Implementing a Railways Operational Topology based on INSPIRE: An Interoperability Improvement with RINF

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Agenda

Objective
Previous situation
INSPIRE Railways
RINF
Operational Examples
Objective

The aim of this work is to implement traditional geometries and Attributes, defined in RINF, using INSPIRE railways features in an operational environment, and show some working examples.
Once Upon a Time – Railways geography
Once Upon a Time – Railways characteristics

From construction plans and sketches
No interoperability
Difficult up to date
Today – Different railways topologies

Every organization has its own proprietary attributes and topology
Today – Standards

UIC RailTopoModel

Common data infrastructure model
Railway capacity and topology uses

Railway capacity is the maximum number of trains which can be scheduled in the railway in a fixed period of time.
## Tools

### Datasources
- ADIF Infrastructure attribute data
- IDEADIF – ADIF Spatial Data Infrastructure
- IGN

### Tools
- Python
- GDAL
- PostGis Database
- Apache
- Geoserver
INSPIRE feature implementation

IDEADIF IGN → Load Postgis database → Feature identification from attributes → Track split Inspire feature computations

X, Y RailwayNodes
X0, Y0 RailwayStationNode
X, Y − X', Y' RailwayLink

Diferencia entre PKs

Trazado
INSPIRE feature implementation

IDEADIF
IGN

X,Y – X',Y'
RailwayLink

Load Postgis
database

Feature
identification
from attributes

Track split
Inspire feature
computations
INSPIRE & RINF

INSPIRE Railways

The Rail Transport Networks application schema (Rail Schema) employs a link and node structure to represent the rail tracks used for transportation in the form of a linear network. The Rail Schema inherits classes from the Common Transport Schema and also creates its own classes to describe properties of the rail network such as Ownership and restrictions that can apply to whole sections of the network element or subsections that can be described using linear referencing.

RINF

The activity of the WG Register of Infrastructure (RINF) scheduled in the ERA work programme 2009 is based on Article 18 of Regulation 1335/2008 amending Regulation 881/2004 establishing a European Railway Agency (ERA) and Article 35 of Directive 2008/57/EC on the Interoperability of the Rail System within the Community.

<table>
<thead>
<tr>
<th>INSPIRE</th>
<th>Common</th>
<th>RINF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focused on Spatial Data</td>
<td>20 common attributes Coordinate Systems RINF Annex H</td>
<td>Focused on Attribute Data</td>
</tr>
</tbody>
</table>
INSPIRE & RINF – INSPIRE elements
INSPIRE & RINF – RINF elements
INSPIRE & RINF - Agregation
INSPIRE & RINF
Operational Examples – Incidence assistance

Use WPS services to exchange information

https://www.youtube.com/watch?v=O6L9kdAYDA8
Operational Examples – Railway capacity impact

https://www.youtube.com/watch?v=63qbSx4hoxU

More than 3500 train paths will be taken into account
Operational Examples – Railway capacity impact
Operational Examples – on board system

19 10:45:40.728904 Lon: -3.675349667 Lat: 40.3877205 PK: 2.854 V: 15.056
Conclusion

INSPIRE railway schemas and RINF specifications may be used to represent railway elements from micro to macro level.

They are standards that can be used to improve interoperability among organizations.

It is necessary an attribute to link between both schemas. In this work, position has been chosen.

Allows Independence from any company.

Allows a cost reduction in time integration and money.

Future work

Make a conversion process between INSPIRE and RailTopomodel schemas.

Add spatial analysis to more operational activities.

Improve relations with other INSPIRE Themes as Road, Weather, etc.
Thanks for your attention

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