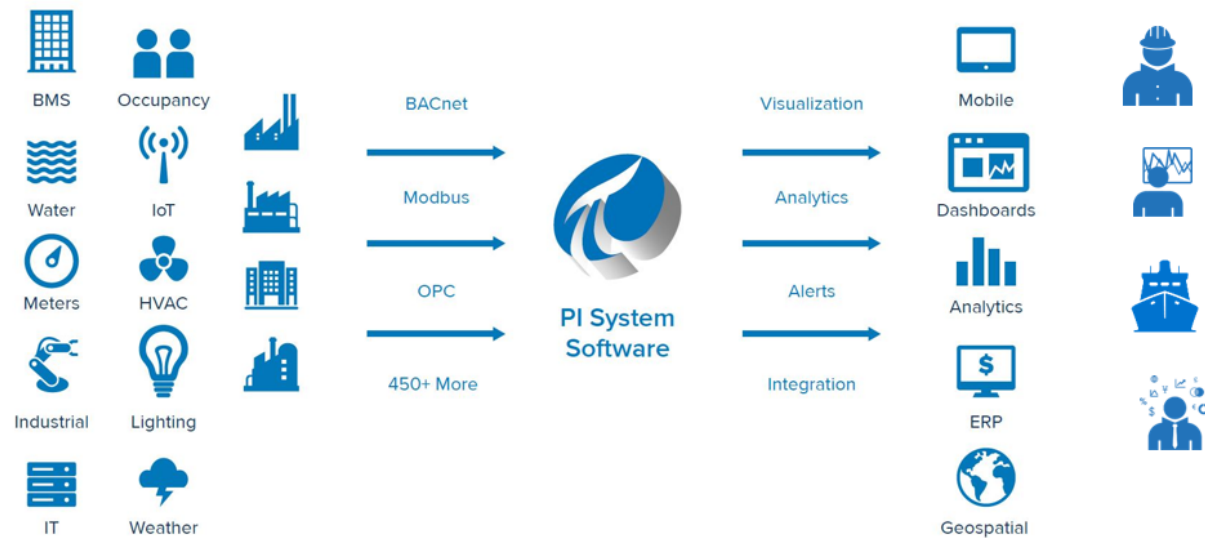


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First, The Commercial

The PI System: Insight on Demand

The Right Data to the Right People, at the Right Time in the Right Format





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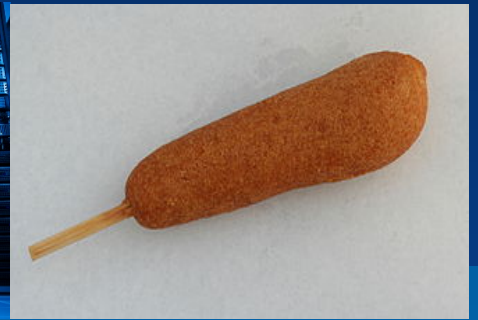
ArcelorMittal
\$40 million in extra
production via
supply chain mods



Maynilad
Finding leaks =
Delivering 640 million
more liters a day



IBM
\$10 million saved in
fab water and power



Tyson Foods
“Lost” production cut
by over 1M pounds



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Some Peculiar Things About Industry

The Equipment is Ancient

Large Power Transformers

- \$2-\$7 million
- 40,000 in U.S.
- 6 mo. to 2 years to install
- Avg. age is 42-44 years





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It's Often Out of the Way

Predictive Maintenance: can cut turbine repairs by 90%

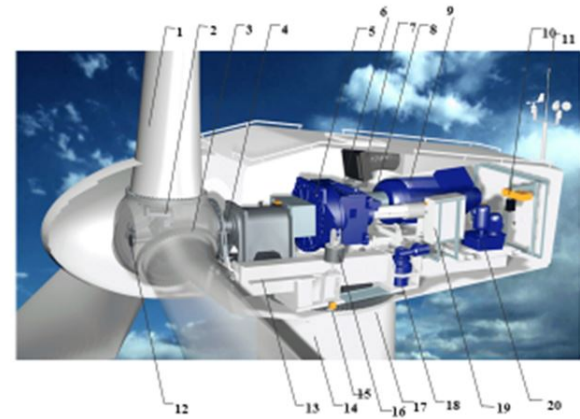
650 data streams per wind turbine (300-1000 range)

Tracked every 10 mins = 93,600 reads per day

57,636 turbines in US = 5.4 billion reads a day

Wind Turbine typical components

1. Blade
2. Hub controller
3. Blade bearing
4. Main carrier
5. Composite disk coupling
6. Main disc brake
7. Oil cooler
8. Yaw gears
9. Generator
10. Polipasto
11. Anemometer and wind vane
12. Pitch actuator
13. Machine foundation
14. Tower
15. Bearing controllers
16. Shock absorbers
17. Turning crown
18. Turning differential
19. Electrical control
20. Hydraulic group





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10,000 Feet Out of the Way

A Blow Out
Preventer: The
Achilles Heel of
Offshore Drilling



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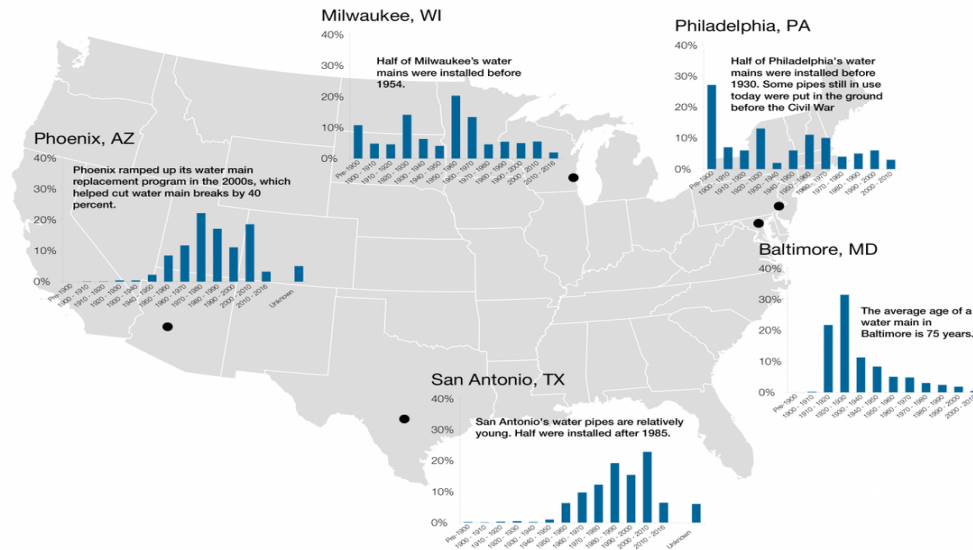


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And All Over the Place

The Age of U.S. Water Pipes

From pre-Civil War to Civil Rights era, U.S. water systems reflect a range of ages.



Pipe age data requested by Circle of Blue from Baltimore Department of Public Works, Milwaukee Water Works, Philadelphia Water, Phoenix Water Services Department, and San Antonio Water System.

Each year about **240,000 water main breaks** result in lost water and disruptions to daily life.
(U.S. Environmental Protection Agency)

America's municipal water systems are responsible for more than **1.2 million miles** of water mains.
(Utah State University)

Repairing and replacing old water pipes could cost more than **\$US 1 trillion** over the next two decades.
(American Water Works Association)





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These Are Not Streams

WHUD saving \$2.5 million per year





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The Future of Industrial IoT Devices

Retrofits

- Sawing Toilet Paper Since the 1970s
- Traditional Upgrade: \$31,500
- IoT Gateway and Sensors: \$9500

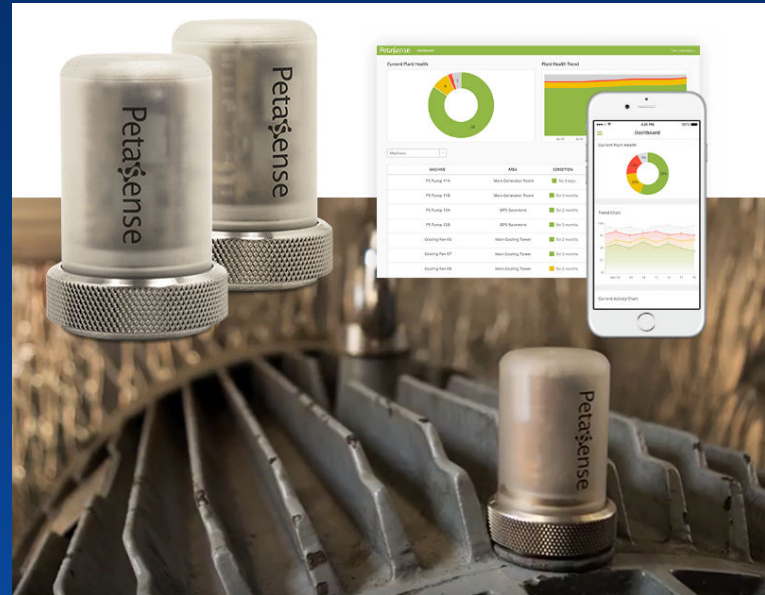




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The Future of Industrial IoT Devices

Stick-on Sensors and Gateways





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The Future of Industrial IoT Devices

Systems As Devices





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Thank You

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