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MIABIS as a modular system

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MIABIS 2.0

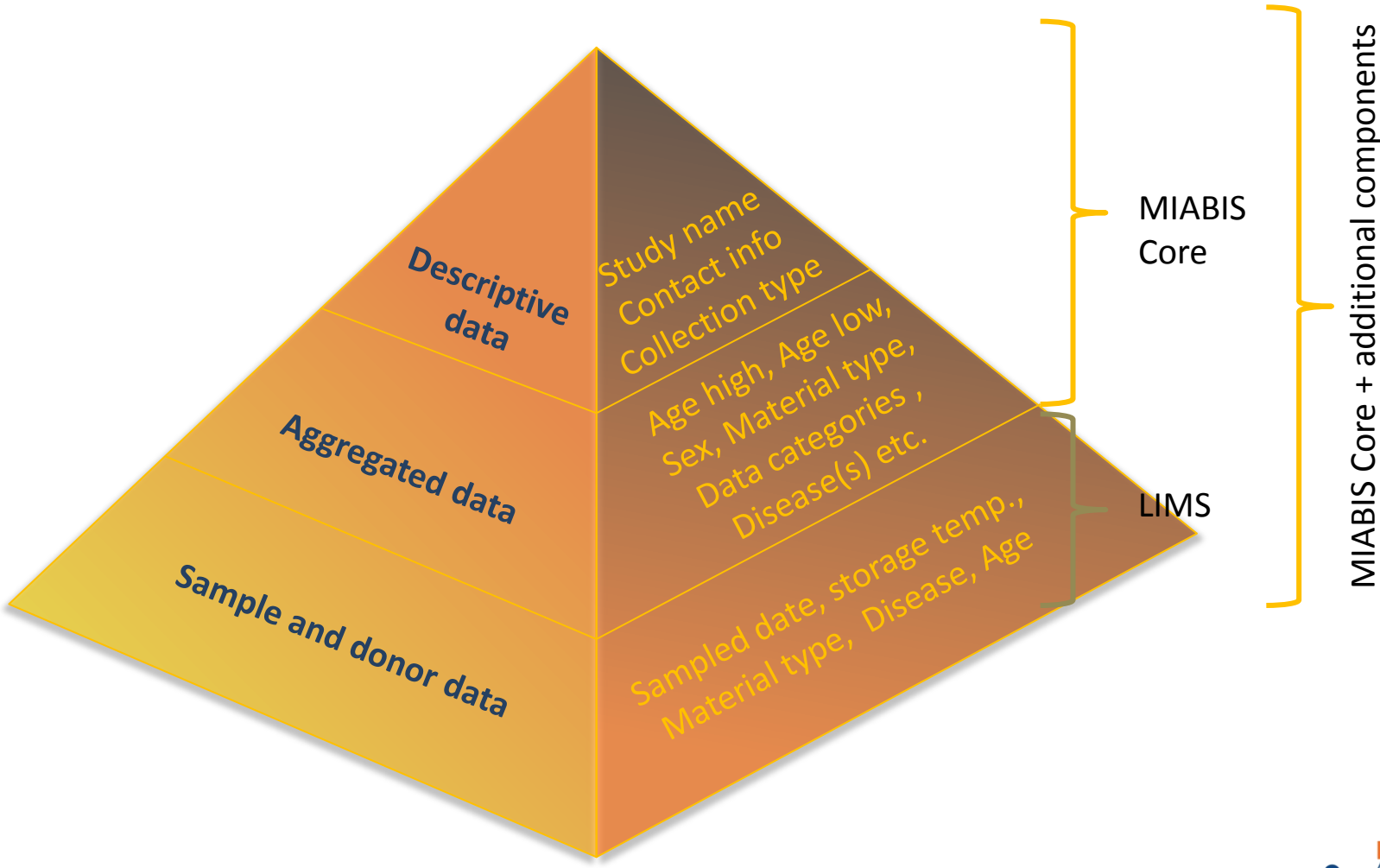
- Core modules:
  - Biobanks
  - Sample collections
  - Studies

- Modules under development:
  - Patients
  - Samples
  - Sample quality
  - Experiments (-omics)
  - Rare diseases

Why use a modular system?

- Different use cases:
  - Biobank catalogue – summary information
  - Study catalogue – information per sample
  - Availability catalogue – counting samples via filtering
  - Workflow system for sample / data set request
  - Biobank Information System – operational support
  - Publication – minimum information for in the paper

Biobank Information Data Pyramid



Biobanks (Core)

- Definition[1]:
  1. "Collections, repositories and distribution centres of all types of human biological samples, such as blood, tissues, cells or DNA and/or related data such as associated clinical and research data, as well as biomolecular resources, including model- and microorganisms that might contribute to the understanding of the physiology and diseases of humans" (BBMRI-ERIC)
  2. "An organized collection of human biological material and associated information stored for one or more research purposes" (P3G)
- Defines the organisation: juristic person, contact person

[1]Fransson MN et al. Toward a common language for biobanking., Eur J Hum Genet. 2014 Apr 9. doi: 10.1038/ejhg.2014.45

Sample Collections (Core)

- Definition[1]:
  1. "A collection of samples with at least one common characteristic" (Swedish Association of Local Authorities and Regions)
  2. "A number of samples collected or gathered together, viewed as a whole" (Oxford English Dictionary)
- Defines common characteristics of a collection

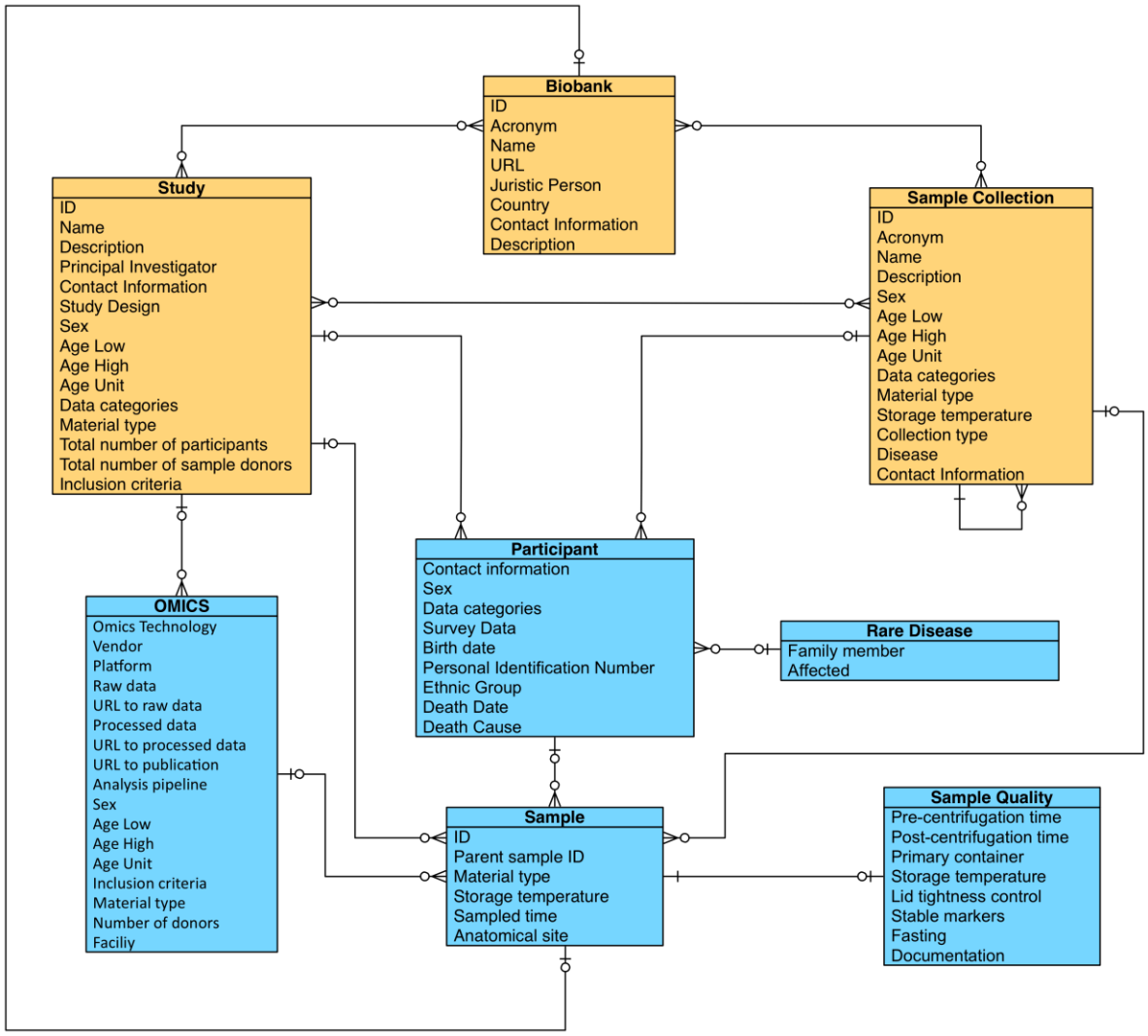
Studies (Core)

- Definition[1]:
  1. "A detailed examination, analysis or critical inspection of a subject designed to discover facts about it" (NCI)
- Defines common characteristics used in the study

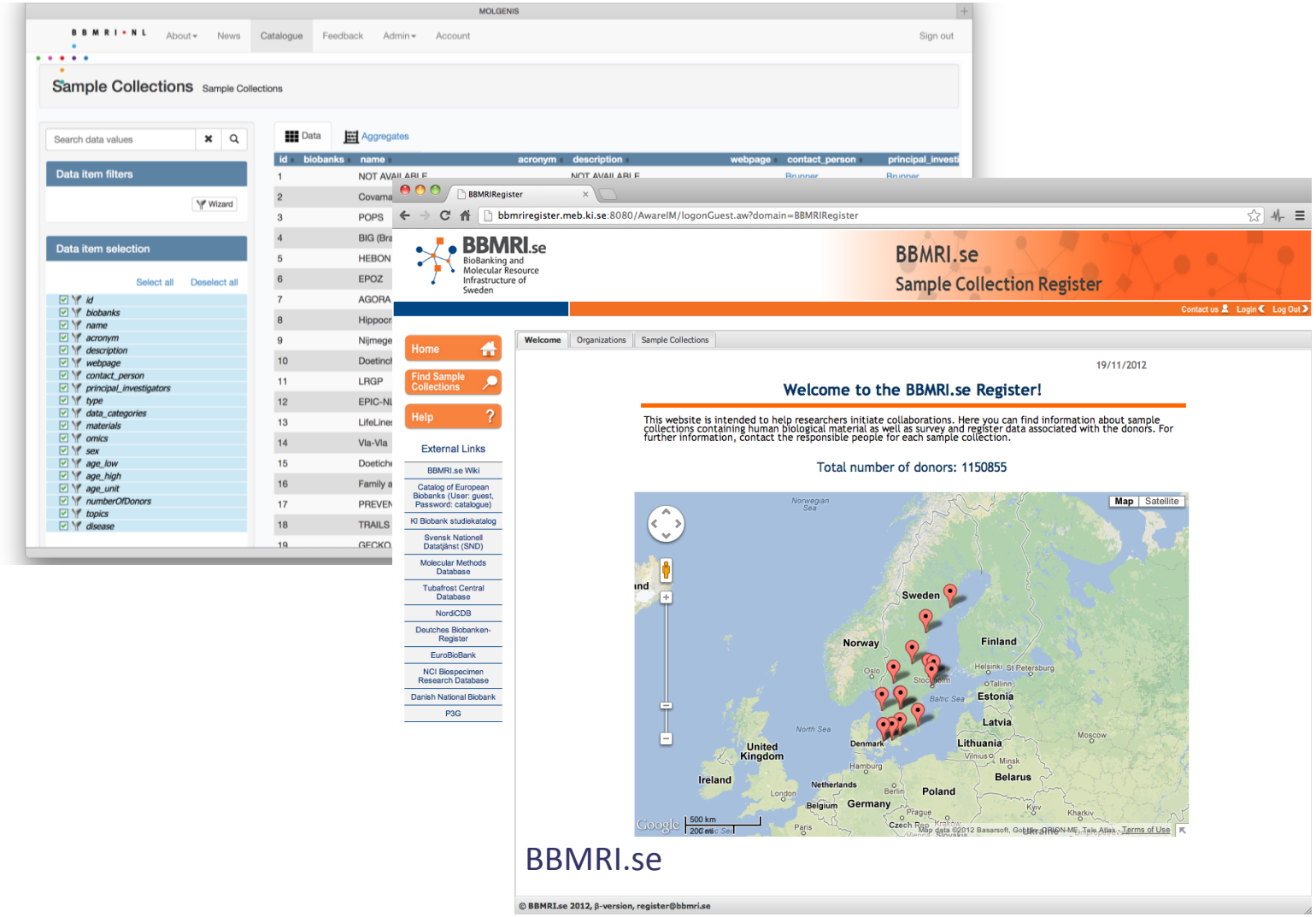
Additional components (proposal)

- Participant
  - Donor of the sample
- Sample
  - Sample and the anatomical source of the sample
- Sample Quality
  - Quality parameters of the sample
- Experiment (OMICS)
  - Experiments performed on samples
- Rare Disease
  - Additional properties used in rare disease studies

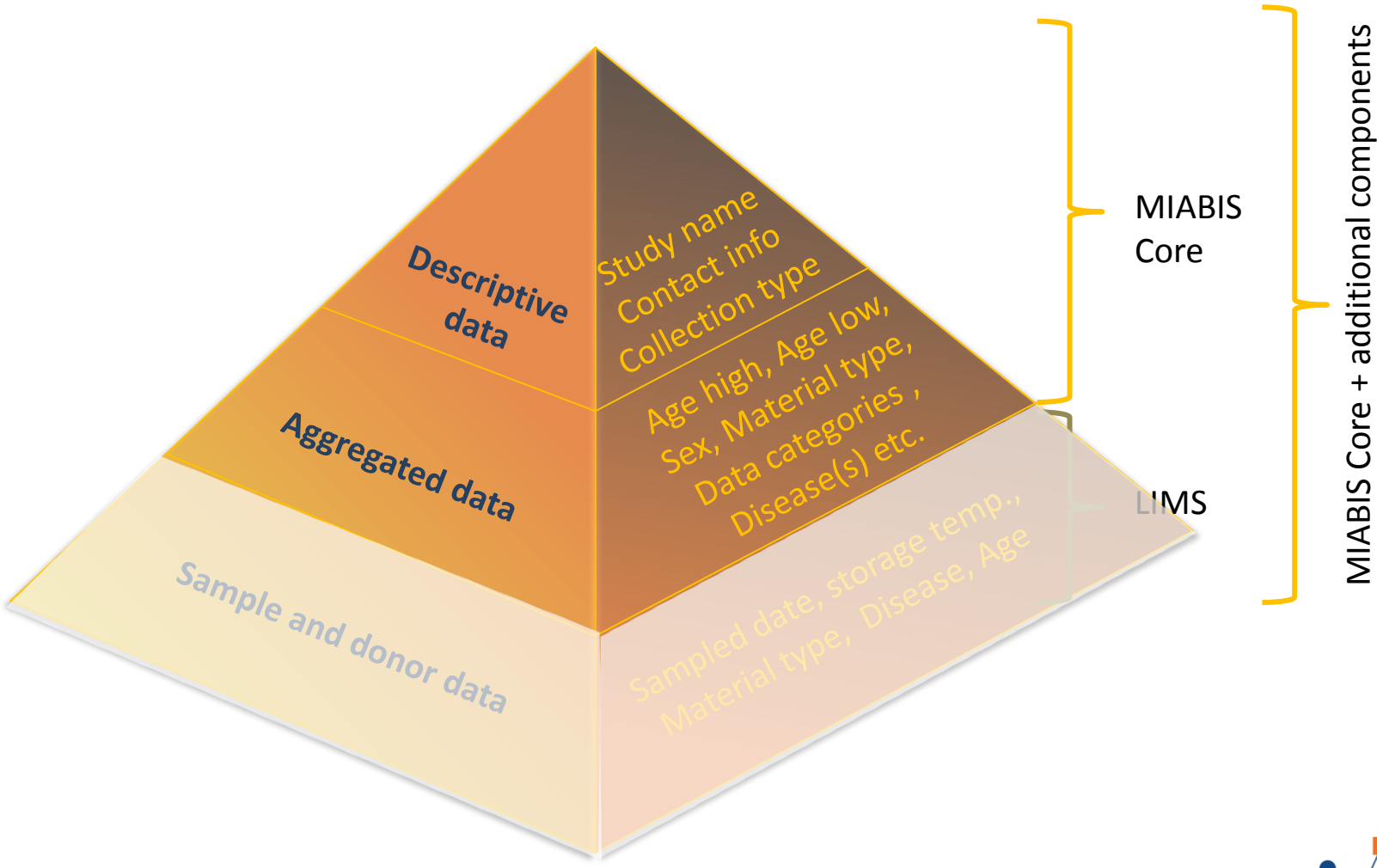
MIABIS 2.0 diagram (simplified)



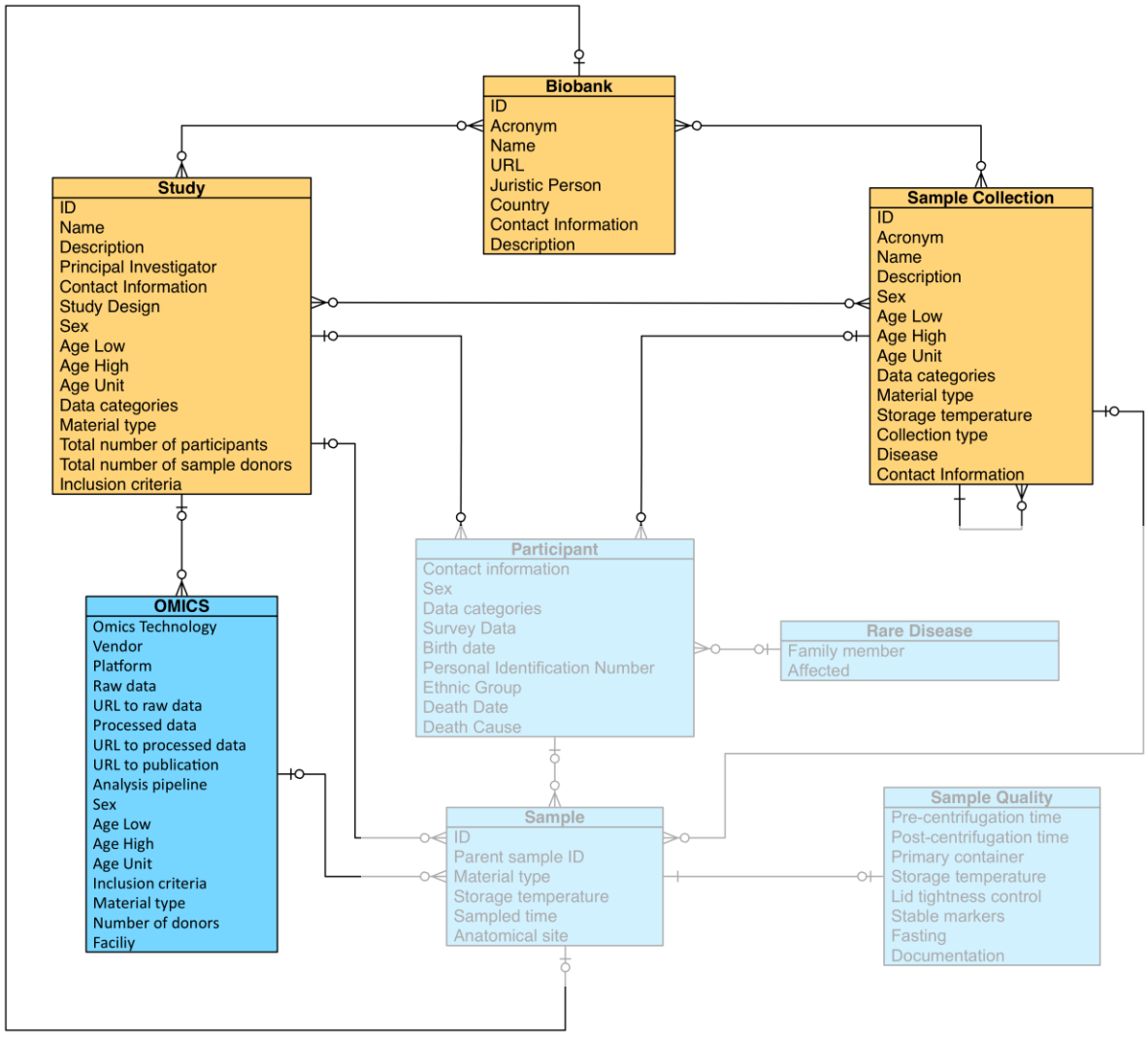
Use Case Biobank Catalogue



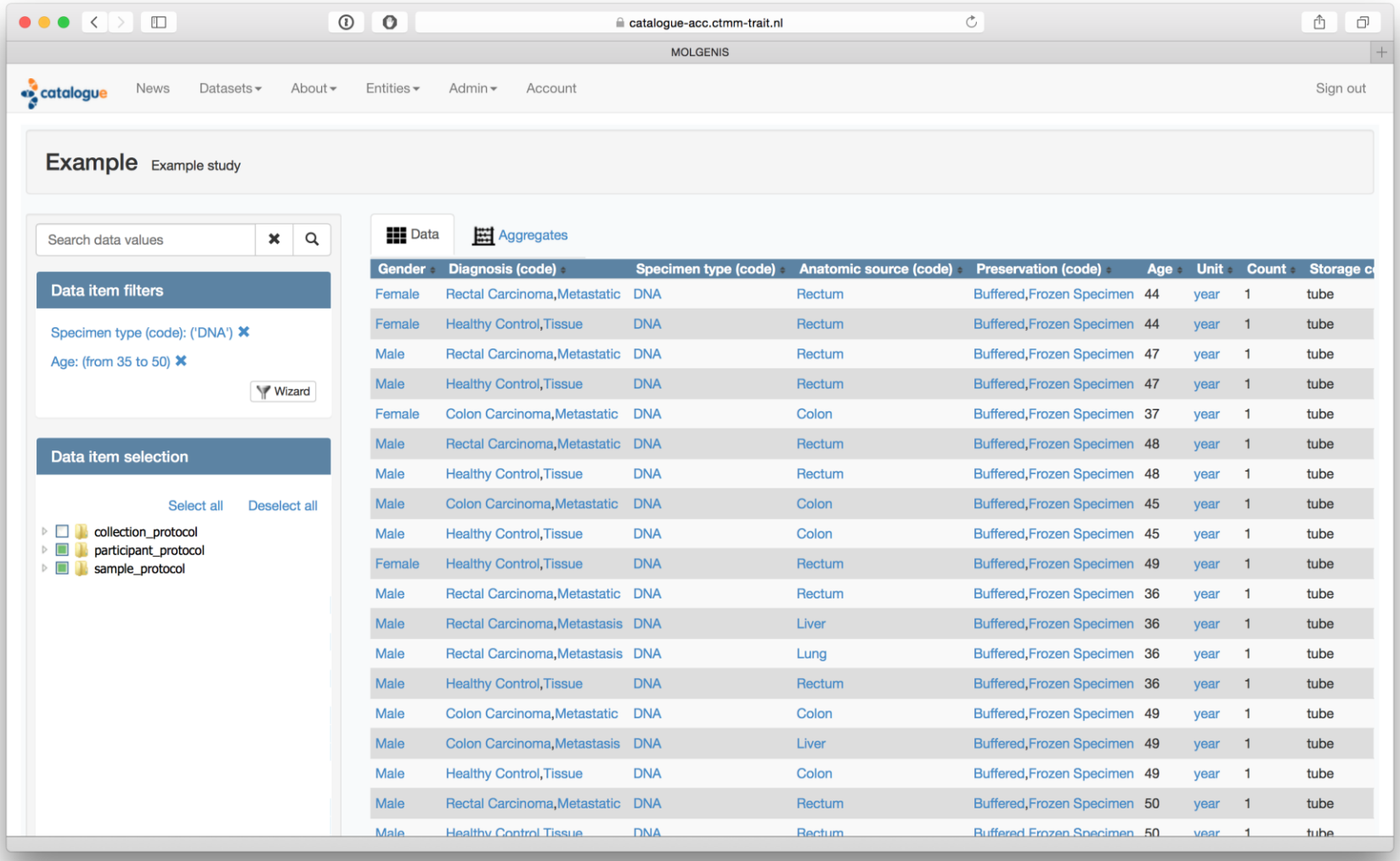
Use Case Biobank Catalogue



Use Case Biobank Catalogue

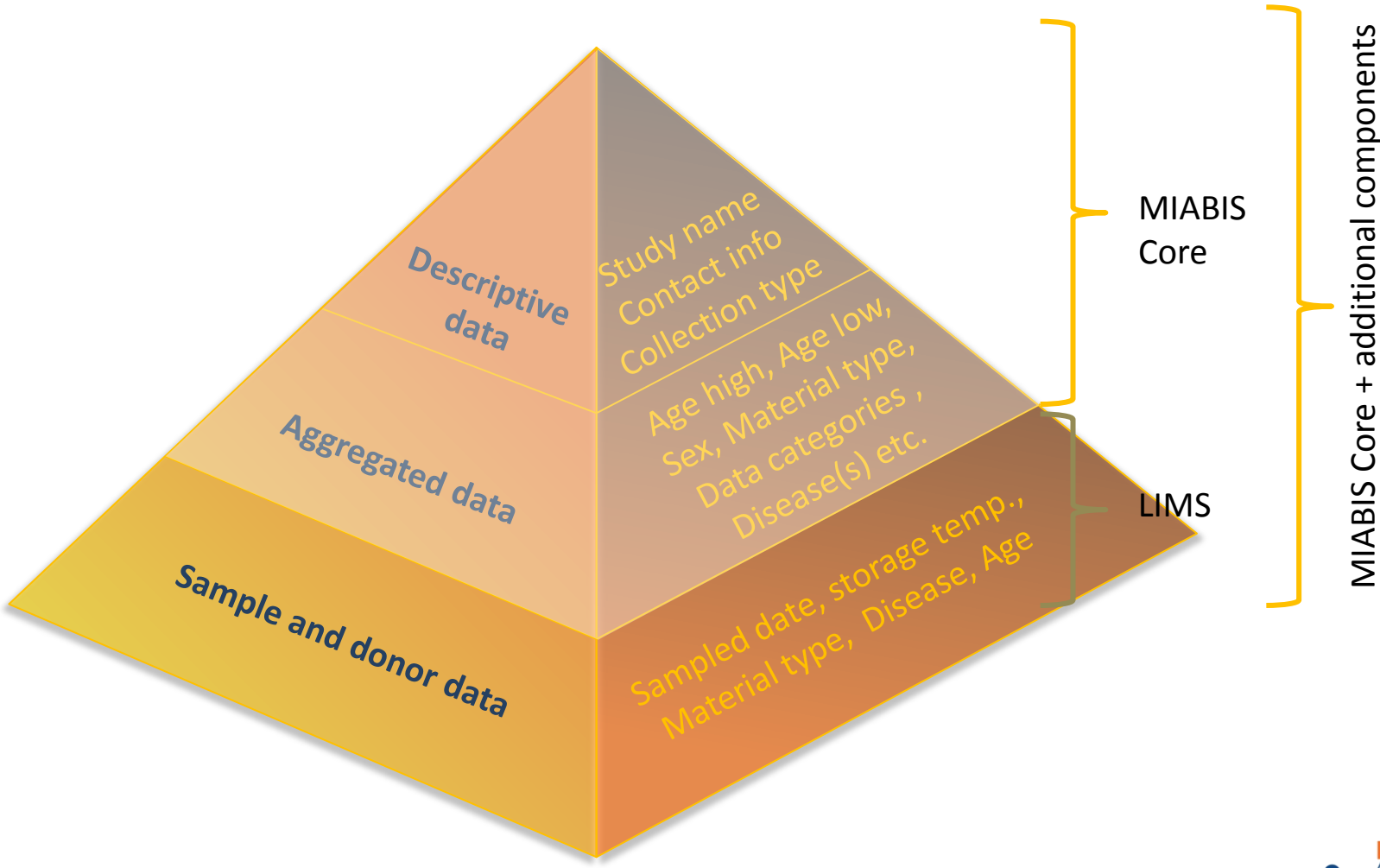


Use Case Study Catalogue

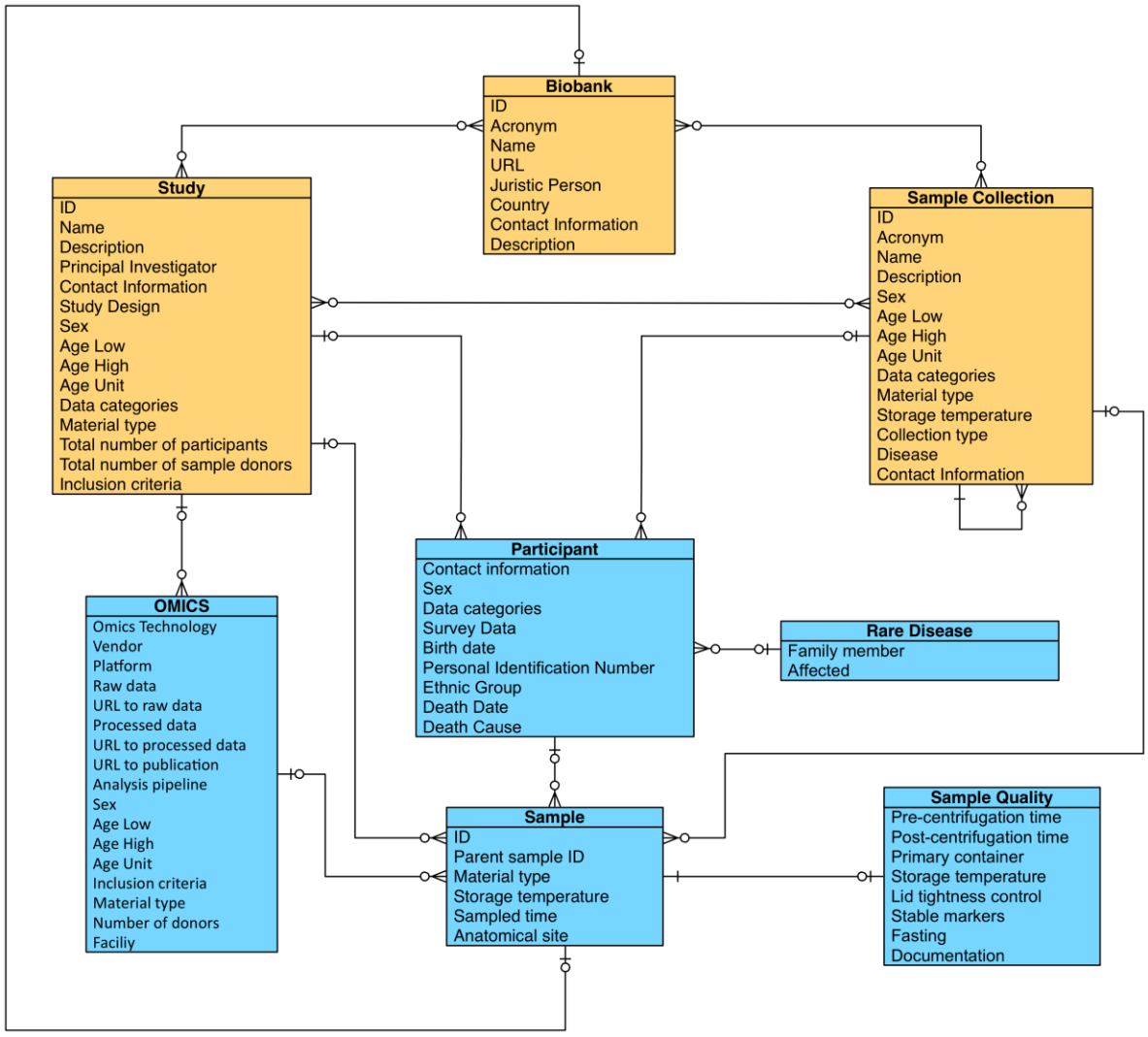


Gender	Diagnosis (code)	Specimen type (code)	Anatomic source (code)	Preservation (code)	Age	Unit	Count	Storage c
Female	Rectal Carcinoma,Metastatic	DNA	Rectum	Buffered,Frozen Specimen	44	year	1	tube
Female	Healthy Control,Tissue	DNA	Rectum	Buffered,Frozen Specimen	44	year	1	tube
Male	Rectal Carcinoma,Metastatic	DNA	Rectum	Buffered,Frozen Specimen	47	year	1	tube
Male	Healthy Control,Tissue	DNA	Rectum	Buffered,Frozen Specimen	47	year	1	tube
Female	Colon Carcinoma,Metastatic	DNA	Colon	Buffered,Frozen Specimen	37	year	1	tube
Male	Rectal Carcinoma,Metastatic	DNA	Rectum	Buffered,Frozen Specimen	48	year	1	tube
Male	Healthy Control,Tissue	DNA	Rectum	Buffered,Frozen Specimen	48	year	1	tube
Male	Colon Carcinoma,Metastatic	DNA	Colon	Buffered,Frozen Specimen	45	year	1	tube
Male	Healthy Control,Tissue	DNA	Colon	Buffered,Frozen Specimen	45	year	1	tube
Female	Healthy Control,Tissue	DNA	Rectum	Buffered,Frozen Specimen	49	year	1	tube
Male	Rectal Carcinoma,Metastatic	DNA	Rectum	Buffered,Frozen Specimen	36	year	1	tube
Male	Rectal Carcinoma,Metastasis	DNA	Liver	Buffered,Frozen Specimen	36	year	1	tube
Male	Rectal Carcinoma,Metastasis	DNA	Lung	Buffered,Frozen Specimen	36	year	1	tube
Male	Healthy Control,Tissue	DNA	Rectum	Buffered,Frozen Specimen	36	year	1	tube
Male	Colon Carcinoma,Metastatic	DNA	Colon	Buffered,Frozen Specimen	49	year	1	tube
Male	Colon Carcinoma,Metastasis	DNA	Liver	Buffered,Frozen Specimen	49	year	1	tube
Male	Healthy Control,Tissue	DNA	Colon	Buffered,Frozen Specimen	49	year	1	tube
Male	Rectal Carcinoma,Metastatic	DNA	Rectum	Buffered,Frozen Specimen	50	year	1	tube
Male	Healthy Control,Tissue	DNA	Rectum	Buffered,Frozen Specimen	50	year	1	tube

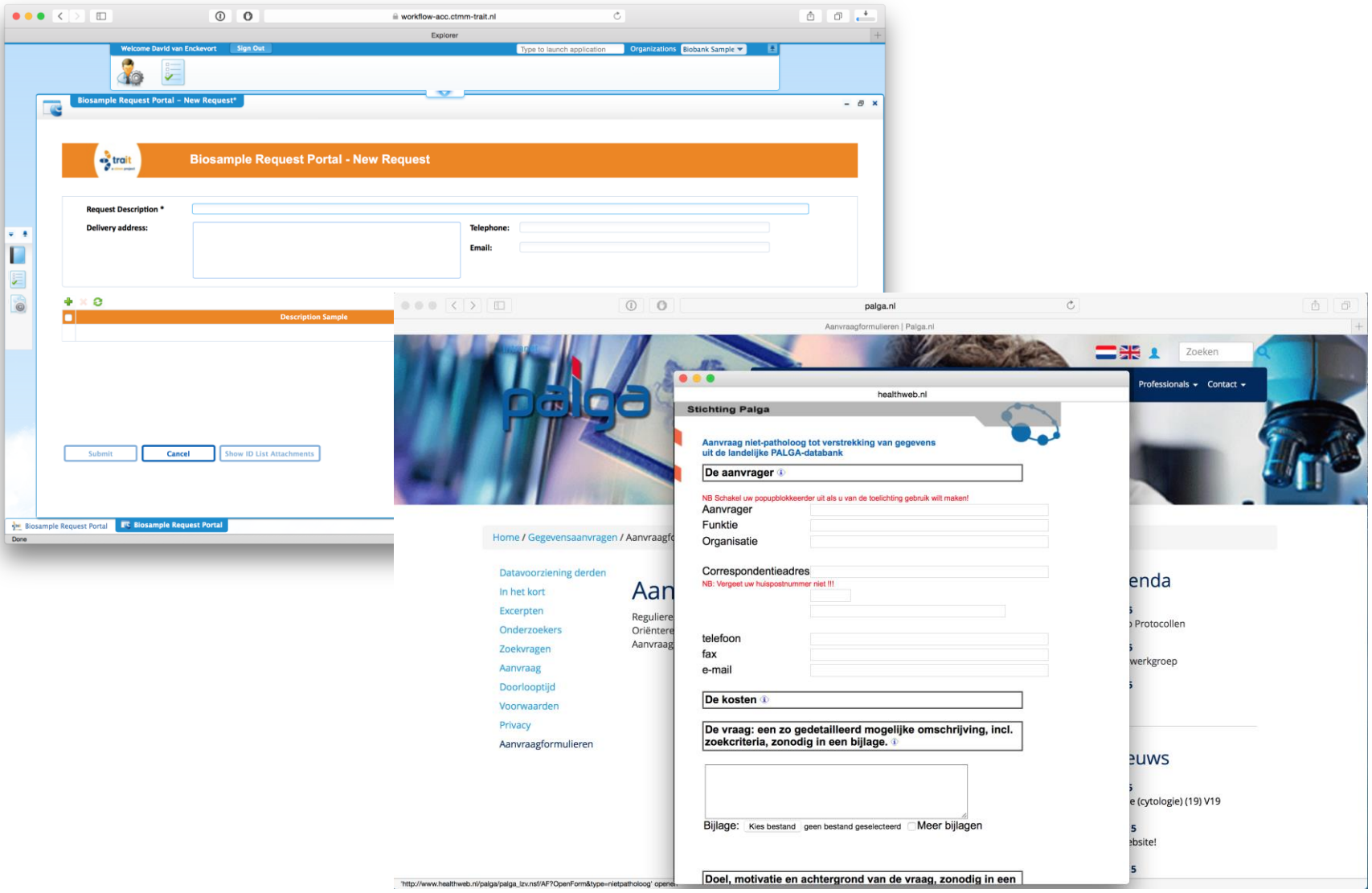
Use Case Study Catalogue



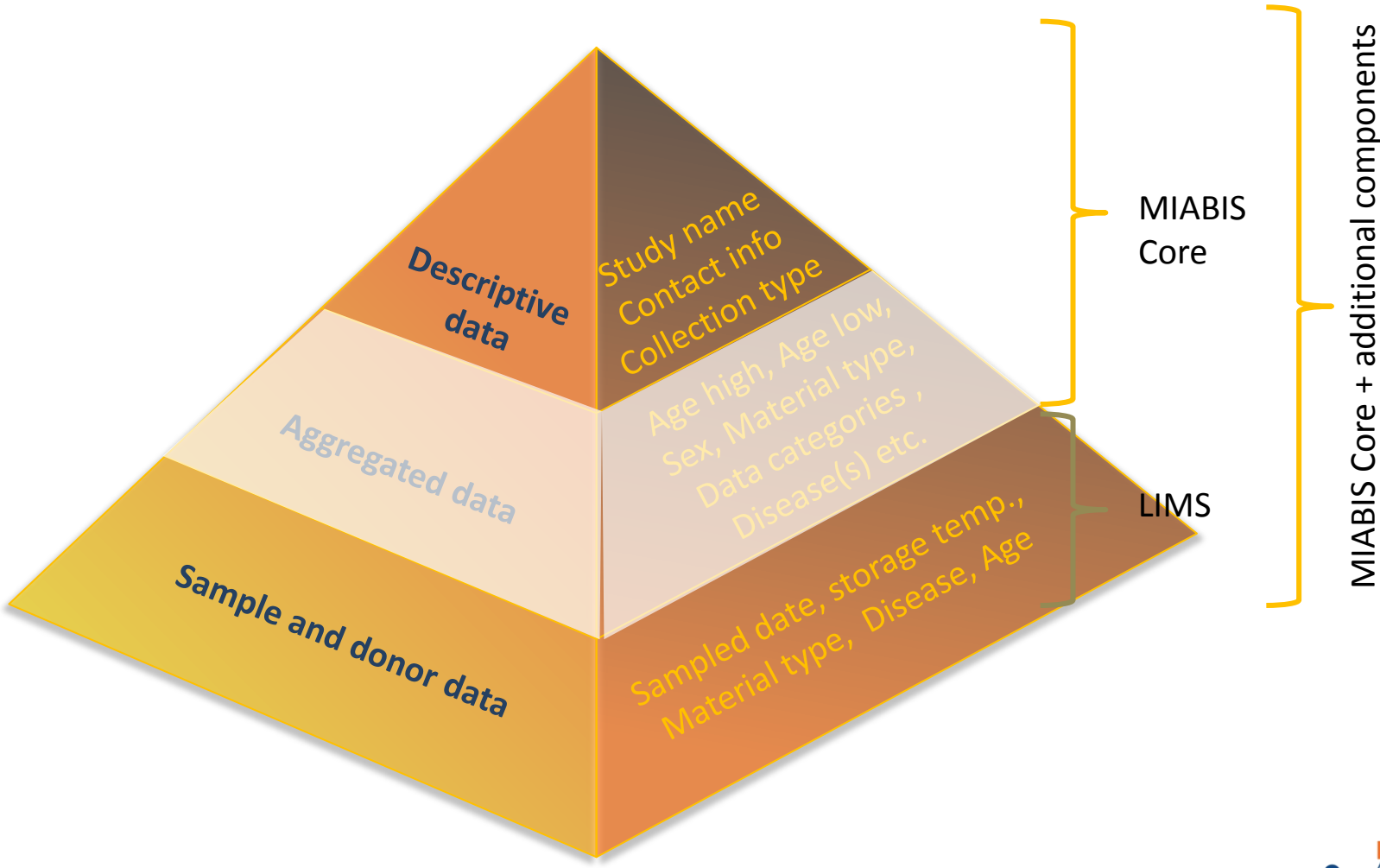
Use Case Study Catalogue



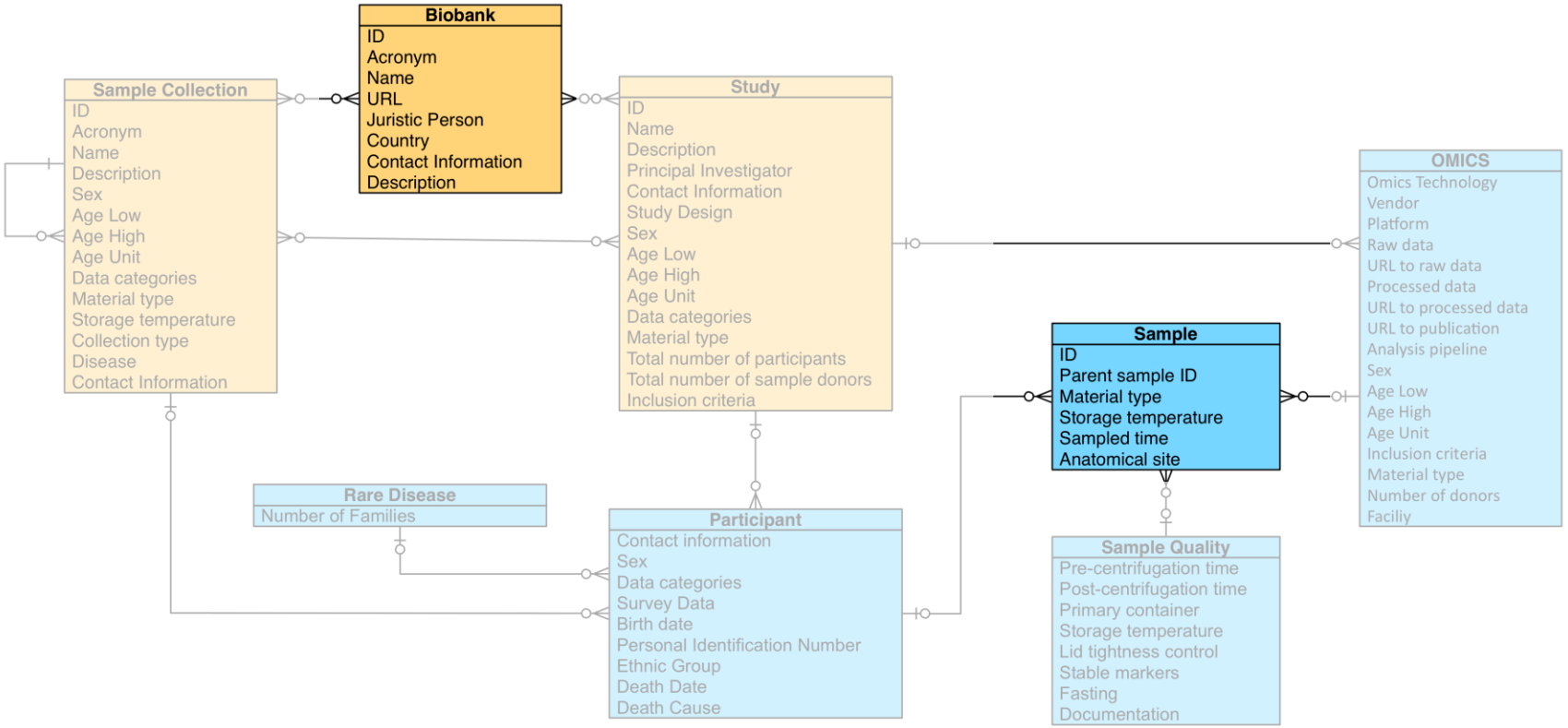
Use case Sample Request Workflow



Use case Sample Request Workflow



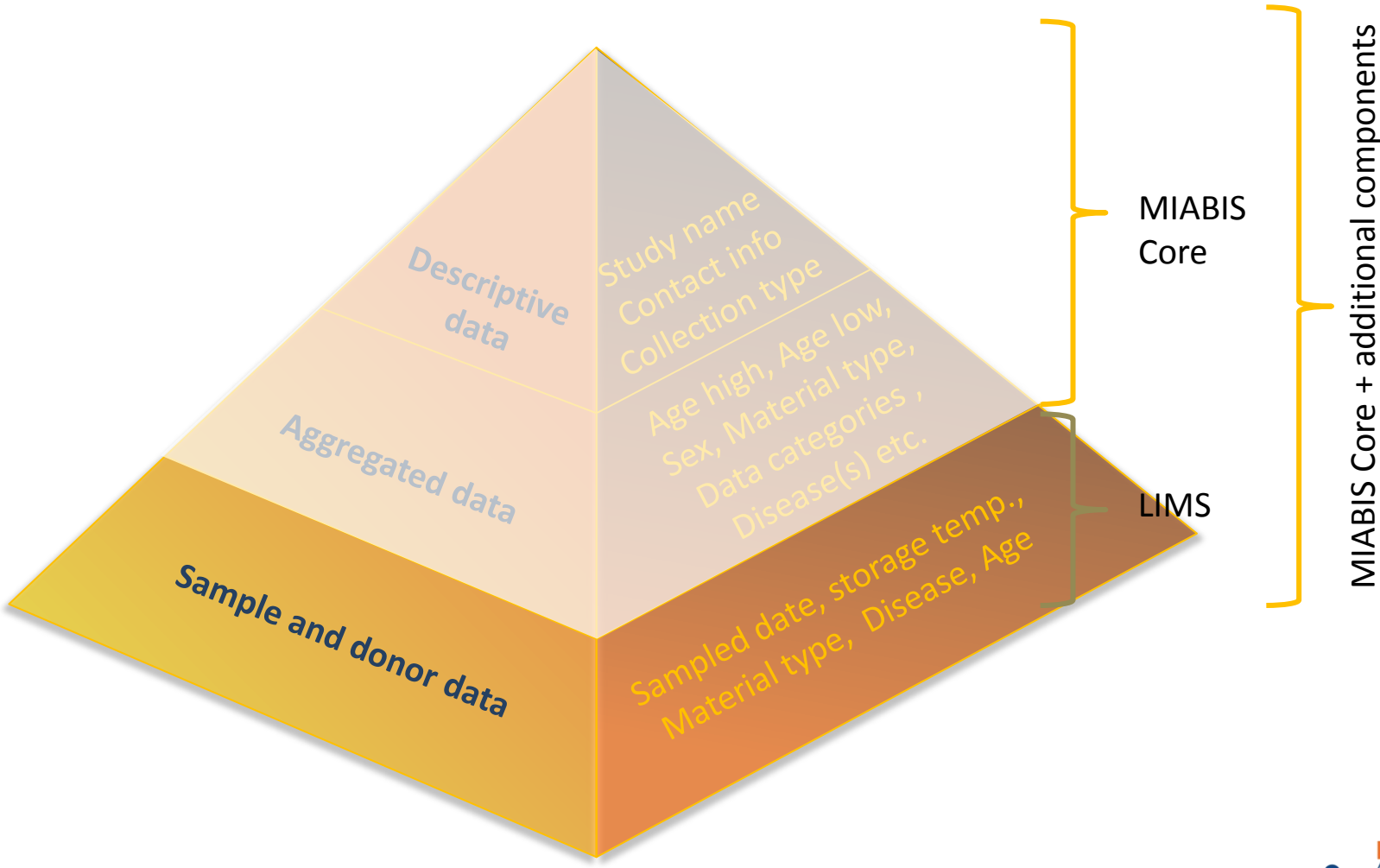
Use case Sample Request Workflow



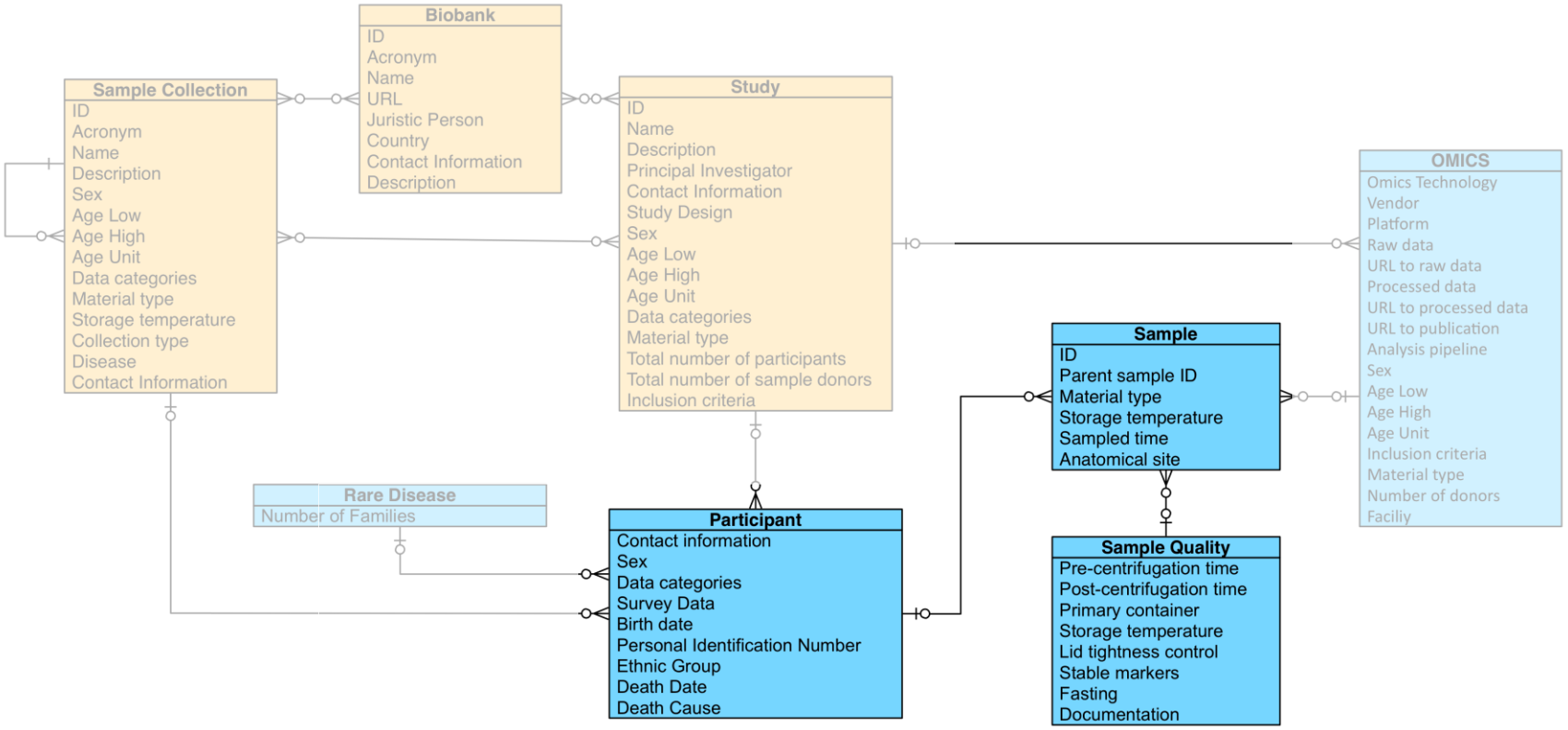
Use case Biobank Information System

- IDQuest
- OpenSpecimen

Use case Biobank information system



Use case Biobank Information System



Implementation

- Working on programmatic interfaces: XML schema definition

```
<?xml version="1.0"?>
<xs:schema xmlns="http://www.bbmri-eric.eu/miabis"
           xmlns:m="http://www.bbmri-eric.eu/miabis"
           xmlns:xs="http://www.w3.org/2001/XMLSchema"
           targetNamespace="http://www.bbmri-eric.eu/miabis"
           elementFormDefault="qualified"
           attributeFormDefault="unqualified">

    <xs:import namespace="http://www.w3.org/XML/1998/namespace"/>

    <xs:simpleType name="String">
        <xs:restriction base="xs:string"/>
    </xs:simpleType>

    <xs:simpleType name="Age">
        <xs:restriction base="xs:positiveInteger">
            <xs:maxInclusive value="54750">
                <xs:annotation>
                    <xs:documentation>
                        The maximum value is limited to 150 years expressed in
                        days.
                    </xs:documentation>
                </xs:annotation>
            </xs:maxInclusive>
        </xs:restriction>
    </xs:simpleType>
```

Conclusions

- MIABIS is tested in real life applications
- Different use cases can use different modules of MIABIS
- Standardized modules makes it easier to create interchangeable software

Acknowledgements

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