

# Dynamiske støykart – tilgang til real-time støyinformasjon fra trådløse sensorer

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# Noise risk management



Risk controls:1.Elimination/Substitution2.Technical solutions3.Organizational solutions4.Personal protection equipment

- In Statoil, the number of work related illness has been dominated by hearing damage
- Noise is flagged as a major challenge in Statoil's HSE strategy
- Noise is a company-wide challenge

- Remove noise sources
- Reduce source emission
- Sound insulation
- Work time restriction
- Info and training
- Hearing protection



# Planning the work day



- Noise map when planning work operations
  - Estimate area noise exposure and work time restrictions
  - Determine requirements to personal protective wear (e.g. single/double/ intelligent hearing protection)
- Noise maps are created from manual point measurements
  - Represents «normal» condition
  - Does not account for sudden changes in noise levels, noise generated by tools
- Long update intervals (years)



# Introducing WiNoS – Real time noise maps

What is WiNoS

- WiNoS = Wireless Noise Surveillance
- A network of wireless noise sensors, continuously measuring noise in the process area
- Industry standard wireless
   infrastructure
- Computer software for processing sensor data and producing graphical noise maps

WiNoS business drivers

- Reduce work related hearing damages, by always providing an up-to-date area noise map
- Optimizing time-on-tools, since daily noise exposure can be predicted more precisely
- Instant feedback on the impact of any noise reducing measures
- Acoustical condition monitoring<sup>1</sup>

<sup>1</sup> Future expansion, hardware already prepared







# The project organization

Project Owner: Statoil / Gassco		
Norsonic AS	Yokogawa Electric Corporation	SINTEF, Dept. of Acoustics
<ul> <li>Noise sensor</li> <li>Microphone design</li> <li>Sound level meter and signal processing</li> </ul>	<ul> <li>Sensor application</li> <li>Wireless interface</li> <li>Mechanical housing</li> <li>ATEX</li> <li>Wireless infrastructure</li> <li>Standardized wireless technology</li> <li>Interface to wired network architecture</li> </ul>	<ul> <li>WiNoS software</li> <li>WiNoS software applications</li> <li>WiNoS database</li> <li>Interface to network architecture</li> </ul>
Stakeholders: Statoil DPN, TEX and HSE. Gassco HSE		



### The noise sensor



#### **Requirements to sensor**

- Battery operation, two years battery life time
- Industry standard wireless communication protocol, for license free operation globally
- Frequency range 25 Hz 16 kHz
- Accuracy according to IEC 61672 class 2
- «Auto-calibration»
- Intrinsic safe design confirming to ATEX Group II, gaseous explosive atmosphere Zone 1 (ref (directive 2014/34/EU)
- IP grade 66: Dust and waterproof
- Specially designed microphone to meet environmental and IP requirements



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Classification: Open

# Output from the noise sensor





# The noise mapping software



### Basic concept

- Reference model
  - Pre-collected noise map
  - CAD drawings of area
- Real-time data
  - Wireless noise sensors
- S/W Calculation model

#### $\rightarrow$ Dynamic Noise Map



### WiNoS system test March 2016



#### Where

 Industrial lab hall (35x25x15 m), Statoil Rotvoll, Trondheim

#### What

- Network of 7 ISA100 enabled wireless noise sensors
- Fully functional noise mapping S/W
- Synthesized noise sources (loudspeakers)
- Fully integrated IT backhaul architecture



# WiNoS system test March 2016

### **Conclusions from the test**

- End-to-end connection verified sensor – IMS – WiNoS application server
- Reliable values from wireless sensor
- Reliable and stable wireless sensor network (ISA100)
- Promising noise map quality (despite few sensors)
- Robust and scalable IT architecture





There's never been a better time for **GOOD ideas** 

WiNoS – Dynamiske støykart

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