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Interoperability / FAIR Data : building on Standards and Best Practices to achieve it

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Égalité
Fraternité*



Géosciences pour une terre durable

brgm

SETTING THE SCENE



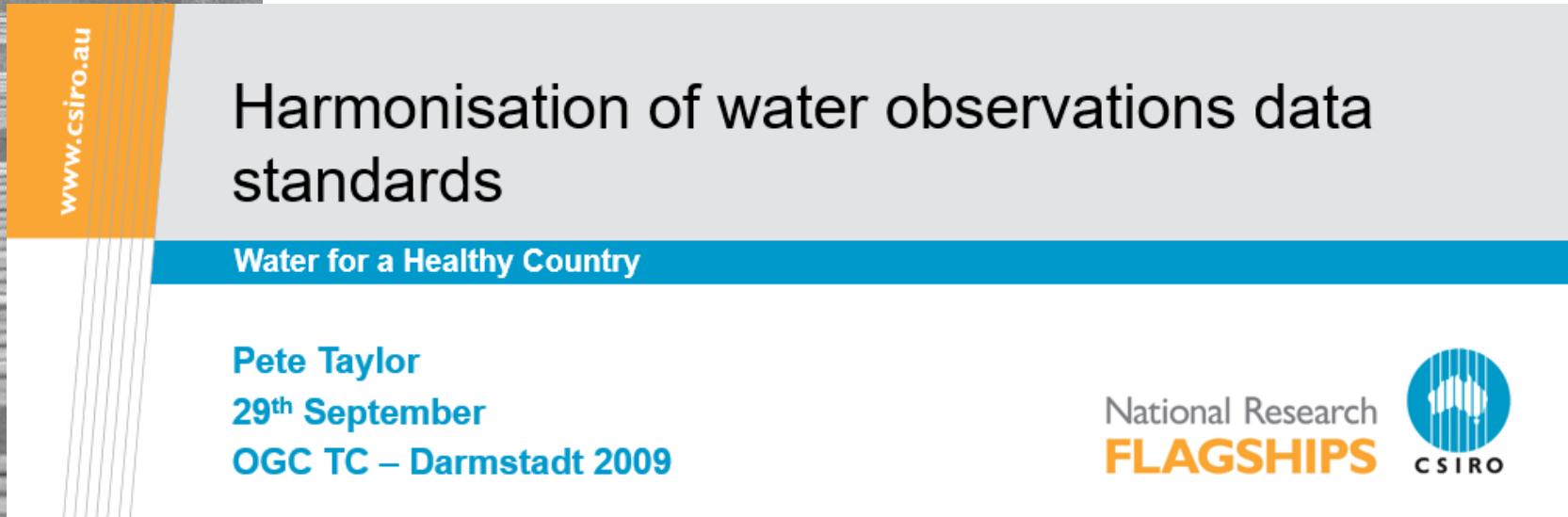
Sylvain Grellet – BRGM
ENSG – mastère GDM – 2023-01-20



Why do we need interoperability -> hydrology example

- Let's go there : https://external.ogc.org/twiki_public/HydrologyDWG/DarmstadtTc2009

- 2009_Sept_Darmstadt_HarmonisationObservations_PeterT.ppt




www.csiro.au

Harmonisation of water observations data standards

Water for a Healthy Country

Pete Taylor
29th September
OGC TC – Darmstadt 2009

National Research
FLAGSHIPS



CSIRO



Why do we need interoperability -> hydrology example



The need for standards

- Sharing of hydrological data is somewhat ad-hoc, based largely on CSV files and FTP
- Leads to very inefficient (or non-existent) transfer and sharing of data
- Sharing requires a lot of transformation effort on the behalf of the data requestor
 - Parse different file formats
 - Understand the concepts
 - Metadata is often limited or non-existent, requiring follow up conversations

Why do we need interoperability -> hydrology example



Hydro Jack
Need flow data!
Hmm maybe Don can help...

RING RING

Hi Don, I need some
RING RING upper Derwent flow
readings for my
geochemical model.
Where is the site
located?

Coordinates?

What reference
system??

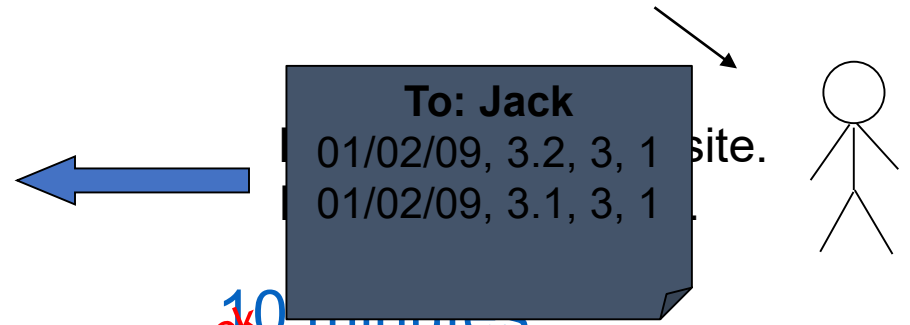
Ok. What sensor is
used?

Oh...how accurate is
that?

DON?

10 minutes...

How often have you been
(or Don) ?



Oh, it's at laughing jack bridge.

Ummm. (papers shuffle)
147.123 -41.588

I think it's GDA94

It's calculated from the stream
gauge reading using a rating
curve..

Umm.....

CLICK

Why do we need interoperability -> geoscience example



REGISTRES & VOCABULAIRES
LA QUALITÉ ET L'INTEROPÉRABILITÉ DES DONNÉES PAR
LA SÉMANTIQUE
HÉLÈNE BRESSAN

15/06/2020

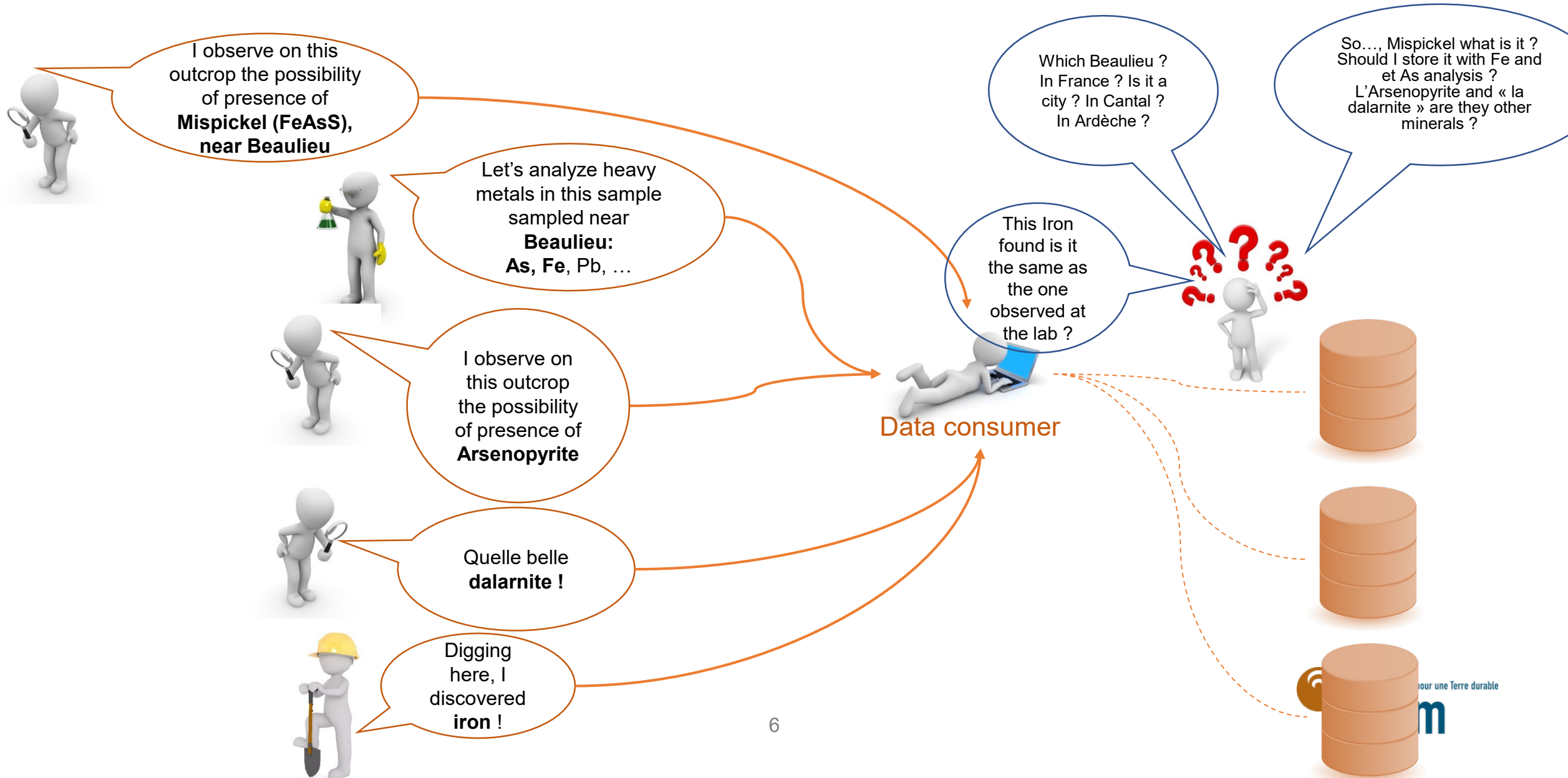


Trad : *Linked data registries and vocabulaires*

Data quality & interoperability thanks to semantics



Why do we need interoperability -> geoscience example



Why do we need interoperability

observe on this outcrop the possibility of presence of **Mispickel (FeAsS)**, near **Beaulieu**

Let's analyze heavy metals in this sample sampled near **Beaulieu**.
As, Fe, Pb

I observe on this outcrop the possibility of presence of **Arsenopyrite**

Quelle belle **dalarnite !**

Digging here, discovered **iron !**

I observe on this outcrop the possibility of presence of <https://data.geoscience.fr/ncl/Minls/22> (**FeAsS**), near <http://id.insee.fr/geo/commune/15020>

Let's analyze heavy metals in this sample sampled on <https://environment.data.gov.uk/catchment-planning/WaterBody/GB520704201400>, then, <https://data.geoscience.fr/ncl/ObjParSubs/3183>, <https://data.geoscience.fr/ncl/ObjParSubs/3177>, Pb, ...

I observe on this outcrop the possibility of presence of <https://data.geoscience.fr/ncl/Minls/22>

Quelle belle <https://data.geoscience.fr/ncl/Minls/22> !

I discovered <https://data.geoscience.fr/ncl/AnthroMat/62>

Location

Observations and measures

Minerals

Share semantics to describe and exchange data

Chemical composition

8 Iron made Object



do we need interoperability -> geo

I observe on this outcrop the possibility of presence of <https://data.geoscience.fr/ncl/Minls/22> (FeAsS), near <http://id.insee.fr/geo/commune/15020>

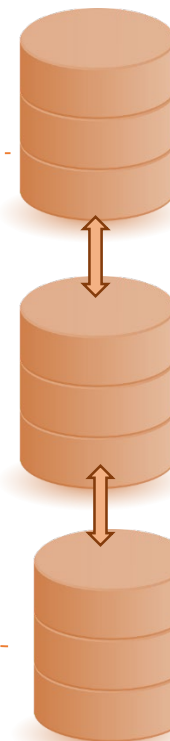
Let's analyze heavy metals in this sample sampled on <https://environment.data.gov.uk/catchment-planning/WaterBody/GB520704201400>, then, <https://data.geoscience.fr/ncl/ObjParSubs/3183>, <https://data.geoscience.fr/ncl/ObjParSubs/3177>, Pb, ...

I observe on this outcrop the possibility of presence of <https://data.geoscience.fr/ncl/Minls/22>

Quelle belle <https://data.geoscience.fr/ncl/Minls/22> !

I discovered <https://data.geoscience.fr/ncl/AnthroMat/62>

Interoperable data



No more siloed data

Share semantics to describe and exchange data



Why do we need interoperability -> space example

- Lead to the creation of OGC SWE – Sensor Web Enablement standards

Sensor Metadata!

WIREID Nov. 10, 1999: Metric Math Mistake Muffed Mars Meteorology Mission

LISA GROSSMAN 11-10-99 07:00 AM

NOV. 10, 1999: METRIC MATH MISTAKE MUFFED MARS METEOROLOGY MISSION



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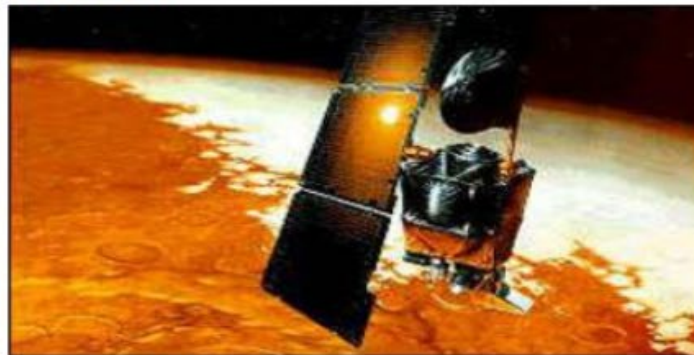
[On Air](#)

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[Low Graphics](#)
[Help](#)

Thursday, September 30, 1999 Published at 18:53 GMT 19:53 UK

Sci/Tech Confusion leads to Mars failure



The Mars Climate Orbiter: Now in pieces on the planet's surface

The Mars Climate Orbiter Spacecraft was lost because one Nasa team used imperial units while another used metric units for a key spacecraft operation.

Sci/Tech Contents

Relevant Stories

24 Sep 99 | Sci/Tech
[Scientist fights Mars setback](#)

23 Sep 99 | Sci/Tech
[Mars probe feared destroyed](#)

23 Sep 99 | Sci/Tech
[What the loss of Mars Climate Orbiter means](#)

17 Jul 99 | Sci/Tech
[Astronauts call for Mars mission](#)

Internet Links

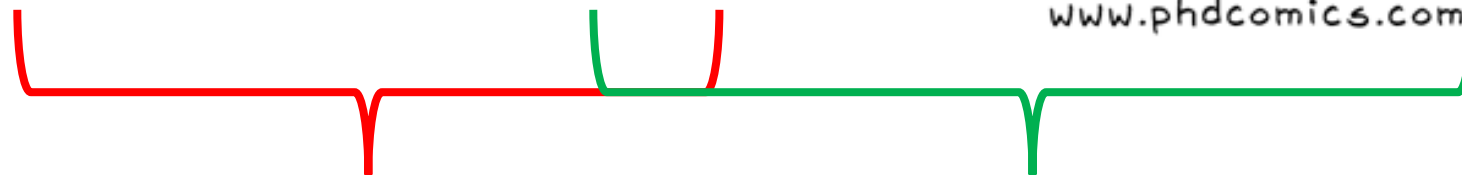
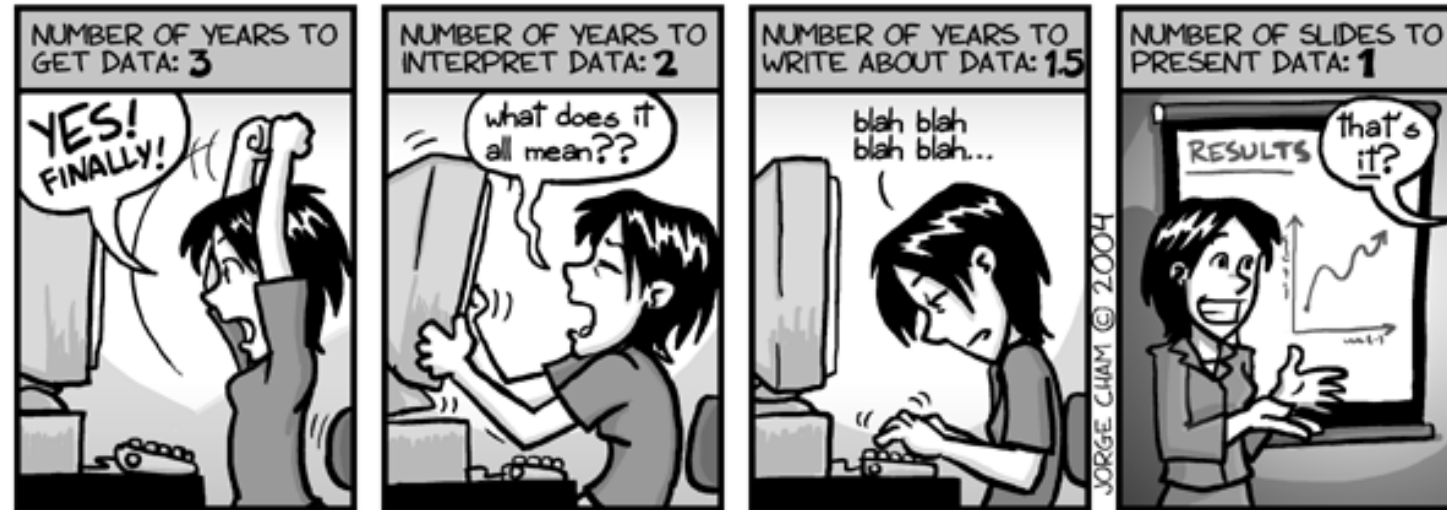
[Mars Climate Orbiter](#)

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Why do we need interoperability -> Research example



DATA: BY THE NUMBERS



Interoperability / FAIR data

for our domain colleagues do to their real work

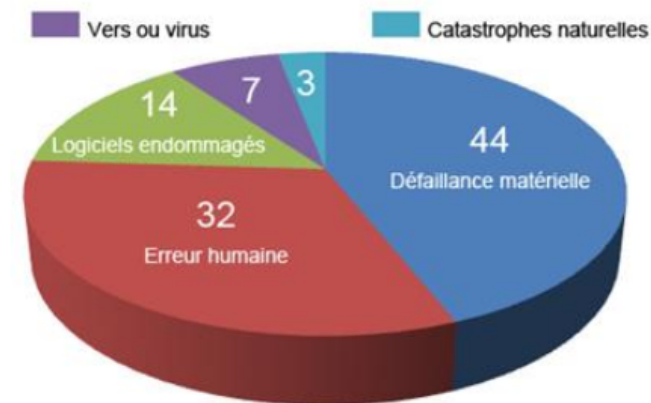
Why do we need interoperability -> Research example

20 years after publication, 80% of scientific data is lost

— III. Données de la recherche : pourquoi les gérer ?

20 ans après publication, 80 % des données scientifiques sont perdues...

- Pour les auteurs
- Pour les équipes, organismes, institutions
- Pour la recherche mondiale
- **Causes :**
 - Destruction des supports
 - Problème de version, obsolescence matérielle ou logicielle
 - Lieu de stockage indéfini
- **Conséquences :**
 - Perte de temps, d'argent (fonds publics...)
 - Pas de vérification des résultats possible
 - Pas de comparaison des résultats dans le temps ou l'espace
 - Pas de réutilisations (différentes)



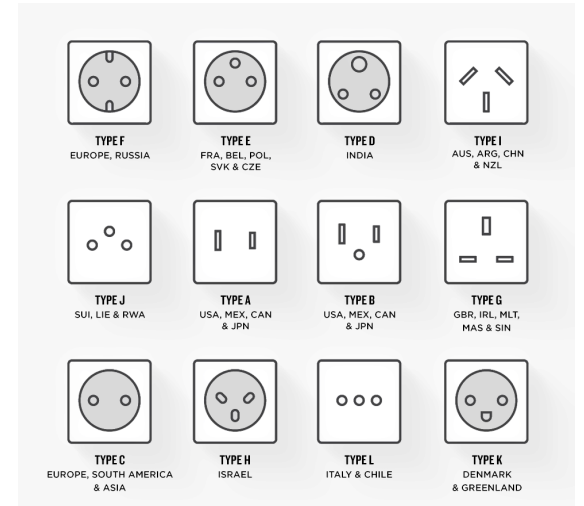
Why do we need interoperability

It's everywhere in our daily life

- Simple thing done everyday



Simple because normalized, we can easily plug our kettle at home or at the office



Adaptators exist when need be

- Shared driving signs*



With local specificities



* let's not discuss who is driving on the good(right) side of the road please ☺

Dream goal

Let's see what we could do if everyone played the interoperability game

- QGIS

The screenshot displays the QGIS interface with the XML metadata for an EnvironmentalMonitoringFacility. A context menu is open over a URI, showing options like 'Copy value', 'Copy XPath', 'Resolve external', 'Swap X/Y', 'Embedded', and 'As a new layer'. A semi-transparent box at the bottom of the screenshot contains the text: 'Dereferencing related raw ground water level timeseries URI'. To the right, a diagram illustrates the data flow: 'Borehole Index' (green box) is linked via 'URI' to 'Env. Monitoring Facility' (blue box), which is linked via 'URI' to 'Observations / logs' (orange box), and 'Env. Monitoring Facility' is also linked via 'URI' to 'Geology / Hydro/Geology' (blue box).

See :

https://github.com/BRGM/gml_application_schema_toolbox/tree/master/docs/presentations/2018_INSPIRE_conference



Dream goal

Let's see what we could do if everyone played the interoperability game

- Linked data aware web client

The screenshot shows a web client interface for a linked data aware web client. At the top, there is a search bar with the text "Enter BRGM linked data resource URI here..." and a "OR" button. Below the search bar is a text area containing a JSON-LD resource:

```
{
  "@id": "https://opengeospatial.github.io/ELFIE/FR/HY-WaterBody/sgwiE6-009-",
  "@type": "HY_WaterBody",
  "name": "La Somme Canalisée",
  "gsp:hasGeometry": {
    "@type": "gsp:Geometry",
    "gsp:asWKT": "MULTILINESTRING((3 13347982042203 49 7409931557826 3 133170628680 49 7409863061587 3 13214210011018 49 7410646964317 3 1252874658722 49 7415840788399 3 1246553611381 49 74163055031 3 12161265730084 49 741860943894)(3 12161265730084 49 741860943894 3 12122729092244 49 741890079681)(3 06976861191596 49 7425710354124 3 06893673695938 49 7425708998422)(3 15918689153231 49 7427682536191 3 1586460279536 49 7422442393435 3 15275264729884 49 7419408914488 3 14587342803432 49 7415872285919 3 13899429797443 49 7412304817264 3 13556933117711 49 7410537433805 3 13490236704776 49 7410194423897 3 13347982042203 49 7409931557826)(3 12122729092244 49 741890079681 3 11843407483668 49 7421012769724 3 1115791627624
```

Below the JSON-LD resource is a URL: <https://opengeospatial.github.io/ELFIE/FR/HY-WaterBody/sgwiE6-009->. There are also several checkboxes for selecting ontologies, with "http://opengeospatial.org/standards/geosparql/Geometry" and "http://opengeospatial.org/standards/hy/HY-WaterBody" selected.

The main content area is split into two parts. On the left is a map of Belgium showing a river network highlighted in red. The map includes labels for "Brugge", "Bruxelles - Brussel", "Lille", "Amiens", "Reims", and "Rouen". A text box at the bottom of the map says "River network traversed to its mouth". On the right is a linked data graph showing relationships between resources. The graph includes nodes for "La Somme Canalisée", "https://opengeospatial.github.io/ELFIE/FR/HY-WaterBody/sgwiE390552", "https://opengeospatial.github.io/ELFIE/FR/HY-WaterBody/sgwiE390710", "Rivière d'Haile", "Crue du Séno-Turonien en Artois-Picardie", and "https://opengeospatial.github.io/ELFIE/FR/GW-Hydrogeo/Unit/sgwi121AT". Relationships are shown with arrows labeled "hydlowstreamWaterBody" and "related".

https://opengeospatial.github.io/ELFIE/demo/surface_groundwater_network_interaction

Interoperability

Benefits

- 2 folds aspects
 - Either we have legal constraints (Re INSPIRE and FAIR presentation)
 - But when no constraints exist, how to set up a Data Sharing culture?

- Creating the necessary organizational context to opening / sharing data is already quite an endeavor
 - So, when this point is reached, the technical aspects should be straightforward.

Interoperability

Context

- More and more external pressure on organisations
 - Climate change
 - Health crisis
 - Reduced (public) fundings

=> Organizations cannot afford to reinvent their own wheel locally when it comes down to sharing data

- Even more when we have 90% of the solutions at hand
 - Experience shows that it's not a matter of IT issues (those can always be fixed)
 - It's a matter of organizing communities & changing behaviours

=> Let's explore how to do so

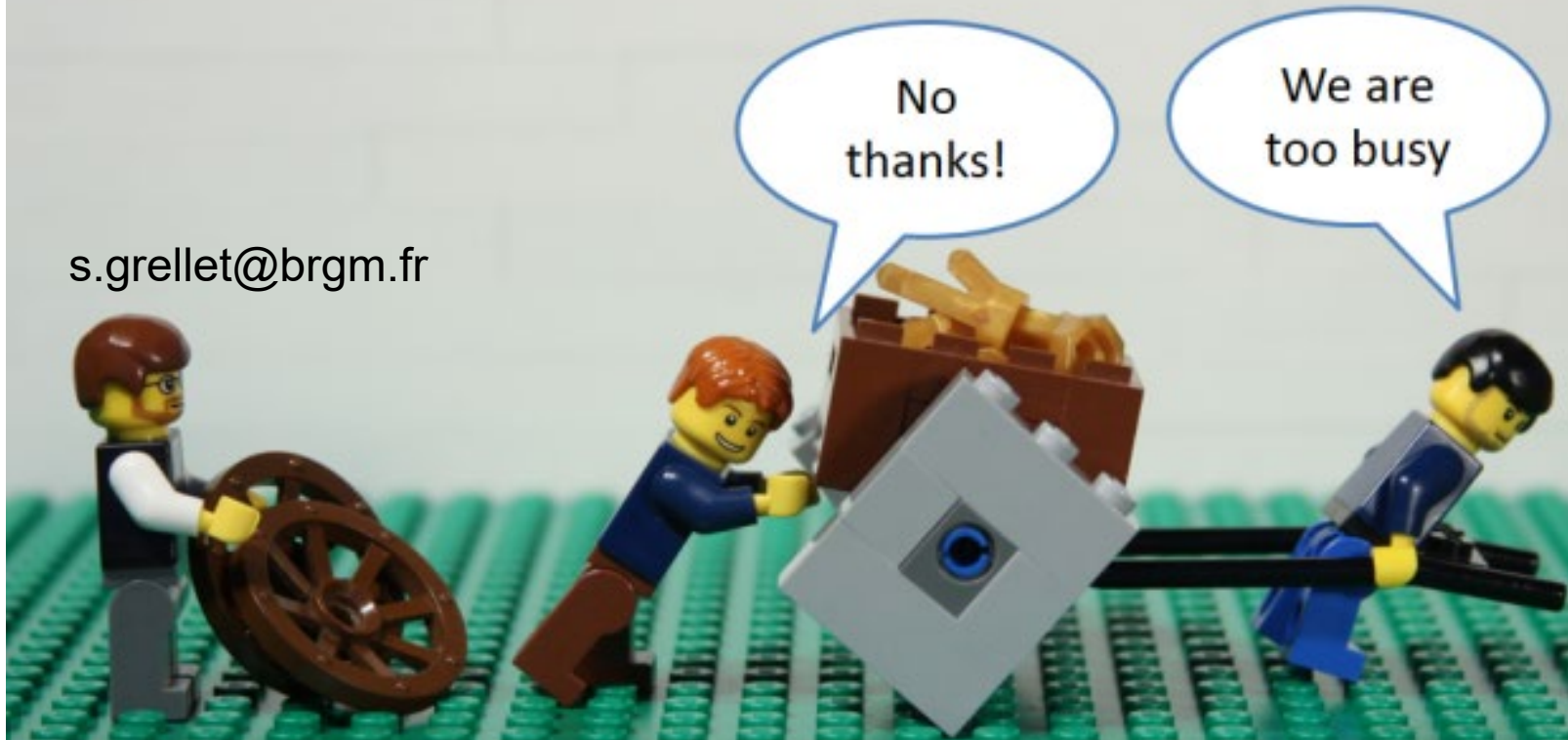
With local specificities

Thank you



Are you too busy to improve?

s.grellet@brgm.fr



Håkan Forss @hakanforss <http://hakanforss.wordpress.com>

This illustration is inspired by and in part derived from the work by Scott Simmerman, "The Square Wheels Guy" <http://www.performancecompany.com/>

Thanks to

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