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Use of OIDs and IIs in EN13606

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A discussion Paper

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USE OF OIDS AND IIs in EN13606

1. ISO OIDs - A Brief Introduction

ISO Object Identifiers (OIDs) are a standardised identification scheme. OIDs were developed in 1985 and they are now widely used in the standards community. Each OID forms a node in a tree. The arcs (edges or branches) between nodes in this tree are numbered and can also be associated with an alphanumeric identifier which typically begins with a lower case character. Some examples of different OID notations are shown below.

Numeric form	*2.16.382.1*
Alphanumeric form	*{joint-iso-itu}.{country}.{ire}.{organisation}.*
URN notation	*urn:oid: 2.16.382.1*
IRI notation	*oid:/joint-iso-itu/country/ire/organisation*

Fig 1: Different representations of OIDs

Unlike IP numbers and IP addresses, there can be an infinite number of arcs at each level of the node tree and an infinite number of levels in the OID hierarchy. Objects within a community that represent terminology resources, ICT assets, countries, organizations, algorithms and many other concepts, are associated to a node in the tree.

When a node is added to the tree, the objects are uniquely identified by the path (OID) from a root node to the newly added node. The OID is then registered. For single organisation use, it may not be necessary for OIDs to be registered in this way. For distributed cases registration authority nodes can allocate subordinate arcs to dependent registration authorities. In theory, this arrangement of can continue indefinitely to form a tree of infinite depth.

Within the EN13606 specification, OIDs are used as the ROOT of an instance identifier (II). Typically, this means that OIDs identify a service that can generate II EXTENSIONs. The concatenation of ROOT and EXTENSION then forms an II. IIs are used extensively in EN13606 to identify different types of information artifacts.

OIDs have the following features,

- They are based on a tree based registry.
- New OIDs can be allocated by adding nodes to the OID tree (the OID is the path from the root of the tree to the added node).

- A new node can be added by any organisation that holds an OID root (also called a registration authority) at any point in the tree. Organisations can add these new nodes 'below' their organisation's root node.
- Organisations can request another organisation to assign a root OID to it.
- Once an OID is assigned to an object it can never be redirected to another object.
- Once an OID is issued it can never be withdrawn and it always identifies the same object.
- On the other hand a single object can be identified by multiple OIDs
- Parts of an object (e.g. document parts) can be identified by sub-OIDs but this is not mandatory.
- New OIDs can also be assigned where appropriate for revisions of an object (e.g. document or specification)
- OIDs are not intended to be parsed or decomposed by a receiving software application but should rather be used solely as a monolithic identifier.

OIDs can be viewed in an OID repository. An OID repository is not a registration authority but it does need to interact with one to allow new nodes to be added to the OID tree and so produce new OIDs. These OIDs can then be viewed in the repository.

The main global OID repository is at http://www.oid-info.com

National OID repositories are available at the links given below

Germany http://www.dimdi.de/static/en/ehealth/oid/index.htm
Switzerland http://www.hl7.ch/oid
Spain http://www.hl7spain.org/Ficheros/0/Documentos/OID%20HL7%20Spain%281%29.html
United Kingdom http://www.hl7.org.uk/version3group/downloads/OidRootHl7UkOnly.html
Norway KITH AS manage Norwegian OID space -see details at:
http://translate.google.ie/translate?js=n&prev=_t&hl=en&ie=UTF-8&layout=2&eotf=1&sl=auto&tl=en&u=http%3A%2F%2Fwww.kith.no%2Ftemplates%2Fkith_WebPage____3334.aspx

It has been noted that multiple OIDs can refer to the same object. There is already some repetition. For instance some of the national implementations use an OID in their own national arc for terminological resources such as SNOMED-CT. It is not clear whether these OIDs refer to national profiles of SNOMED-CT (but this seems reasonable)

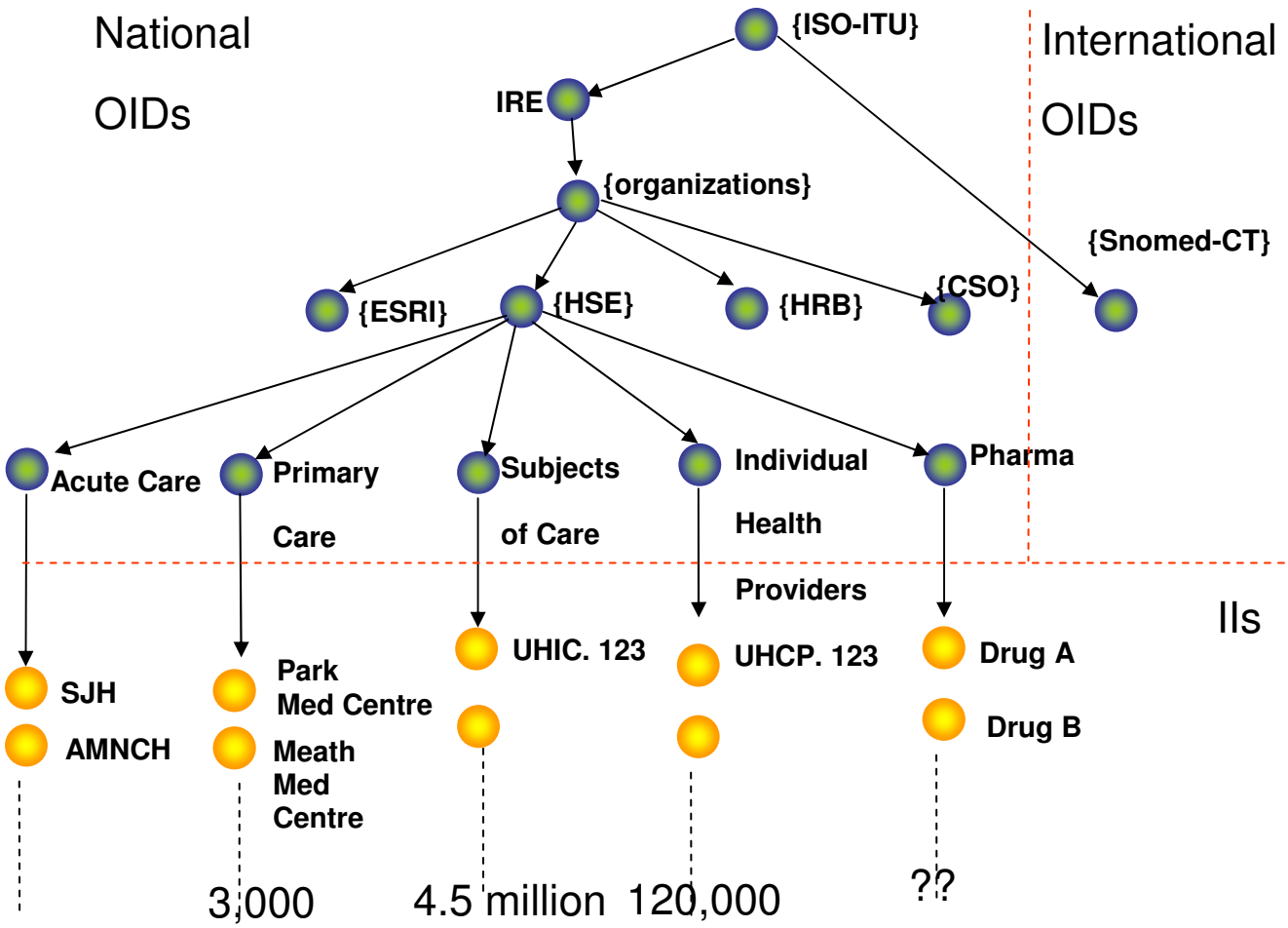

Figure 2: how the OID/II space for Ireland might appear.

OID Resolution Protocol

The OID resolution protocol (ORP), defined in a IEC work item will define the interaction bertween an OID resolution client which sends an OID as part of a request and an OID resolution server which returns the OID information available at the corresponding node in the tree. The service is similar to the Domain Name Service.

2. Relationships to other unique identifier schemes

There are a number of other unique identifier approaches. Some of these other approaches are described here.

2.1 URI or Uniform Resource Locator is a string that identifies a name or internet resource. There are two types of URI and a resource can be addressed by both types simultaneously.

URL (Uniform Resource Locator) is a widely used type of URI that identifies and provides a means for retrieving an internet resource.

URN (Uniform Resource Name) is a mechanism for naming or finding a resource and associating meta-information with a name. The presence of a URN for a resource does not necessarily imply that the resource is available. A URN can be used to represent an OID. The joint ISO-ITU OID for Ireland in URN syntax is

```
urn:oid:2.16.382
```

In general terms, a URN takes the form

```
<URN> ::= "urn:" <Namespace identifier> ":" <namespace specific string>
```

2.2 UUID Universally Unique Identifier formed by a series of 16 octets or a total of 128 bits or 32 hexadecimal digits (often separated in groups of four). Using this scheme, a new unique UUID could be created every 100 nanoseconds on every internet machine for the next 1600 years. UUIDs can be registered in an OID registry. For example the OID `2.25` has been reserved as a registration authority for UUIDs. GUID is another name for a UUID. From figure 2 below it can be seen that OIDs can represent (registered) UUIDs and can in turn be represented by a type of URIs (actually a URN). The advantage of the OID over a UUID is that it guarantees uniqueness through registration.

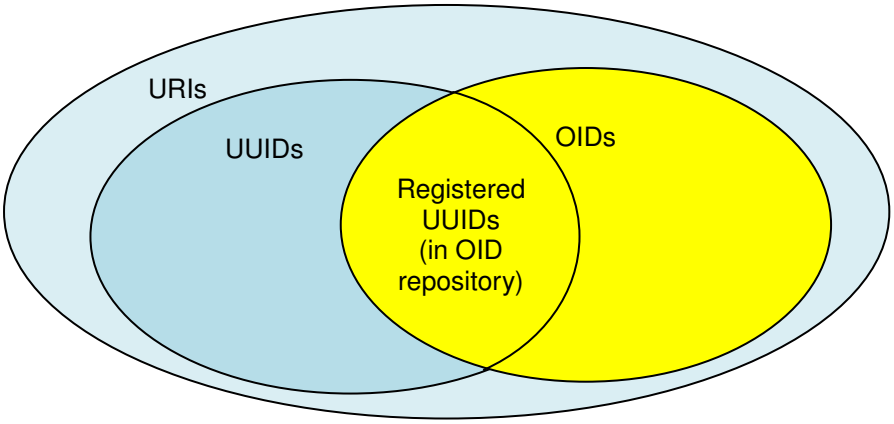

Figure 3: Scope of the three types of unique identifiers described above

UUIDs are used in Norwegian EHR specifications to refer to (EHR) message instances and referrals.

3. Examples of possible generation of IIs for some of the key identifiers in an EN13606 compatible system.

The following EN13606 properties are likely to play a central role in an implemented solution and it would be useful to have a single agreed solution for EN13606 systems which nevertheless addresses the different EHR configurations that may arise. If this unified approach is not agreed, it will make it more difficult for regional implementations to interoperate.

a) EHRSystemID (Extract)

As specified in EN13606, this is likely to be a root OID which is given to each health provider organisation by a national authority. OID assigning authorities in the designated health organisation in turn have the ability assigns sub OIDs as per the scheme similar to the one outlined in 2 and 3 below.

EHRSystemID II Format: `{EHRSystemID} (root OID)`

e.g.

```
2{iso-
itu}.16{country}.382{ireland].1{organisation}.2.{hse}.2{ehrsys
tems}.301{materehrsysid}
```

Some regions in Norway have begun to identify EHR systems in this way.

b) EHR_ID

This property could for example be created and managed by a service associated with each EHRsystem. Following this simple case, a single unique EHR_ID Instance Identifier is created per patient per patient identity domain. This corresponds to one primary patient identity domain per health provider organization. Of course this approach will not be sufficient in many cases.

`EHR_ID II Format:  {EHRsystem ID}(root OID).{MRN}(Extension)`

By taking the numeric form of the OID from the previous example and applying an MRN 1234567 as extension would be produced.

```
2.16.382.1.2.2.301.1234567
```

c) rc_ID

This II could be created by each EHRsystem. An interesting issue arises if the EHRsystem attempts to use legacy data to calculate on the fly, a reusable rc_ID.

Which can be used as a basis for future requests for record components in an EXTRACT. This rc_ID must be either retained or be reproducible.

Rc_ID II Format:

```
{EHRsystemID+concatenatedMRN}(root).{Unique
alphanumeric}(Extension)
```

NOTE: the properties *original parent ref* and *contribution_id* could follow the same scheme as the one shown above. Original parent ref could refer to an rc_id and contribution_id would require a new II for each contribution.

A number of experts have noted that UUIDs may be a more practical option for rc_ID.

d) archetype_id (for a record component only – i.e. ignoring the archetype_ids found in an extract)

archetype_id II Format: `{OID of Archetype repository.concatenated Archetype ID}(Root OID).{atCode of archetype node for this record component}(Extension)` *This follows an approach proposed by David Moner on the Wiki.*

e) For Health professionals the following properties need IIs which are assigned at national or regional level or calculated at local level.

- performer (of a functional role)

- committer (of a record component)

- Authorising Party (of an extract)

II Format: `{National/regional/local HCP identifier assigning authority}(root OID).{unique HCP identifier}(extension)`

An approach like this is used to identify health professionals in Norway, under the OID 2.16.578.1.12.4.

f) For Patients, the following properties need IIs which are assigned at national or regional level or calculated at local level. In the following form.

- related party

- subject of care

- subject of information (of an entry)

II Format: `{National/regional/local unique health identifier assigning authority}(rootOID). {unique health identifier} (extension)`

An approach like this is used to identify health system users in Norway, under the OID 2.16.578.1.12.4.

4. Types of services that are associated with OIDs in EN13606

In line with the standard, the following services can be identified using (root) OIDs in EN13606 compliant systems. Typically these services would need to be capable of adding Extensions to form unique Instance Identifiers for the relevant object.

4.1 OIDs for national, regional or local assigning authorities and other resources

EN13606 suggests the provision of OID roots for the following shared resources the location of these shared resources is not dictated by the standard,

- Identities of subjects of care and related parties.
- Identities of healthcare provider organizations (or parts of same?)
- Identities of individual healthcare providers
- Identities of Medical devices
- EHR system identifiers (or for identifiers for parts of EHR systems?) that participate in an EHR community.
- Terminological systems

4.2 Local OID roots

The standard also indicates a need for the following OID roots at local EHR provider level,

- Individual EHRIds (typically within an individual EHR system)
- Individual RC_ids (typically within an individual EHR system)
- (Access control) policies
- Contributions, committals and versioning of various types of record components.

Note: A cluster of issues arise here in relation to generation of unique local identifiers: there are a number of different ways in which uniqueness can be generated. E.g.

- *authorID + timestamp*

- *subject of careID + timestamp*

- *MachineID + random number (UUID)*

- *InformationSystemID + number unique to the information system.*

EN13606 says that local identifiers should be IIs. Is this the optimum approach? Should RC_Ids be UUIDs for instance? This would be similar to the approach adopted in certain instances (pun intended) in Norway. In any case, given the number of information systems involved, if EN13606 is adopted on a wide scale, it would make sense to employ a mature and easy-to-implement approach. For Ids which are most numerous, UUIDs appear to be a practical alternative albeit at the cost of some human readability. One approach which allows the specification to remain unchanged is to employ the "UUID OID (OID 2.25) which was mentioned in section 2.2. Locally generated UUIDs could be appended to the end of this OID.

4.3 Specific issues comments and questions

- RC_id for record components other than elements should support being linked through an Original_parent_ref, Attestation_info, and Links.
- Should archetypes be given OIDs in addition to archetype_ids?
- The HL7 organisation have assigned OIDs for a large number of resources. These are available at http://www.hl7.org/Oid/index.cfm. It would seem sensible to reuse these OIDs where possible but there are cases where this is not possible (e.g in the case of national profiles of terminologies). Is there a need for a separate GENERAL OID repository for EN13606?

5. Using OIDs to refer to different types of objects.

This section describes how OIDs might be or are already being used to identify different types of objects.

5.1 OIDs for standards

Below is a list of standards and specifications that are mentioned in EN13606 Parts 1-5. Each of these standards may require a registered OID to identify them to support unambiguous communication. The standard for country codes, ISO3166 is an interesting special case, in the sense that the country codes from this standard have been used to create "country" sub-OIDs. A similar approach could also be taken with language codes of ISO 639 and other term lists to populate the OID hierarchy.

Table 1: ISO standards named in EN13606

Identifier	Name	Proposed OID
ISO 639:1988(E/F)	Code for the representation of names of languages	1.0.639.1 1.0.639.2
ISO 1087-1:2000	Terminology work - Vocabulary - Part 1: Theory and application	1.0.1087.1
ISO 3166: 1993	International Standard for country codes	1.0.3166.1 1.0.3166.2 1.0.3166.3
ISO 7498-2:1988	Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 2: Security Architecture	
ISO 8601:2000	Data elements and interchange formats – Information interchange – Representation of dates and times	1.0.8601
ISO 11404	Information technology. Programming languages, their environments and system software interfaces. Language-independent datatypes	1.0.11404

Table 2: Joint ISO IEC standards named in EN13606

Identifier	Name	Proposed OID
ISO/IEC 2382-8:	1998 Information technology – Vocabulary - Part 8: Security	1.0.2382.8
ISO/IEC 7498-2	Information processing systems – Open Systems Interconnection -- Basic Reference Model -- Part 4: Management framework	1.0.7498.2
ISO/IEC 8824-1	Information technology -- Abstract Syntax Notation One (ASN.1): Specification of basic notation	1.0.8824.1
ISO/IEC 10646-1	Information technology -- Universal Multiple-Octet Coded Character Set (UCS) Part 1: Architecture and Basic Multilingual Plane	1.0.10646.1
ISO/IEC 10746-1:1988	Information technology – Open Distributed Processing – Reference model: Overview	1.0.10746.1
ISO/IEC 11179-3: 2003	Information technology – Metadata registries (MDR) – Part 3: Registry metamodel and basic attributes	1.0.11179.3
ISO/IEC	Information technology – Programming	1.0.11404

11404: 1996	languages, their environments and system Open software interfaces – Language-independent datatypes	
ISO/IEC 17799:2005	Information technology -- Security techniques -- Code of practice for information security management	1.0.17799
ISO 22857:2004	Health informatics - Guidelines on data protection to facilitate trans-border flows of personal health information	1.0.22857

Table 3: Other ISO documents named in EN13606

Identifier	Name	Proposed OID
ISO/TS 17090-1: 2001	Health informatics – Public key infrastructure – Part 1: Framework and overview	1.0.17090.1
ISO/TS 18308: 2004	Requirements for an Electronic Health Record Reference Architecture	1.0.18308
ISO/CD TR 20514:	draft Technical Report: Electronic Health Record Definition, Scope, and Context	1.0.20514
ISO/DIS prEN 27799:2005	Health informatics – Security management in health using ISO/IEC 17799	1.0.27799
ISO/TS 21091:2005	Health informatics – Directory services for security, communications, and identification of professionals and patients.	1.0.21091
ISO TS 21298	Health informatics -- Functional and structural roles	1.0.21298
ISO/TS 22600-1:2005	Health Informatics – Privilege management and access control – Part 1: Overview and policy management	1.0.22600.1
ISO/TS 22600-2:2005	Health Informatics – Privilege management and access control – Part 2: Formal Models	1.0.22600.2
ISO/TS 22600-3	Health informatics -- Privilege management and access control -- Part 3: Implementations	1.0.22600.3
ISO/ DIS 27799	Health informatics -- Information security management in health using ISO/IEC 27002	1.0.27799

Table 4: CEN standards named in EN13606

Identifier	Name	Proposed OID
EN 14484:2003	Health informatics - International transfer of personal health data covered by the EU data protection directive - High level security policy	?
EN 14485:2003	Health informatics - Guidance for handling personal health data in international applications in the context of the EU data protection directive	?
EN 14822-1: 2004	Health Informatics – General Purpose Information Components: Part 1: General	?
EN 14822-2: 2004	Health Informatics – General Purpose Information Components: Part 2: Non-Clinical	?
EN 14822-3: 2004	Health Informatics – General Purpose Information Components: Part 3: Clinical	?

Table 5: CEN Pre-standards and other specifications named in EN13606

Identifier	Name	Proposed OID
ENV13606-1:2000	modified Health Informatics – EHCR Communication: Part 1 Electronic Health Record Architecture	?
/TS 14796: 2004	Health Informatics - Data types	?
prEN 13940:2006	Health Informatics — System of concepts to support Continuity of care — Part 1: Basic concepts	?
prEN 13608-1:2005	Health informatics – Security for healthcare communication – Part 1: Concepts and terminology	?
prEN 13608-2:2005	Health informatics – Security for healthcare communication – Part 2: Secure data objects	?
prEN 13608-3:2005	Health informatics – Security for healthcare communication – Part 3: Secure data channel	?

Table 6: W3C / IETF Specifications named in EN13606

RFC 1738: 2004	Uniform Resource Locators (URL)	?
RFC 2045: 1996	Multipurpose Internet Mail Extensions - (MIME) Part One:	?
RFC 2046: 1996	Multipurpose Internet Mail Extensions - (MIME) Part Two: Media Types	?
RFC 2806: 2000	URLs for Telephone Calls	?
RFC 2936: 2000	HTTP MIME Type Handler Detection	?
RFC 2978: 2000	IANA Charset Registration Procedures	?
RFC 3881:2004	Security Audit and Access Accountability Message - XML Data Definitions for Healthcare Applications	?

5.2 OIDs for organisations and other resources in selected countries

The following OIDs appear to be active for different countries.

2.16.372 Ireland
2.16.724 Spain
2.16.724.4 SNS
2.16.724.4.5 Canary Islands regional health service
2.16.724.4.8 Castilla La Mancha regional health service
2.16.724.4.9 Catalonia regional health service
2.16.724.4.11 Extremadura Regional health service
2.16.724.4.14 Regional health service of Murcia
2.16.724.4.15 Navarra regional health service
2.16.724.4.21 Ministry of Health and Social Policy
2.16.276 Germany
2.16.840 USA
1.2.826 United Kingdom (Doesn't seem to be an active arc under 2.16.826)

2.16.578 Norway
- 2**.16.578.1.34** helse-vest
- **2.16.578.1.12.4** social and health sector
  - **2.16.578.1.12.4.1** tidelv-av-kith (
    - **2.16.578.1.12.4.1.1.** code sets
    - **2.16.578.1.12.4.1.2** communication parties
    - **2.16.578.1.12.4.1.4** identifiers
    - **2.16.578.1.12.4.1 6** EHR components
  - **2.16.578.1.12.4.2** helse-mid-norge
  - **2.16.578.1.12.4.3** helse-sor-ost
  - **2.16.578.1.12.4.4** helse-nord

2.16.528 Netherlands

2.16.40 Austria (there doesn't seem to be an active arc here however)

For many country OIDs, two sub OIDs are defined.

.1 is reserved for organisations

.101 is reserved for government

So under this scheme for Ireland,
2.16.372.1 would be reserved for Irish organisations
2.16.372.101 would be reserved for Irish Government agencies.
Under this scheme, it would appear that NGOs would use the former OID.

5.3 OIDs for Terminologies

HL7 have already assigned OIDs to a large number of terminologies, such as,

UCUM	**2.16.840.1.113883.6.8**
ICD10	**2.16.840.1.113883.6.3**
HL7	**2.16.840.1.113883**
Snomed-CT	**2.16.840.1.113883.6.96**

Note: Norway have a national OID for ICD-10, the Norwegian version which is based on the 10th revision. This OID is 2.16.578.1.12.4.1.1.7110. As mentioned earlier, certain countries will also have national profiles of different terminologies. In cases of national translated versions or profiles of terminologies it would be incorrect to refer to the HL7 OID for ICD-10. National versions or profiles of this type are more likely to be allocated an OID at the relvant national or regional level.

5.4 Compression Algorithms

HL7 has assigned a Compression Algorithm. OID: **2.16.840.1.113883.5.1009**

5.5 Specific issues and questions.

- There is currently no separate OID space for CEN or IETF specifications.
- In some cases, depending on the ISO document type resulting from a CEN specification, it could be possible to create an ISO OID for a CEN document.
- On the other hand, it may be possible to have a CEN or IETF standard or technical specification document with the same number as a completely different ISO document. This is certainly true of document numbers for national standards.
- So if the OID idea is to support a wide range of terminologies and other resources there is a need for separate OID spaces for other SDOs.
- Is it possible to assign an OID to an unpublished specification? (e.g. prENV) would this be useful??
- If a CEN specification that is used by the standard subsequently becomes an ISO specification, then the OID for the revised document will have to be moved into the ISO OID space.

6. Costs for OID assignment

USA charges a $1,000 fee for numeric OID registration and $2,500 for alphanumeric OID registration.

In the U.K. all registered companies may avail of a free service that allows them to append their company registration number to the root 1.2.826.0.1 to produce an OID.

7. HL7 and OIDs

Finally, it makes sense that we should where possible reuse the valuable work and experience of HL7 in this area, including their defined OIDs. A snippet of the HL7 policy on OIDs is included here:

"...HL7 has established this OID registry and assigns OIDs in its branch For HL7 users and vendors upon their request. HL7 also assigns OIDs to Public identifier-assigning authorities both U.S. nationally (e.g., the U.S. State driver license bureaus, U.S. Social Security Administration, HIPAA Provider ID registry, etc.) and internationally (e.g., other countries Social Security Administrations, Citizen ID registries, etc.)

The HL7 registered OIDs must be used for these organizations, regardless whether these organizations have other OIDs assigned from other sources.

When assigning OIDs to third parties or entities, HL7 shall investigate whether an OID is already assigned for such entities through other sources. It this is the case, HL7 shall record such OID in a catalog, but HL7 shall not assign a duplicate OID in the HL7 branch. If possible, HL7 shall notify a third party when an OID is being assigned for that party in the HL7 branch...."