

*Improving the health and wealth  
of the nation through research*



**NHS**  
*National Institute for  
Health Research*

# NIHR IS Function Data Services

4<sup>th</sup> November 2010

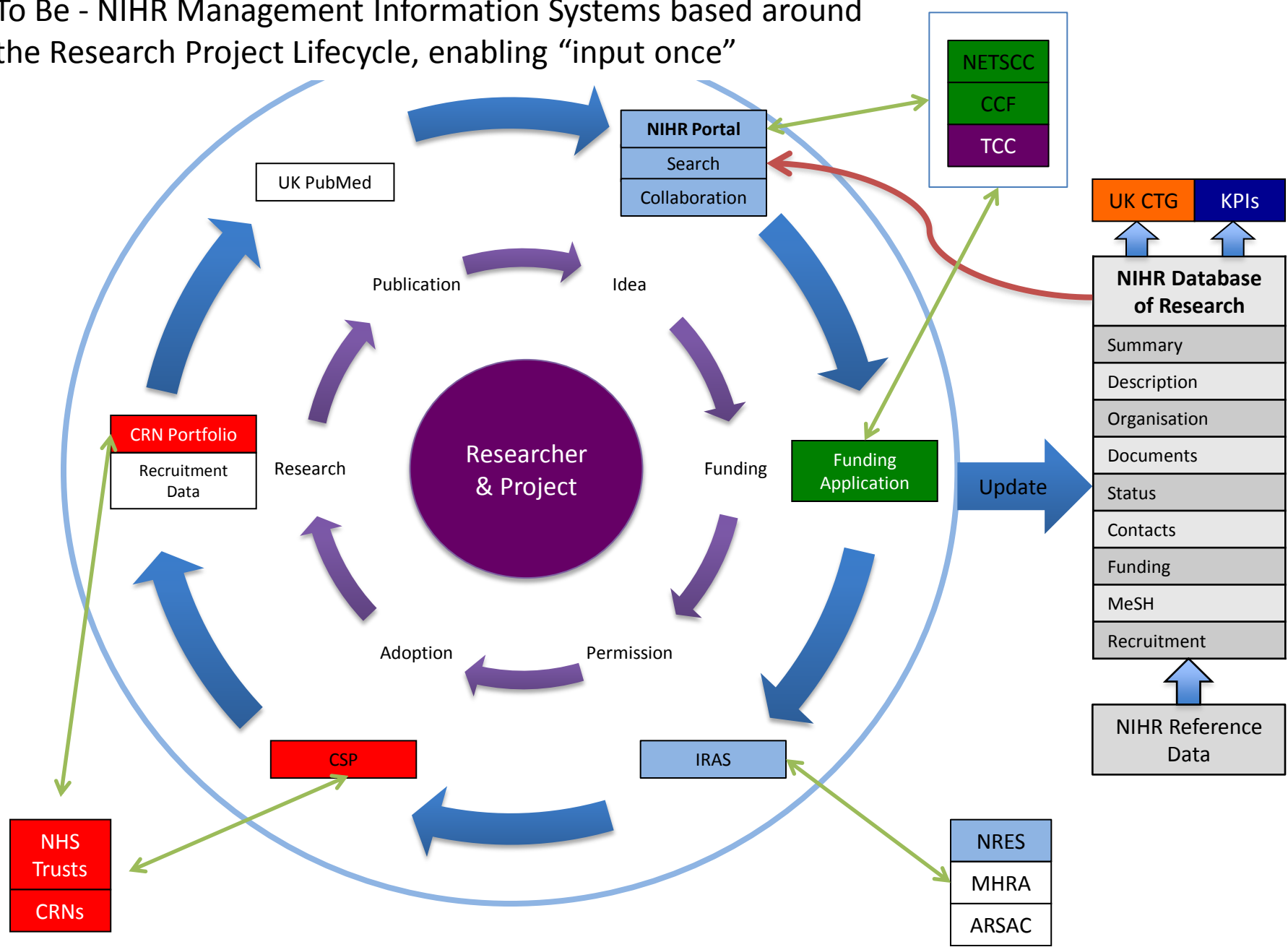
# Contents

- NIHR – Vision and Mission statements
- Research Lifecycle
- Systems Architecture (to be)
- Shared Data
- The Repository, using organisations as an example

# NIHR Vision & Mission Statements

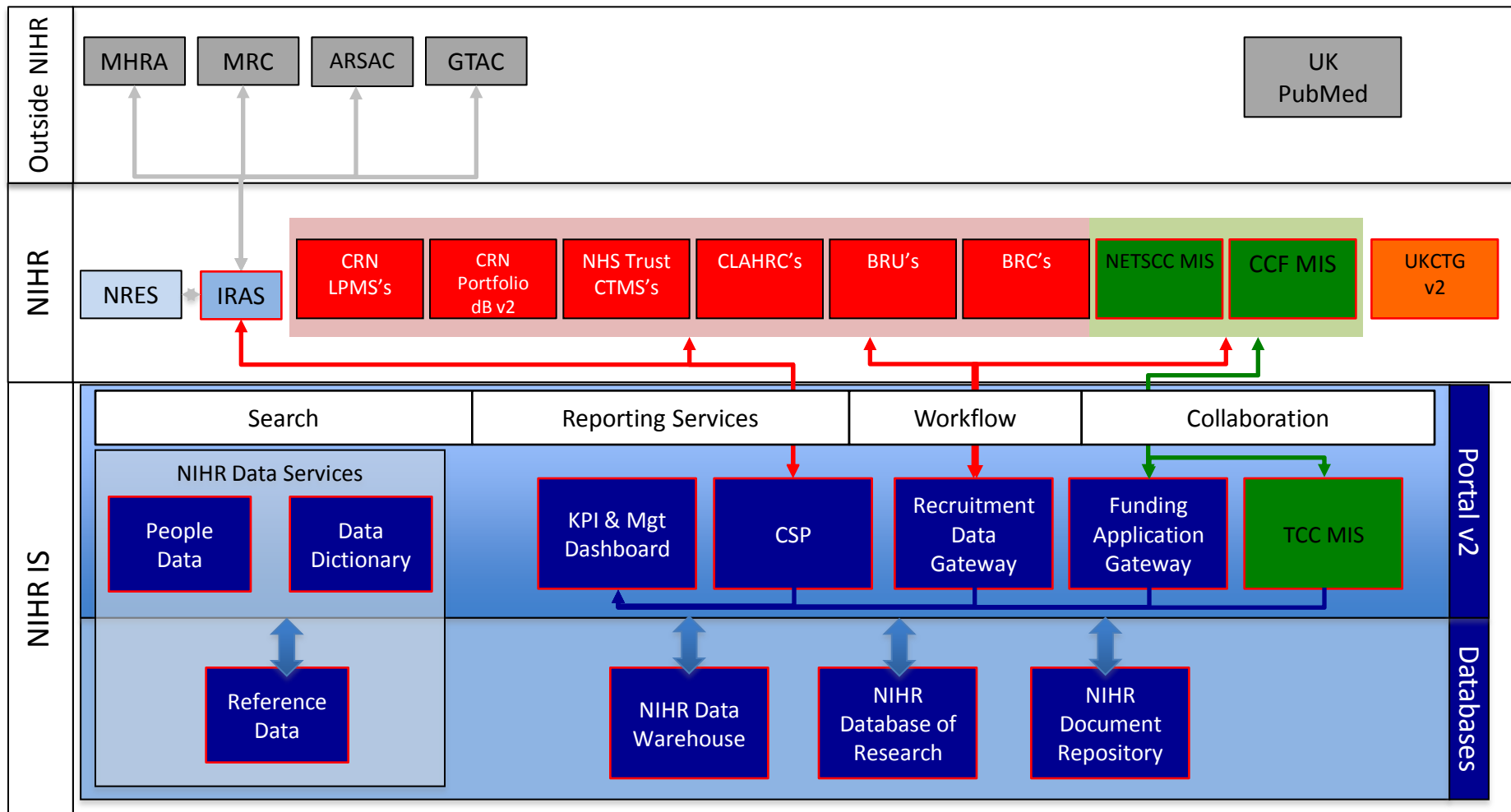
- National Institute of Health Research (NIHR)
  - provides the framework through which the Department of Health can position, maintain and manage the research, research staff and research infrastructure of the NHS in England as a national research facility.
- Vision
  - To improve the health and wealth of the nation through research
  - IS function vision
    - To improve the health and wealth of the nation through research supported by world class information systems
- Mission
  - To maintain a health research system in which the NHS supports outstanding individuals working in world-class facilities, conducting leading-edge research, focused on the needs of patients and public
  - IS function mission
    - To provide information systems to consolidate, unify, streamline and simplify the corporate information sharing and business support services for the NIHR

To Be - NIHR Management Information Systems based around the Research Project Lifecycle, enabling “input once”



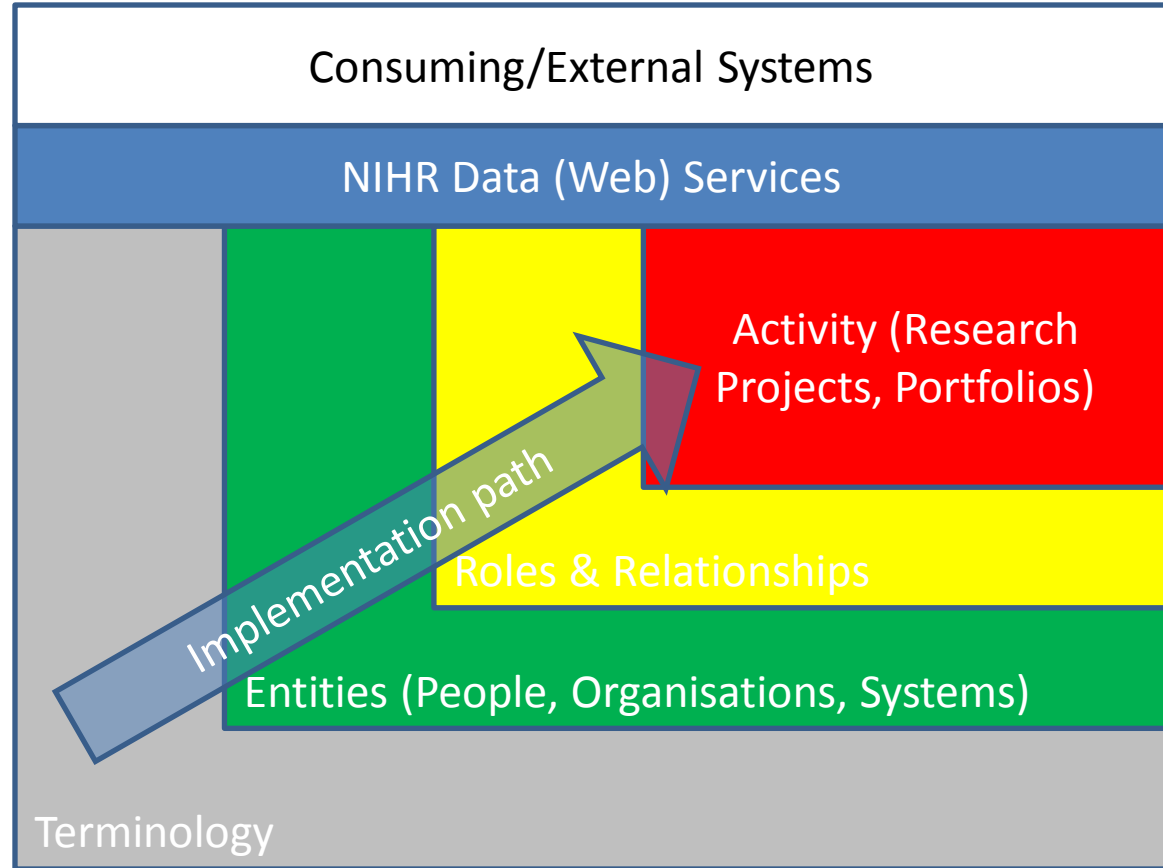
# To Be – Systems View

To be confirmed through the Blueprint work and incorporation of agreed business processes



# Shared Data

- Terminology
  - Study Type
  - Standardised Forms
  - Clinical Specialties
- Reference Data
  - Roles and Relationships
    - Study Sites NHS & Non-NHS
    - Investigators
    - System Users
  - People
  - Organisations
    - Trusts
    - Research Networks
    - Universities
    - Clinical Study Groups
- Research Projects
  - Studies
  - Portfolios



# The Repository

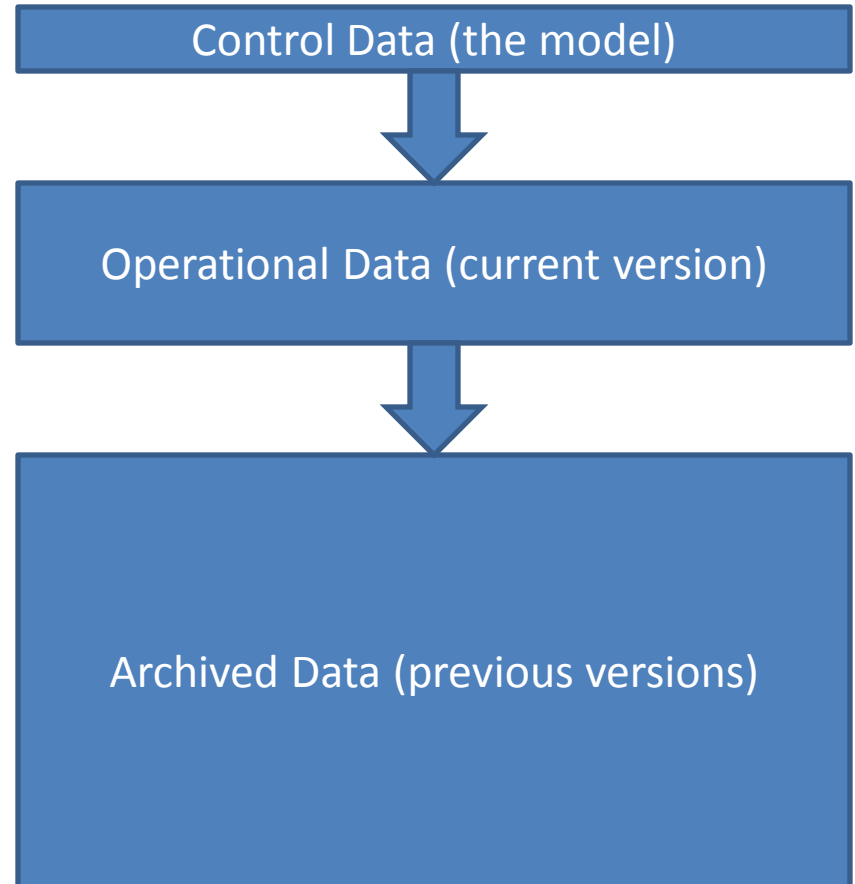
- Technology
  - SQL Server 2008
  - Microsoft WCF (Windows Communication Foundation)
  - .NET 3.5
- Terminology Data
  - Data Store & Web Services Model based upon CTS version 1 model
- Reference Data
  - Based upon HL7 model
  - Using Entity Attribute Value (EAV) structure
    - Flexibility – business requirements and model are not yet finalised
    - Slower than a dedicated implementation model, but still ‘fast enough’

# High Level View of Repository

All I/O is controlled by the model stored within Control Database

EAV store with archetypes for shared, 'complex' data types such as identifiers, telecoms, codes & addresses

As changes are persisted into Operational data, these changes are copied out to the archive (i.e. archive contains a copy of current data and all previous versions of that data)





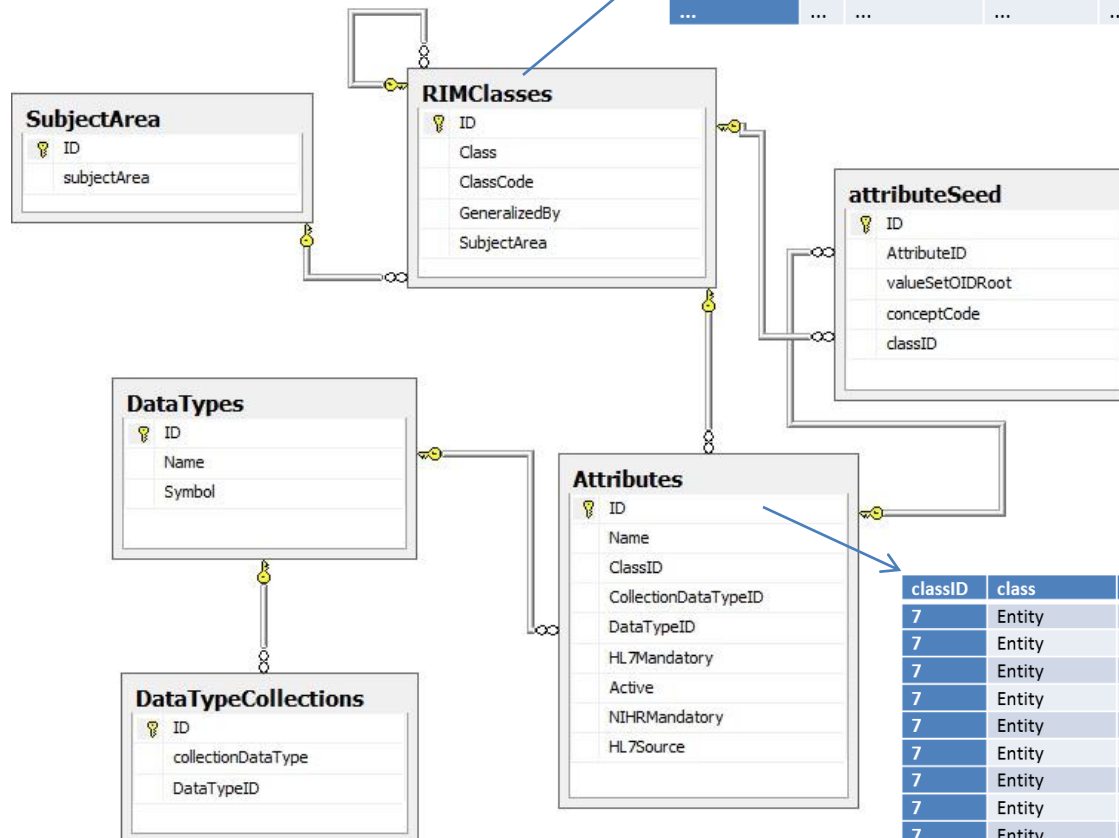
# Control DB Structure

- 1, Entities
- 2, Roles
- 3, Acts
- ...

subjectArea	ID	Class	ClassCode	GeneralizedBy	SubjectArea
ENTITIES	7	Entity	ENT	48	3
ENTITIES	8	Organization	ORG	7	3
ENTITIES	9	LivingSubject	LIV	7	3
...	...	...	...	...	...

RIMClasses:

- define HL7 RIM classes
- Define 'local' classes as specialisations of these RIM classes



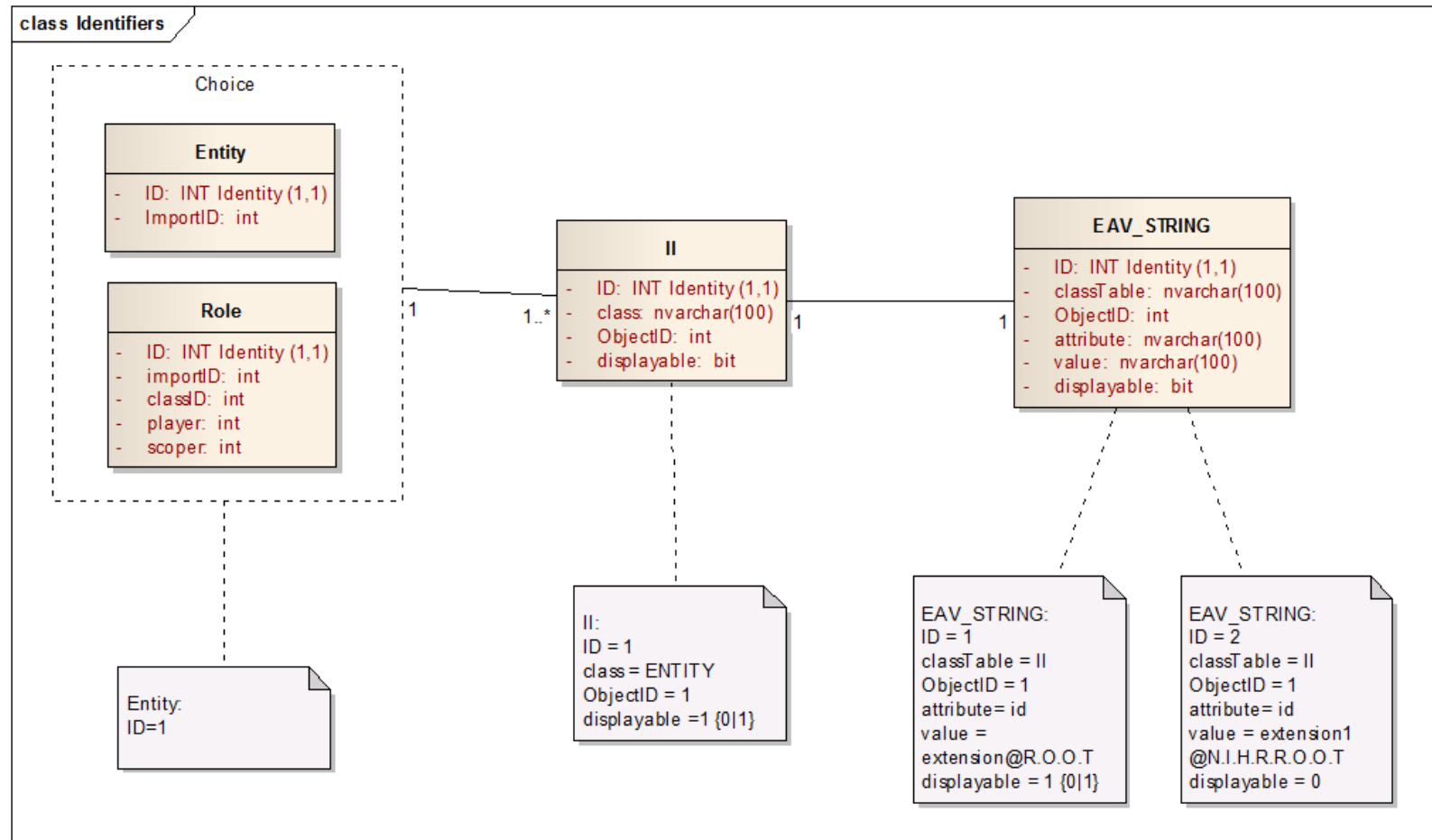
attributeSeed:

- defines default/fixed content of class attributes

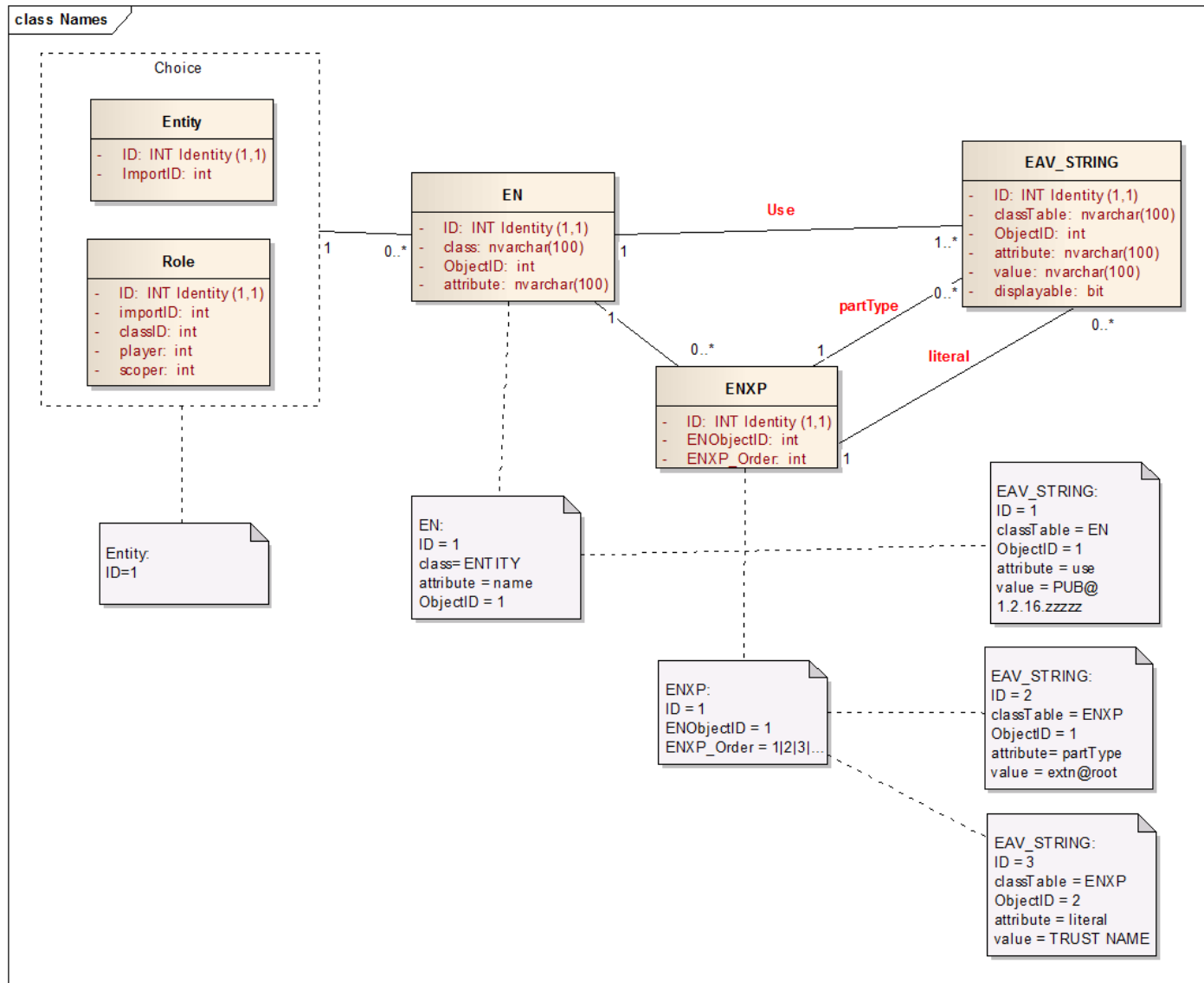
- Attributes:
- defines attribute content of classes

classID	class	attrID	attributeName	dataTypeSymbol	mandatory	active
7	Entity	24	classCode	CS	1	1
7	Entity	25	determinerCode	CS	1	1
7	Entity	26	Id	DSET<II>	0	1
7	Entity	27	code	CD	0	1
7	Entity	28	quantity	PQ	0	1
7	Entity	29	name	COLL<EN>	0	1
7	Entity	30	desc	ED	0	1
7	Entity	31	statusCode	CS	0	1
7	Entity	32	existenceTime	IVL<TS>	0	1
7	Entity	33	telecom	COLL<TEL>	0	1
7	Entity	34	riskCode	DSET<CD>	0	1
7	Entity	35	handlingCode	DSET<CD>	0	1
8	Organization	36	addr	COLL<AD>	0	1
8	Organization	37	standardIndustryClassCode	CD	0	1

# Ref DB structure example - Identifiers



# Ref DB structure example - Names



# Web Services – Organisation interface

- Example requirements:
  - Organisation Types - Term Lists (valuesets)
  - Organisation Lists
    - By type (eg all Comprehensive Research Networks)
    - By name (eg like “%leed%”)
    - By parent and type (eg all Trusts within a specified Research network)
  - Organisation Details

# Web services – getValueSetMembers

The screenshot displays the soapUI 3.6 interface. On the left, the 'Projects' tree shows a 'Terminology' project with a 'TerminologyDefault' folder containing a 'getValueSetMembers' service. The 'Request 1' tab is selected. The main area shows the raw XML of the request and response.

**Request 1**

URL: `http://nihrmacc36.ukcrn.leeds.ac.uk/Services/Terminology/Service.svc`

**Raw XML**

```
<?xml version='1.0' encoding='utf-8'>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/">
  <soapenv:Header/>
  <soapenv:Body>
    <vl:getValueSetMembers>
      <!--Optional:-->
      <vl:incomingMsg>
        <!--Optional:-->
        <cts:ValueSetOID>2.16.840.1.113883.2.1.3.8.5.11.1.106</cts:ValueSetOID>
      </vl:incomingMsg>
    </vl:getValueSetMembers>
  </soapenv:Body>
</soapenv:Envelope>
```

**Raw XML**

```
<s:Envelope xmlns:s="http://schemas.xmlsoap.org/soap/envelope/">
  <s:Body>
    <getValueSetMembersResponse xmlns="http://www.nill.org/2009/09/terminology/">
      <getValueSetMembersResult xmlns:a="urn:hl7.org/v3" xmlns:b="http://schemas.xmlsoap.org/soap/envelope/">
        <a:ValueSetMemberItem>
          <b:Designations xmlns:c="http://schemas.xmlsoap.org/soap/envelope/">
            <c:string>CARE_ORG</c:string>
          </b:Designations>
          <b:ValueSetCodes xmlns:c="http://schemas.xmlsoap.org/soap/envelope/">
            <c:string>CARE_ORG</c:string>
          </b:ValueSetCodes>
          <b:ValueSetID>5325</b:ValueSetID>
        </a:ValueSetMemberItem>
        <a:ValueSetMemberItem>
          <b:Designations xmlns:c="http://schemas.xmlsoap.org/soap/envelope/">
            <c:string>NHS Hospitals Trust</c:string>
          </b:Designations>
          <b:ValueSetCodes xmlns:c="http://schemas.xmlsoap.org/soap/envelope/">
            <c:string>TRUST</c:string>
          </b:ValueSetCodes>
          <b:ValueSetID>5210</b:ValueSetID>
        </a:ValueSetMemberItem>
        <a:ValueSetMemberItem>
          <b:Designations xmlns:c="http://schemas.xmlsoap.org/soap/envelope/">
            <c:string>PCO</c:string>
          </b:Designations>
          <b:ValueSetCodes xmlns:c="http://schemas.xmlsoap.org/soap/envelope/">
            <c:string>PCO</c:string>
          </b:ValueSetCodes>
          <b:ValueSetID>5210</b:ValueSetID>
        </a:ValueSetMemberItem>
      </getValueSetMembersResult>
    </getValueSetMembersResponse>
  </s:Body>
</s:Envelope>
```

Request for valueset members

Returned data

Web service request list

Using SOAPUI as test harness

# Web services – getOrganisationsByType

The screenshot displays a web service client interface with a project tree on the left and two panels showing SOAP messages. The project tree includes a 'Reference' section with 'GetOrgsByTypeXML' selected, and a 'Terminology' section. The main panels show the raw XML of a SOAP request and its corresponding response.

**Request 1 (Left Panel):**

```
<?xml version='1.0' encoding='UTF-8'>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/">
  <soapenv:Header/>
  <soapenv:Body>
    <vl:GetOrgsByTypeXML>
      <!--Optional:-->
      <vl:incomingMessage>
        <vl1:OrgType>CLRN</vl1:OrgType>
        <vl1:StatusCode>active</vl1:StatusC...>
        <vl1:MaxRecords>100</vl1:MaxReco...>
        <vl1:OrderBy>name</vl1:OrderBy>
        <vl1:RecordsFrom>0</vl1:RecordsFr...>
        <vl1:RecordsTo>0</vl1:RecordsTo>
      </vl:incomingMessage>
    </vl:GetOrgsByTypeXML>
  </soapenv:Body>
</soapenv:Envelope>
```

**Response (Right Panel):**

```
<?xml version='1.0' encoding='UTF-8'>
<s:Envelope xmlns:s="http://schemas.xmlsoap.org/soap/envelope/">
  <s:Body>
    <GetOrgsByTypeXMLResponse xmlns="http://www.nihr.ac.uk/services/reference/v...>
      <GetOrgsByTypeXMLResult xmlns:a="http://www.nihr.ac.uk/services/reference...>
        <a:QueryData>
          <QueryResults xmlns="">
            <OrganizationList queryType="GetOrganizationsByType" executionD...>
              <!--Parameter_FromRecordNo=0: indicates records returned will...>
              <!--Parameter_ToRecordNo=0: indicates records returned will...>
              <!--"* within a given call, parameter_MaxRecords takes prece...>
              <Organization Order="1">
                <id root="2.16.840.1.113883.2.1.3.8.1.1" extension="RN1"/>
                <name>Birmingham and the Black Country CLRN</name>
              </Organization>
              <Organization Order="2">
                <id root="2.16.840.1.113883.2.1.3.8.1.1" extension="RN2"/>
                <name>Central and East London CLRN</name>
              </Organization>
              <Organization Order="3">
                <id root="2.16.840.1.113883.2.1.3.8.1.1" extension="RN3"/>
                <name>Cheshire and Merseyside CLRN</name>
              </Organization>
              <Organization Order="4">
                <id root="2.16.840.1.113883.2.1.3.8.1.1" extension="RN4"/>
                <name>County Durham and Tees Valley CLRN</name>
              </Organization>
              <Organization Order="5">
                <id root="2.16.840.1.113883.2.1.3.8.1.1" extension="RN5"/>
                <name>Cumbria and Lancashire CLRN</name>
              </Organization>
              <Organization Order="6">
                <id root="2.16.840.1.113883.2.1.3.8.1.1" extension="RN6"/>
                <name>Essex and Hertfordshire CLRN</name>
              </Organization>
              <Organization Order="7">
                <id root="2.16.840.1.113883.2.1.3.8.1.1" extension="RN7"/>
                <name>Greater Manchester CLRN</name>
              </Organization>
            </OrganizationList>
          </QueryResults>
        </a:QueryData>
      </GetOrgsByTypeXMLResult>
    </GetOrgsByTypeXMLResponse>
  </s:Body>
</s:Envelope>
```

# Web services – getOrganisationsByTypeAndParent

The screenshot displays a web service client interface. On the left, a tree view shows the project structure, including 'Reference', 'CLRNDefault', and 'Terminology'. The main area is divided into two panes: 'Request 1' and 'Response 1'. The 'Request 1' pane shows a SOAP request with the following XML structure:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/">
  <soapenv:Header/>
  <soapenv:Body>
    <vl:GetOrgsByTypeAndParentXML>
      <!--Optional:-->
      <vl:incomingMessage>
        <vl1:OrgType>TRUST</vl1:OrgType>
        <vl1:StatusCode>Active</vl1:StatusCode>
        <vl1:MaxRecords>100</vl1:MaxRecords>
        <vl1:OrderBy>name</vl1:OrderBy>
        <vl1:RecordsFrom>0</vl1:RecordsFrom>
        <vl1:RecordsTo>100</vl1:RecordsTo>
        <vl1:ParentOID>RN5@2.16.840.1.113883.2.1.3.8.1.1</vl1:ParentOID>
      </vl:incomingMessage>
    </vl:GetOrgsByTypeAndParentXML>
  </soapenv:Body>
</soapenv:Envelope>
```

The 'Response 1' pane shows a SOAP response with the following XML structure:

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Header/>
  <soap:Body>
    <vl:peAndParentXMLResponse xmlns="http://www.nihr.ac.uk/services/reference/v1.0#cont"
      yTypeAndParentXMLResult xmlns:s="http://www.nihr.ac.uk/services/reference/v1.0#cont"
      ryData>
      <eryResults xmlns="">
        <OrganizationList queryType="GetOrganizationsByTypeAndParentOID" executionDateT>
          <!--Parameter_FromRecordNo=0: indicates records returned will start from 1 in>
          <!--Parameter_ToRecordNo=0: indicates records returned will end at either th>
          <!--** within a given call, parameter_MaxRecords takes precedence over para>
          <Organization Order="1">
            <id root="2.16.840.1.113883.2.1.3.2.4.19.1" extension="RXI"/>
            <name>BLACKPOOL, FYLDE AND WYRE HOSPITALS NHS FOUNDATION TRUST</name>
          </Organization>
          <Organization Order="2">
            <id root="2.16.840.1.113883.2.1.3.2.4.19.1" extension="RXX"/>
            <name>CALDERSTONES PARTNERSHIP NHS FOUNDATION TRUST</name>
          </Organization>
          <Organization Order="3">
            <id root="2.16.840.1.113883.2.1.3.2.4.19.1" extension="RNN"/>
            <name>CUMBRIA PARTNERSHIP NHS FOUNDATION TRUST</name>
          </Organization>
          <Organization Order="4">
            <id root="2.16.840.1.113883.2.1.3.2.4.19.1" extension="RXR"/>
            <name>EAST LANCASHIRE HOSPITALS NHS TRUST</name>
          </Organization>
          <Organization Order="5">
            <id root="2.16.840.1.113883.2.1.3.2.4.19.1" extension="RW5"/>
            <name>LANCASHIRE CARE NHS FOUNDATION TRUST</name>
          </Organization>
          <Organization Order="6">
            <id root="2.16.840.1.113883.2.1.3.2.4.19.1" extension="RXN"/>
            <name>LANCASHIRE TEACHING HOSPITALS NHS FOUNDATION TRUST</name>
          </Organization>
        </OrganizationList>
      </eryResults>
    </vl:peAndParentXMLResponse>
  </soap:Body>
</soap:Envelope>
```

Parent is a specified CLRN

Returned list of organisations  
(trusts) within that CLRN

# Web services – getOrganisationDetails



The image shows a SQL query in a text editor on the left and its corresponding XML output on the right. The SQL query is a SELECT statement that calls a function [FN\_GetOrgDetails] with a specific ID and extension. The XML output is a structured representation of the data returned by the function, including details about an organization and its location.

```
SELECT [RefDB].[dbo].[FN_GetOrgDetails] (
    null
    , 'RXL@2.16.840.1.113883.2.1.3.2.4.19.1'
    , null)
GO
```

```
<organization classCode="ORG" determinerCode="INSTANCE">
  <id root="2.16.840.1.113883.2.1.3.2.4.19.1" extension="RXL" displayable="true" />
  <code code="TRUST" displayable="true" codeSystem="2.16.840.1.113883.2.1.3.8.5.2.1" />
  <name use="A">
    <value>BLACKPOOL, FYLDE AND WYRE HOSPITALS NHS FOUNDATION TRUST</value>
  </name>
  <statusCode code="active" />
  <telecom />
  <existenceTime>
    <low value="20020401" inclusive="true" />
  </existenceTime>
  <locatedEntity classCode="LOCE">
    <place classCode="PLC" determinerCode="INSTANCE">
      <id root="2.16.840.1.113883.2.1.3.8.1.3" extension="10247" displayable="true" />
      <statusCode code="active" />
      <telecom />
      <existenceTime>
        <low value="20020401" inclusive="true" />
      </existenceTime>
      <addr use="PUB">
        <streetAddressLine>VICTORIA HOSPITAL</streetAddressLine>
        <streetAddressLine>WHINNEY HEYS ROAD</streetAddressLine>
        <streetAddressLine>BLACKPOOL</streetAddressLine>
        <streetAddressLine>LANCASHIRE</streetAddressLine>
        <postalCode>FY3 8NR</postalCode>
      </addr>
    </place>
  </locatedEntity>
</organization>
```

Results Messages

	(No column name)
1	<organization classCode="ORG" determinerCode="INS...

Not yet connected to web service, example of output given



# Questions?