The Interoperability of Wireless Sensor Networks

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Motivation

- **Interoperability of sensors** aims at the integration of in-situ and remote sensors to achieve an integrated sensing system at both data and network levels.

- **Metadata** has been traditionally related to routing protocols in WSN and it does not provide the knowledge of the state of the network that can support the interoperability of sensors.

Our research challenge

- Develop a model for the interoperability of WSN based on metadata attributes in order to:
  - provide a description of observations, processes and functionalities, as well as their status and configuration,
  - enable a better understanding of the network itself,
  - ensure the interoperability with other networks of sensors.
Our first step…

- **Exploratory study**
  1. Identify the main WSN functionalities.
  2. Identify metadata for each WSN
  3. Classify examples of metadata attributes according to a specific level of interoperability.
  4. Analyze the role of metadata in WSN.

Different WSN functionalities  Different levels of interoperability
WSN Functionalities

- Sensing
- Processing
- Communication
- Configuration
- Maintenance

Previously developed for the interoperability of SDIs using seven different levels of interoperability.

Interoperability Model

- Technical
- Syntactic
- Semantic
- Pragmatic
- Dynamic
- Conceptual
- Organisational

(Manso et al, 2008)
## Preliminary Results

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<tr>
<th>Interoperability Level</th>
<th>WSN Functionalities</th>
<th>Configuration</th>
<th>Communication</th>
<th>Sensing</th>
<th>Maintenance</th>
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Depending on the interoperability level and the WSN functionalities, the metadata have played a different role such as:

1. Passive vs. active metadata
2. Dynamic vs. static metadata
3. Automated vs. manual creation and maintenance

(Graybeal et al. 2007)
Conclusions

- Our exploratory study demonstrates the existence of relations between WSN functionalities and different interoperability levels.

- “Conceptual shift” from defining metadata for WSN towards defining metadata for the interoperability of WSN.
Future Research

- Implementation of concrete case of study for the evaluation of our interoperability model
  - with a special attention on the dynamic behaviours in the context of mobile sensor.
  - use Sensor Web specifications to inherit its metadata, trying to integrate our interoperability model with Sensor Web.
Metadata is essential to generate the knowledge of a sensing system and the common thread that will connect all the states and functionalities of WSN and preserve the context of the collected data.

Thanks for your attention!

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