WG2: Interoperability

What is interoperability?

- **Integrate “their data” with “my data”**
- **Integrate “their software” with “my software”**
- **Integrate “their service” with “my service”**

Why and with whom do we want to be interoperable?

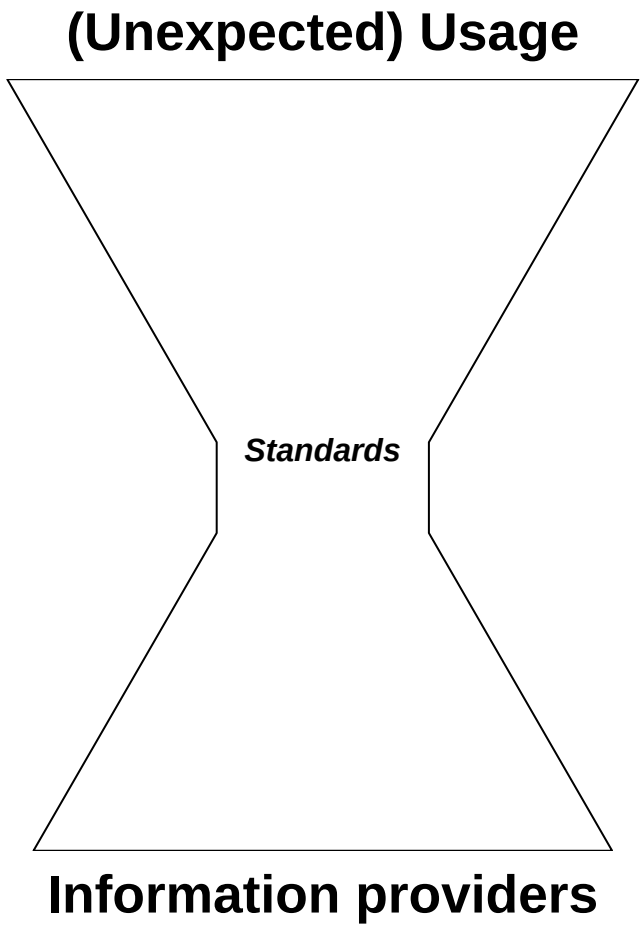
- **Traditionally successful within Met community**
- **We try to push our own standards on external users (GRIB, BUFR), which is not what other communities necessarily want**
  - **XML based formats seems to be what people want**
- **Reaching people who can assess the societal benefits of our products (e.g. decision makers)**
  - **They use GIS tools to overlay several sources of information**
- **Exchange with research to benefit from their activity**

Why and with whom do we want to be interoperable? (cont.)

- **Commercial interest is main driving force**
- **Some moral obligation**
  - **Data for NGOs**
  - **Environmental monitoring**
- **Force by law (INSPIRE)**
- **Unknown future usage of our products**

Interoperability and standards

- **Internet is a good example of interoperability that works, leading to unforeseen usage of published information**
- **Small set of simple, stable, non-proprietary and accepted standards contributed to success**
- **The standard imposes minimal constraints**



What infrastructure should be used?

- **Internet analogy:**
  - **Format: HTML**
  - **Protocol: HTTP**
  - **Requesting: URL**
- **We need to agree on formats, protocols and requests**
  - **Formats: GRIB, BUFR, CF-NetCDF, (GML_BUFR), GeoTIFF, KML, GIF, PNG, JPG, …**
  - **Protocols**
    - **Low: (s)ftp, http(s), DVB, …**
    - **High: OGC Web Services, …**
    - **Other: SMS, VOICE, RSS, …**
  - **Requesting ?**
    - **File naming convention, OGC Query language,…**

What infrastructure should be used? (cont)

- **Internet, Private Network (e.g. RMDCN)**
  - **P2P technologies only efficient if data is used by multiple users. Issue: when can data be removed from network (e.g. when does everyone have a copy)**
  - **Web Services do not support asynchronous data requests/delivery. Something is needed for large/off-line data sets.**
    - **Two solutions: polling, notification (no standards seem to exist).**
    - **OGC Galeon project is looking into an asynchronous mechanism for Web Coverage Services (UNIDATA, BADC, …)**
- **Satellite Broadcasting (e.g. GEONetcast, RETIM2000, …)**
  - **Global reach with limited local infrastructure**
  - **Cheap (for the user)**

Access control, Data policy and security

- **(Digital) right management: data has to be traceable to owner to protect intellectual property and prevent misuse.**
- **Difficult to implement and enforce (especially across national boundaries)**
- **Issue of controlling access to Web Services need to be addressed**

What rules should be followed?

- **INSPIRE will define rules on how serve and present geo-reference data.**
  - **Rules rely on still evolving standards (ISO19109, rules for application schema)**
  - **Chosen standards will certainly be OGC (Open Geospatial Consortium).**
- **Eurocontrol has also chosen OGC as standard for aviation met information.**

Data formats

- **Standardising on data formats is not sufficient. Difficulty comes from semantics/ schemas.**
- **Meteorological schemas might be too complicated for non-meteorological users**
- **Formats should not be exposed to users.**
- **Success of formats is depended on availability and user-friendliness of tools that support the format (e.g NetCDF)**
  - **Users don't really care about the format, as long as they can use the data**
- **Initiative (Eurocontrol WXCM) to define GML schema for meteorological data based on BUFR schema (GML-BUFR)**

Thoughts on XML

- **There are mixed feelings on XML**
- **XML is pushed by the industry**
- **Many XML tools exists**
  - **Most programming languages have XML parsers**
- **XML can be bloated**
  - **Usage of XML should be limited to small data exchanges with other communities**
  - **Within the Met community, data exchange should continue to driven by efficiency.**
  - **XML processing is CPU intensive**
- **XML is a syntax, does not provide semantics**

Conclusion

- **OGC/ISO Standards are coming (INSPIRE, Eurocontrol)**
- **Met services seem to have or are building expertise on OGC.**
- **Need for more collaboration and creation of common reference implementation of OGC compliant web services for met data which can be proposed to WMO.**
  - **Workshop to exchange experience on OGC/GML, covering data management and graphics**