# Implementation of WMO Information System in Japan Meteorological Agency

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2nd workshop on the use of GIS/OGC standards in meteorology
Toulouse, France, November 2009



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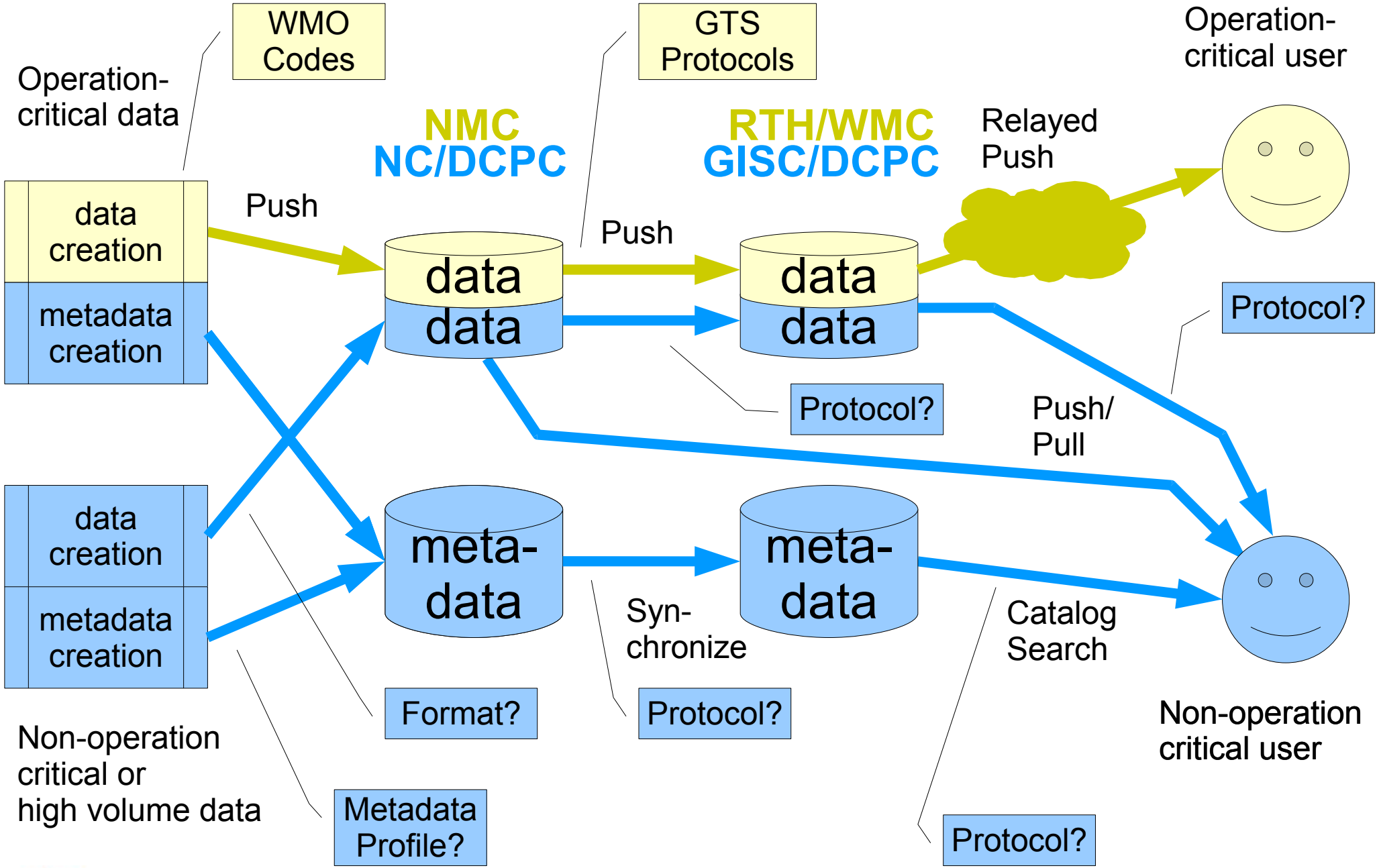
# Topics of the talk

- WIS and activities in JMA
- What we expect for interoperability activity
  - OGC Met Ocean DWG and WMO/CBS IPET-MDI in mind

# WMO Information System (WIS)

- Sustain & improve GTS [part A]
  - Legacy store-forward protocols, routing tables
  - Domain-specific data formats
  - Reliability precedes over flexibility and volume
- Add new features [part B]
  - Flexible and/or cost-effective communication
    - Data discovery, access, & retrieval (DAR)
  - Serve more diverse communities
  - Enhanced interoperability

# GTS/WIS centers and standards



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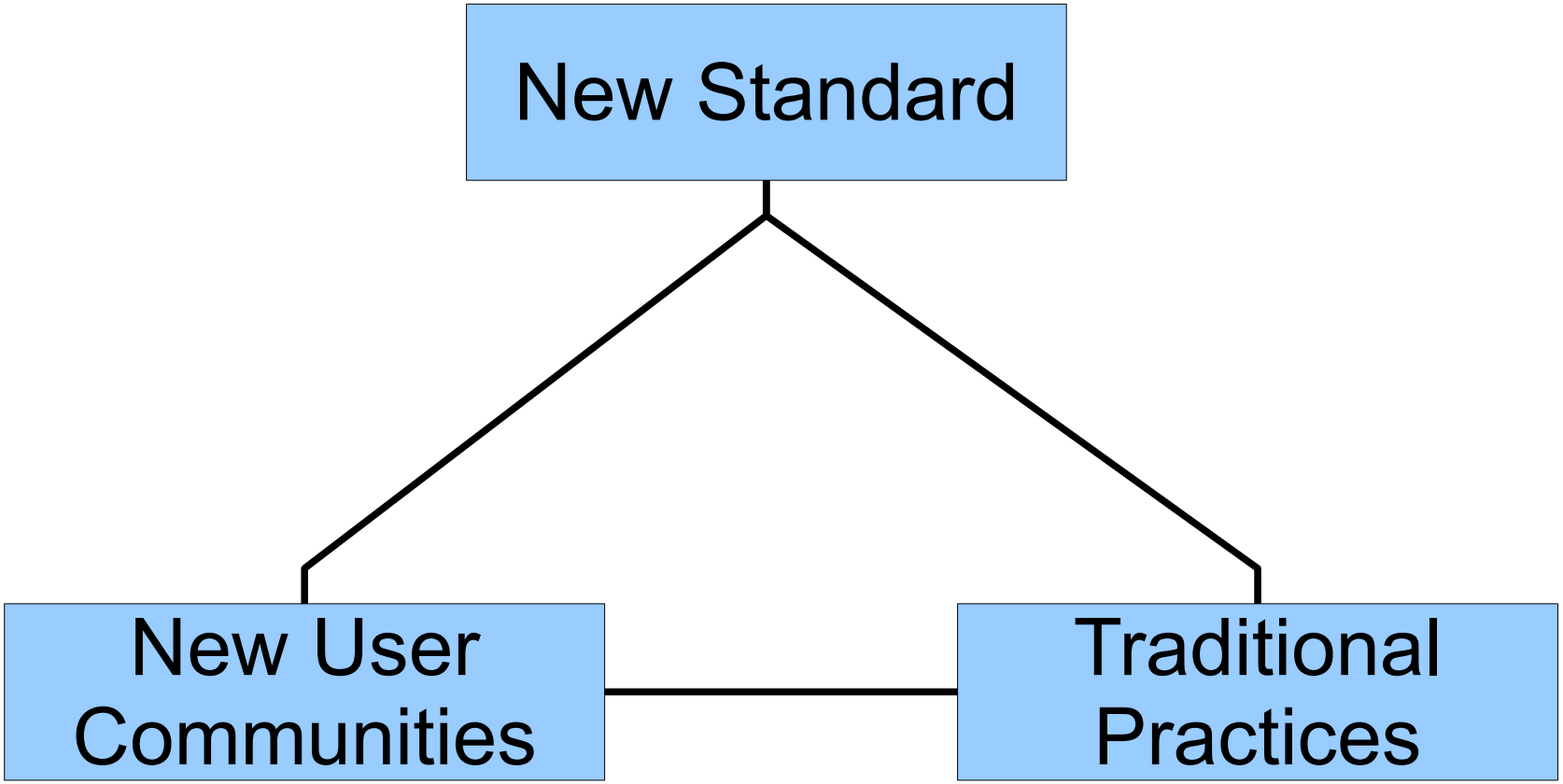
# Three key factors of interoperability activity:



# JMA activities for WIS

- DAR Catalogue
  - Further developing WMO profile of ISO 19115
  - SRU considered primary search protocol
- Communication protocols
  - OAI-PMH for metadata
  - Atom syndication for data
- Data formats
  - HTML5 Microdata
  - Data format interoperability

} Blog-based Technologies

# Metadata and Catalogue

- JMA has long experience
  - As RTH of GTS: WMO No. 9 Volume C1
  - Non-GTS data:

    General information catalogue (since 1997)

    now online and searchable: visit

    http://www.jma.go.jp/jma/kishou/177jmh/catalogue.html

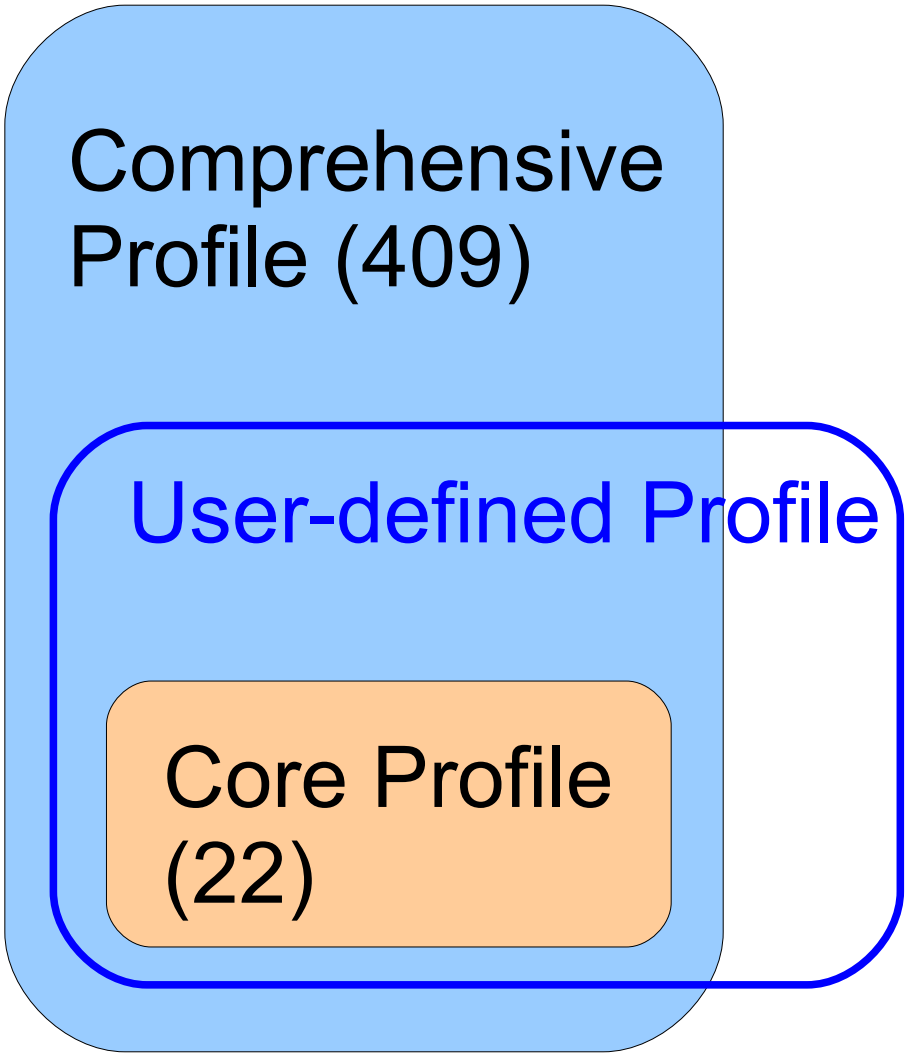
    if you can read Japanese language :-)
- Now working to establish WIS DAR standard and implementation

# Further Development of WMO Metadata Profile

- WMO Core Profile to ISO 19115 Metadata
  - Ver. 1.1 endorsed by CBS-XIV (March 2009)
- Almost identical to ISO 19115 Core Profile
  - Some code tables added
  - No extra structure
  - No element additionally mandated

# What is profile intended by ISO?

- Entire 19115 is too huge
  - 409 elements
- Core 19115 is too small
  - 22 elements
  - only 7 mandatory
- Users are supposed to select elements to suit application
  - that *is* profile



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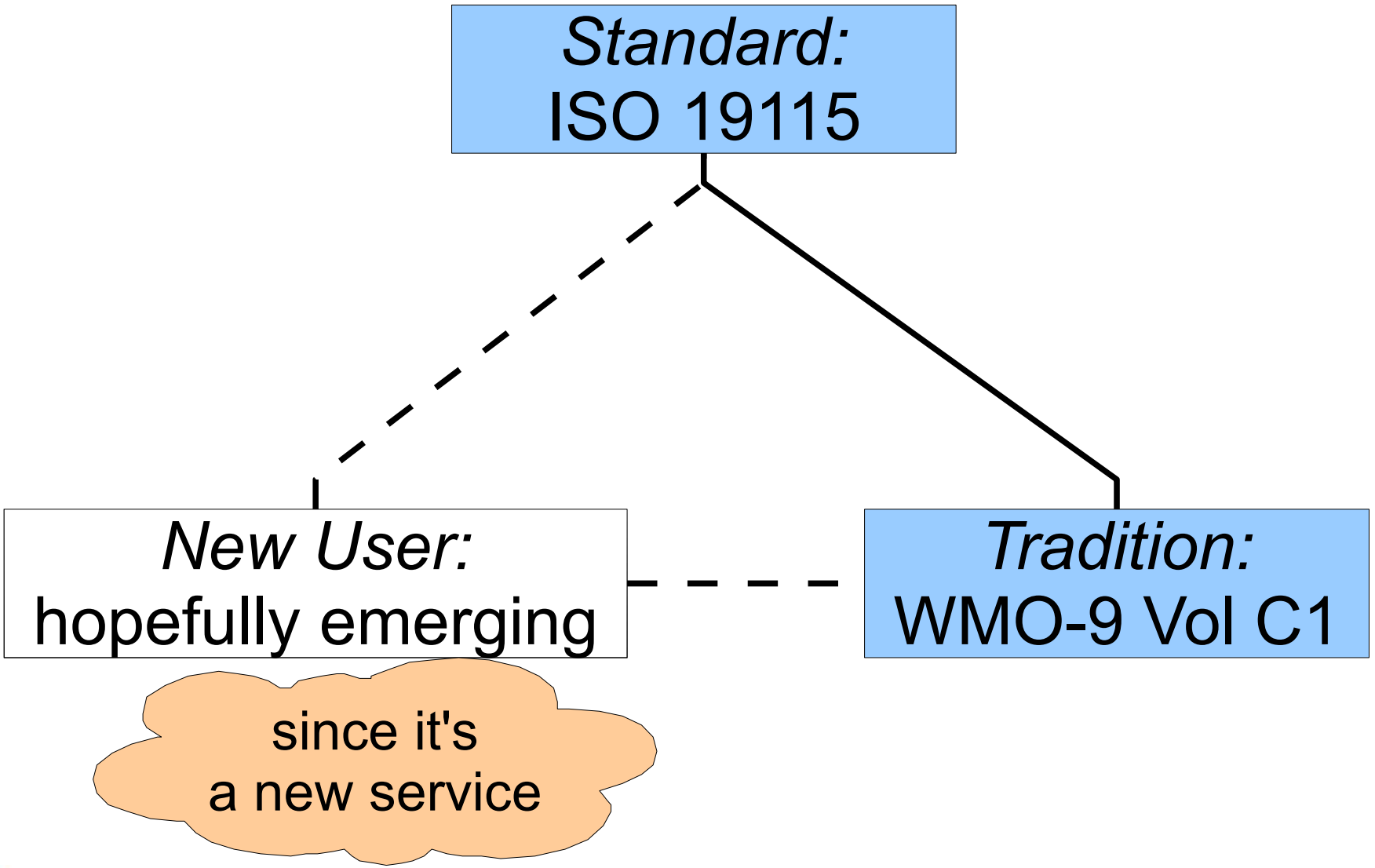
# Metadata profiles in Japan

- Generic GIS
  - Japan Metadata Profile v2.0
    by Geographical Survey Institute
    http://zgate.gsi.go.jp/ch/jmp20/cle_met_right.html
    (in Japanese)
  - Profile to ISO 19115 Core Profile
  - Conceptually parallel to INSPIRE
- Oceanography
  - Marine Metadata Profile
    by Japan Coast Guard
    http://www1.kaiho.mlit.go.jp/GIJUTSUKOKUSAI/KENKYU/report/tbh27/tbh27-01.pdf
    (in Japanese)
  - Profile to JMP 2.0

# Situation of metadata structre



# Proposal for DAR Metadata

- Discussion in IPET-MDI etc.
  - by JMA, CMA, and DWD
- Goal: practical guidance on Volume C1 to 19115 conversion
  - could be VolC1-type Profile

    VolC1 Profile ⊃ WMO Core ≒ ISO Core
  - or just a guideline is okay
  - more experience with new users/data will tell us better standard structure

# Observation station mapping

Tokyo Metadata | Tokyo File | Tokyo HTML5 Microdata

## Tokyo Metadata

Filtered[category=/synop_an, tag=france]

**/synop_an france**

| Published:2009-10-22T06:03:45Z | Updated:2009-10-22T06:03:45Z | Category:/synop_an | Tag:france |

- URL for Data File: http://www.shiken.kishou.go.jp/roller/tokyofile/page/filter?category=/synop_an&tag=france
- URL for HTML5 Microdata (Decoded Data): http://www.shiken.kishou.go.jp/roller/tokyomicrodata/page/filter?category=/synop_an&tag=france


KML file : Google Maps

- link name: SNFR34 LFPW
- code format: FM12-XI
- time(UTC): 01,02,04,05,07,08,10,11,12,13,14,16,17,19,20,22,23
- station number: 07260 07265 07374 07379 07385 07469 07473 07475 07480 07482 07486 07487 07491

Link

Priority Data File

HTML5 Microdata

Page Search

Category: /pilot_an /ship_an /synop_an

Tag: (exclude: ☐ ) finland france french_antilles french_guiana french_polynesia

Title:

Content:

Search | No Search |

Search with Global View

Category: /synop_an

Search

Atom Syndication

Updated-min: - - T : : Z

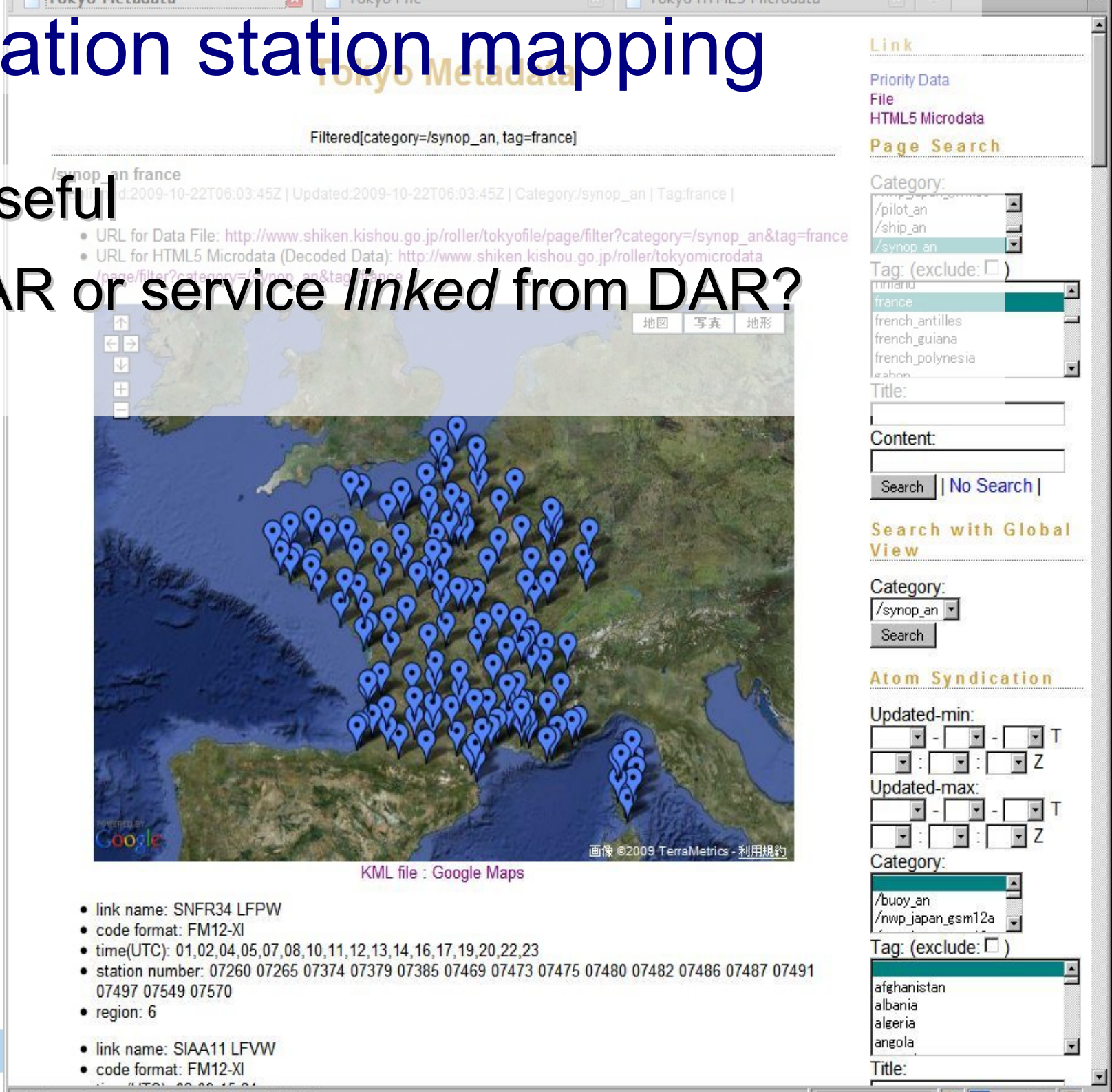
Updated-max: - - T : : Z

Category: /buoy_an /nwp_japan_gsm12a

Tag: (exclude: ☐ ) afghanistan

# Observation station mapping

- Very useful
- Is it DAR or service *linked* from DAR?

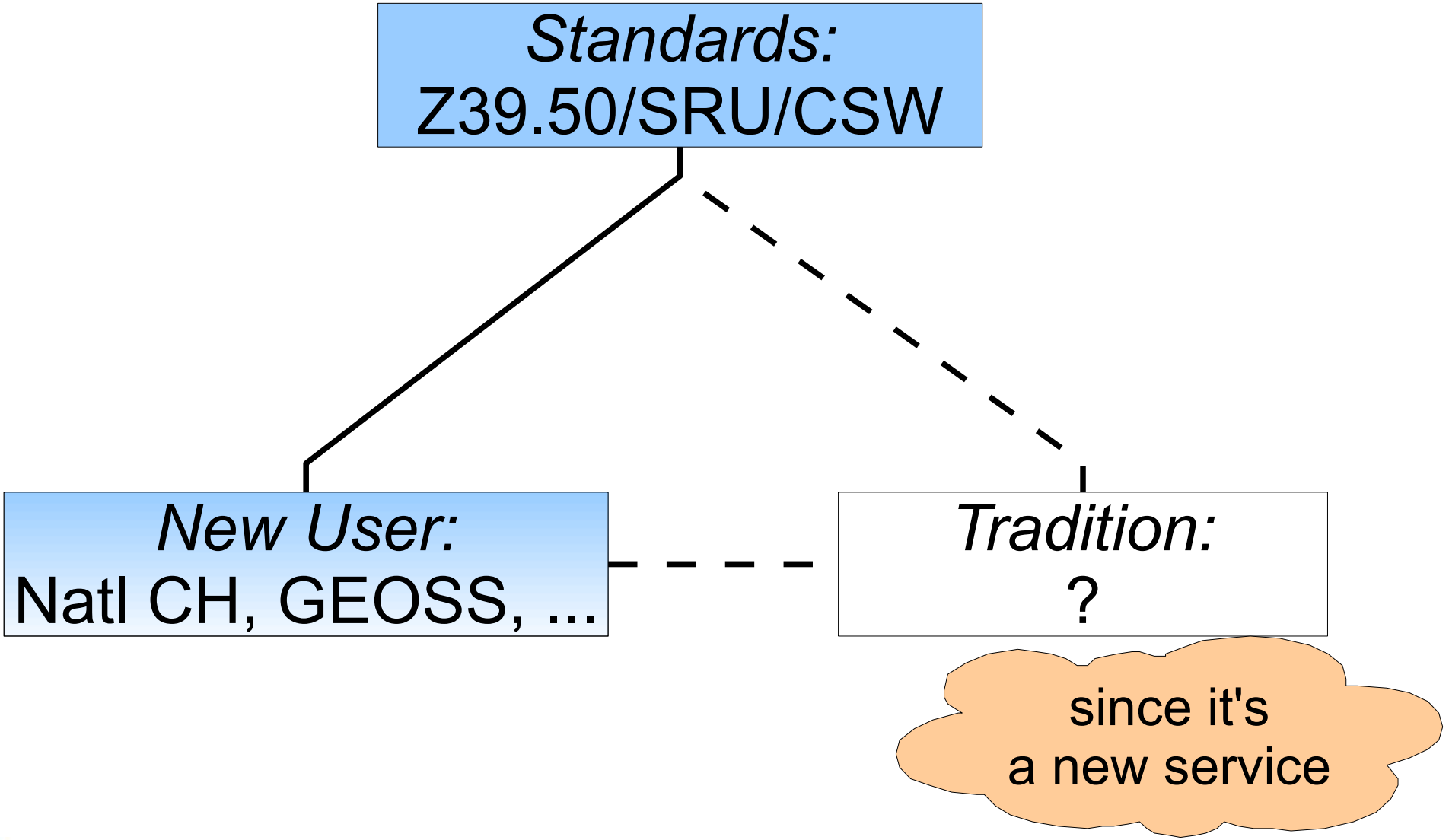


# Metadata Search Protocols

- ISO 23950 (aka ANSI Z39.50)
  - old, binary, and non-HTTP
  - anybody here wants *"raw"* Z39.50?
- SRU (Search by URL)
  - HTTP-based simple protocol, intended to be gateway to Z39.50
  - minimal requirement for WIS centres
- OGC CSW
  - concept similar to SRU

Further work/experience/guideline desired

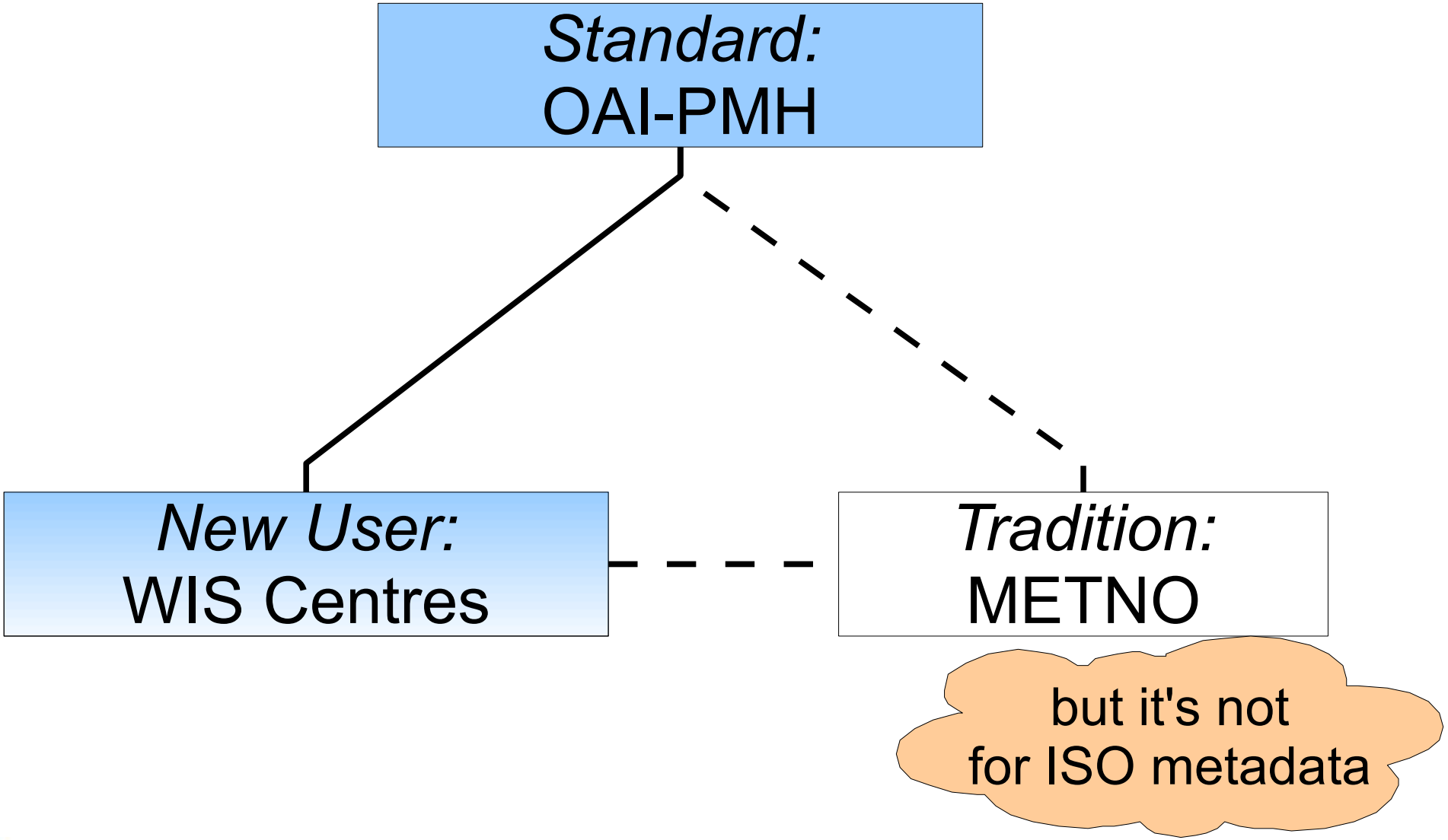
# Situation of metadata search



# Protocol to synchronize metadata

- GTS Practice
  - METNO bulletin tells change of Volume C1
  - (of course) not for ISO 19115
- OAI-PMH
  - standard of Open Archive Initiative
  - used in SIMDAT project
  - Tokyo-Beijing synchronization test working
- Any other activity?

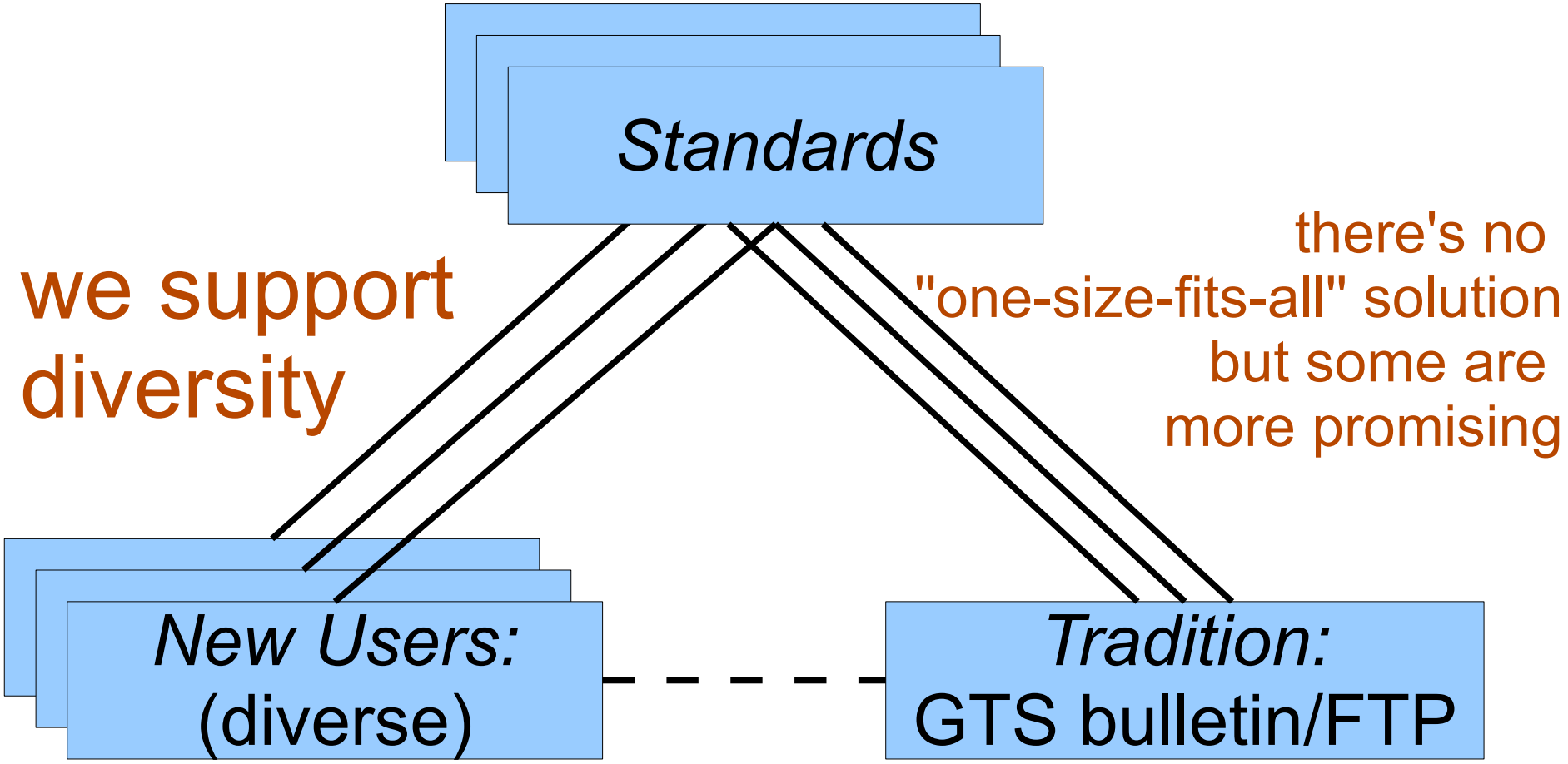
# Situation of metadata distribution



# Data transfer protocols

- Discussion was active since the onset of “Future WIS” concept
- Number of protocols have been proposed
  - Push
    - GTS store-and-forward
    - GTS-FTP, LDM, …
  - Middle: subscription
  - Pull
    - OPeNDAP
    - Pandora (REST used in JMA)
    - OGC WCS/WMS series

# Situation for data transfer protocol




if existing one doesn't work for you...

# Push vs pull controversy

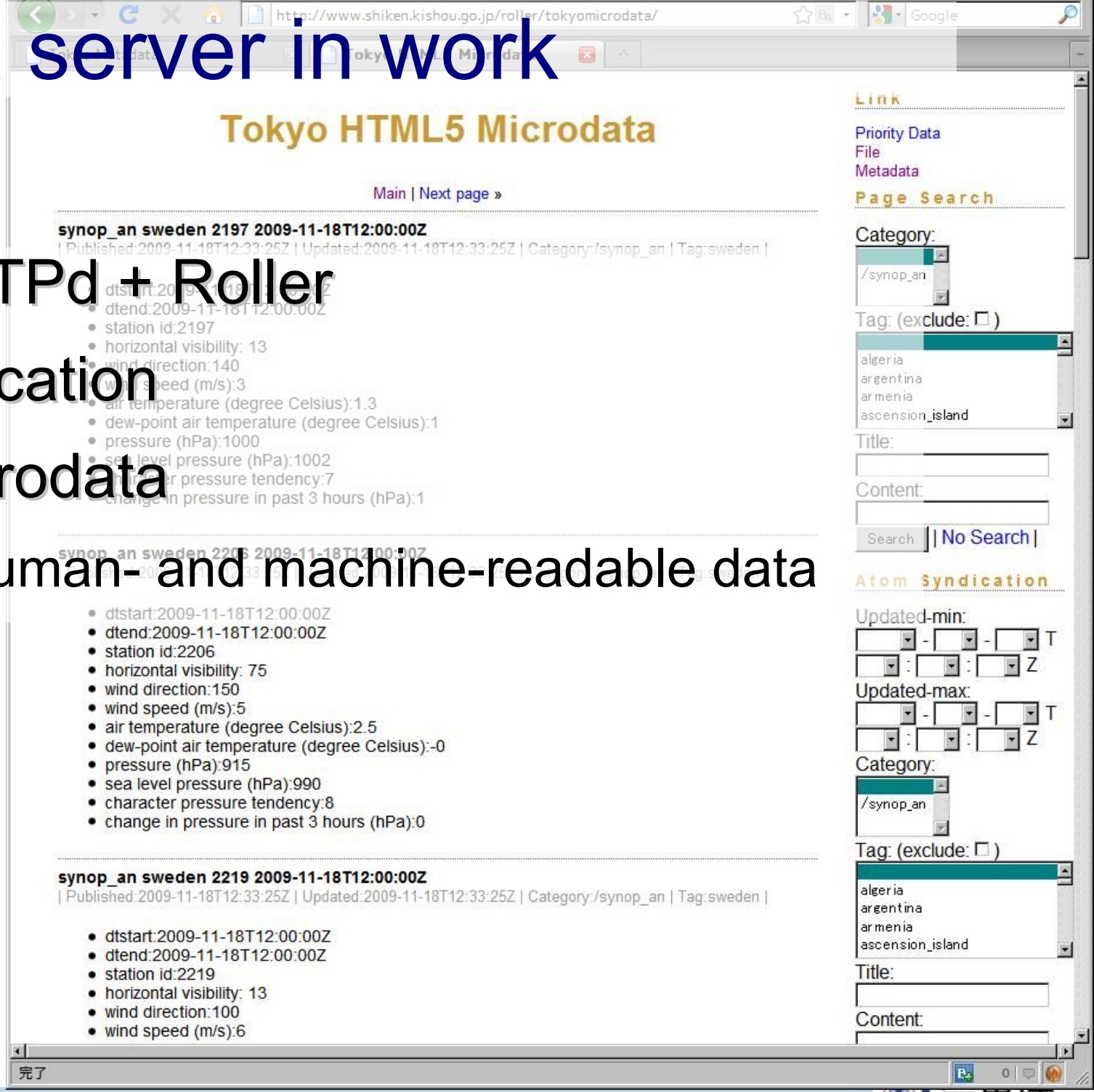
- Management – pull
  - in case of retry/backup/ad hoc setup
    recipient knows better what is needed
- Popularity – pull
  - everybody use the web
  - off-the-shelf httpd-CGI implementations
  - abundant knowledge on security
- Delay – push
  - polling is needed for pull protocols
  - average delay = ½ (poll interval)×(# hops)

# JMA's blog-based proposal

- HTTP-GET for data distribution
- Atom syndication (aka RSS) for update notification
  - text data can be bundled
  - widespread use of GeoRSS as substitute of metadata catalog
- Atom publishing for time-critical message
  - REST: simpler than SOAP

# Blog data server in work

- Apache HTTPd + Roller
- Atom Syndication
- HTML5 Microdata
  - Both human- and machine-readable data



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# Microdata display of SYNOP

- HTML code (extract)

```
<section item="vevent int.wmo.synop">
<ul>
<li>coordinates:
    <span itemprop="vevent int.wmo.vevent.geo">+42.55;+9.48</span></li>
<li>air temperature (degree Celsius):
    <span itemprop="int.wmo.prop.temperature">11.0</span></li>
<li>pressure (hPa):
    <span itemprop="int.wmo.prop.pressure">1017</span></li>
</ul>
</section>
```

- Rendering
  - coordinates: +42.55; +9.48
  - air temperature (degree Celsius): 11.0
  - pressure (hPa): 1017

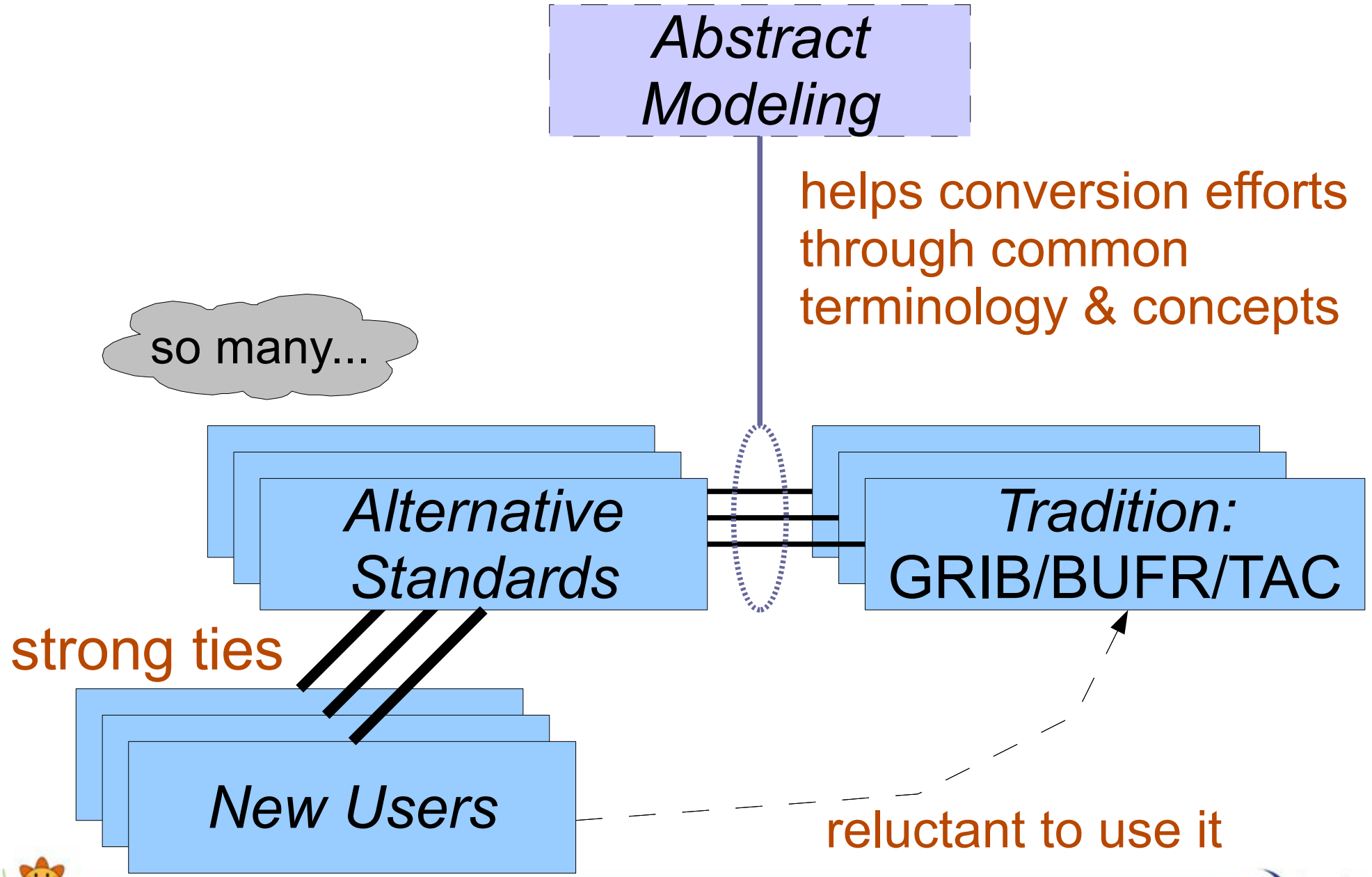
# Data formats (1) aviation OPMET

- Tradition
  - METAR, TAF, SIGMET, …
  - AFTN limitations character set & message size
- Users: aviation community
  - seeking more quality and additional info
  - future of AFTN environment?
- Standard
  - XML
    - work in progress at CBS IPET-MDI

# Data formats (2) grid data

- Tradition: GRIB
- Many users:
  - academia: CF-NetCDF
  - space science: HDF
  - GIS: GeoTIFF, ArcInfo, ERDAS, …
- Possible way forward
  - forced unification won't work
  - conversion
    - spec: comparison of data forms
    - terminology: common/ISO data models

# Situation for data interoperability



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# Future: web services & conversion

Standardised conversion will help:

- WMS/WCS
  - parameter `FORMAT=`
  - mapserver uses GDAL
- Pandora (used in JMA)
  - request header `Accept:` or filename suffix
- OpeNDAP
  - server: format-by-format implementations
  - client does not care about source data structure

# Summary

- JMA in WIS: RTH on IMTN and prospective GISC
- Three keys of interoperability
  - traditional practice
  - new user community
  - standard
- Interoperability is desired for
  - metadata format & search protocol
  - data transfer protocol
  - data format

We have proposals & are open to discussion