HXL Date/Time Standard – *DRAFT v2*

The Humanitarian eXchange Language date/time standard (HXL-Date) specifies how timestamp and time period/interval information is to be included into datasets that use the HXL vocabulary. The main requirements for HXL-Date are that it has to be (1) capable of handling different levels of temporal granularity and (2) should be compliant with existing standards.
HXL-Date consists of two components: The representation standard for the actual date and time information (described in section 1 of this document) and the RDF predicates to attach date/time information to resources such as reports and projects (section 2). Both components reuse existing standards for maximum compatibility. HXL reuses the W3C profile [1] of the ISO 8601 standard for representation of dates and times [2] and predicates defined by the Dublin Core Metadata Initiative [3].

1. W3C Date/Time Formats

This section quotes the relevant parts of W3C profile [1] of the ISO 8601 standard for representation of dates and times [2]. Developers building adapters to export/import HXL should note that this format is *not* identical to the date and time formats defined for the corresponding XML schema (XSD) data types [4], but a valid *subset* of the XSD data type formats. It is recommended best practice to facilitate exporting HXL data by using the correct data type declarations (see section 3). By following these standards, date/time information in HXL should be easy to export to any systems that use ISO or XSD formats for date and time.

Extract from [1]:

> Different standards may need different levels of granularity in the date and time, so this profile defines six levels. Standards that reference this profile should specify one or more of these granularities. If a given standard allows more than one granularity, it should specify the meaning of the dates and times with reduced precision, for example, the result of comparing two dates with different precisions.
> The formats are as follows. Exactly the components shown here must be present, with exactly this punctuation. Note that the "T" appears literally in the string, to indicate the beginning of the time element, as specified in ISO 8601.

```
Year:
       YYYY (eg 1997)
Year and month:
       YYYY-MM (eg 1997-07)
Complete date:
       YYYY-MM-DD (eg 1997-07-16)
Complete date plus hours and minutes:
       YYYY-MM-DDThh:mmTZD (eg 1997-07-16T19:20+01:00)
Complete date plus hours, minutes and seconds:
       YYYY-MM-DDThh:mm:ssTZD (eg 1997-07-16T19:20:30+01:00)
Complete date plus hours, minutes, seconds and a decimal
fraction of a second
```

```
       YYYY-MM-DDThh:mm:ss.sTZD (eg 1997-07-
16T19:20:30.45+01:00)
```

where:

```
     YYYY = four-digit year
     MM   = two-digit month (01=January, etc.)
     DD   = two-digit day of month (01 through 31)
     hh   = two digits of hour (00 through 23) (am/pm NOT
allowed)
     mm   = two digits of minute (00 through 59)
     ss   = two digits of second (00 through 59)
     s    = one or more digits representing a decimal fraction
of a second
     TZD  = time zone designator (Z or +hh:mm or -hh:mm)
```

This profile does not specify how many digits may be used to represent the decimal fraction of a second. An adopting standard that permits fractions of a second must specify both the minimum number of digits (a number greater than or equal to one) and the maximum number of digits (the maximum may be stated to be "unlimited").

This profile defines two ways of handling time zone offsets:

1. Times are expressed in UTC (Coordinated Universal Time), with a special UTC designator ("Z").
2. Times are expressed in local time, together with a time zone offset in hours and minutes. A time zone offset of "+hh:mm" indicates that the date/time uses a local time zone which is "hh" hours and "mm" minutes ahead of UTC. A time zone offset of "-hh:mm" indicates that the date/time uses a local time zone which is "hh" hours and "mm" minutes behind UTC.

A standard referencing this profile should permit one or both of these ways of handling time zone offsets.

2. Recommended predicates for data annotation

The classes and predicates of HXL-Date reuse and build on the Dublin Core Metadata Terms [3].

1. Classes

The classes specify which types of things can occur as subjects (and objects) in a HXL statement.

dc:PeriodOfTime

Description	An interval of time that is named or defined by its start and end dates.
URI	http://purl.org/dc/terms/PeriodOfTime

2. Predicates

The predicate definitions specify between which kinds of things these predicates can be used, i.e., what kinds of subjects and objects can be part of a statement that uses this predicate. The *domain* defines the types of subjects; the *range* defines the types of objects.

dc:date

Description	Date may be used to express temporal information at any level of granularity.
URI	http://purl.org/dc/terms/date
Range	rdfs:Literal

hxl:start

Description	Specifies the start date of a period of time (at any level of granularity).
URI	http://hxl.humanitarianresponse.info#start
Superproperty	dc:date

hxl:end

Description	Specifies the start date of a period of time (at any level of granularity).
URI	http://hxl.humanitarianresponse.info#end
Superproperty	dc:date

hxl:duration

Description	Specifies the duration of a period of time (at any level of granularity) when the period cannot be assigned definite start/end dates.
URI	http://hxl.humanitarianresponse.info#duration
Superproperty	dc:date

3. Examples

The following examples in Turtle notation[1] give an overview of how to annotate resources with time stamps and time periods (at different levels of granularity). Note that the given URIs are *not* referring to any actual content and only assigned for illustration. The HXL URI Pattern Guidelines [5] will specify how these URIs have to be constructed. The examples below use the following namespace prefixes:

```
@prefix hxl:  <http://carsten.io/hxl/ns#> .
@prefix rdf:  <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix dc:   <http://purl.org/dc/terms/> .
```

[1] See http://www.w3.org/TeamSubmission/turtle/.

```
@prefix xsd:  <http://www.w3.org/2001/XMLSchema#> .
```

1. Time stamps

Timestamp for an earthquake (in UTC):

```
<http://exam.pl/resource/event/1234>
     dc:date  "2011-06-13T02:20:50"^^xsd:dateTime ;
     dc:title "Christchurch earthquake"^^xsd:string .
```

Timestamp for a report:

```
<http://exam.pl/resource/report/456>
     dc:date  "2011-03-12"^^xsd:date ;
     dc:title "Food distribution report for March 12."^^xsd:string .
```

Specifying the correct XSD datatype for a HXL timestamp (e.g. `xsd:dateTime`, `xsd:date`, `xsd:gYear`) is optional, but recommended best practice to facilitate parsing HXL and exporting the data to other (e.g., XML-based) formats.

2. Time periods

Time period for a project:

```
<http://exam.pl/resource/project/4711>
     hxl:start  "2011-06"^^xsd:gYearMonth ;
     hxl:end    "2011-10"^^xsd:gYearMonth ;
     dc:title   "Vaccination project."^^xsd:string .
```

Duration of a (planned) activity:

```
<http://exam.pl/resource/activity/42>
     hxl:duration "2 months"^^xsd:string ;
     dc:title     "Hygiene education project."^^xsd:string .
```

Reporting period for a report:

```
<http://exam.pl/resource/project/4711>
     rdf:type   hxl:Report ;
     hxl:period <http://exam.pl/resource/period/0815> .

<http://exam.pl/resource/period/0815>
     rdf:type   hxl:ReportingPeriod ;
     hxl:start  "2011-02-01"^^xsd:date ;
     hxl:start  "2011-02-15"^^xsd:date .
```

As shown in these two examples, time periods can either be attached directly to a resource via hxl:start / hxl:end, or by creating a resource for the period of time (such as a reporting period). A separate resource for each period of time is required whenever further statements about this period of time are to be made, and especially when several time periods are required (e.g. to distinguish the period the report is about from the period during which the report was written).

3. Graph visualization

Figure 1 gives a visual overview of the examples introduced above.

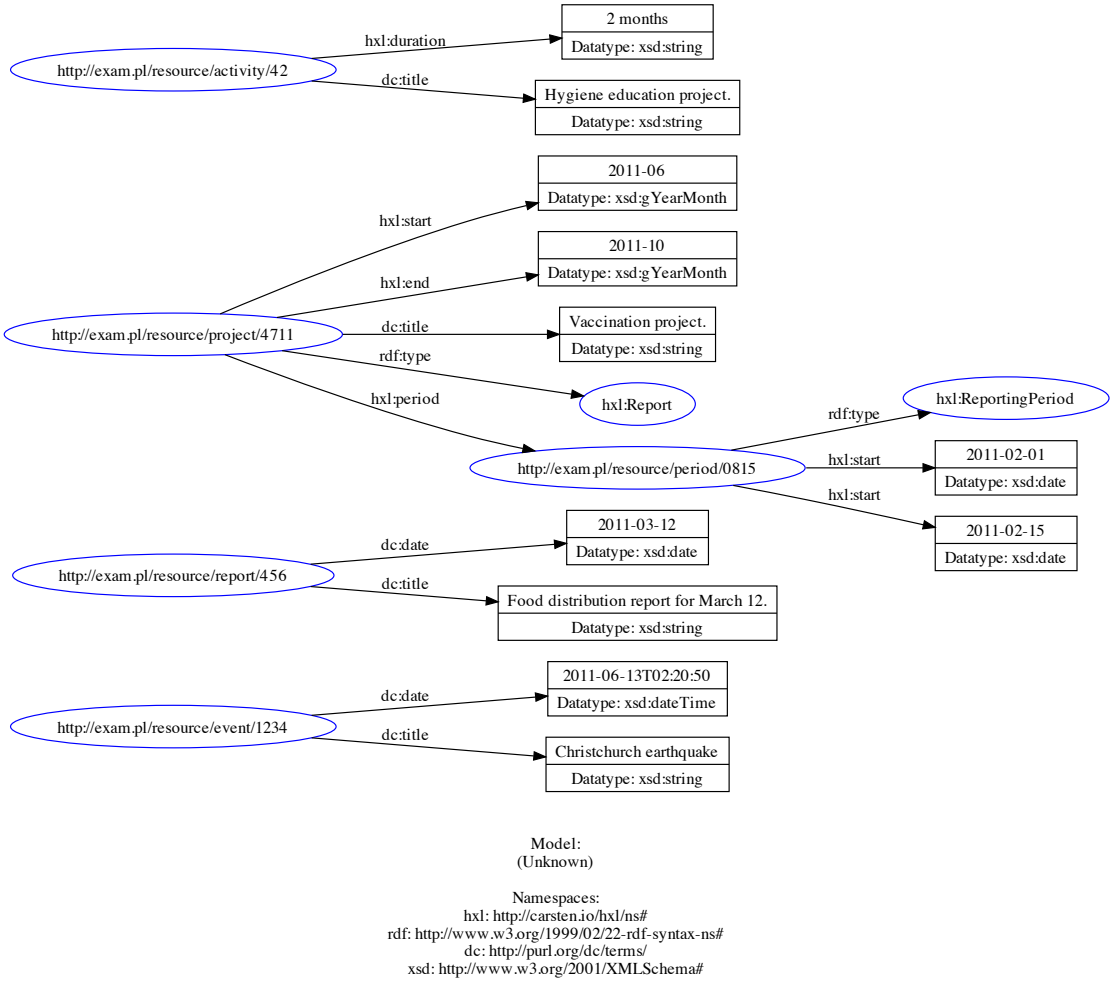

Figure 1: Graph visualization of the examples.

5. References

[1] W3C (1997) Date and Time Formats. Discussion note available from http://www.w3.org/TR/NOTE-datetime

[2] International Standards Organization (1988) Data elements and interchange formats - Information interchange - Representation of dates and times. Available from http://www.iso.org/iso/iso_catalogue/catalogue_ics/catalogue_detail_ics.htm?csnumber=15903

[3] Dublin Core Metadata Initiative (2010) DCMI Metadata Terms. Vocabulary specification available from http://dublincore.org/documents/dcmi-terms/

[4] WRC (2004) XML Schema Part 2: Datatypes Second Edition, section on ISO 8601 Date and Time Formats. Available from http://www.w3.org/TR/xmlschema-2/#isoformats

[5] HXL URI pattern guidelines – tbd.