Units in the IVOA architecture

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Naples

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IVOA standards

- Search all IVOA Standards for mentions of Units

- Get a comprehensive view of :

  - where units are used

  - how they are used

- What / how can we stardardize ?

Units Where and How ?

- Where

  - Unit attribute : <FOO ... unit="" ... />

  - Unit element : <TAG>unit here</TAG>

    - corresponding utype "ns:This.Is.My.Unit"

- How Unit strings are spelled (scheme) : basic units + rules for combining (km/s)

  - IAU 1989 : more typographic rules

  - Standard for catalogues (2000: CDS, AAS)
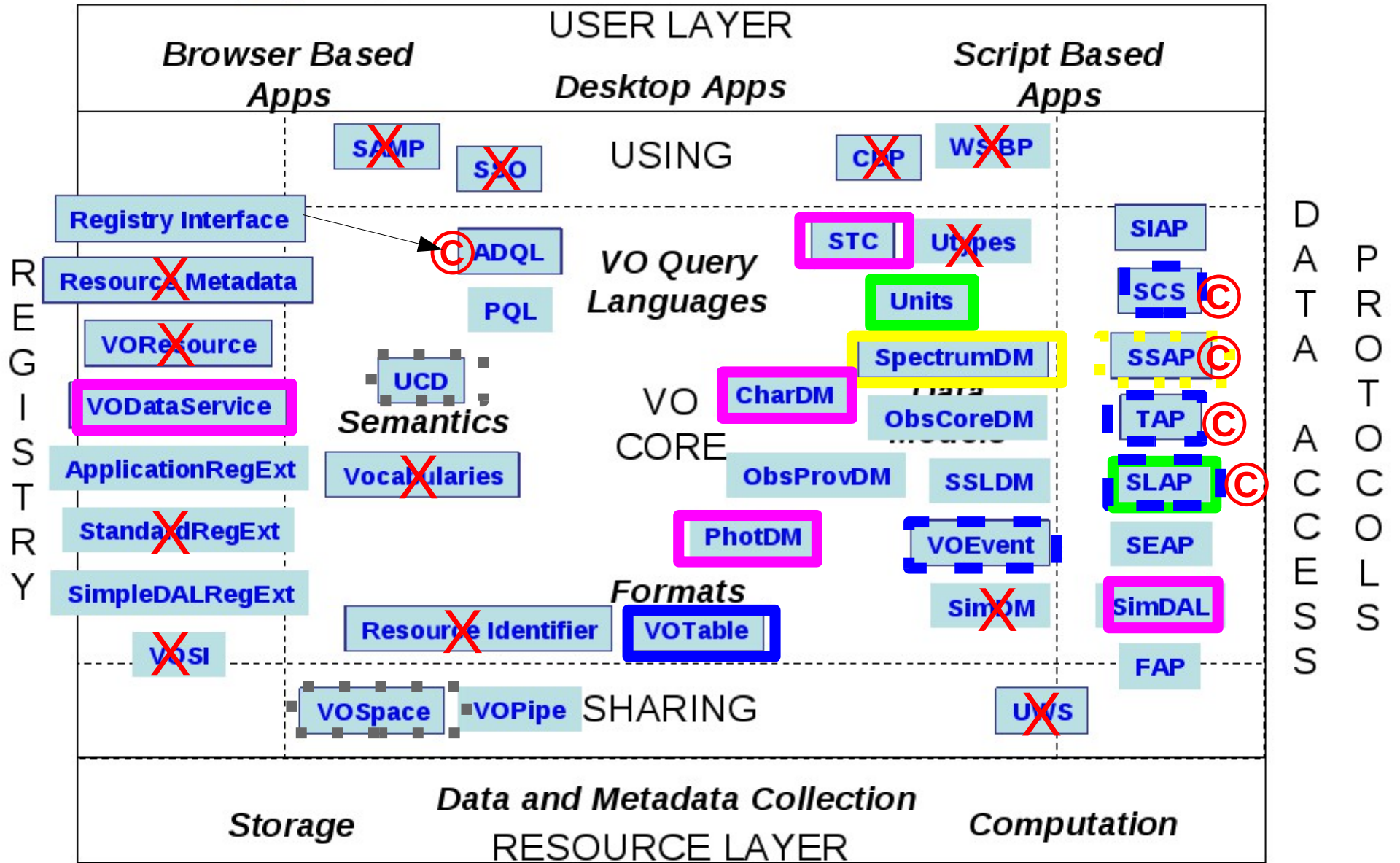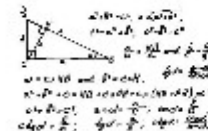
  - OGIP (1993: HEASARC)

LEVEL 2

USERS

COMPUTERS

REC

InProgress

USER LAYER

Browser Based Apps

Desktop Apps

Script Based Apps

SAMP ~~SSO~~ USING ~~CLIP~~ ~~WSBP~~

Registry Interface SIAP

Ⓒ ADQL *VO Query Languages* STC ~~Utypes~~

~~Resource Metadata~~ PQL Units SCS Ⓒ

~~VOResource~~ SpectrumDM SSAP Ⓒ

VODataService UCD CharDM TAP Ⓒ

Semantics VO ObsCoreDM

ApplicationRegExt ~~Vocabularies~~ CORE ObsProvDM SSLDM SLAP Ⓒ

~~StandardRegExt~~ PhotDM VOEvent SEAP

SimpleDALRegExt *Formats* SimDM SimDAL

~~VOSI~~ ~~Resource~~ Identifier VOTable FAP

VOSpace VOPipe SHARING ~~UWS~~

R E G I S T R Y

D A T A   A C C E S S

P R O T O C O L S

Data and Metadata Collection

Storage *Computation*

RESOURCE LAYER

20101004
IVOA Architecture

PROVIDERS

Units in VO Standards

- Through VOTable 1.2

- OGIP conventions

- Dedicated entities in Data Models, utypes

(possibly with dimensional equations)

- Remarks, no clear restrictions

- Restricted or implicit Units values ©

Units in VOTable 1.2

```
<FIELD ... unit="" ... />
<PARAM ... unit="" ... />
```

- Section 4.4 of VOTable 1.2 Rec
  - String without blanks or spaces
  - Relies on
    - IAU 1989 recommendation
    - Section 4 in Greisen and Calabretta 2002, A&A 395, 1061
    - Catalogues standard description @CDS
- Not always compliant in examples !!

DM vs DAL

- Data Models often do not constrain Unit strings, no recommended scheme

- DAL protocols often

  - restrict possible units

  - have implicit units

Restricted Units (enumerated)

- SIAP
  - Field VOX:BandPass_Unit = meters | hertz | keV
- SLAP
  - ssldm:Line.****Level.energy.value : Joules
  - char:TimeAxis.Coverage.Bounds.**** days
- SSAP
  - POS, TIME (degrees), BAND (meters) TIME (ISO 8601 UTC??)

Implicit Units in protocols

- CS : RA, DEC SR in decimal degrees

- SIA 1.0 : POS, SIZE in decimal degrees

- SLAP : WAVELENGTH in meters, EINSTEIN_A in s-1

- ADQL 2.0 : coordinates angles in decimal degrees

Discussions about Units

- "UCDs are not units". There is a word meta.unit

- TAPRegExt : unit=rows or bytes

- VOSpace 2.0 : properties may have units

Non-compliant Units examples

- SLAP : <TD>micron</TD>

- ObsCore DM : kbyte, kB, Kbytes

Units in Semantics session

- Present current status

- Proposals for VOUnits

- Feedback to all documents in PR / RFC