Using Inspire as part of the strategy for ubiquitous services in the Internet of Things

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The IoT Future

A use case for Inspire?

http://www.autonews.com/
Context

Inspire – Satisfying the IoT Use Case

The emerging IoT community is confronted by a number of issues that are similar to those faced by the environmental data community when Inspire was envisioned in 2011.

• The issues of interoperability between data services and data clients.
• The IoT community is therefore developing standards that facilitate discovery and download of data from heterogeneous IoT data sources.

There is however considerable overlap between the Inspire space and the IoT space, not least when we are concerned with data from environmental sensors.

• In Inspire these would be covered by the EF data theme.

In addition Inspire provides service interfaces to a huge pool of harmonised data that could underpin many analytical data services in the IoT world.
Lets look at Hypercat - an IoT Discovery Standard

**BSI PAS 212: 2016**

Standard developed by BSI as part of their fast-track PAS process for innovative and niche areas

Hypercat wanted to make their research on IoT discovery public and asked BSI to develop it into a standard

In this presentation we look at how Inspire provides a key logical layer and associated infrastructure to underpin IoT services.
More about PAS 212

Catalogue Format

• PAS 212 specifies a common catalogue format that clients can use to discover data in servers that they can use.
• It describes an open, lightweight JSON-based hypermedia catalogue format for exposing collections of uniform resource identifiers (URIs).
• Each catalogue may expose any number of URIs, each with any number of resource description framework (RDF)-like triple statements about it.
• This PAS intentionally does not set out to solve all the challenges of data interoperability, but only to address the problem of resource discovery.
PAS 212  Geospatial Capabilities

Geographic Search

Table 14 – Item relations to allow geographic search

<table>
<thead>
<tr>
<th>rel</th>
<th>Meaning</th>
<th>Example val</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.w3.org/2003/01/geo/wgs84_pos#lat">http://www.w3.org/2003/01/geo/wgs84_pos#lat</a></td>
<td>WGS84 Latitude</td>
<td>51.508775</td>
</tr>
<tr>
<td><a href="http://www.w3.org/2003/01/geo/wgs84_pos#long">http://www.w3.org/2003/01/geo/wgs84_pos#long</a></td>
<td>WGS84 Longitude</td>
<td>-0.116993</td>
</tr>
</tbody>
</table>

Table 15 – Geographic search query parameters

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>geobound-minlat</td>
<td>Inclusive lower bound of latitude of bounding box</td>
</tr>
<tr>
<td>geobound-maxlat</td>
<td>Inclusive upper bound of latitude of bounding box</td>
</tr>
<tr>
<td>geobound-minlong</td>
<td>Inclusive lower bound of longitude of bounding box</td>
</tr>
<tr>
<td>geobound-maxlong</td>
<td>Inclusive upper bound of longitude of bounding box</td>
</tr>
</tbody>
</table>
Hypercat – Beyond Discovery

Catalogues versus resources

Catalogues are JSON documents, typically served over HTTP(S). A catalogue may list any number of resources by URI of any type, accessed with any protocol. Due to the wide range of resource types which may be linked, it is difficult to imagine a single, universal, mechanism for subscribing to resource data.

One possibility is to place all data directly into catalogues; for example, a sensor may insert its current temperature value into a catalogue as item metadata. While this approach enables existing subscription methods to be used, it falls short in some real world use-cases.

This PAS has a simple data model of rel-val pairs of metadata, where vals are always strings. While this is ideal for ensuring interoperability of high-level metadata and aiding discovery of resources, it is a poor fit for real-world IoT asset and device data which is often too complex to fit this PAS’s intentionally simple metadata model.

For this reason, structured, live or complex IoT data is often held in resources, referenced in catalogues by URL/URI.

Hypercat gives breadth – but virtually no depth. To get depth, Hypercat needs to link to services with richer semantics.
Adding richer semantics

About the thing you are monitoring
Adding richer semantics

About how you are monitoring it
Adding richer semantics

And the observation itself

- Feature
- Property
- Observation
- Process
- Values

47.83, 14.44
O₃ Hourly mean
Horiba APNA 360
DetectionLimit: 0.1

procedure
featureOfInterest
observedProperty
result

2010-03-01T01:00, 40.87
2010-03-01T02:00, 50.27
The IoT Future
A use case for Inspire?

To get ‘numbers on the screen’ in a sensible and automated way requires intelligent parsing of and underlying ontology.
So what does this all mean?

**Inspire - beyond Environmental Reporting**

Inspire has a primary use case around environmental management and reporting
- WFD, MSFD etc.
- Don’t loose site of this, but...

Inspire offers far greater value to the emerging IoT communities
- These communities need established, rich data models to underpin their services

Most IoT communities have not heard of Inspire
- When looking at cost:benefit of Inspire this engagement needs to happen

1. Don’t think too narrowly about what Inspire can do
2. Engage more with IoT communities
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