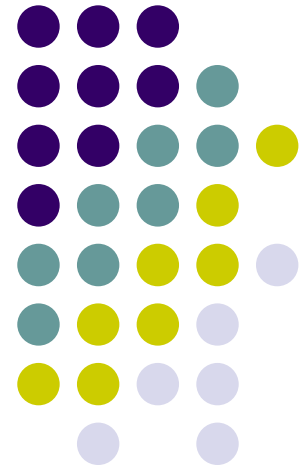


# Wireless Technology and On-Line Monitoring



Ramesh (“Rudy”) Shankar  
Signatech Systems, Inc.

*Solving Tomorrow’s Energy Problems Today™*

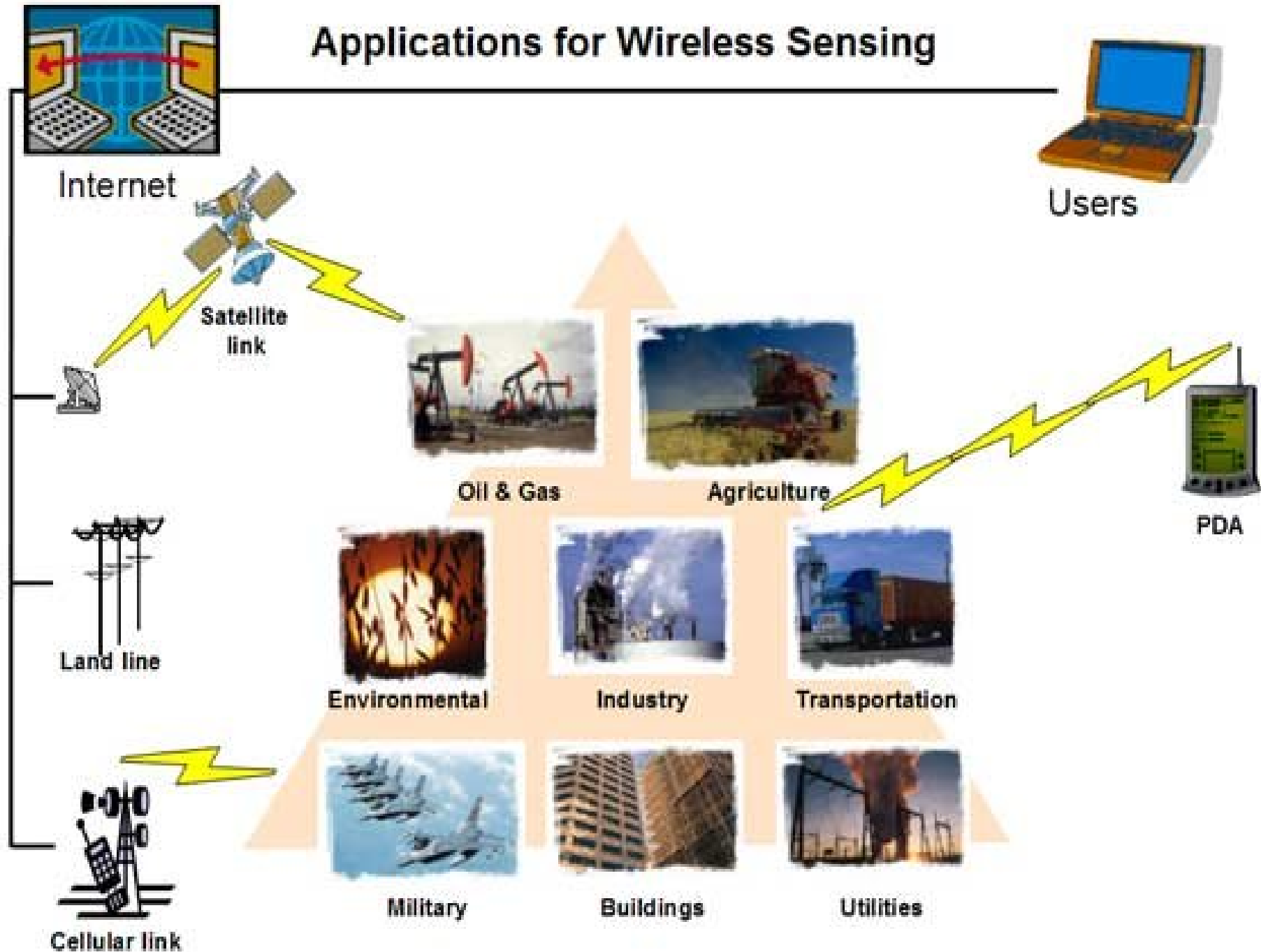


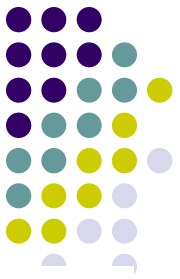
[www.signatechsystems.com](http://www.signatechsystems.com)

**704-430-7233**

*Signatech Systems, Inc. All Rights Reserved*

# Applications for Wireless Sensing

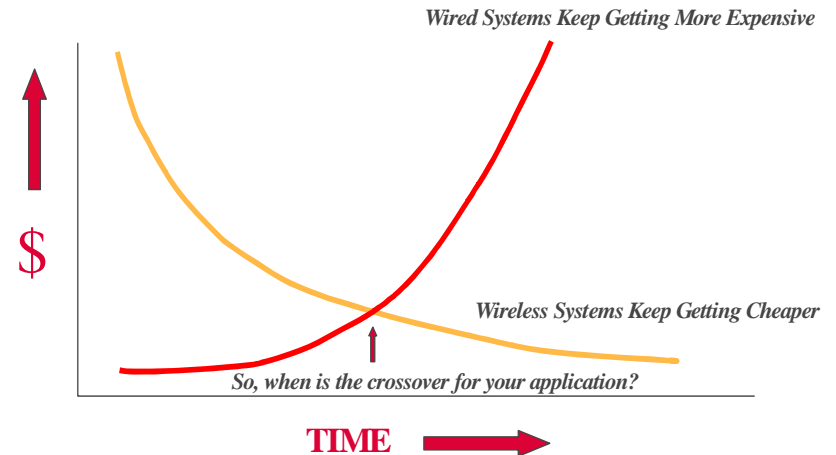




# What's the Wireless Buzz All About?

- Faster, Cheaper and More Secure Ways of Communication Entering into the Market
- Unlicensed portion of the EM Spectrum
  - IEEE 802.11
  - Bluetooth
- Wiring Costs
- Monitoring Rotating Components

It's Not About If ...  
It's About When!





**Connectivity**

**24/7 Info access**

**Easier Interfaces**

**Convergence**

**Distributed**

# Business Trends: Then and Now

THEN	NOW
Dial in to company server	Log on via laptop, PDA
Information highly restricted: ( <i>only the warehouse manager had the inventory levels</i> )	Demand projections can be accessed across the supply chain
Interfaces were arcane ( <i>usually person-to-person</i> )	Web-Based Forms
Security was individualized	Electronic Key
Access to localized resources	Resources are global ( <i>never not in your office</i> )

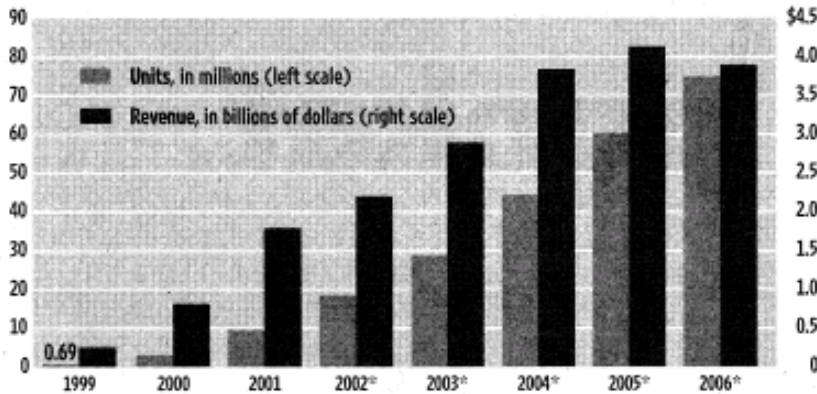
# Articles in the Wall Street Journal

## March 31 2003



### Beaming Up

The use of wireless-networking hardware has exploded in recent years, and is expected to go even higher.



\*Figures for 2002-2

Source: In-Stat/MDR

### Wi-Fi Wildfire

Public 'hot spots' with wireless access are expected to surge

300 thousand

200

0

'01

'02

'03

'04

'05

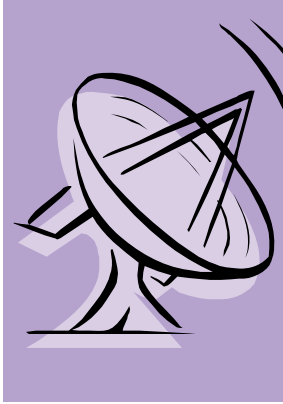
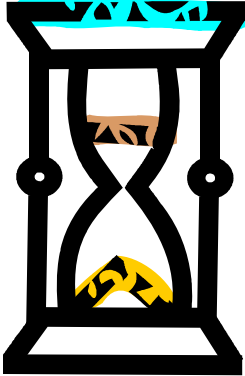
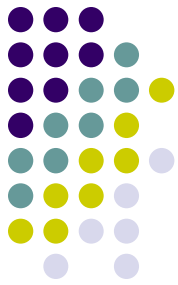
Source: TeleAnalytics

estimated

Intel Makes Bet on Wireless Brand



# The World of On-Line Monitoring







# Wireless Data Acquisition Using Bluetooth Technology

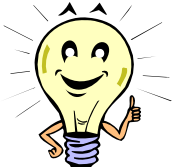
Fletcher Gibbs  
Tennessee Valley Authority

1 Computer Engineering Group/Nuclear

# Leveraging Wireless Technology

**Michael Cole**  
Manager, Routine Processes  
Duke Power Electric Distribution  
Of Duke Energy




## Wireless Exposure Monitoring Challenges in Today's Power Plant

EPRI Wireless Workshop  
Orlando, FL  
November 2002

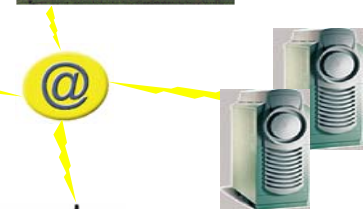


4/14/2000

2007 Sigmatell Systems, Inc



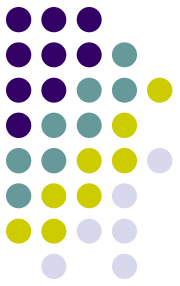
## Development and Evaluation of Wireless Technology at EDF



Tuan DANG, Catherine DEVIC,  
Nicolas LEJEUNE, Pierre NGUYEN  
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nicolas.lejeune@edf.fr, pierre.nguyen@edf.fr





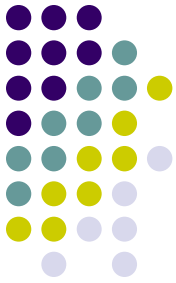


## Business Case

- Wireless technology as an overall strategy for integrated communications
- Buy-in at all levels
  - End Users
  - Management
- Clear demonstration of success
  - Cost per Job & Customer Sat vs Time
  - ROI or Payback Period



# Example Business Case - Work Management and Scheduling



## CAPABILITIES:

- Electronic Work Packaging - Smart work packages are generated by auto processes and inserted into work schedules by auto scheduling processes. Packages are automatically routed to necessary pre-work review steps with status auto-captured as pre-work steps are completed
- Expanded Minor Maintenance- Hardware problems can be reported, diagnosed, and fixed while crew still on the site.
- Collaborative Activities- Work document

GROSS BENEFIT	
One Time (\$)	On going (\$ per Year)
\$ 0	\$ 1,482,000

COST	
One Time (\$)	On going (\$ per Year)
\$ 1,335,000	\$ 356,000

## BENEFITS (Quantitative and Strategic):

- Increases human performance
- Eliminates duplication of work and process steps
- Captures expert knowledge
- Reduces crew downtime as packages are routed
- Improves management effectiveness
- Reduces equipment out-of-service time
- Reduces the scheduling cycle time and load
- Provides data for trending and risk management

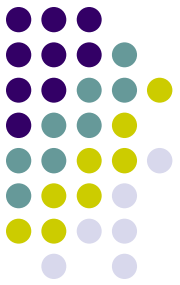
## CONFIDENCE FACTOR: 3

1. ESTIMATE WITH NO SME EXPERIENCE
2. ESTIMATE WITH SOME SME EXPERIENCE
- ➔ 3. ESTIMATE WITH LESS THAN 50% DOCUMENTATION
4. ESTIMATE WITH MORE THAN 50% DOCUMENTATION
5. PROPOSAL LEVEL ESTIMATE WITH 100 % DOCUMENTATION

# Standards



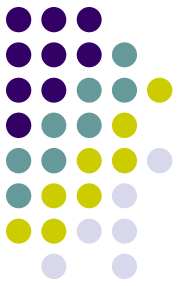
- Consumer Market vs Industrial Market
- Many standards
  - IEEE 802.11 A, B,.....
  - Bluetooth
  - ZigBee IEEE 802.15.4
  - IEEE 1451.5 Smart Sensor Standard
  - Time Synch/Stamp Standard IEEE 1588
  - MIMOSA
- Critical need for a usable standard
  - Traction



# Security

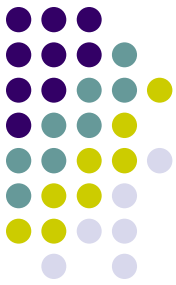
- Critical Infrastructure
  - Power Transmission and Distribution Network
  - Plant Systems
  - Threats, External and Internal
- Is the industry prepared/willing to meet more demanding security needs?
- And who pays? Government? Consumer?

# Industry Activities in On-Line Monitoring

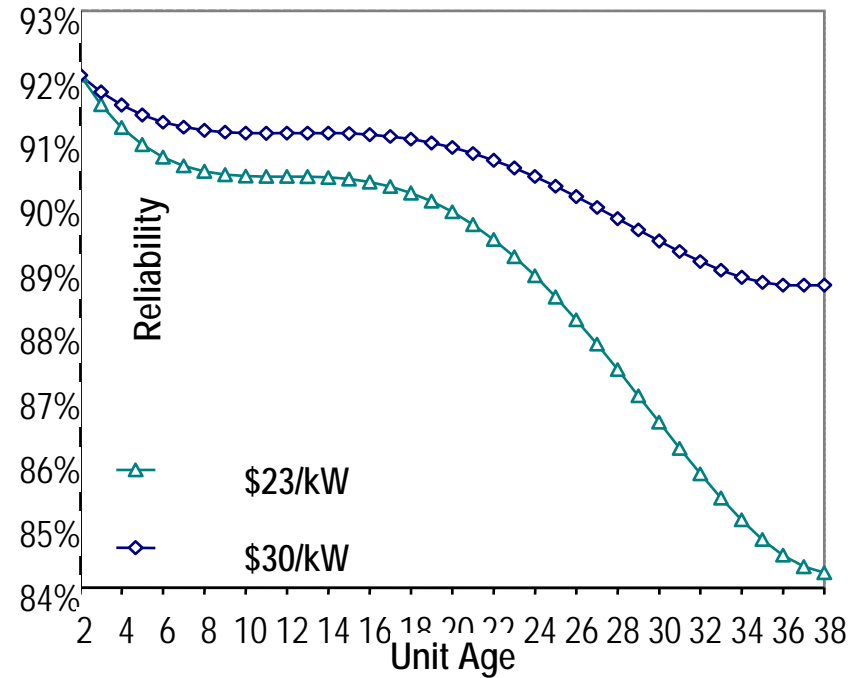
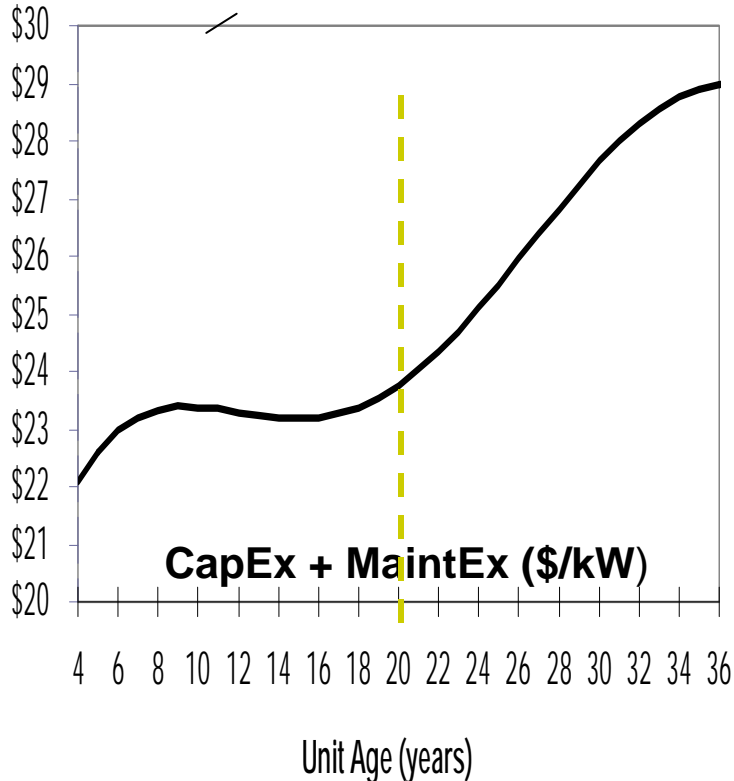


- Sensor Validation
- Emission Monitoring
- Coal Flow Monitoring
- Coal Analyzer
- CMW
- Flame Doctor
- Pulverizer PdM/Wireless
- FatiguePro
- Creep FatiguePro
- SAFER
- Smart Component

# Effect of Unit Aging on Costs

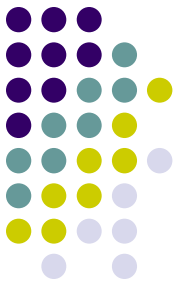


Annual Expenses to Maintain Constant  
(92%) Reliability



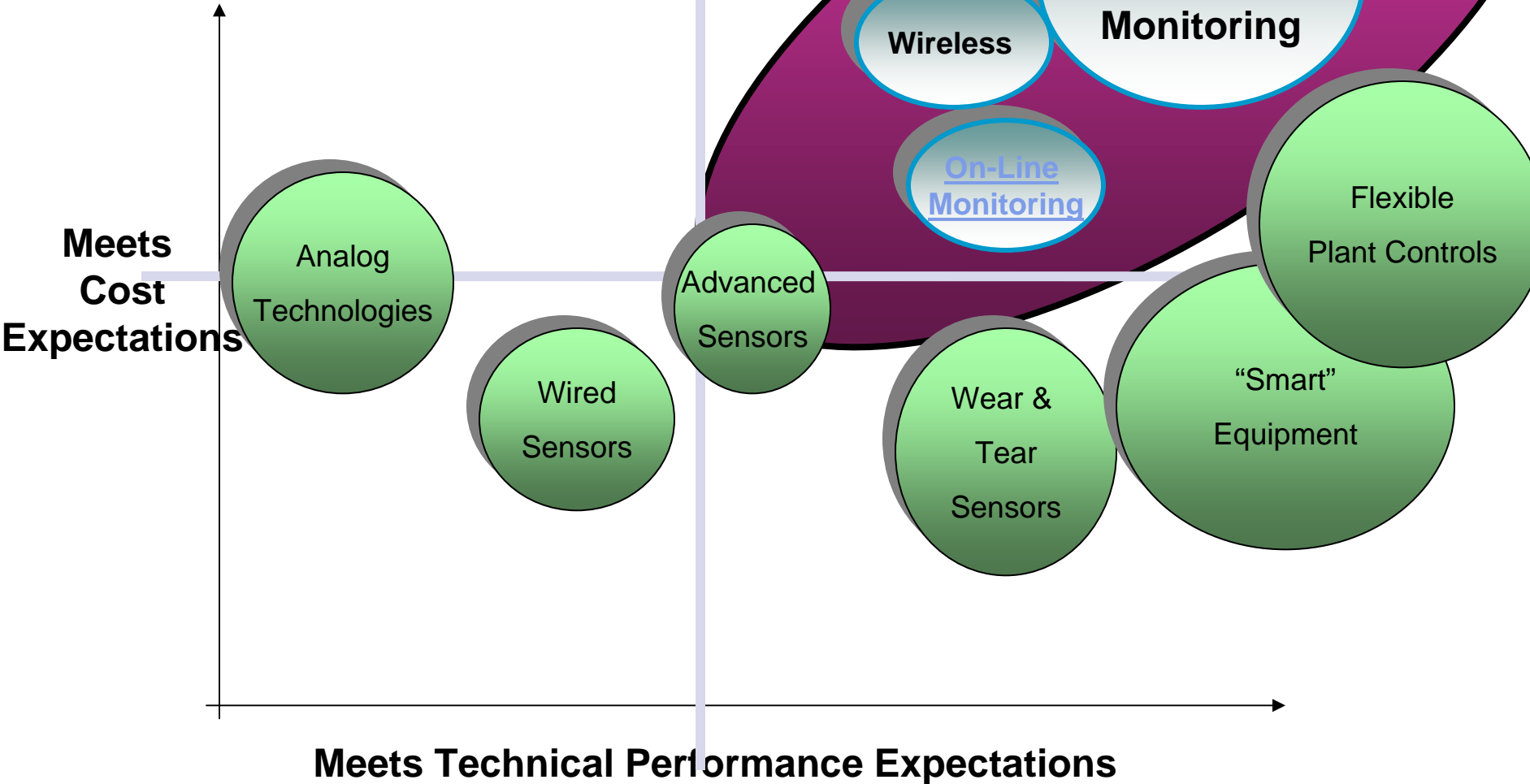
*Revenues vs Cost Squeeze Play*

# What does On-Line Monitoring Bring to the Table?

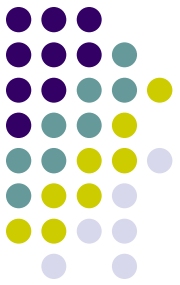


- Accurate assessment of the problem.
  - *Is it the sensor or the process*
- Early warning of incipient equipment/system problems
- Remaining life prediction to implement timely repair/replacement strategy
- “Predict the Unpredictable”
- Integratable with OSI/PI Plant Databases

# I&C & Diagnostics Technologies







# Summary

- Advanced Condition Monitoring for Enterprise-Wide Application
- Ability to Perform Diagnostics/Prognostics using sophisticated, proven multi-sensory technology
- Integrate with Business Process
- Several major U.S utilities have adopted Fleet wide monitoring
- Condition Monitoring essential for reducing Maintenance and Operations Expenses
- Condition Monitoring identified as the #1 issue for plants considering Flexible Operations