



**umcg**

## MIABIS as a modular system

David van Enckevort

[david.van.enckevort@umcg.nl](mailto:david.van.enckevort@umcg.nl)

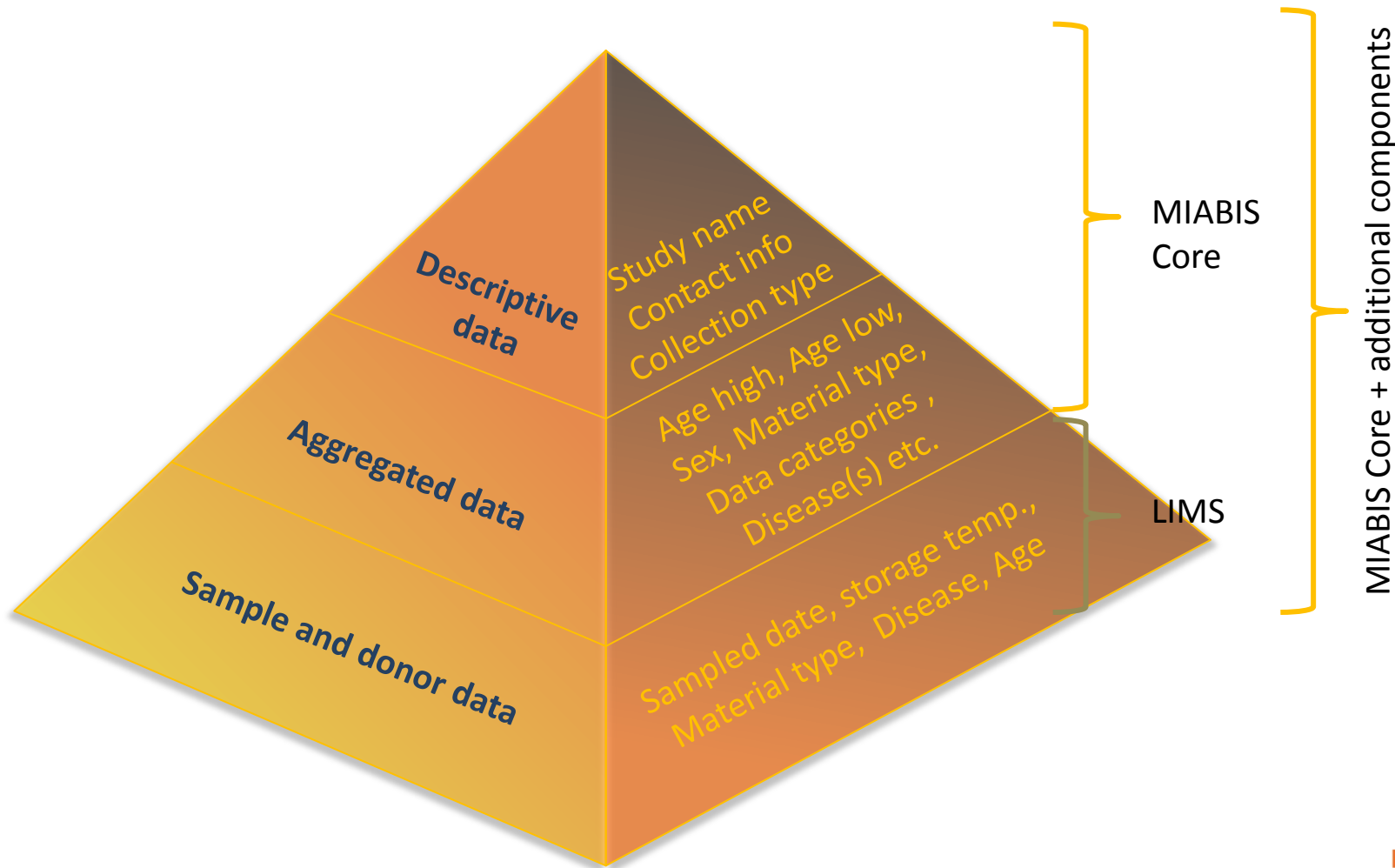
# MIABIS 2.0

- 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<sup>1</sup>:
  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

<sup>1</sup>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<sup>1</sup>:
  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)

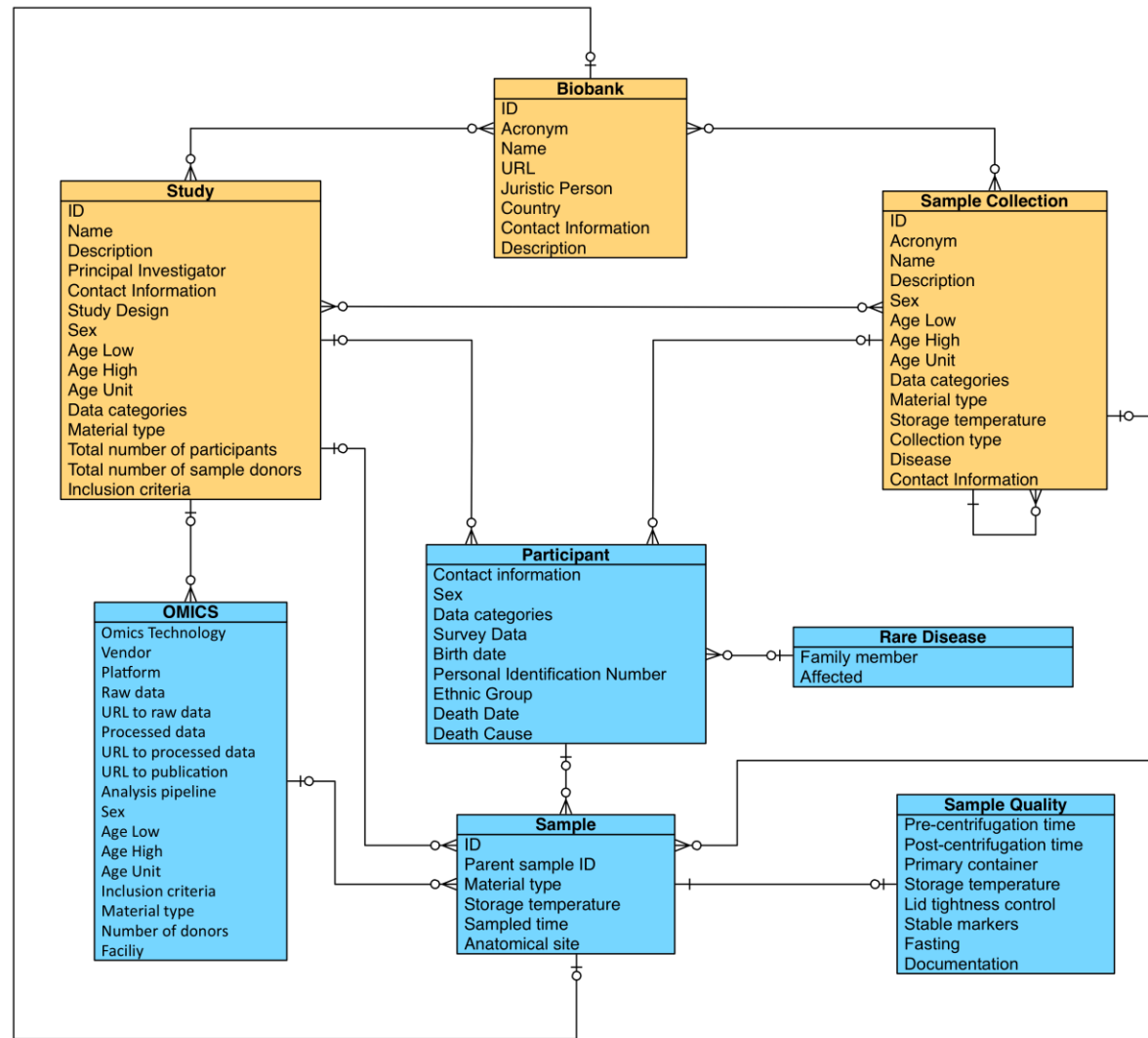
- Definition<sup>1</sup>:
  1. "A detailed examination, analysis or critical inspection of a subject designed to discover facts about it" (NCI)
- Defines common characteristics used in the study

# 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)

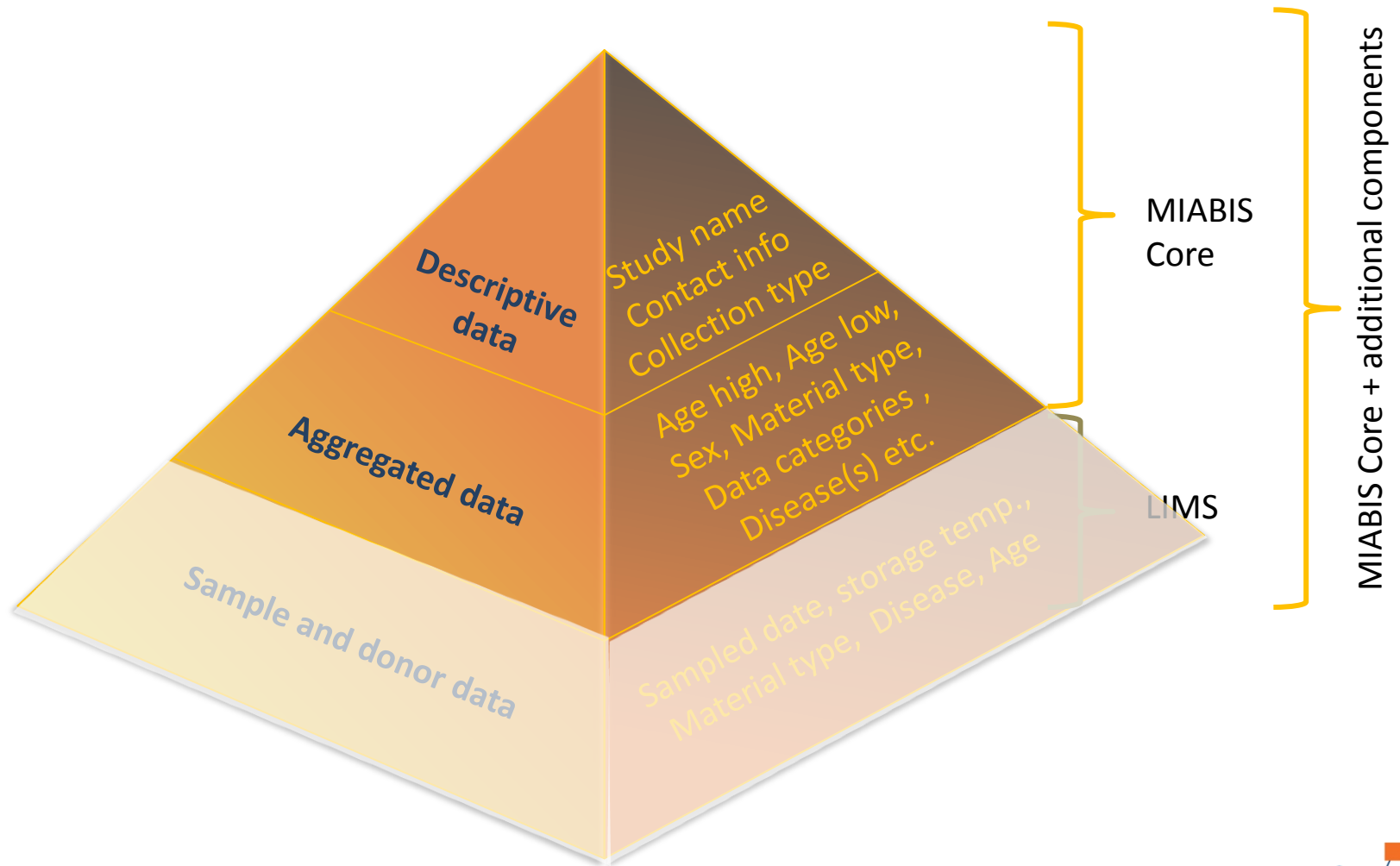


# Use Case Biobank Catalogue

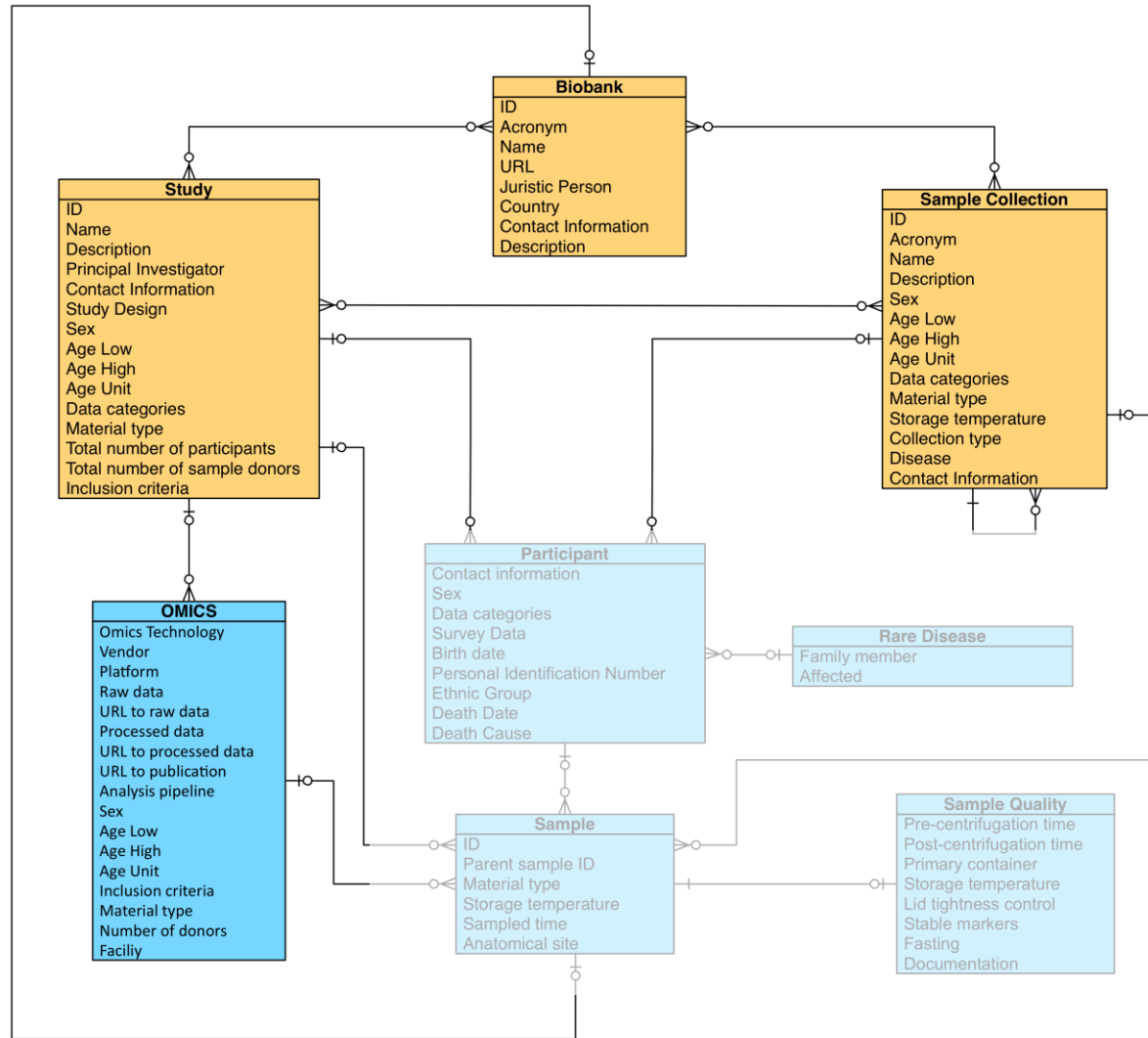
The screenshot displays the BBMRI.se Sample Collection Register website. The interface is divided into several sections:

- Navigation and Search:** At the top, there are navigation links (About, News, Catalogue, Feedback, Admin, Account) and a 'Sign out' button. Below this is a search bar for 'Sample Collections'.
- Data Item Filters:** A sidebar on the left allows users to filter data items. It includes a search box and a 'Wizard' button. The 'Data item selection' section has checkboxes for various fields: id, biobanks, name, acronym, description, webpage, contact\_person, principal\_investigators, type, data\_categories, materials, omics, sex, age\_low, age\_high, age\_unit, numberOfDonors, topics, and disease.
- Table of Sample Collections:** A table lists various biobanks with columns for 'id', 'biobanks', 'name', 'acronym', 'description', 'webpage', 'contact\_person', and 'principal\_invest'. The table contains 19 rows of data.
- External Links:** A sidebar on the right provides links to various external resources, including BBMRI.se Wiki, Catalog of European Biobanks, KI Biobank studiekatalog, and others.
- Main Content Area:** The main content area features a 'Welcome to the BBMRI.se Register!' message, a date of 19/11/2012, and a total number of donors: 1150855. Below this is a map of Europe with red pins indicating the locations of various biobanks across the continent.
- Footer:** The footer includes the BBMRI.se logo and copyright information: '© BBMRI.se 2012, β-version, register@bbMRI.se'.

# Use Case Biobank Catalogue



# Use Case Biobank Catalogue

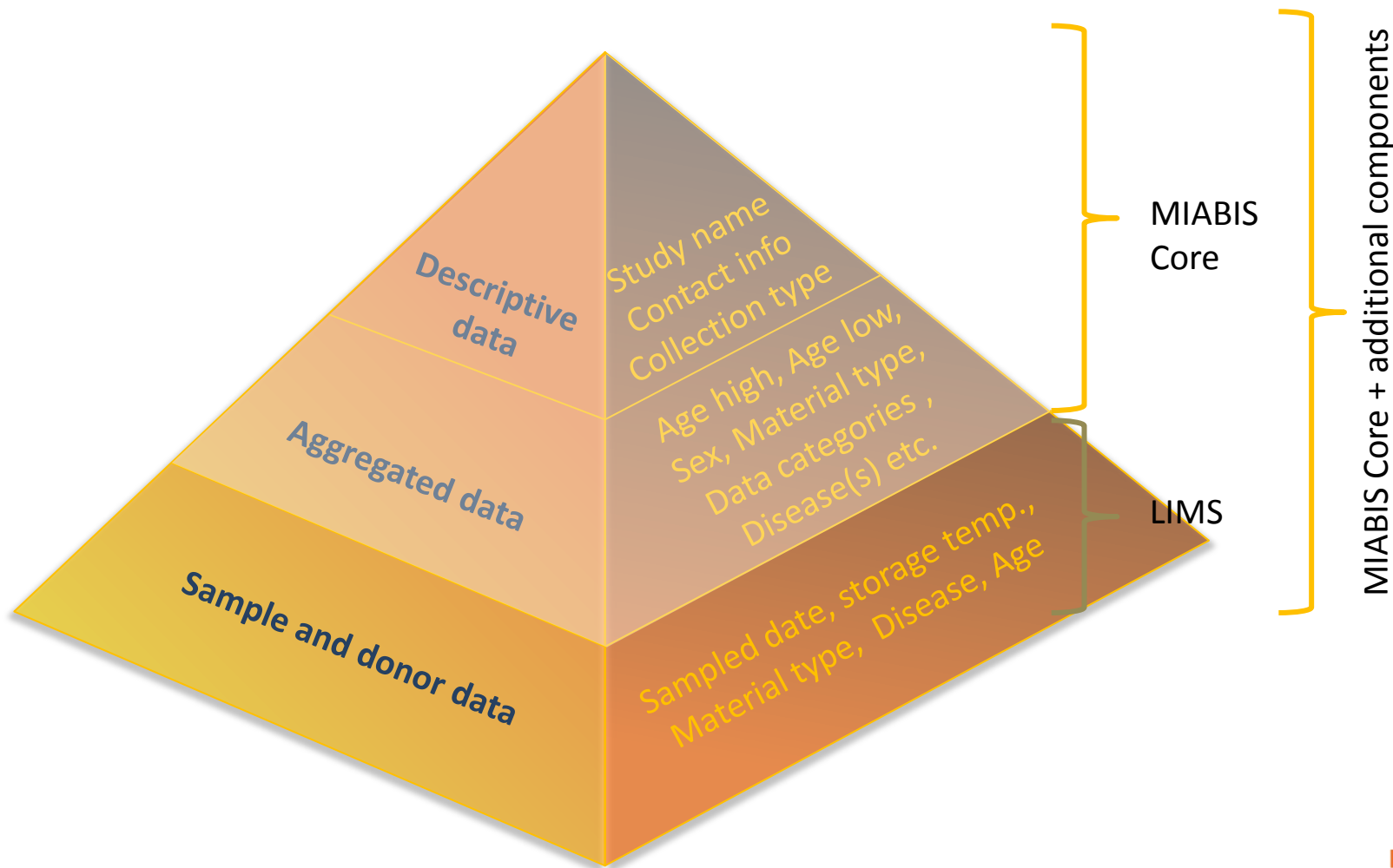


# Use Case Study Catalogue

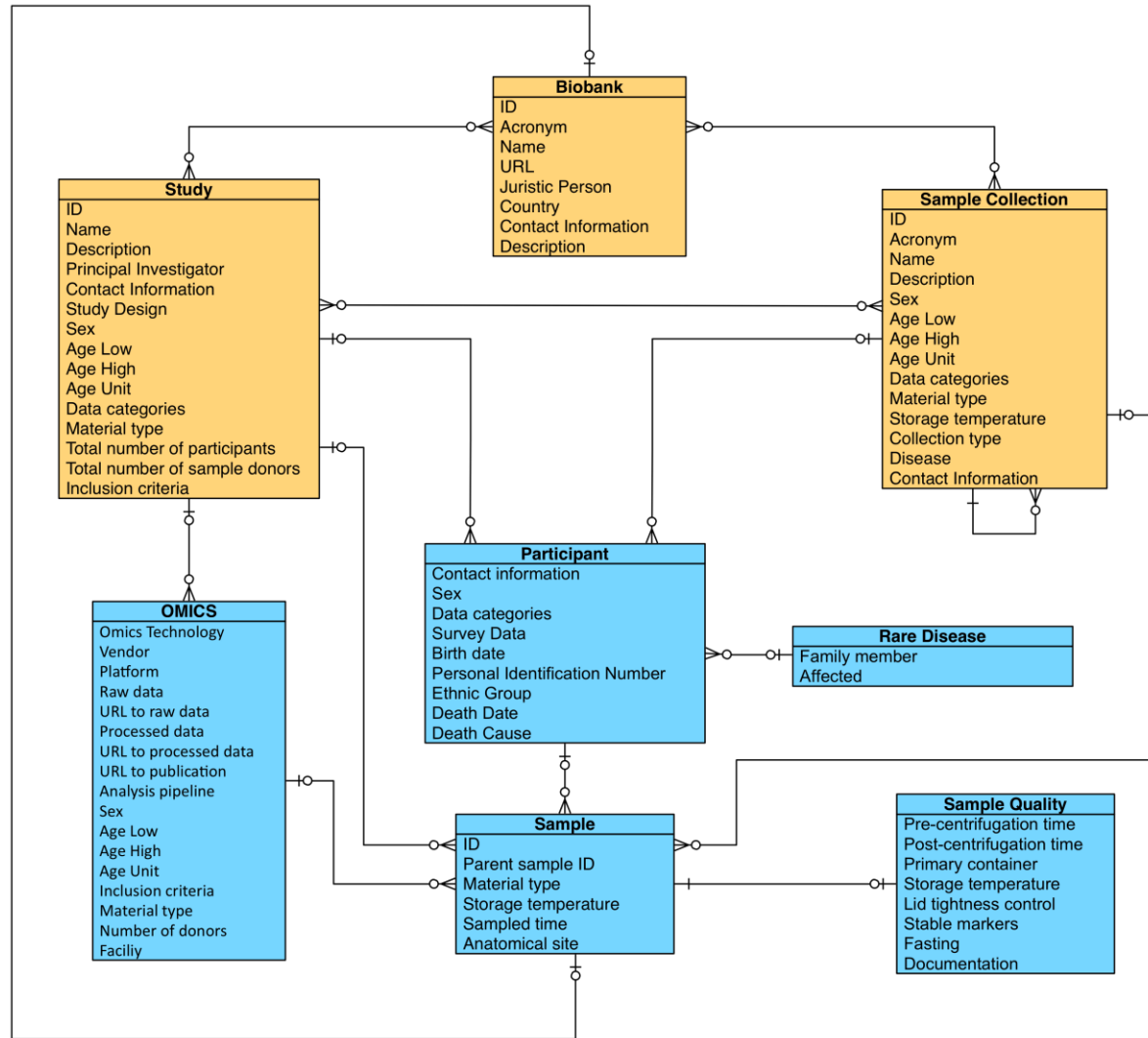
The screenshot displays the MOLGENIS web application interface. The browser address bar shows 'catalogue-acc.ctmm-trait.nl'. The navigation menu includes 'News', 'Datasets', 'About', 'Entities', 'Admin', and 'Account'. The main content area is titled 'Example Example study'. On the left, there is a search bar and a 'Data item filters' section with filters for 'Specimen type (code): ('DNA')' and 'Age: (from 35 to 50)'. Below this is a 'Data item selection' section with expandable folders for 'collection\_protocol', 'participant\_protocol', and 'sample\_protocol'. The main table is titled 'Data' and contains 20 rows of specimen data.

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



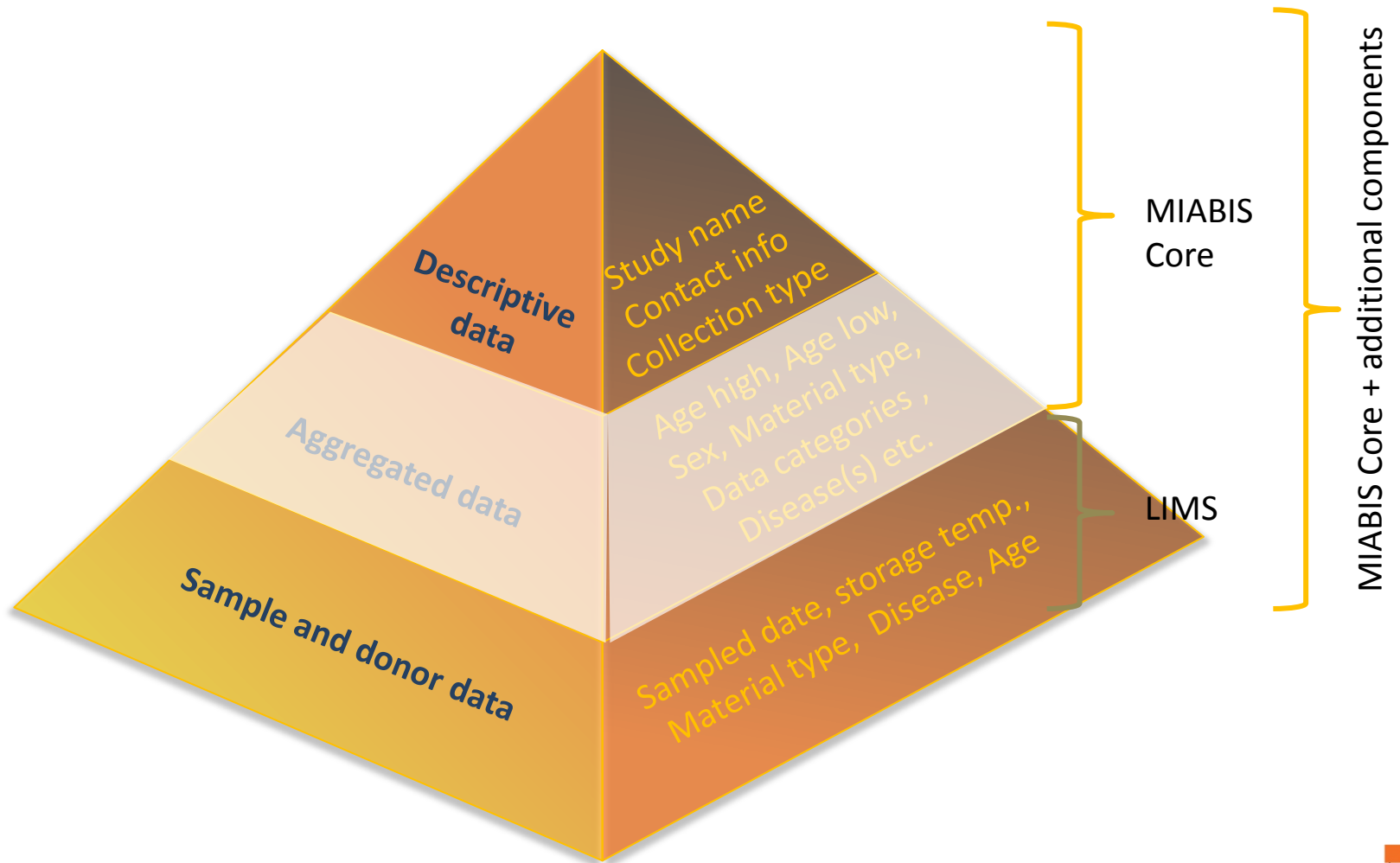
# Use case Sample Request Workflow

The image displays a workflow for submitting a sample request, shown through three overlapping browser windows:

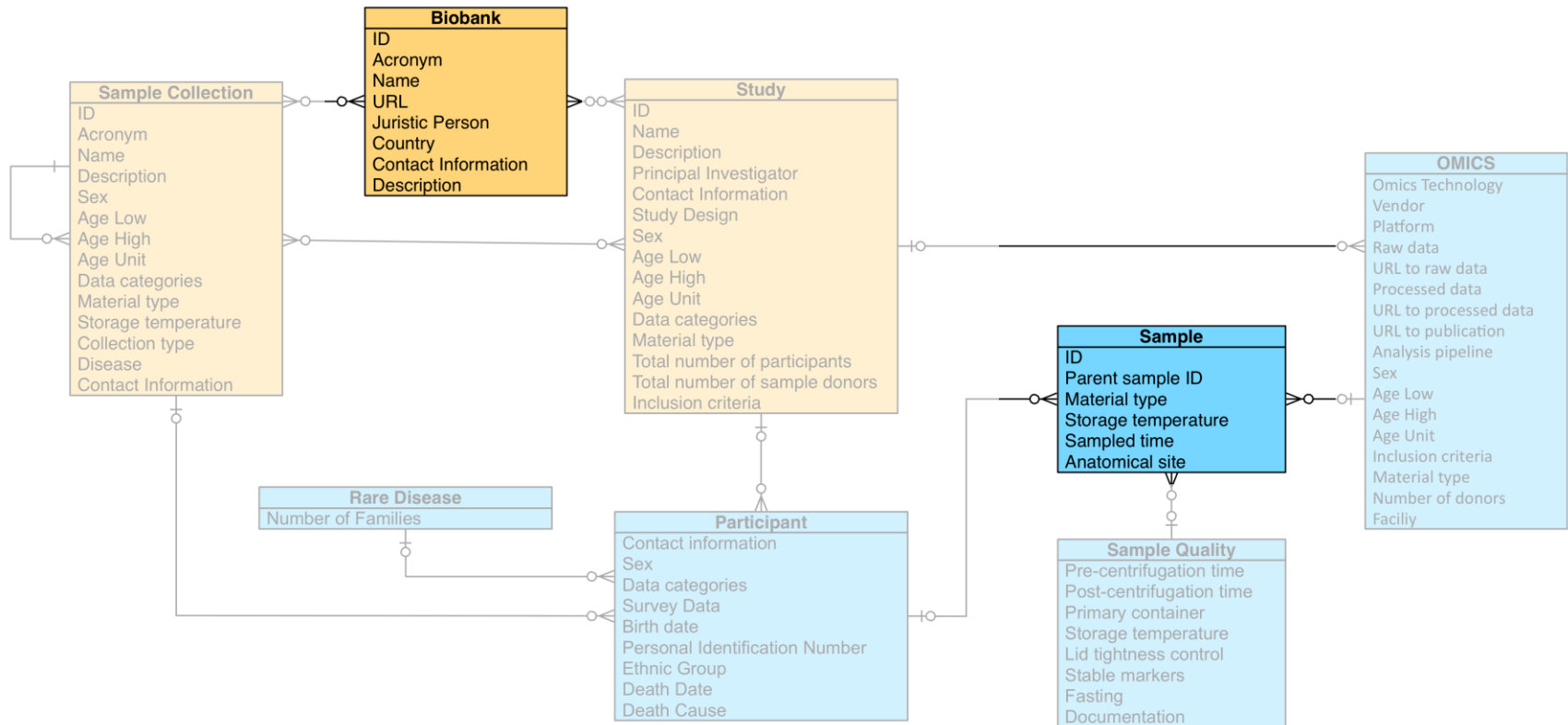
- Top Window (workflow-acc.ctmm-trait.nl):** Shows the 'Biosample Request Portal - New Request' form. It includes fields for 'Request Description \*', 'Delivery address:', 'Telephone:', and 'Email:'. Buttons for 'Submit', 'Cancel', and 'Show ID List Attachments' are visible at the bottom.
- Middle Window (palga.nl):** Shows the 'Aanvraagformulieren | Palga.nl' page. It features a search bar, a navigation menu with 'Home / Gegevensaanvragen / Aanvraagformulieren', and a list of links including 'Datavoorziening derden', 'In het kort', 'Excerpten', 'Onderzoekers', 'Zoekvragen', 'Aanvraag', 'Doorlooptijd', 'Voorwaarden', 'Privacy', and 'Aanvraagformulieren'.
- Bottom Window (healthweb.nl):** Shows the 'Stichting Palga' form titled 'Aanvraag niet-patholoog tot verstrekking van gegevens uit de landelijke PALGA-databank'. It contains several sections:
  - De aanvrager:** Fields for 'Aanvrager', 'Functie', and 'Organisatie'. A note reads: 'NB Schakel uw pop-upblokkeerder uit als u van de toelichting gebruik wilt maken!'.
  - Correspondentieadres:** Fields for 'Correspondentieadres' and 'Postcode'. A note reads: 'NB: Vergeet uw huispostnummer niet!!!'.
  - telefoon, fax, e-mail:** Fields for contact information.
  - De kosten:** A field for 'De kosten'.
  - De vraag:** A field for 'De vraag: een zo gedetailleerd mogelijke omschrijving, incl. zoekcriteria, zonodig in een bijlage.'.
  - Bijlage:** A file upload section with 'Bijlage: Kies bestand geen bestand geselecteerd' and a 'Meer bijlagen' link.
  - Doel, motivatie en achtergrond van de vraag, zonodig in een bijlage:** A field for 'Doel, motivatie en achtergrond van de vraag, zonodig in een bijlage'.



# Use case Sample Request Workflow



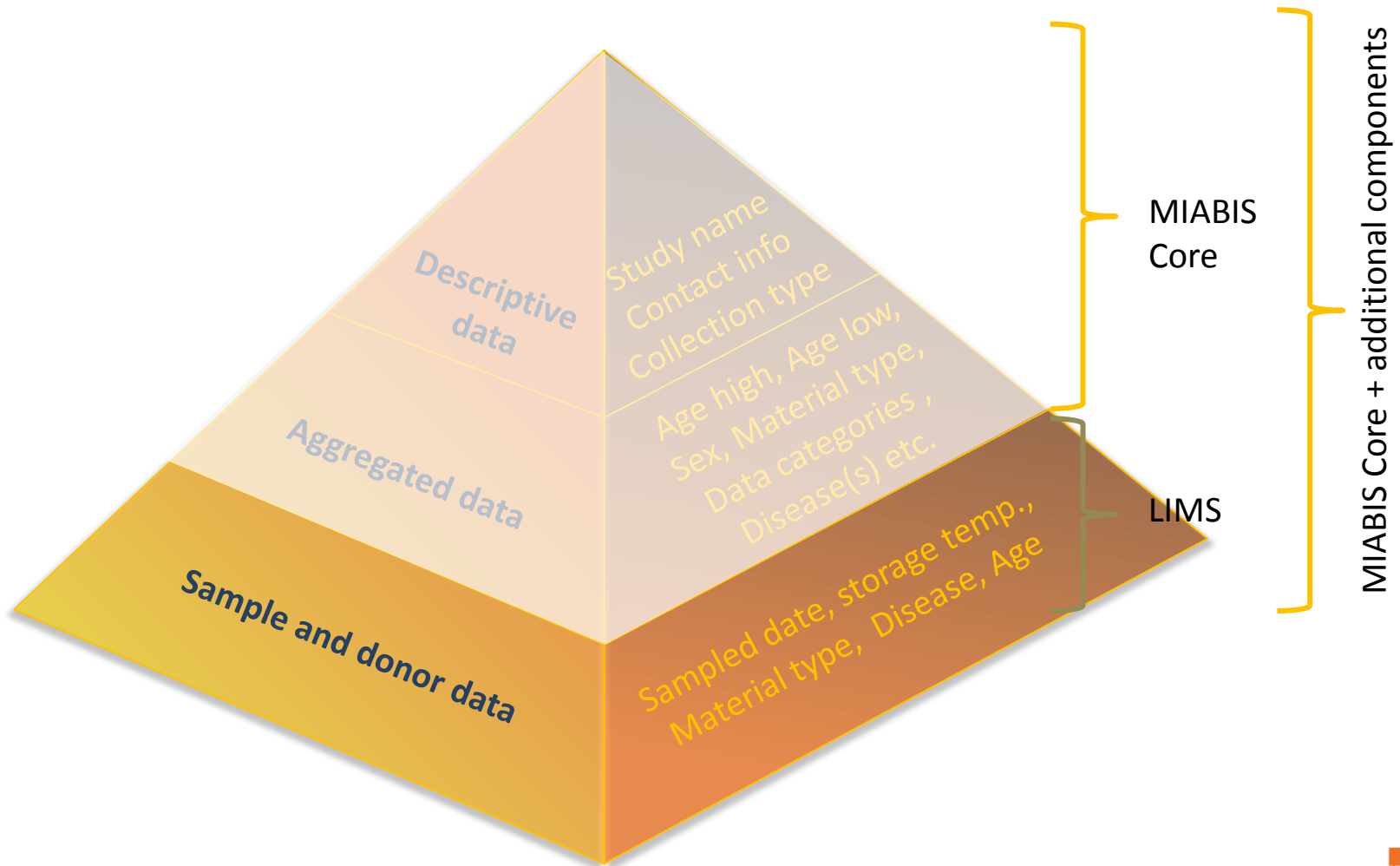
# Use case Sample Request Workflow



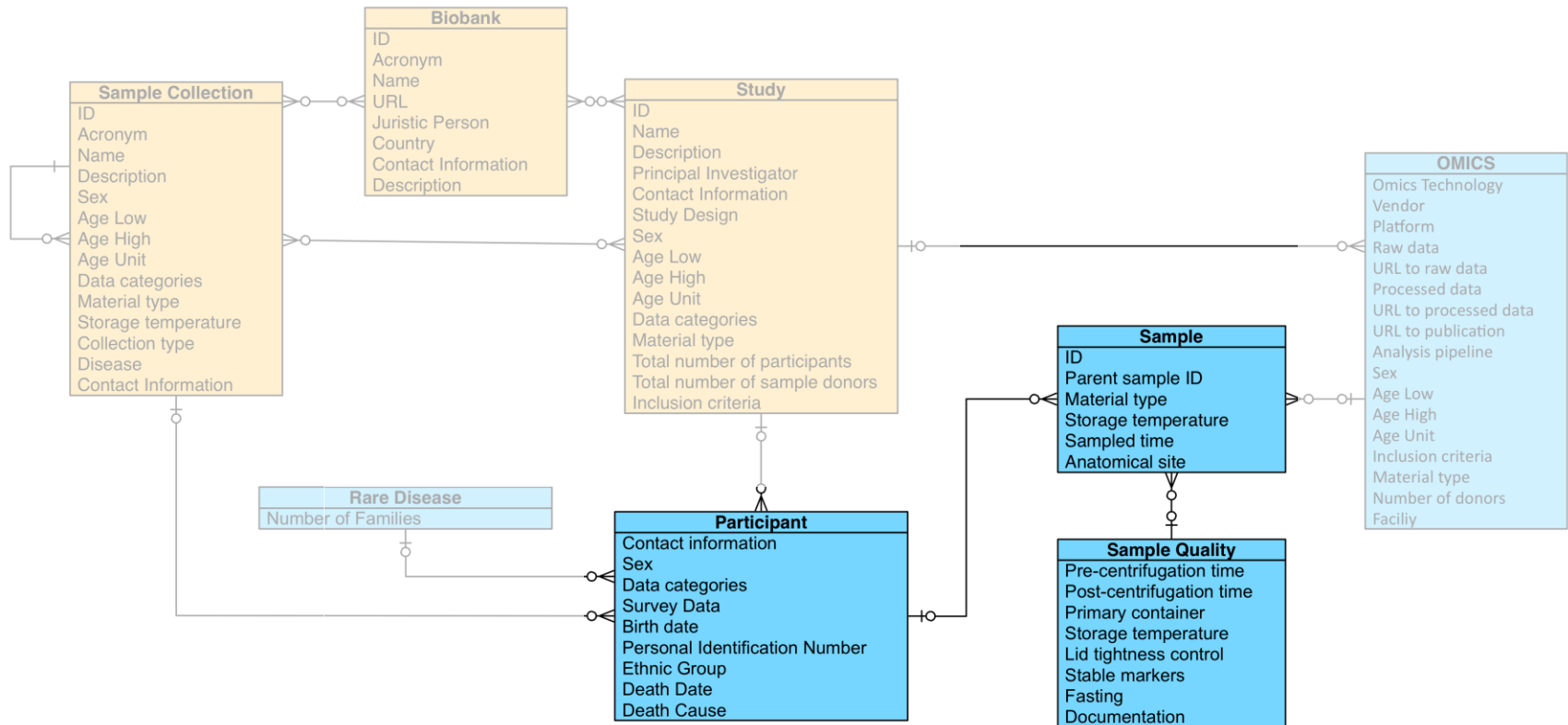
# Use case Biobank Information System

- IDQuest
- OpenSpecimen

# Use case Biobank information system



# Use case Biobank Information System



- 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

**MIABIS working group:** *Linda Mook, Roxana Merino-Martinez, Loreana Norlin, Gabriele Anton, Simone Schuffenhauer, Kaisa Silander, Anita Nieminen Roman Siddiqui, Murat Sariyar, Michael Hummel, Cathleen Ploetz Raffael Bild, Helmut Spengler, Heimo Müller, Linda Zaharenko, Araceli Diezfraile, Joakim Geeraert, Petr Holub, Ondra vojtitsek, Kristjan Metsalu, Martin Fransson, Michaela Mayrhofer, Morris Swertz, Klaus Kuhn, Jan-Eric Litton*

**CTMM TraIT:** *Peter Lansberg, Linda Mook, Erik van Iperen, Cuneyt Parlayan, Tim Hulsen*

**Parelsnoer Institute:** *Erik Flikkenschild, Gerhard Zielhuis, René Oostergo, Ariaan Siezen*

**BBMRI-NL:** *Margot Heesakker, Petra van Overveld, Margreet Brandsma, Mascha Jansen*

**Palga / DNTP:** *Chantal Steegers, Lucy Overbeek, Arne Hoffman*