

Wireless Communication in the Oil Industry

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ABB

Wireless - Motivation

- *Reduced Costs*
 - Through the elimination of cables, wireless technology greatly reduces the CAPEX associated with instrumentation.
- *Improved Flexibility*
 - Mobile instruments and hand-held devices (video cameras, PDAs, laptops) allow devices to be positioned, both temporally and spatially, as required.
- *Ease of Scalability*
 - The elimination of cables increases the scalability of the wireless networks: enabling the ease of new device installation on an existing infrastructure
- *New Applications*
 - Wireless instruments and hand-held devices provide additional solutions that are not possible (physically or financially) with today wired solutions.



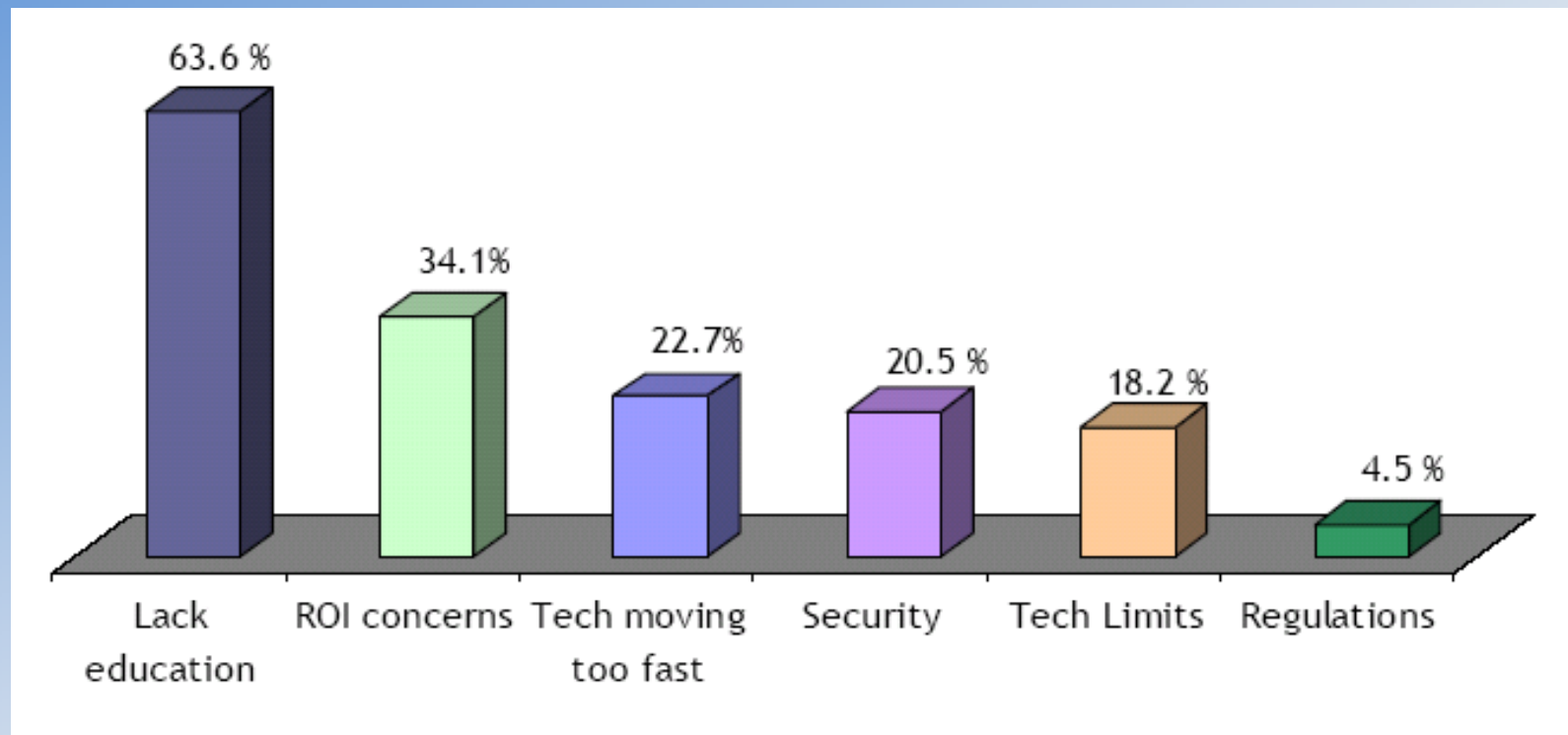
Motivation for Wireless Technology

"It is possible to achieve up to 10% reduction of construction costs by utilizing wireless instrumentation in new plants and facilities."

Dag Sjong, Automation Leader
StatoilHydro 2007

Limiting factors for industrial adoption

- Not understanding the possible benefits of wireless technology is the largest barrier



Source: Industry Total

The (Perceived) Issues with Wireless...

- **Security**
 - Eavesdropping, Tampering, Malicious attacks...
- **Battery Lifetime**
 - Changing batteries in the field is not acceptable, changing thousands of batteries every year is too time-consuming, battery life too low...
- **Difficult to Install**
 - Tricky to get good coverage, especially in a typical Oil & Gas environment, results vary...
- **Coexistence**
 - Different technologies operating in the same space will interfere with each other
- **No standards**
 - Forced to use proprietary solutions, don't want to be locked into a particular vendor...

The Wireless Reality...

- **Security?**
 - As good as wired
- **Battery Lifetime?**
 - 5-10 years typical for wireless instrumentation
- **Difficult to Install?**
 - Mesh networking, Redundancy, Site surveys...
- **Coexistence?**
 - Standards are ensuring that their technologies are 'good neighbours'
 - channel blacklisting, frequency hopping, frequency agility...
- **No standards?**
 - WLAN, WirelessHART, ISA 100...

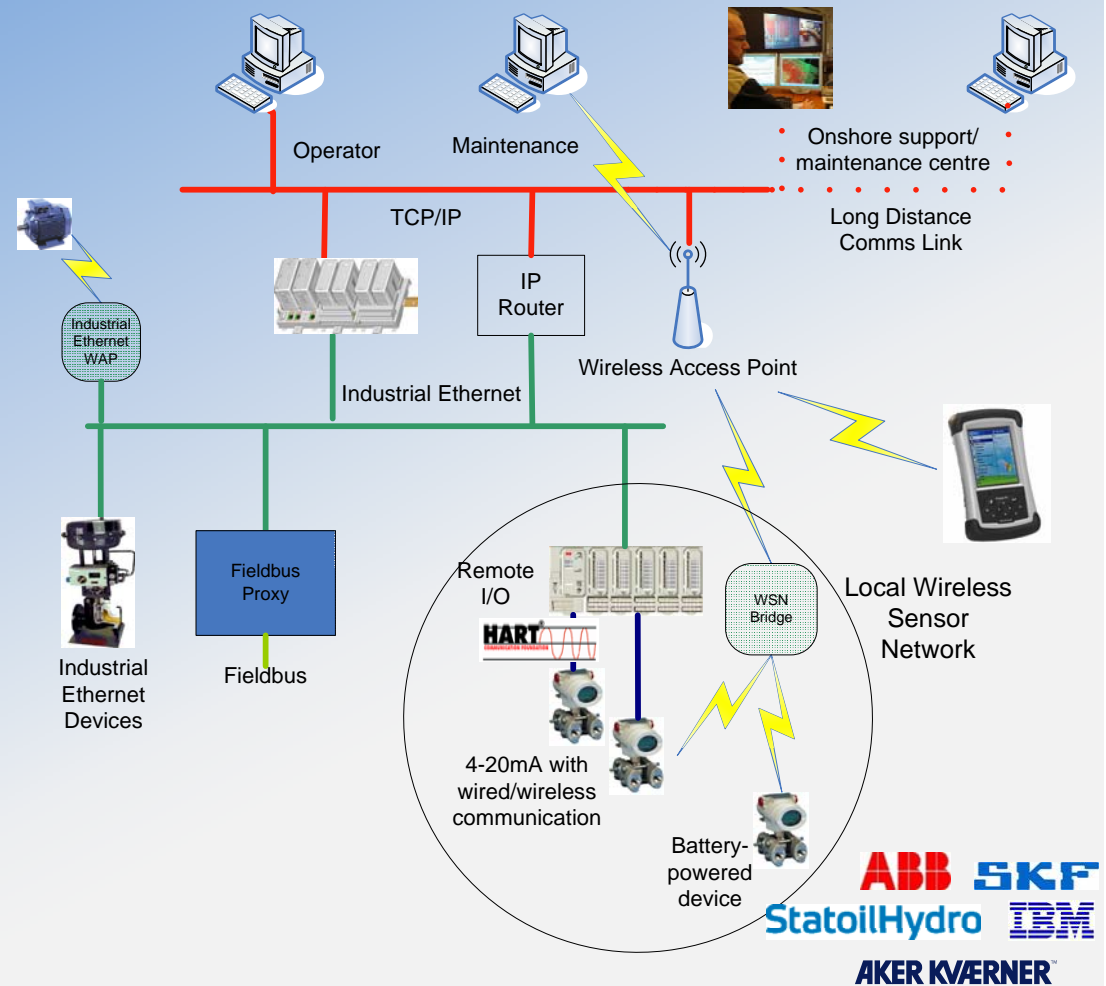
Main Application Areas for O&G

- Mobile Worker
- Condition & Performance Monitoring
- In-Process Wireless



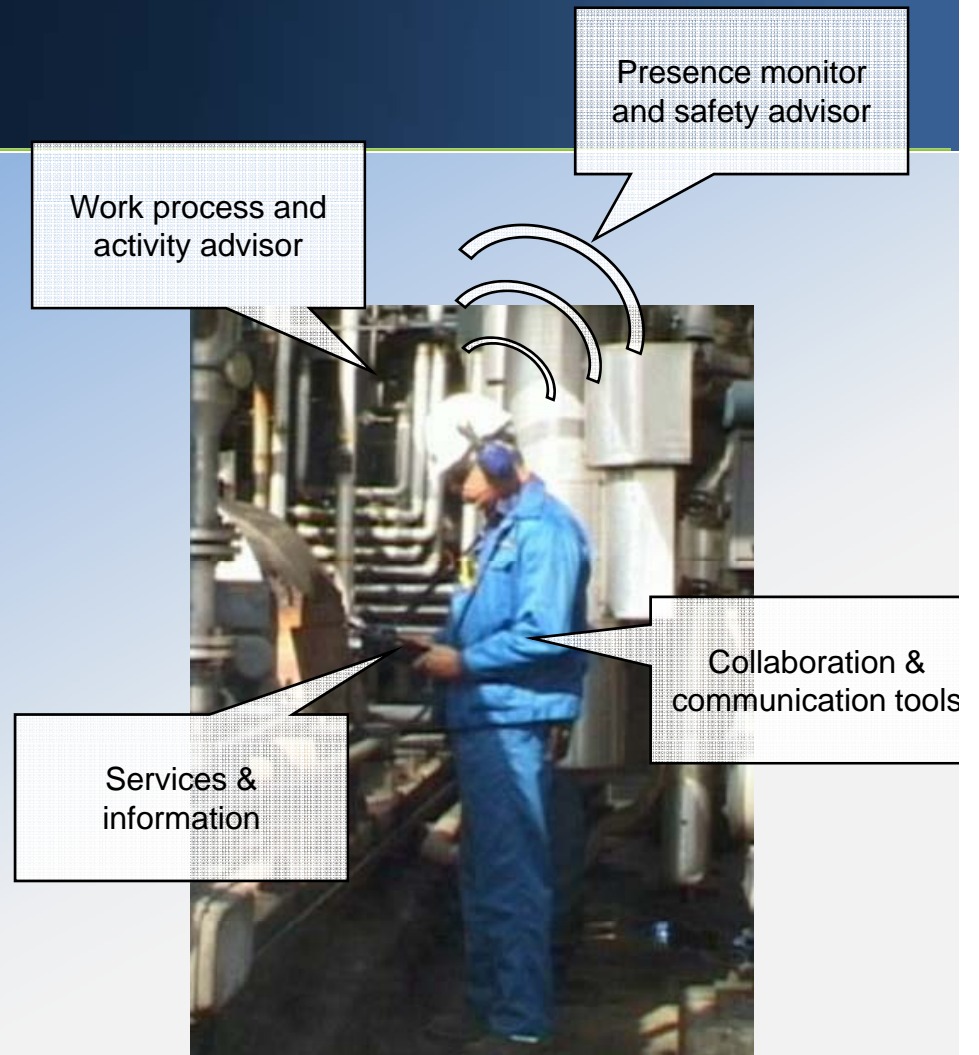
Case – Tail IO: F3 Wireless (StatoilHydro)

- Evaluate, test and apply new and open standardized communication system architectures that allow handling increased amount of data in a cost-efficient and reliable manner for remote support & operation centres
- Develop a functional requirement specification for future communications integrated in process control and safety systems
- Investigate new monitoring and control opportunities brought about by wireless sensors
- Support condition based maintenance with wireless sensing techniques & communication
- Coordinate with mobile ICT to keep infrastructure cost at minimum when installed



Mobile Worker

- **Always connected**
 - Online access to asset information and documentation.
 - Online reporting
 - Real-time collaboration between operators and engineers in support centres
 - Improved safety through presence monitoring
 - Read/write work notifications, work orders and permits in field
 - Activity planning for modifications / turnarounds
 - Tools for condition monitoring etc.



Mobile Worker: Wireless Video

- Company: StatoilHydro at Åsgard B
- Company: ConocoPhillips at Ekofisk
- Challenge:
 - Relay real-time field video to control room and onshore support centre
 - Maintain field worker mobility
- Solution
 - Mobile video system based on WLAN
- Why Wireless?
 - Mobility is not possible (or is severely reduced) when the worker needs to be attached with a cable
- Outcome
 - Mobile solution allows field workers to relay real-time video data to control room and onshore support centre.



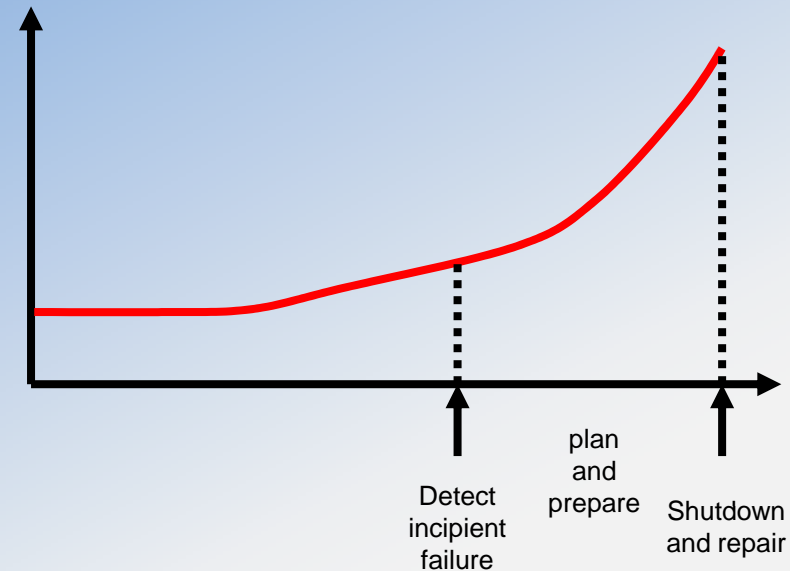
Mobile Worker: Fire & Gas Testing

- Company: StatoilHydro at Snøhvit
- Challenge:
 - To remove the time-consuming interaction between field worker & control room operator
 - Reduce the capacity for human error
- Solution
 - Mobile F&G tester based on WLAN & RFID
 - Connected to ABB's Safety & Automation System (SAS)
- Why Wireless?
 - Provides the necessary mobility
 - Reduces human errors
 - Reduces the control room operators workload
- Outcome
 - Currently in prototype->pilot phase



Condition & Performance Monitoring

- Monitoring the condition & performance of assets increases lifetime and maintenance interval
- Low-cost solutions, brought by wireless technology, enable monitoring of less-critical equipment
- The mobility of a wireless installation allows for installation in hard to reach areas
- Rotating equipment can be particularly difficult to wire



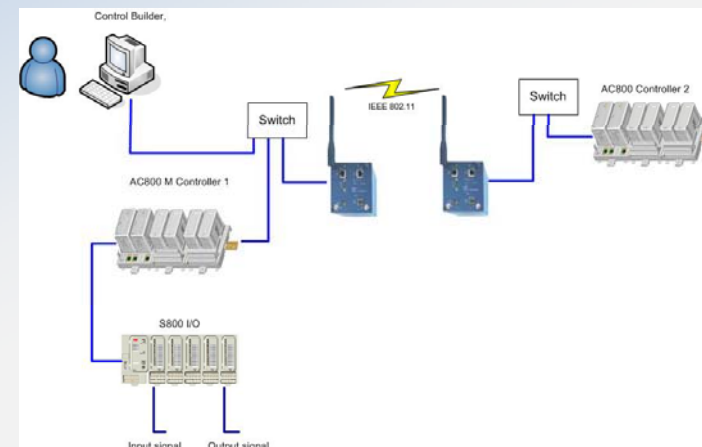
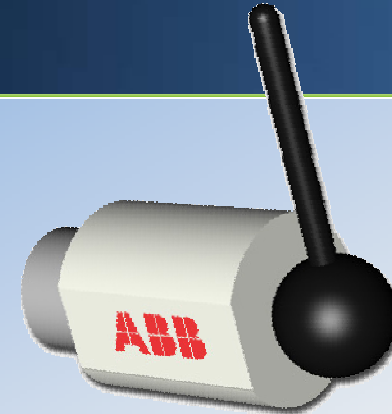
WiVib – Wireless Vibration Sensor

- Vibration monitoring of LV AC motors
 - Size below 400kW
 - Non-intrusive (very simple installation)
 - Fully autonomous
 - Small, inexpensive, wireless
 - Long battery life (5-10 years)
 - Suitable for EX environment
 - WirelessHART compliant
 - Available Q2 2009



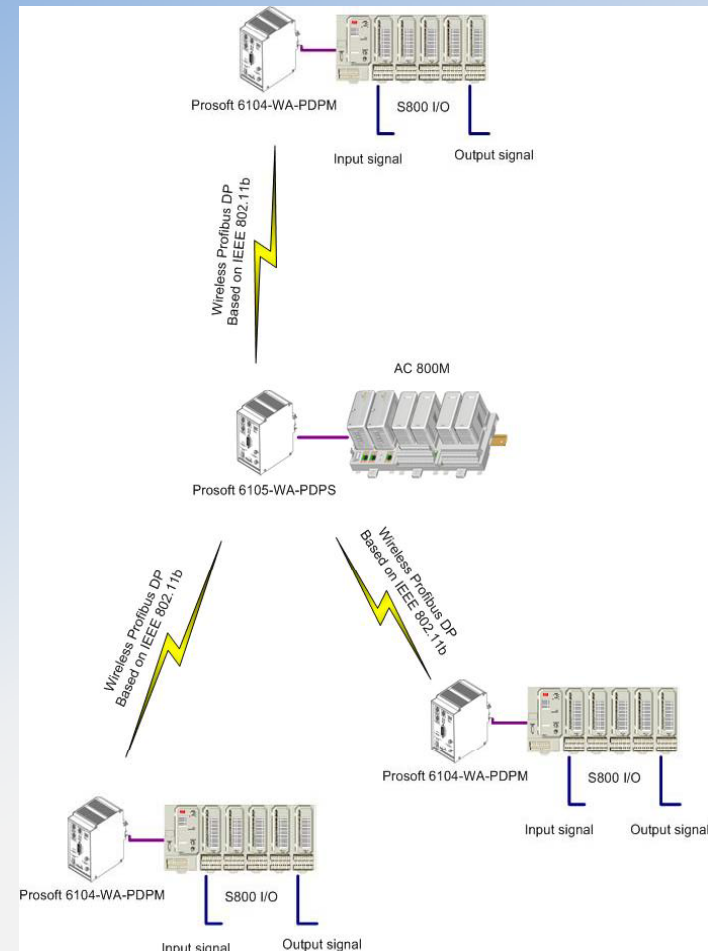
In-Process Wireless

- Wireless instrumentation,
 - Wireless remote I/O,
 - Wireless fieldbus.
-
- Low-cost installation
 - Installation in difficult areas
 - Ideal for modular processes
 - Line-powered / Battery powered



In Process: Wireless Remote IO

- Wireless PROFIBUS between controller and multiple remote IO
- Allows for islands of remote IO units to operate within the scope of a controller without the need for a physical connection
- Mobile process modules
- New process modules where cabling would lead to great installation costs
- Retrofit installations

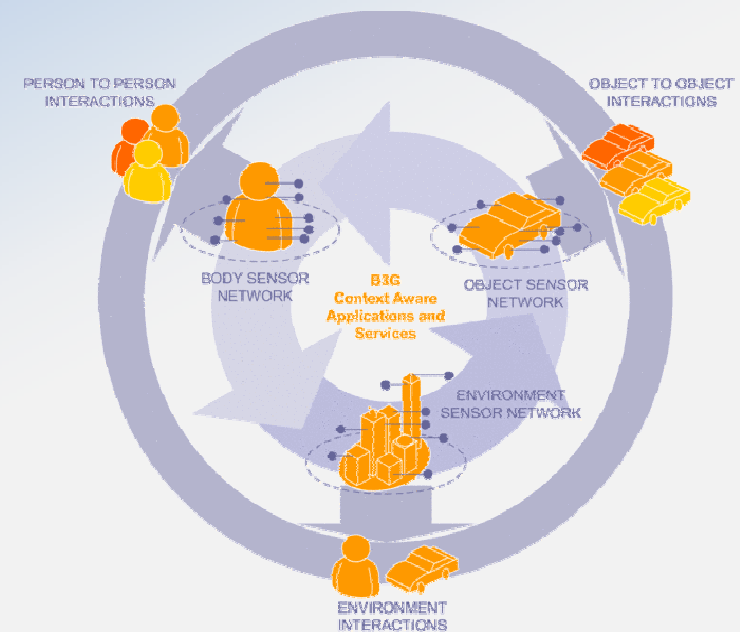


Key Oil & Gas Wireless Technologies

- Wireless Sensor Networks
 - Monitoring, in-line process measurements, enabling smart instrumentation...
- WLAN
 - real-time plant information, local instrument configuration, work process activation/deactivation...
- RFID
 - Asset Tracking, Personnel Tracking...
- WiMax
 - Long-range communication, Inter-Platform communication...

Next: Wireless intelligent environments

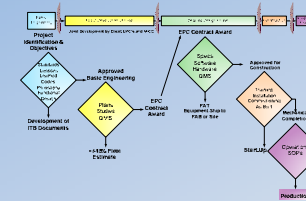
- Intelligent environments
 - Space or environment with embedded systems and information and communication technologies
 - In which information and communication technologies and sensor systems “disappear” as they become embedded into physical objects, infrastructures, and the surroundings
 - Always on, anytime, anyplace, anywhere
 - Context-aware
 - Sense physical environment and adapt behaviour accordingly
 - Where device is
 - What other devices are in range
 - Available resources



*If I'd asked my customers what they wanted, they'd have said a **faster horse**. Henry Ford (on inventing the Model T)*

Summary

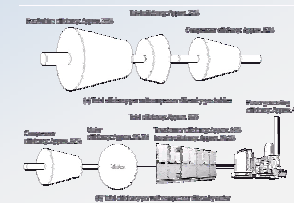
- **Market Drivers**
 - Health and Safety
 - Execution & Ressources
 - Energy & Sustainability
 - Service & Maintenance
- **Technology Drivers**
 - Wireless
 - Web technologies
 - Remote operation support
 - Asset Management



Flawless Execution



Product Technologies



Process and Energy



Integrated Operations