

Preserving spatial data on the Web

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Geonovum



Founded in 2007



Helping the government do its work better using geo-information. That's our daily job.

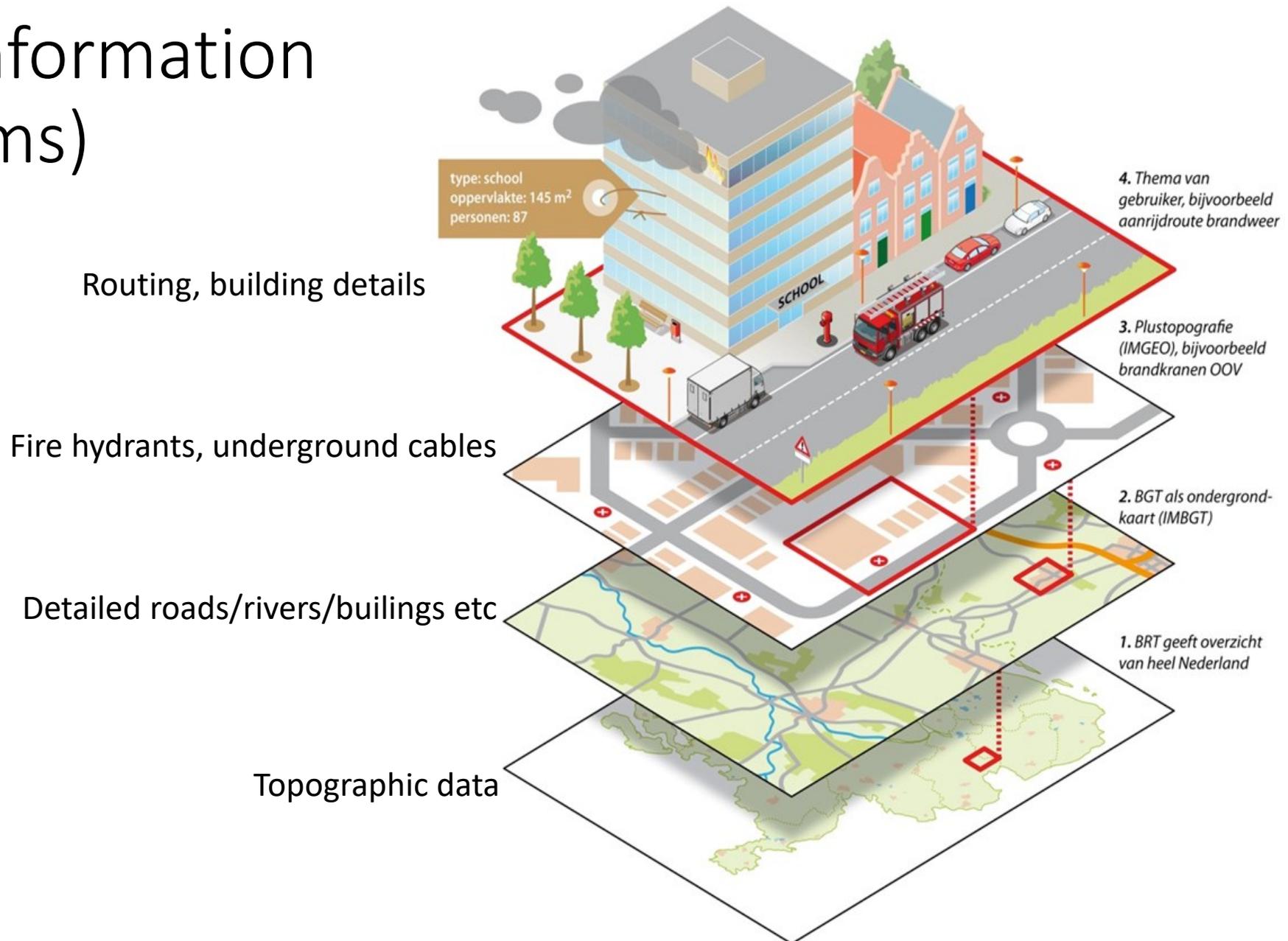


We do this by making geo-information FAIR and by making sure geo-information can be exchanged and combined with other information types - **using standards.**

De overheid beter laten presteren met geo-informatie. Dat is waar wij dagelijks aan werken.

We doen dat door de toegankelijkheid van geo-informatie te verbeteren en door uitwisseling van geo-informatie onderling en andere gegevenstypen mogelijk te maken met standaarden.

Geo-information (systems)



The Geospatial Niche

Open Geospatial Consortium

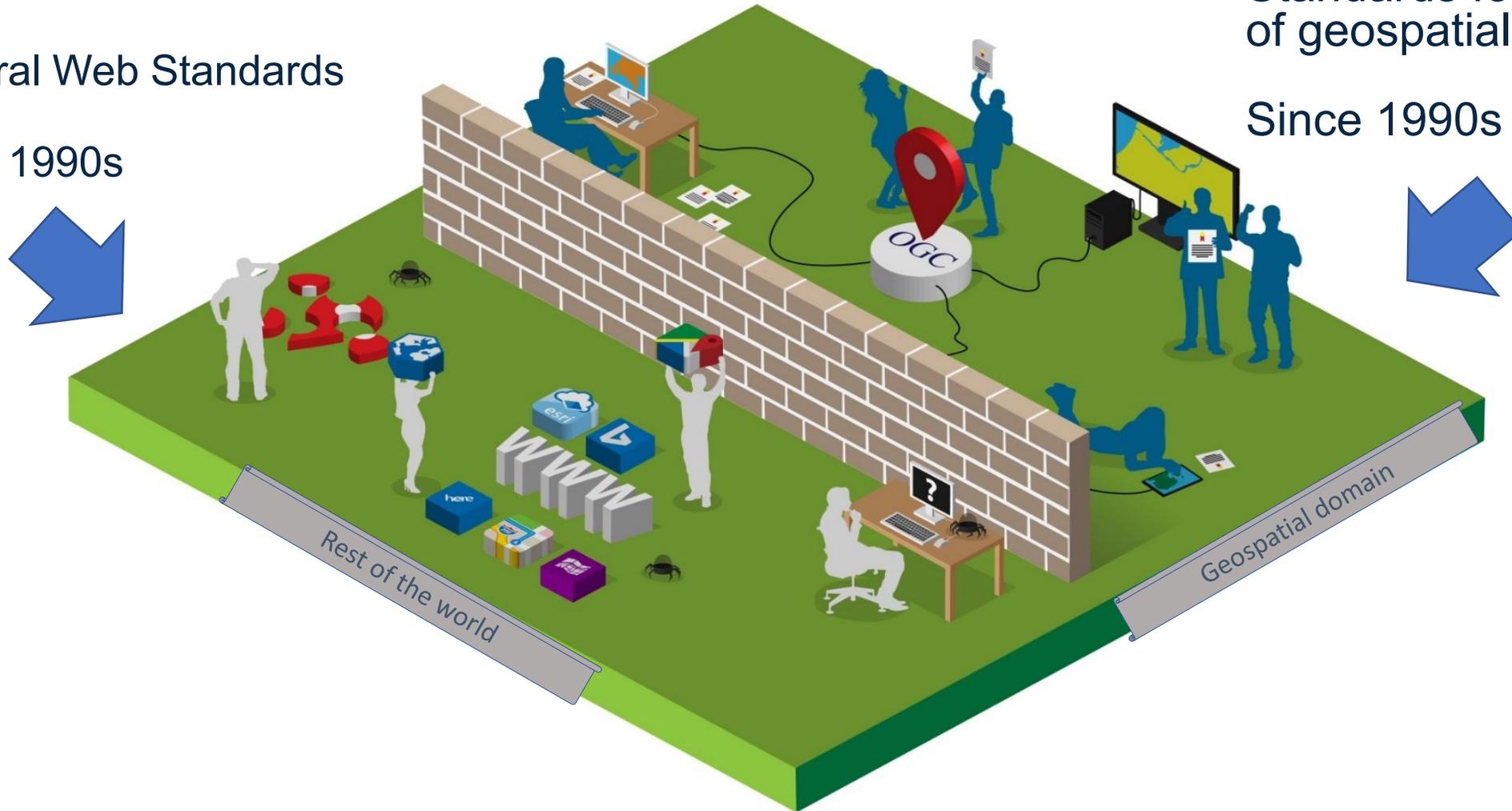
Standards for dissemination
of geospatial data

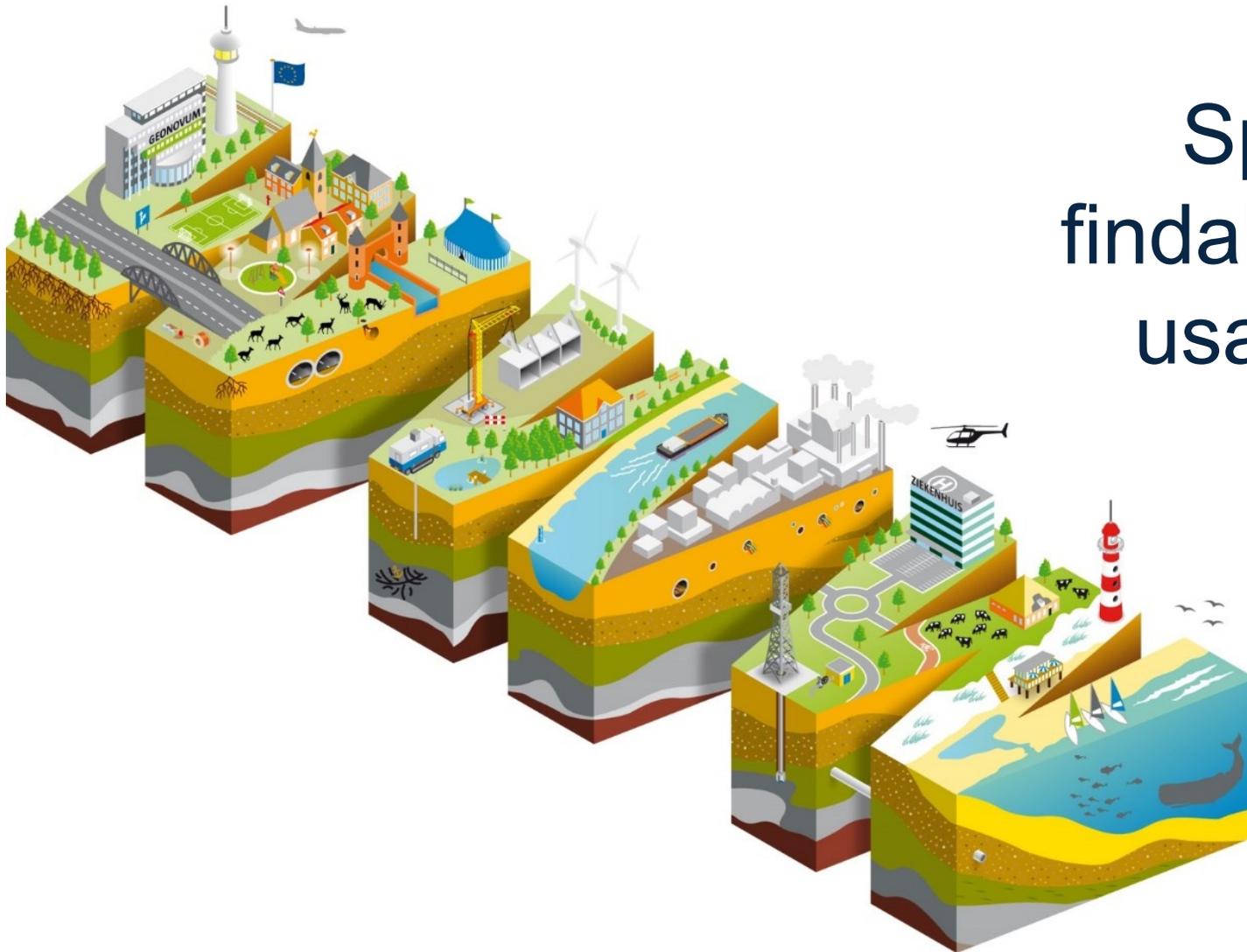
Since 1990s

World Wide Web Consortium:

General Web Standards

Since 1990s



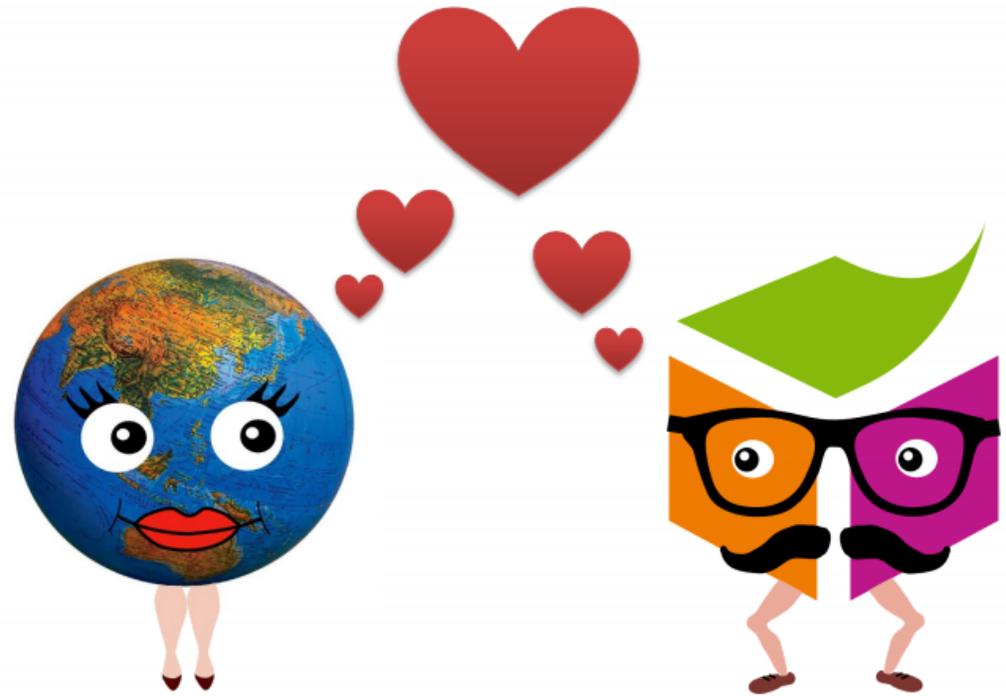


Spatial data on the web:
findable by search engines,
usable by web developers

Start of OGC - W3C collaboration

March 2014: joint workshop Linking Geospatial Data

2015-now: Joint W3C-OGC **Spatial Data on the Web** working group



Source: *Linked Data and Geoinformatics – a love story* - By Frans Knibbe
<https://www.w3.org/2014/03/lqd/Frans>

Spatial Data on the Web Working Group



Mission

- Integration of spatial information with other data on the Web;
- Make it possible to relate different facts in different datasets to the same place;

Goal

- To complete the standardization of informal technologies already in widespread use

Products of the working group

- **Best Practices for Publishing Spatial Data on the Web**
- OWL Time
- Semantic Sensor Network Ontology
- The Responsible Use of Spatial Data
- Publishing and Using Earth Observation Data with the RDF Data Cube and the Discrete Global Grid System
- CoverageJSON

Spatial Data on the Web Best Practices



W3C Working Group Note 28 September 2017

This version:

<https://www.w3.org/TR/2017/NOTE-sdw-bp-20170928/>

Latest published version:

<https://www.w3.org/TR/sdw-bp/>

Latest editor's draft:

<https://w3c.github.io/sdw/bp/>

Previous version:

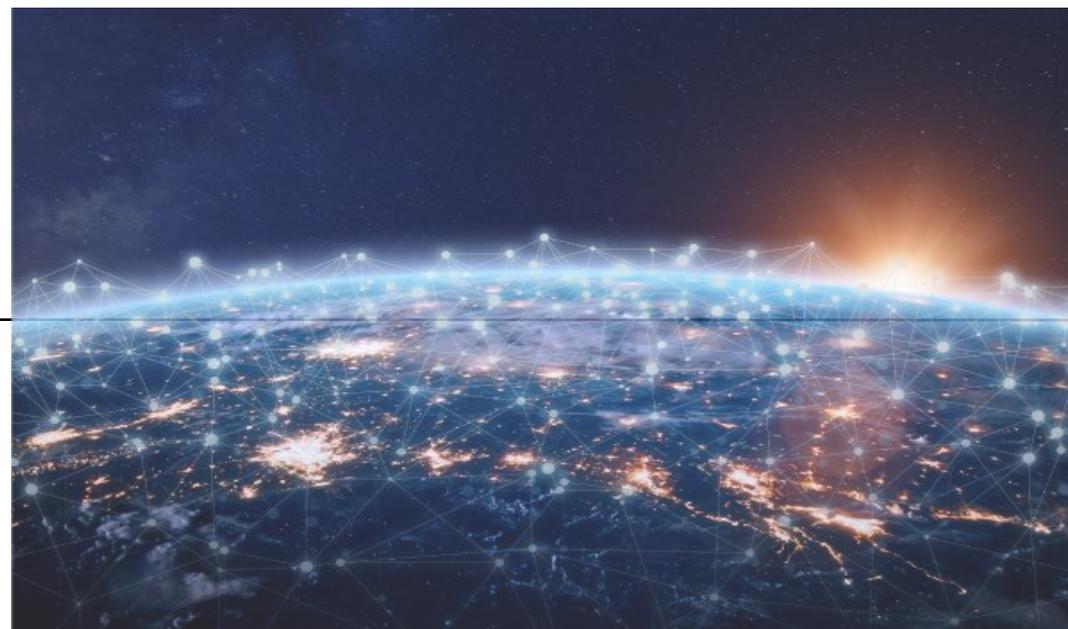
<https://www.w3.org/TR/2017/NOTE-sdw-bp-20170511/>

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The Best Practices

Best Practices Summary

Web principles	Best Practice 1 : Use globally unique persistent HTTP URIs for Spatial Things	Best Practice 8 : State how coordinate values are encoded	Spatial aspects
	Best Practice 2 : Make your spatial data indexable by search engines	Best Practice 9 : Describe relative positioning	
	Best Practice 3 : Link resources together to create the Web of data	Best Practice 10 : Use appropriate relation types to link Spatial Things	Access
Spatial aspects	Best Practice 4 : Use spatial data encodings that match your target audience	Best Practice 11 : Provide information on the changing nature of spatial things	Metadata
	Best Practice 5 : Provide geometries on the Web in a usable way	Best Practice 12 : Expose spatial data through 'convenience APIs'	
	Best Practice 6 : Provide geometries at the right level of accuracy, precision, and size	Best Practice 13 : Include spatial metadata in dataset metadata	
	Best Practice 7 : Choose coordinate reference systems to suit your user's applications	Best Practice 14 : Describe the positional accuracy of spatial data	

Web principles

Best Practice 1: Use globally unique persistent HTTP URIs for Spatial Things

Best Practice 2: Make your spatial data indexable by search engines

Best Practice 3: Link resources together to create the Web of data

WEB ARCHITECTURE

- ★ **Linkable**: use stable and discoverable global identifiers
- ★ ★ **Parseable**: use standardized data metamodels (e.g. [CSV](#), [XML](#), [RDF](#), or [JSON](#)).
- ★ ★ ★ **Understandable**: use well-known or at least well-documented vocabularies/schemas
- ★ ★ ★ ★ **Linked**: link to other resources whenever possible
- ★ ★ ★ ★ ★ **Usable**: label your document with a license

The F in FAIR

site:ldproxy.net



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Pagina 3 van ongeveer 18.500 resultaten (0,17 seconden)

[Lopik, Lopikerweg west 50 - Services](#)

www.ldproxy.net/bag/inspireadressen/inspireadressen.2414293/ ▾

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[Groesbeek, Hommelstraat 10 - Services](#)

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[Groningen, Oosterkade 1001 - Services](#)

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Findable

Accessible

Interoperable

Reusable

Implementing Best Practice 1 + 2
makes spatial data findable in
popular search engines

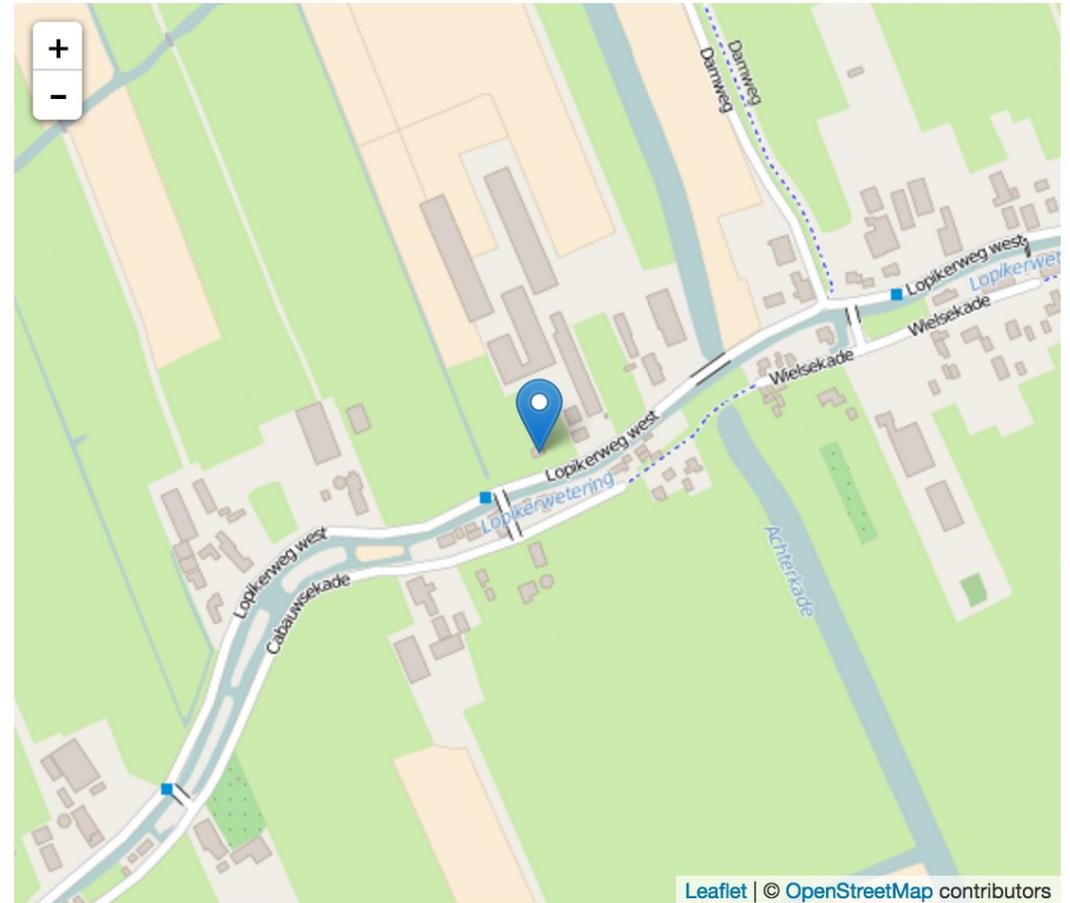
Findable: every single spatial thing...

Idproxy Services » INSPIRE Adressen WFS » Adressen » Lopik, Lopikerweg west 50

View as: [JSON-LD](#) | [GeoJson](#) | [GML](#)

Lopik, Lopikerweg west 50

id	inspireadressen.2414293
streetAddress	Lopikerweg west 50
addressLocality	Lopik
postalCode	3411AP
latitude	51.97321237169963
longitude	4.915126563760037



The A in FAIR

Access

Best Practice 10: Use appropriate relation types to link Spatial Things

Best Practice 11: Provide information on the changing nature of spatial things

Best Practice 12: Expose spatial data through 'convenience APIs'

A hand holding a white alarm clock. The clock face shows the time as approximately 1:50. The background is a light blue gradient.

Time To First Successful Call

Being capable of doing a successful request to the API within a few minutes will increase the chances that the developer will stick to your API).

The I in FAIR

Interoperability

- Encodings for the Web: HTML / JSON / RDF based formats
- GML
- ~~Shapefile~~ > OGC GeoPackage
- Clearness in working with coordinates!

Best Practice 4: Use spatial data encodings that match your target audience

Best Practice 5: Provide geometries on the Web in a usable way

Best Practice 6: Provide geometries at the right level of accuracy, precision, and size

Best Practice 7: Choose coordinate reference systems to suit your user's applications

Spatial aspects

Best Practice 8: State how coordinate values are encoded

Best Practice 9: Describe relative positioning

Coordinate reference systems (CRS)

source: <https://thetruesize.com/>

- Fundamental aspect of spatial data
- There are many coordinate reference systems
 - world wide, regional, national...
 - Geographical vs projected
- The order of coordinates is important (lat-long vs long-lat)
- If the CRS is undefined / unclear, the coordinates are unusable! E.g:
 - `POINT(4.8842353 52.375108)`
 - `POINT(120749.725 487589.422)`

Best Practice 8: State how coordinate values are encoded



Coordinate Reference Systems - continued

- Shift of continents over time & **dynamic CRS** - E.g. the coordinates of “fixed” features in the Australian landscape are changing by **seven centimetres per year**.
- Refer to CRS used, including temporal information or “*epoch*” if necessary
- OGC Register <http://www.opengis.net/def/crs/>
- EPSG register <https://epsg.org/>



The R in FAIR

- Making spatial data **reusable** = describing a dataset so users can determine its **fitness for a certain purpose**

Metadata

Best Practice 13: Include spatial metadata in dataset metadata

Best Practice 14: Describe the positional accuracy of spatial data

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6.	Vocabulary specification
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6.2	Elements from other vocabularies

Data Catalog Vocabulary (DCAT) - Version 2

W3C Candidate Recommendation 03 October 2019

This version:

<https://www.w3.org/TR/2019/CR-vocab-dcat-2-20191003/>

Latest published version:

<https://www.w3.org/TR/vocab-dcat-2/>

Latest editor's draft:

<https://w3c.github.io/dxwg/dcat/>

Implementation report:

https://docs.google.com/spreadsheets/d/1eEVUuPFAGO2GjS5ocxyIY8T1AlpqlwnOTc3er_Mhcv4/edit#gid=108132380%22

Previous version:

<https://www.w3.org/TR/2019/WD-vocab-dcat-2-20190528/>

Latest Recommendation:

<https://www.w3.org/TR/2014/REC-vocab-dcat-20140116/>

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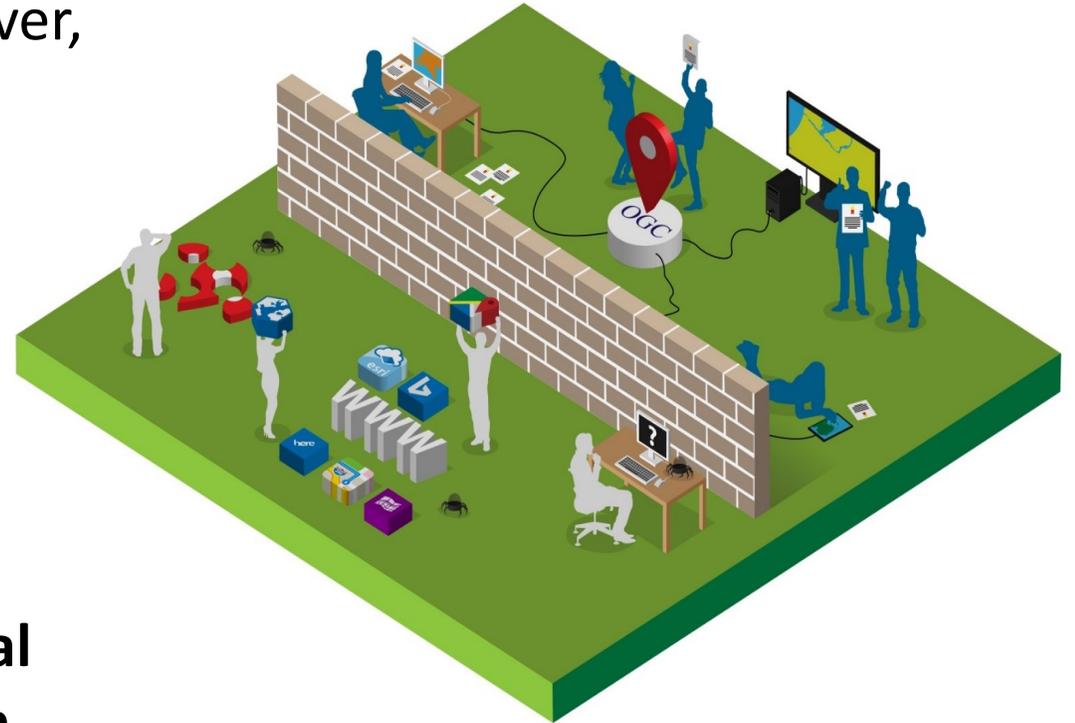
- number of dimensions (1D, 2D, 3D, 4D)
- spatial representation type (e.g. grid, vector, text table)
- geometric property (e.g. boundary, bounding box, region, centerline, centroid, field) - expressed in the WGS 84 coordinate reference system to make the metadata consumable by as broad an audience as possible (see Best Practice 7: Choose coordinate reference systems to suit your user's applications for more information).
- Coordinate Reference System(s) - refer to section 9. Coordinate Reference Systems (CRS) for an introduction to that topic
- spatial resolution - Best Practice 14: Describe the positional accuracy of spatial data
- spatial significance of non-spatial properties (e.g. point value, interpolation, unit average, sum)

Key take-aways

We are **evolving and modernizing** how we discover, access, use, integrate and share **any data that is associated with location**

...using **Web standards!**

Keep an eye on standards of the **Open Geospatial Consortium** and the work of the **Spatial Data on the Web working group**





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