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WMO Codes Registry:
http://codes.wmo.int

86th OGC Technical Committee

Frascati, Italy

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Overview of WMO Codes Registry

- WMO Codes Registry provides web-based publication of authoritative vocabulary for new data exchange standard WMO AvXML enabling transmission of XML-encoded operational meteorological data for international air navigation (OPMET) as specified in ICAO Annex 3 Amd 76 (Nov 2013)

- Implemented with UKgovLD Registry software using RDF and Linked-Data principles – open source (Apache 2 license) on GitHub

- Definitive source of terms is WMO No. 306 Manual on Codes and other WMO Technical Regulation

- Current coverage of WMO No. 306 is sparse as initial objective is support for WMO AvXML; commitment from WMO to expand coverage

- Service operated on behalf of WMO by Met Office for initial 2-years from September 2013

- For further information, please refer to User Guide, FAQ and technical documentation

Overview of Registry concepts

- **Register**: a single controlled collection (e.g. a *list*) maintained on behalf of some owner organization which provides the authority & governance regime for the collection

- **Entity**: a member of the controlled collection – the Entity type is completely open but may be constrained by the Register's governance policy

- **Sub-register**: a Register may contain other Registers, enabling creation of arbitrarily complex sub-register hierarchies

- **Register Item**: a metadata record describing the relationship of an Entity to a given Register – the Register Item includes a graph of information properties that describe the Entity as determined by the Register manager enabling a local description of the Entity to be maintained within the Registry

- Data model is derived from ISO 19135 'Geographic information – Procedures for item registration' – please refer to technical documentation for full details of the data model

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Registry information views

- The Registry design assumes that the majority of users simply want to access the list of member entities for a given Register; a "Container view" is provided for this purpose
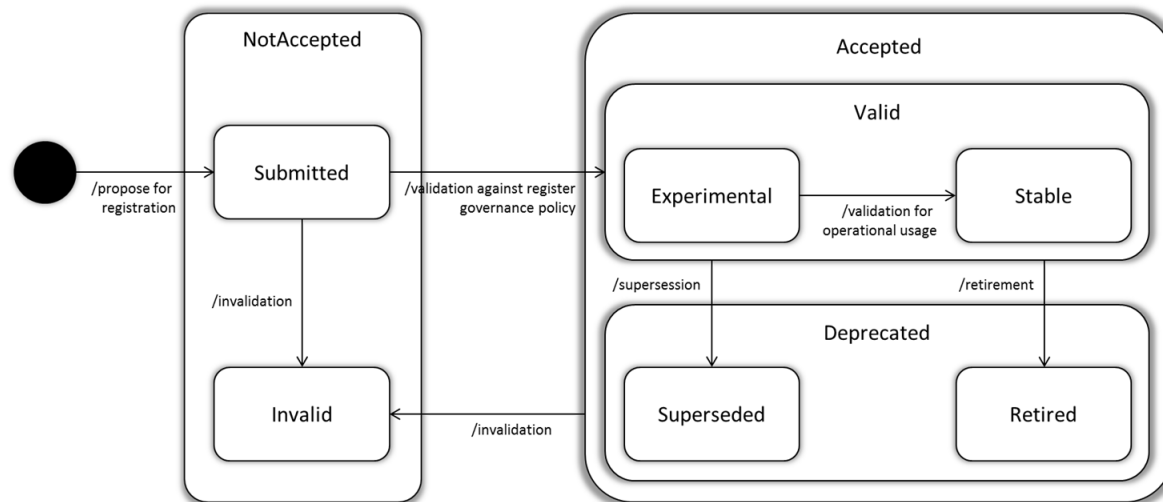- A "full view" provides expert users with detailed item-level metadata …
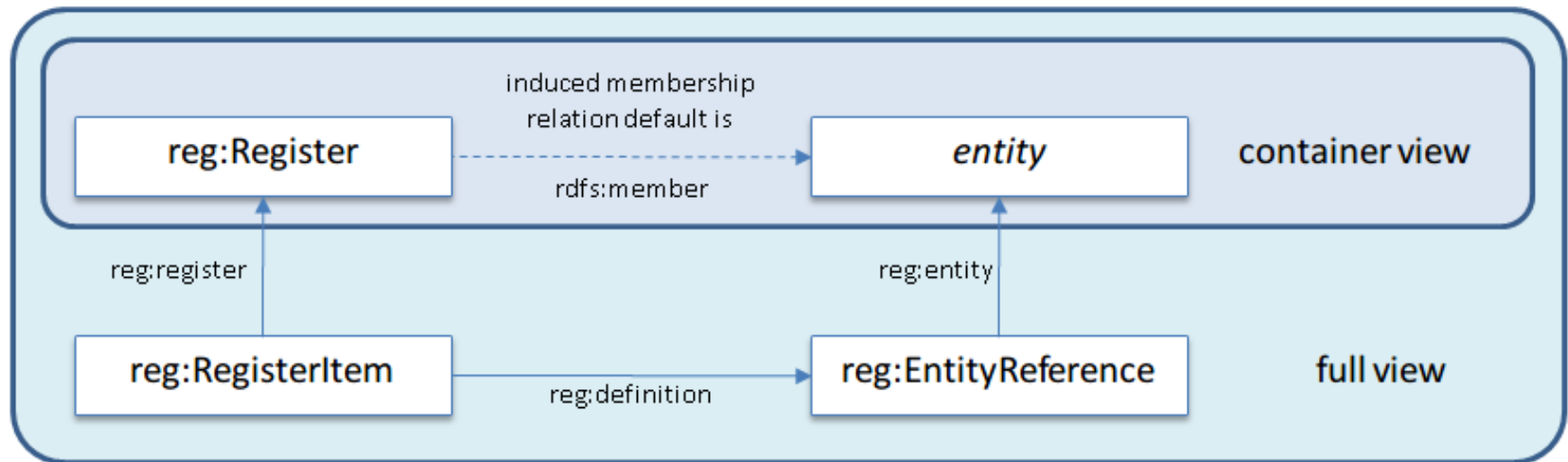
Relationship between Register, Entity and Register Item

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Register Item status and lifecycle

- A Register Item has status within its associated Register
- Status is not intrinsic to the Entity but rather a statement of how the Entity is regarded by the Register's authority
- Lifecycle is derived from ISO 19135 'Geographic information – Procedures for item registration'
- Note that only Entities whose Register Item has status "Accepted" (& subtypes thereof) are regarded as members of the Register

NotAccepted

Submitted

/propose for registration

/validation against register governance policy

/invalidation

Invalid

/invalidation

Note: entities with status 'NotAccepted' are not considered to be members of the register.

Accepted

Valid

Experimental

/validation for operational usage

Stable

/supersession

/retirement

Deprecated

Superseded

Retired

Note: entities with status 'Accepted' are considered to be members of the register and are included in the default response to a register READ request.

Note: it is permitted, albeit unusual to invalidate a deprecated entity.

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History and versioning

- The Registry service maintains an accessible history of changes to Registers and Register Items – including changes to the graph of information properties used to describe the Entity

- **Concept management 101**: it is essential that changes to the description of an Entity do not change its semantics; once allocated, the Entity's identifier should always refer to the same concept – else data "in the wild" referring to that concept (e.g. using the identifier) may be rendered incorrect. Instead, deprecate the concept and introduce a replacement that supersedes it. Likewise, don't delete concepts; mark them as retired

- For more information regarding history and versioning please refer to technical documentation

WMO Codes Registry web application & API

- The WMO Codes Registry provides two forms of read and modify access:
  - Programmatic access via an API
  - Human readable access via a web application
- Details of the programmatic API can be found [here](#), including a [summary of the API operations](#)
- Modification of Registry content requires authorization – external Identity Providers are used to authenticate via the [OpenID protocol](#) (currently only Google is validated as a working Identity Provider, but other OpenID providers may also work)
- By default, HTML content is provided; this may be overridden using the `_format={format}` query parameter; content negotiation is also supported
  - [HTML](#):   text/html
  - [Turtle](#):   text/turtle   `?_format=ttl`
  - [RDF/XML](#):   application/rdf+xml   `?_format=rdf`
  - [JSON-LD](#):   application/ld+json   `?_format=jsonld`

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Overview of web application navigation (i)

- The figure below provides a generic overview of navigation within the web application; please refer to the User Guide (pg: 19-30) for a more detailed review …

Overview of web application navigation (ii)

1. Link to root Register; provides quick access to top-level Registers
2. Links to Registry functions
3. Search facility to find resources within the WMO Codes Registry; based on textual properties of resources (e.g. label, description)
4. Link to user authentication page
5. "Breadcrumb" specifying the path to current Register; provides hyperlinks to parent Registers for quick access
6. Register or Entity label
7. Register or Entity description
8. Register or Entity status
9. Links providing data-download access for the current Register or Entity
10. Tabs providing information about the current Register or Entity
11. Sidebar providing quick access to supplemental information for the current Register or Entity
12. Information section; content varies depending on which tab is selected

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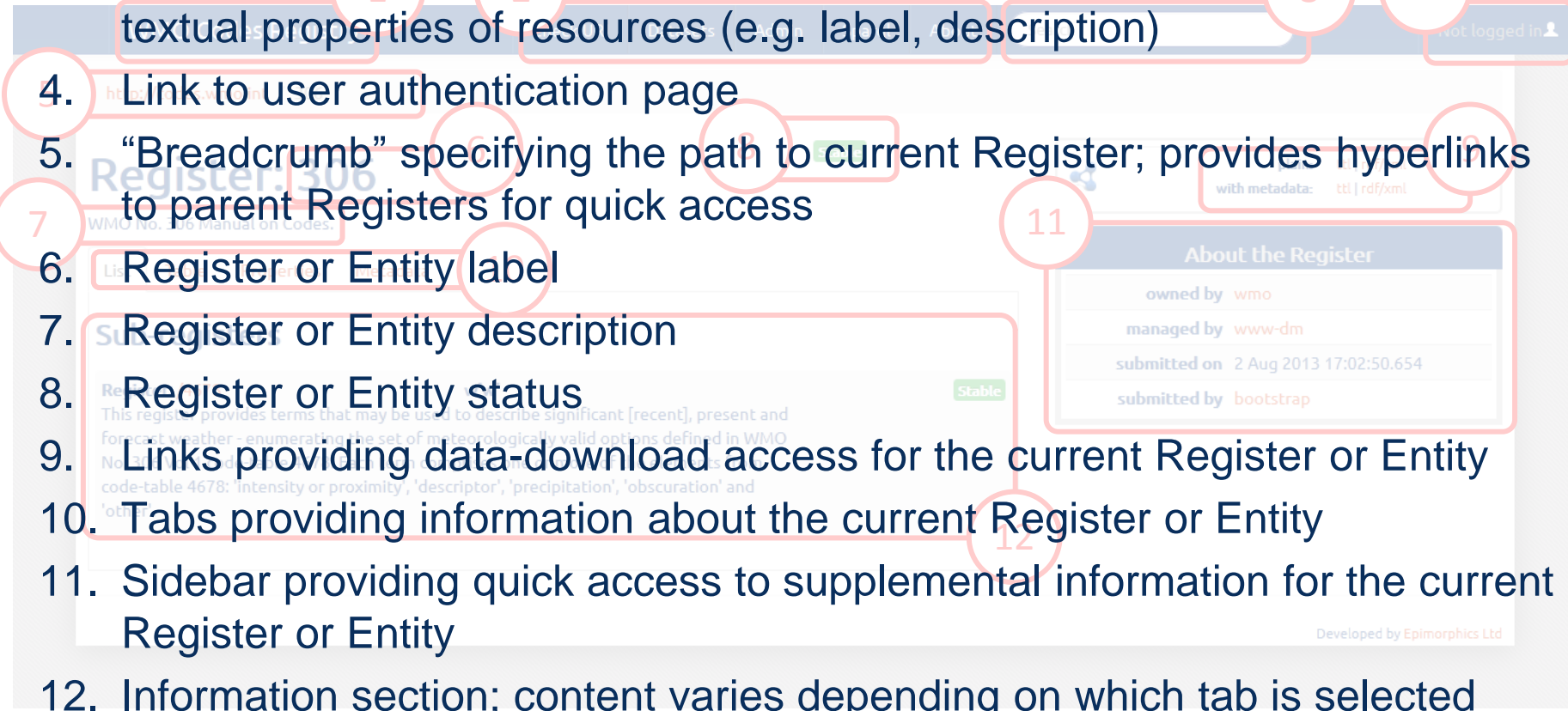
Top-level Registers

- Top-level Registers in the WMO Codes Registry are aligned with WMO publications
- Currently, this includes:
  – WMO No. 306 – Manual on Codes
  – WMO No. 49 Volume II – Meteorological Services for Air Navigation
- Due to their frequency of use, top-level registers are also provided for terms drawn from *WMO No. 306 – Manual on Codes – International Codes, Volume I.2*; FM 92 GRIB (edition 2), FM 94 BUFR (edition 4) and Common features
- Each top-level register is assigned a unique URI within the wmo.int domain:
  – WMO No. 306   http://codes.wmo.int/306
  – WMO No. 49-2   http://codes.wmo.int/49-2
  – FM 94 BUFR (edition 4) http://codes.wmo.int/bufr4
  – FM 92 GRIB (edition 2) http://codes.wmo.int/grib2
  – Common Features   http://codes.wmo.int/common

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Leaf Registers

- The WMO Codes Registry is organized into Sub-registers; where possible this is aligned with the organization of the WMO publications

- Each Sub-Register is assigned a unique URI – adding a further segment to the URI of the parent Register

- Leaf Registers represent the code-tables themselves; for example, table 0 20 086 "Runway deposits" from FM 94 BUFR (edition 4) Code- and Flag-tables has identifier http://codes.wmo.int/bufr4/codeflag/0-20-086

0 20 086

Runway deposits

Code figure	
0	Clear and dry
1	Damp
2	Wet with water patches
3	Rime and frost covered (depth normally less than 1 mm)
4	Dry snow
5	Wet snow
6	Slush
7	Ice
8	Compacted or rolled snow
9	Frozen ruts or ridges
10–14	Reserved
15	Missing or not reported (e.g. due to runway clearance in progress)

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«CodeList» classes within AvXML

- The leaf Registers are bound to «CodeList» classes in the AvXML Application Schema enabling the controlled vocabulary for AvXML to managed outside the model ...

Excerpt from BUFR edition 4 Code- and Flag-tables

Codes and associated concepts

- The Entities within these leaf Registers are the *concepts* represented by the codes, whilst the codes themselves are implemented as the Register Items

- Where available, the numeric identifiers from the WMO code-tables are used as the Register Item 'notation'

- In the majority of cases, the unique URI for an Entity is assigned by appending the 'notation' to the identifier of the containing Register – thus ensuring clash-free allocation of identifiers; the Register Item identifier is distinguished from the Entity identifier by use of the underscore "_" syntax

WMO Codes Registry | Check URI | Datasets | Admin | Sparql | About | Search | Not logged in

http://codes.wmo.int / bufr4 / codeflag / 0-20-086 / _6   **Register Item URI**

Entity: Slush

URI: http://codes.wmo.int/bufr4/codeflag/0-20-086/6   **Entity URI**   Stable

Type: runwayDeposits

Snow or ice on the ground that has been reduced to a soft watery mixture by rain, warm temperature, and/or chemical treatment.

plain: ttl | rdf/xml
with metadata: ttl | rdf/xml

About the Item
submitted on 2 Aug 2013 17:02:39.776
submitted by bootstrap

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Externally managed Entities

- In some cases, the Entity that is registered is defined elsewhere in the Registry – or perhaps defined by some external authoritative source

- In such cases the Register Item identifier is still allocated by appending the 'notation', prefixed with an underscore "_" character, to the identifier of the containing Register. However, the identifier of the Entity shall refer to the external definition

- For example, see the `/common/nil` Register that curates nil-reason codes:
  - Register Item: `http://codes.wmo.int/common/nil/_AboveDetectionRange`
  - Entity: `http://www.opengis.net/def/nil/OGC/0/AboveDetectionRange`

Register membership validation mechanisms

- The WMO Codes Registry provides validation via both web application and programmatic API

- In the case of the web application, one simply enters the URI of the term to be validated in the form-field and selects "check" …

- Alternatively, the programmatic API may be used to achieve the same result by way of a HTTP POST request; e.g.
  - **[POST]** http://codes.wmo.int/bufr4?
        validate=http://codes.wmo.int/bufr4/codeflag/0-20-086/1
  - **[HTTP 200 OK]** http://codes.wmo.int/bufr4/codeflag/0-20-086/1 is
        http://codes.wmo.int/bufr4/codeflag/0-20-086/_1

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e questo è quello *(& that's that)*

Questions please –

although the answers might need to be provided post-meeting

For further information please refer to the User Guide, FAQ and technical documentation

Molte grazie!

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