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Role of the Information Model in Tool Development

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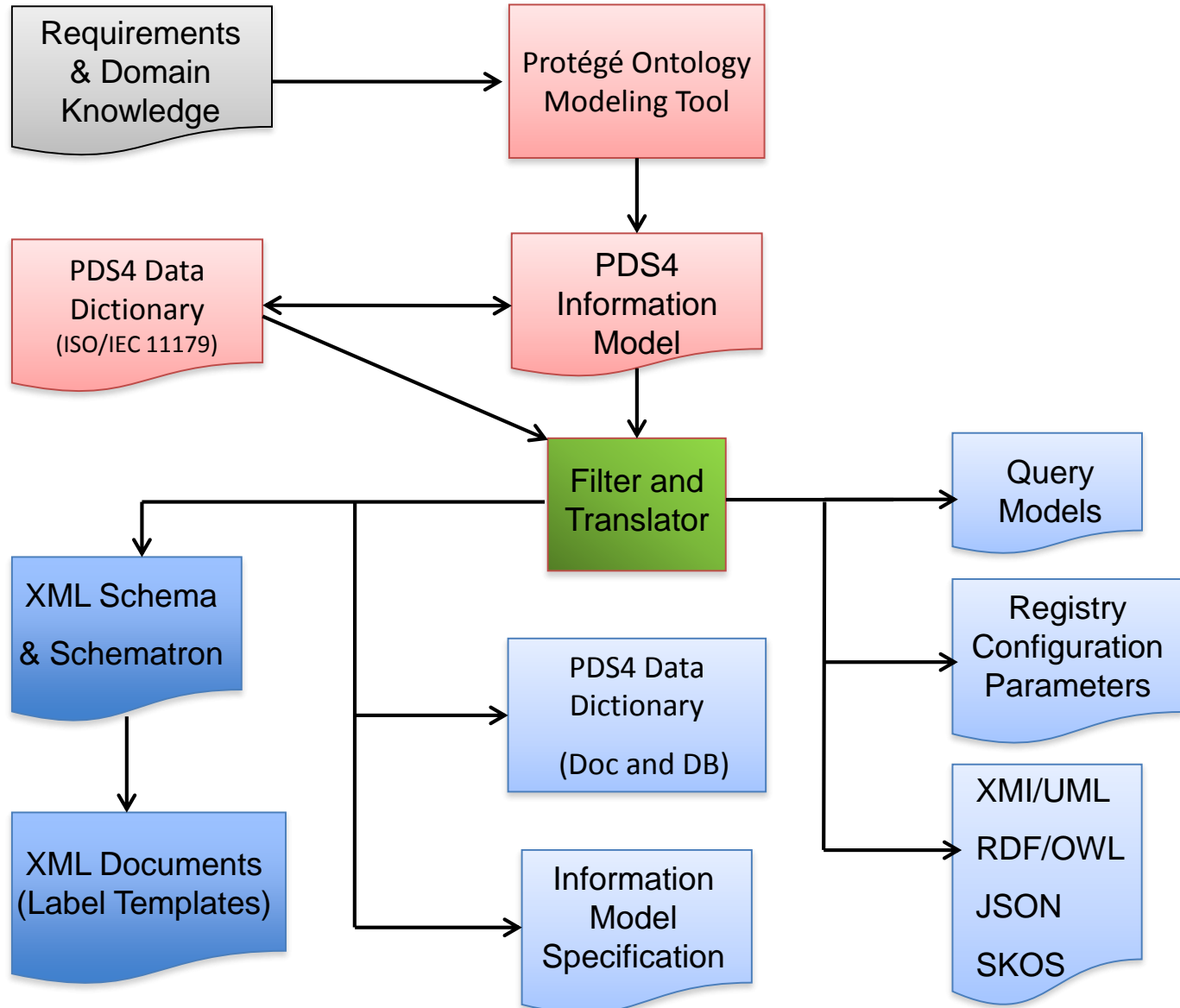


Principles

- The information model provides a comprehensive set of formal data requirements.
 - Can be used directly (after translation):
 - to configure software and services
 - as source code for
 - data structure definitions
 - classes and basic methods (*getting and setting variables*)
 - Documentation (system and user)
- *An information model in data engineering is a representation of concepts and the relationships, constraints, rules, and operations to specify data semantics for a chosen domain of discourse. - Y. Tina Lee (1999). "Information modeling from design to implementation" National Institute of Standards and Technology.*



Work Flow





PDS4 Definitions

- Defines the data structure (format)
- Defines the interpretation of the data
- Defines the context within which the data was captured, processed, and archived
- Defines the relationships between the data



Current Translations and Uses

- XML Schema and Schematron
 - PDS4 Label Template Generation and Label Validation
 - *The core PDS4 software is fully integrated (e.g., registries, validate tool, search, etc).*
 - LACE – Label Designer
- JSON (JavaScript Object Notation)
 - APPS – PDS4 Data Standards Database
 - APPS – SIS Generation



Current Translations and Uses

- UML (Unified Modeling Language)
 - Documentation – UML Class Diagrams
 - Class and Methods for class attribute get and set
- RDF (Resource Description Framework)
 - SKOS – Linked Open Data (LOD) Project
- DocBook, HTML, LaTeX
 - Documentation



JSON (Array Definition)

```
{
  "dataDictionary": {
    "Title": "PDS4 Data Dictionary" ,
    "Version": "1.4.0.0" ,
    "Date": "Thu Feb 12 22:26:42 PST 2015" ,
    "Description": "This document is a dump of the contents of the PDS4 Data Dictionary" ,
    "classDictionary": [
      {
        "class": {
          "identifier": "0001_NASA_PDS_1.pds.Array" ,
          "title": "Array" ,
          "registrationAuthorityId": "0001_NASA_PDS_1" ,
          "nameSpaceId": "pds" ,
          "steward": "pds" ,
          "versionId": "1.0.0.0" ,
          "description": "The Array class defines a homogeneous N-dimensional array of scalars. ..."
            , "associationList": [
              {"association": {
                "identifier": "0001_NASA_PDS_1.pds.Byte_Stream.pds.name" ,
                "title": "name" ,
                "isAttribute": "true" ,
                "minimumCardinality": "0" ,
                "maximumCardinality": "1"
              }
            }
          }
        }
      }
    ]
  }
}
```



JSON (axis_index_order)

```
, {  
  "attribute": {  
    "identifier": "0001_NASA_PDS_1.pds.Array.pds.axis_index_order" ,  
    "title": "axis_index_order" ,  
    "registrationAuthorityId": "0001_NASA_PDS_1" ,  
    "nameSpaceId": "pds" ,  
    "steward": "pds" ,  
    "versionId": "1.4" ,  
    "description": "The axis_index_order attribute provides the axis index that varies fastest with respect to storage order." ,  
    "isMandatory": "false" ,  
    "isEnumerated": "true" ,  
    "dataType": "ASCII_Short_String_Collapsed" ,  
    "minimumCharacters": "1" ,  
    "maximumCharacters": "255" ,  
    "minimumValue": "Unbounded" ,  
    "maximumValue": "Unbounded" ,  
    "pattern": "null" ,  
    "unitOfMeasure": "null" ,  
    "unitId": "null" ,  
    "defaultUnitId": "null"  
  } ,  
  "PermissibleValueList": [  
    {  
      "PermissibleValue": {  
        "value": "Last Index Fastest" ,  
        "valueMeaning": "The values of a multi-dimensional array are stored in an order such ..."  
      }  
    }  
  ]  
}
```




Recommendations

1. Core tools should be fully driven by the information model
2. DN tools should take advantage of the information model (and not hard code the model)
3. EN/DN should identify additional formats for exporting the model
4. If there are gaps or other useful information needed in the model, we can add them