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COBWEB
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UCD DUBLIN

Groundwater SWG
GroundWaterML2 (GWML2)

99th OGC Technical Committee

Dublin, Ireland

Boyan Brodaric & GW SWG

20-24 June 2016

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Making location count.

Agenda

- GWML2 History

- GWML2 Recent Progress

- GWML2 Next Steps

- GWML2 Contents

- Wrap-up

GWML2: History

- **2009-2011: GW1IE** (OGC HDWG)

  Test GW data interoperability using OGC standards and GWML1

- **2012-2015: GW2IE** (OGC HDWG)

  Objectives: develop and test draft **GWML2**

  Participants: 13 agencies; N. America, EU, AU/NZ

  Activities: 50 meetings since June 2012 Kick-off (Reading, UK)

  Results: GWML2 Eng Report (15-082)
    - » completed Sept 2015, approved Nov 2015, released Apr 2016

  14 web services (WMS, WFS, SOS, WPS)

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GWML2: Recent Progress

- **2015-2016: GW SWG**

  Sept 2015: charter submitted (**OGC 15-110**)

  Feb 2016: GW SWG approved/initiated

  Mar 2016: **GWML2** standard submitted (**OGC 16-032**)

  Apr   2016: OAB review

  May 2016: **GWML2** standard revised (**OGC 16-032r1**)

  - Conceptual model made normative (+ reqs & conf classes)
  - Clarifications re: linked data principles, association classes

  May 2016: OGC-NA review

  June 02 2016: **GWML2** standard revised (**OGC 16-032r2**)

  - URL template revision
  - Empty req & conf classes: due to inheritence → change request pending

  June 17 2016: Public review ends: *no changes requested*

  June 23 2016: OGC vote to begin final vote @ Dublin TC closing plenary

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GWML2: Next Steps

- **2016: GW SWG**

    OGC e-vote to ratify **GWML2**r2

    public release of **GWML2**r2

    SWG meetings as required (maintenance, changes)

    initiate WMO approval process (Silvano Pecora champion)

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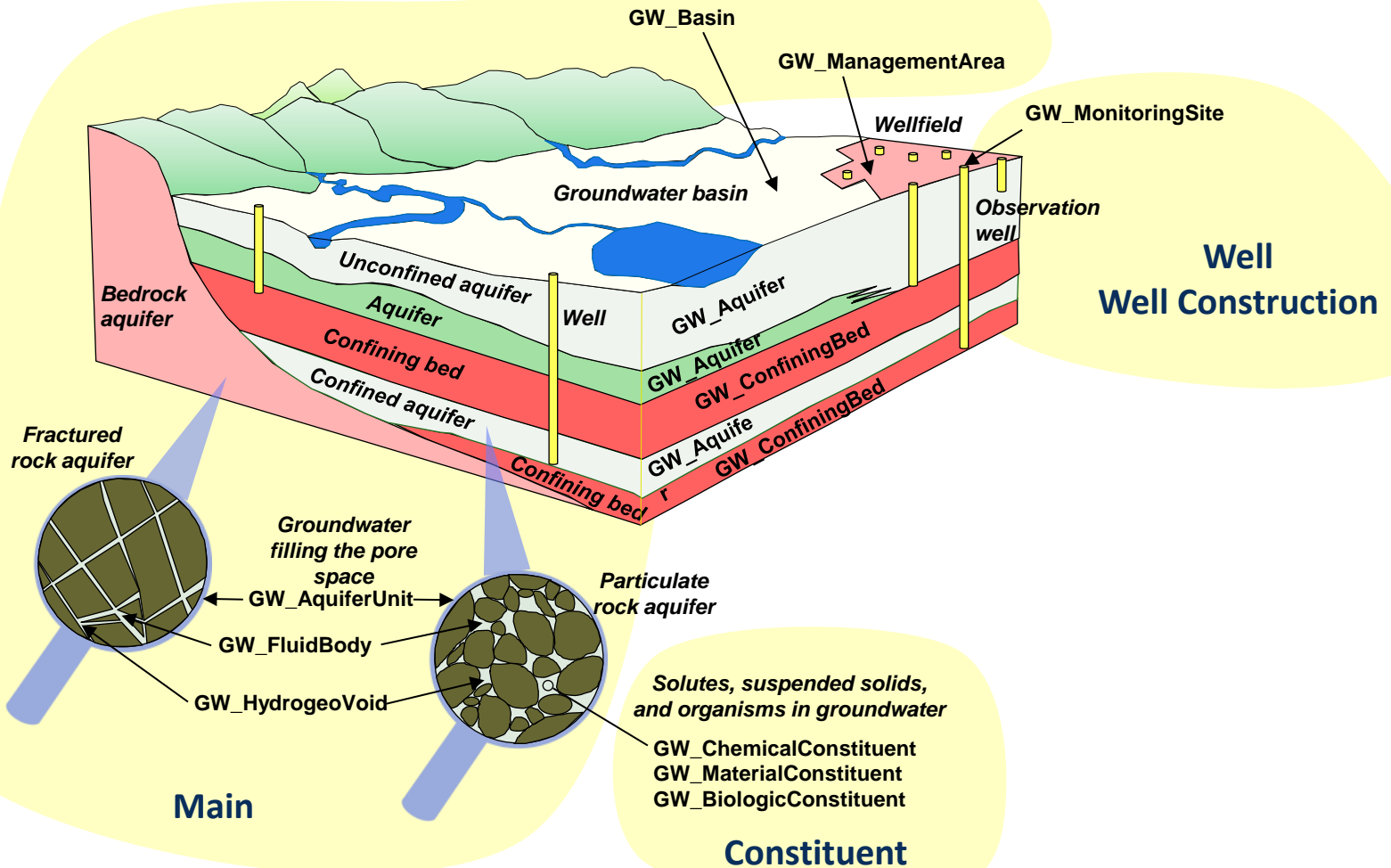
GWML2: Content Overview

- **5 Use-cases**

- **Conceptual Model (CM: text + UML)**
  - technology-neutral, domain-specific
  - narrative defs (vocabulary) → UML

- **Logical Model (LM: UML)**
  - technology-specific implementation of CM (e.g. GML abstract model)
  - **Packages (6)**: *Main, Fluid Bodies, Constituent, Flow, Well, Well Construction, Aquifer Test*
  - **Features (9):** e.g. GW_HydrogeoUnit (Aquifer), GW_Well, …
  - **Extends (3)**: GeoSciML4, O&M, Interleaved Coverage

- **Physical Model (GML-XML schema)**
  - for the syntactical encoding of logical model

- **GML-XML instance examples**
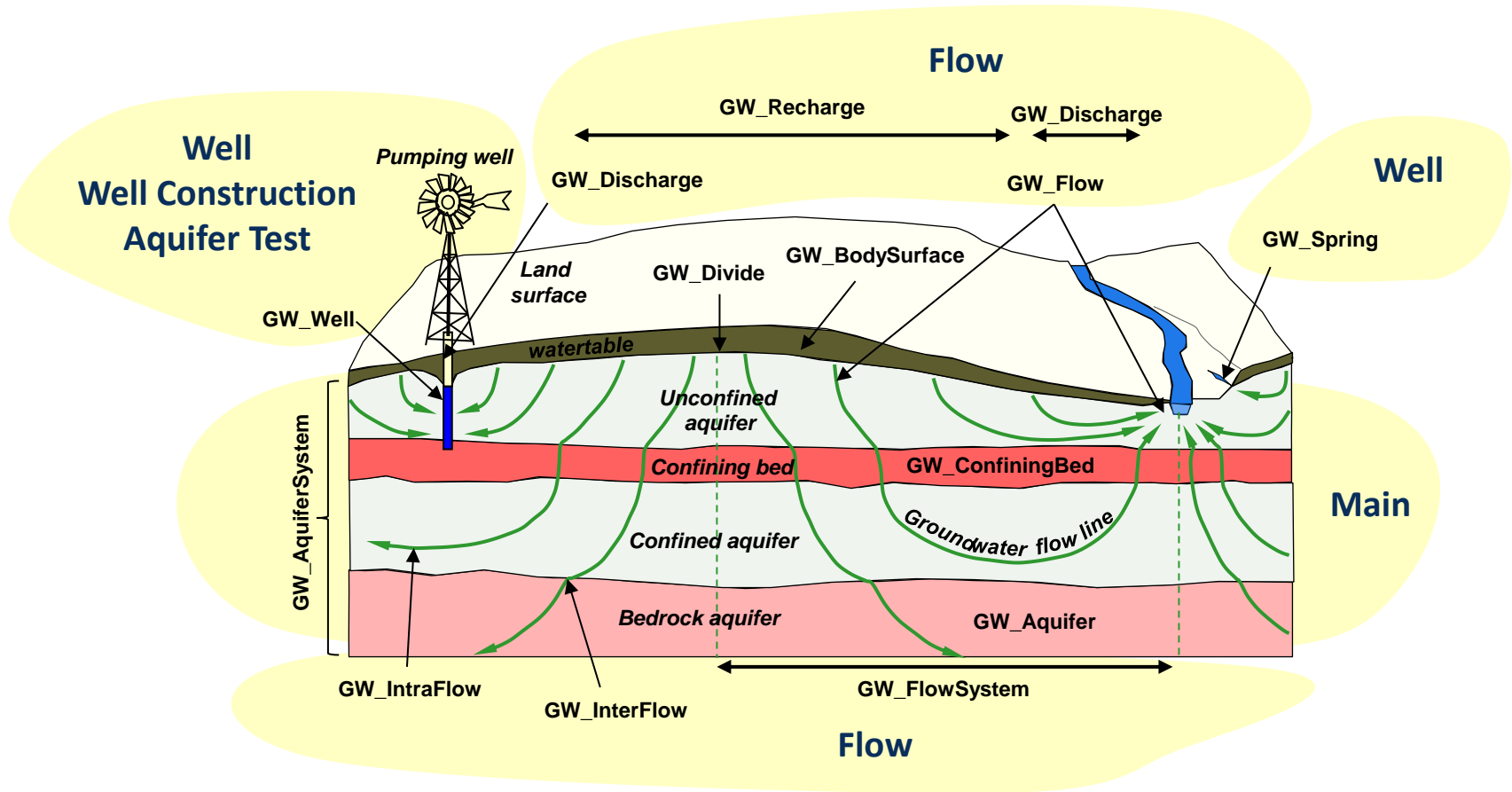 - syntactical encoding examples

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GWML2: Use-cases

1. **Commercial** - find water wells, estimate water well cost
   http://external.opengis.org/twiki_public/HydrologyDWG/UseCase1

2. **Policy** - meet EU Water Framework Directive needs
   http://external.opengis.org/twiki_public/HydrologyDWG/UseCase2

3. **Environmental** - risks to gw dependent ecosystems
   http://external.opengis.org/twiki_public/HydrologyDWG/UseCase3

4. **Scientific** - groundwater flow modeling
   http://external.opengis.org/twiki_public/HydrologyDWG/UseCase4

5. **Technologic** – map GWML2 to existing info models
   http://external.opengis.org/twiki_public/HydrologyDWG/UseCase5

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GWML2: CM & LM Scope

GWML2: CM & LM Scope

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GWML2: GML-XML Schemas

- Publically available from SVN
  - **Schemas:** https://xp-dev.com/svn/gwml2/schemas/
  - **Constraints**: https://xp-dev.com/svn/gwml2/Documents/schematron/
- To be migrated to OGC repository upon approval
  - URL pending

gwml2-aquifertest.xsd

gwml2-constituent.xsd

gwml2-flow.xsd

gwml2-main.xsd

gwml2-well.xsd

gwml2-wellconstruction.xsd

gwml2.xsd

gwml2-aquifertest.sch

gwml2-construction.sch

gwml2-main.sch

gwml2-well-vertical.sch

gwml2-well.sch

xml-rules.sch

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GWML2: GML-XML instance examples

- **Complete coverage:** all parts of **GWML2**
- **Publically available:** via SVN

  https://xp-dev.com/svn/gwml2/Documents/instance/

- **Public web services**: URLs forthcoming

```
▼<gsml:gbUnitDescription>
  ▼<gsmle:GeologicUnitDescription>
    <gsmle:bodyMorphology xlink:href="http://resource.geosciml.org/classifier/cgi/geologicunitmorphology/layer
  </gsmle:GeologicUnitDescription>
</gsml:gbUnitDescription>
<!-- add more compositions -->
<gwml2:gwUnitMedia xlink:href="http://gw-info.net/media/granular" xlink:title="granular"/>
<gwml2:gwUnitWaterBudget xsi:nil="true"/>
▼<gwml2:gwUnitRecharge>
  ▼<gwml2f:GW_Recharge gml:id="gin.richelieu.recharge.1">
    ▼<gml:location>
      <gml:LocationString>Regional precipitation</gml:LocationString>
    </gml:location>
    <gwml2f:gwFlowPersistence nilReason="missing"/>
    <gwml2f:gwFlowProcess xlink:href="urn:Precipitation" xlink:title="Precipitation"/>
    ▼<gwml2f:gwFlowTime>
      ▼<gml:TimePeriod gml:id="gin.richelieu.recharge.1.ft">
        <gml:beginPosition>2012-04-01</gml:beginPosition>
        <gml:endPosition>2013-03-31</gml:endPosition>
      </gml:TimePeriod>
    </gwml2f:gwFlowTime>
    <gwml2f:gwFlowVelocity xsi:nil="true" nilReason="unknown"/>
  ▼<gwml2f:gwFlowVolumeRate>
```

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GWML2: Wrap-up

Since HDWG Workshop 2015 (Orleans)

- GW2IE completed
- GW SWG started
- **GWML2** submitted to OGC

Next Steps

- OGC ratification
- WMO standard initiation

- Questions?
- Comments?

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