



HR-XML Date Time and Effective Dating Best Practices

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Abstract

The objective of this document is to define a consistent manner for using dates for a variety of situations throughout the consortium's work. Specifically, this will consist of recommendations for work groups to follow to determine their needs as well as a set of design patterns to be used based on the decisions made.

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1 Overview

The objective of this document is to provide HR-XML standards developers with the tools to incorporate date, time and effective dating values into their work processes in a consistent manner. This is achieved through the use of standard data types, which permit an XML parser to ensure the validity of a desired style of data. Each work group can define its own business process needs and apply any of the applicable data types defined herein which match that need.

1.1 *Technical Issues*

One issue with the current Schema Recommendation is the fact that the time zone designation is optional. A business partner can receive multiple instance documents based on the same schema design. Some documents can contain a dateTime data element that has the time zone, and some of the documents can contain the same dateTime data element that does not contain the time zone. The business partner has no way of ordering the documents based on this dateTime data element.

1.2 *Domain Issues*

Effective dating within the Human Resource domain poses many challenges. Although many situations only require a date, some circumstances need precision to the second or more. For example, a medical insurance policy may be effective on 2001-01-01 at 00:01:01 EST. If an employee used medical services prior to that time, they may not be covered.

Given the scope of effective dating, we need to develop a consistent method for understanding and transmitting such dates. Although this document is not intended to address how to handle specific data situations within HR, some of the major areas of concern that drive the need to have a consistent handling of effective dating are listed below:

Contact information, such as phone, address, and name are particularly date sensitive. A person may have a summer home address and a winter home address that both need to be tracked.

Positions are typically budgeted for a period of time, such as a fiscal or calendar year.

Pay grades are effective for a specified time frame. A company may create new pay grades that won't be effective until the next fiscal year.

Employee training and development may be date sensitive, such as certification expiration dates.

Participation dates for benefits are date and time sensitive. An employer may need to track original hire date, start date, leave of absence, termination, and recall dates to determine participation or breaks in coverage.

Compensation and time accounting rely heavily on effective dating. If an employee's pay changed in the middle of a pay cycle and/or retroactively, the company needs a method for calculating the correct pay.

Companies use effective dating to track employee history of departments, positions, affiliations, and the like.

Staffing may require contracts for vendor employees that are effective for a specified time frame.

Employee scheduling requires date and time manipulation.

Requisitions are usually active for a period of time. If an employee is unable to fill the position within that timeframe, they may extend the date or remove the requisition.

Like compensation, benefits providers frequently require precise dating, including considerations of retroactivity, to provide fair and accurate provision of services.

2 Definitions

Effective Date – A set of dates used to indicate when events being described occurred or will occur. These events can include the beginning and ending points of a period of time for which a particular representation is considered accurate. HR-XML uses the EffectiveDateAttributeGroup to define the start and end of the 'effective date'.

Effective Date Period - Indicates the date period in which the associated component is effective. This structure allows for a start and end date or a start date and duration. Generally, an end date or duration would be used, but not both.

Start Date – A date used to indicate the first day (inclusive), or the date and time, for which a particular representation of state is in force. HR-XML recommends that all situations requiring a non-meta data date use the StartDate element.

End Date – A date used to indicate the last day, or the date and time, for which a particular representation of state is in force. It is *always* to be inclusive. HR-XML recommends that all situations requiring a non-meta data date use the EndDate element.

valid From – A date used to indicate the first day (inclusive), or the date and time, for which a particular representation of state is in force. HR-XML recommends that all situations requiring a meta data date use the attribute validFrom.

valid To – A date used to indicate the last day, or the date and time, for which a particular representation of state is in force. It is *always* to be inclusive. HR-XML recommends that all situations requiring a meta data date use the attribute validTo.

Event Date – A date used to represent when a particular event (computer system or physical world) occurred or will occur. HR-XML data elements that are “Event Dates” may be named uniquely to indicate the event they are describing or they may inherit the properties of the parent.

Transaction Date – A data element containing a date that, depending on context, could be an “Event Date”, “Start Date”, or “End Date”. Like “Effective Date”, this term is very vague as it is already used in the industry, so HR-XML does not recommend using this term.

Time - The definition should be clear from the context in which it is being used. In many cases, Time is part of the Date structures defined above. For example, Date may be defined as a broad generalization that includes both date (e.g., century, year, month, etc.) and time (e.g., hours, seconds, etc.) representation components.

Instant - Represents a single point on the time line (e.g. Event).

Interval - Represents an unanchored duration of the time line.

Period - Represents an anchored duration of the time line.

UN/CEFACT Data Types

Data Type	Description	Format	Example
date	Defines a date. Year, Month, Day required. An optional Z or +/- hh:mm may be used to specify time zone. "Z" specifies UTC; +/- offsets time zone based on UTC.	YYYY-MM-DD, YYYY-MM-DDZ (UTC), YYYY-MM-DD+/-hh:mm (+/- UTC)	2011-01-15, 2011-01-15Z, 2011-01-15-5:00
dateTime	Defines a date and time. An optional Z or +/- hh:mm may be used to specify time zone. "Z" specifies UTC; +/- offsets time zone based on UTC.	YYYY-MM-DDThh:mm:ss.s, YYYY-MM-DDThh:mm:ss.sZ (UTC), YYYY-MM-DDThh:mm:ss.s+/-hh:mm (+/- UTC)	2011-01-15T12:30:00, 2011-01-15T12:30:00Z, 2011-01-15T12:30:00+5:00
time	Defines a time. Hours, minutes, seconds required. May include fractional seconds. An optional Z or +/- hh:mm may be used to specify time zone. "Z" specifies UTC; +/- offsets time zone based on UTC.	hh:mm:ss.s, hh:mm:ss.sZ (UTC), hh:mm:ss.s+/-hh:mm (+/-UTC)	12:30:18.5, 2011-01-15T12:30:00Z, 2011-01-15T12:30:00+5:00
gDay	Defines one day in the Gregorian calendar. An optional Z or +/- hh:mm may be used to specify time zone. "Z" specifies UTC; +/- offsets time zone based on UTC.	DD, DDZ, DD+/-hh:mm	28, 28Z, 28+5:00
gMonth	Defines the period of one calendar month in the Gregorian calendar. An optional Z or +/- hh:mm may be used to specify time zone. "Z" specifies UTC; +/- offsets time zone based on UTC.	MM, MMZ, MM+/-hh:mm	08, 08Z, 08+5:00
gMonthDay	Defines a day for a specific month in the Gregorian calendar. An optional Z or +/- hh:mm may be used to specify time zone. "Z" specifies UTC; +/- offsets time zone based on UTC.	MM-DD, MM-DDZ, MM-DD+/-hh:mm	08-28, 08-28Z, 08-28+5:00
gYear	Defines the period of one year in the Gregorian calendar. An optional Z or +/- hh:mm may be used to specify time zone. "Z" specifies UTC; +/- offsets time zone based on UTC.	YYYY, YYYYZ, YYYY+/-hh:mm	2011, 2011Z, 2011+5:00
gYearMonth	Defines the month for a specific year in the Gregorian calendar. An optional Z or +/- hh:mm may be used to specify time zone. "Z" specifies UTC; +/-	YYYY-MM, YYYY-MMZ, YYYY-MM+/-hh:mm	2011-08, 2011-08Z, 2011-08+5:00

	offsets time zone based on UTC.		
duration	Defines a time interval. Period (P) required; all other prefixes required if related value exists. An optional Z or +/- hh:mm may be used to specify time zone. "Z" specifies UTC; +/- offsets time zone based on UTC.	PnYnMnDTnHnMnS, PnYnMnDTnHnMnSZ, PnYnMnDTnHnMnS+/-hh:mm	P5Y8M3D, P5Y8M3DT09:50:00, PT10M5S, PT10M5SZ

3 Date Time Data Types

3.1 UN/CEFACT and OAGIS Date Time Types

These types are defined in the UNCEFACT Unqualified Data Type (UDT) and Qualified Data Type (QDT) files as part of the OAGIS platform. The simpleType data types allow the Date, Time, the Date and Time, Year, or Month and Year to be provided in the elements that are based on these types. To use these types in HR-XML schema, they would be prefixed with the "oa" namespace.

3.1.1 Date Type

OAGIS redefines the udt:DateType (xsd:date) as a reusable DateType data type. DateType is used to specify a date in YYYY-MM-DD format.

```
<xsd:simpleType name="DateType">  
  <xsd:restriction base="udt:DateType"/>  
</xsd:simpleType>
```

Examples:

```
<SubmittedDate>2010-07-16</SubmittedDate>  
<SubmittedDate>2010-07-16Z</SubmittedDate>  
<SubmittedDate>2010-07-16-05:00</SubmittedDate>
```

3.1.2 Time Type

OAGIS redefines the udt:TimeType (xsd:time) as a reusable TimeType data type. TimeType is used to specify a time in hh:mm:ss.s" format.

```
<xsd:simpleType name="TimeType">  
  <xsd:restriction base="udt:TimeType"/>  
</xsd:simpleType>
```

Examples:

```
<SubmittedTime>19:20:30.45</SubmittedTime>  
<SubmittedTime>19:20:30Z</SubmittedTime>  
<SubmittedTime>19:20:30-05:00</SubmittedTime>
```

3.1.3 Date Time Type

UN/CEFACT uses xsd:dateTime as their DateTime dataType. OAGIS redefines the DateTime datatype with a union of udt:DateType, udt:TimeType and udt:DateTimeType. HR-XML will use the OAGIS version of DateTime data type.

```
<xsd:simpleType name="DateTimeType">  
  <xsd:union memberTypes="udt:DateType udt:TimeType udt:DateTimeType"/>  
</xsd:simpleType>
```

Examples:

```
<SubmittedDateTime>19:20:30.45T12:30:00</SubmittedDateTime>  
<SubmittedDateTime>2010-07-16</SubmittedDateTime>
```

```
<SubmittedDateTime>2010-07-16T12:30:28.5-05:00</SubmittedDateTime>
```

3.1.4 Partial Date Type

OAGIS redefines the QDT data types as follows. See Definitions: UN/CEFACT Data Types for details.

```
<xsd:simpleType name="YearDateType">
  <xsd:restriction base="qdt:YearDateType"/>
</xsd:simpleType>

<xsd:simpleType name="YearMonthDateType">
  <xsd:restriction base="qdt:YearMonthDateType"/>
</xsd:simpleType>

<xsd:simpleType name="MonthDateType">
  <xsd:restriction base="qdt:MonthDateType"/>
</xsd:simpleType>

<xsd:simpleType name="DayDateType">
  <xsd:restriction base="qdt:DayDateType"/>
</xsd:simpleType>

<xsd:simpleType name="MonthDayDateType">
  <xsd:restriction base="qdt:MonthDayDateType"/>
</xsd:simpleType>
```

3.2 HR-XML Date Time Type

HR-XML uses the OAGIS data types defined above to build reusable date formats. Workgroups may use the date formats based on business needs.

3.2.1 Formatted Date Time Type

This is a formatted representation of a date, which may be specified as a date, date/time, year, or year/month. There may be business situations where the exact date isn't known or only a partial date is sent. For example, a graduation date may only include the Year and Month or only the Year. This structure allows for partial or full dates.

```
<xsd:simpleType name="FormattedDateTimeType">
  <xsd:union memberTypes="oa:DateType oa:YearMonthDateType oa:YearDateType oa:DateTimeType"/>
</xsd:simpleType>
```

Examples:

```
<FormattedDateTime>2009-03-15</FormattedDateTime>
<FormattedDateTime>2011-03</FormattedDateTime>
<FormattedDateTime>2004</FormattedDateTime>
<FormattedDateTime>2009-01-11T12:10:10.10Z</FormattedDateTime>
```

3.2.2 Date Text Type

This is a textual or formatted representation of a date or date information. Business cases occur when a date is represented as text. For example, a date range, description, or partial date. The use of this type should be

reserved for only cases where other more structured types would not suffice as this unstructured type is difficult to use programmatically. HR-XML does not recommend this data type for new development.

```
<xsd:complexType name="DateTextType">
  <xsd:simpleContent>
    <xsd:extension base="oa:NormalizedStringType">
      <xsd:attribute name="typeCode" type="oa:NormalizedStringType"/>
      <xsd:attribute name="languageCodeType" type="LanguageCodeContentType"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

Examples:

```
<DateText languageCodeType="en">2003 to present</DateText>
<DateText languageCodeType="en">Spring 2011</DateText>
<DateText languageCodeType="en">3rd Quarter</DateText>
```

3.2.3 Free Form Date Type

This reusable type provides free form options for representing date information. Since this data type includes the DateText, HR-XML does not recommend this data type for new development.

Recruiting, employment screening, and similar HR processes often rely on information sourced from word processing documents, web forms, paper, third-parties, and human memory. Data quality and consistency is a frequent problem. Free Form Date is intended to give implementers choices for accommodating date information provided with varying quality and precision or that has formatting requirements. When the use of a structured date time type or the date text type are both valid options, always use the structured date time type.

```
<xsd:complexType name="FreeFormDateType">
  <xsd:sequence>
    <xsd:element ref="FormattedDateTime" minOccurs="0"/>
    <xsd:element ref="DateText" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

Examples:

```
<FreeFormBirthDate>
  <FormattedDateTime>1961-04-01</FormattedDateTime>
</FreeFormBirthDate>

<EmploymentPeriod>
  <StartDate>
    <FormattedDateTime>2002</FormattedDateTime>
  </StartDate>
  <EndDate>
    <DateText>until present</DateText>
  </EndDate>
</EmploymentPeriod>
```

3.2.4 Free Form Period Type

This data type provides free form options for representing period data.

Recruiting, employment screening, and similar HR processes often rely on information sourced from word processing documents, web forms, paper, third-parties, and human memory. Data quality and consistency is a

frequent problem. Free Form Period is intended to give implementers choices for accommodating period information provided with varying quality and precision. HR-XML does not recommend using this data type - effective date or effective period should be used instead.

```
<xsd:complexType name="FreeFormPeriodType">
  <xsd:sequence>
    <xsd:element ref="StartDate" minOccurs="0"/>
    <xsd:element ref="EndDate" minOccurs="0"/>
    <xsd:element ref="oa:Description" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>
```

Examples:

```
<FreeFormPeriod>
  <StartDate>
    <FormattedDateTime>2004-01-24</FormattedDateTime>
  </StartDate>
  <EndDate>
    <FormattedDateTime>2004-07-31</FormattedDateTime>
  </EndDate>
</FreeFormPeriod>

<FreeFormPeriod>
  <oa:Description languageCodeType="en" >Spring 2011</oa:Description>
</FreeFormPeriod>
```

4 Effective Dating

HR-XML's 3.X architecture makes a distinction between effective-date meta data and effective dating that is an integral part of the data model for the particular component. For example, a License typically has as an integral part of its data model, a start date and end date during which it is effective. This might be expressed using `StartDate` and `EndDate` components.

Where there is the need to provide "effective dating" metadata for a component the standard approach to be used across the 3.X library will be use `EffectiveDateAttributeGroup`. For example, a `PersonName` does not include effective dating as an integral part of its data model, but effective date meta data may be necessary for accurate processing or handling of a `PersonName`.

Note in some cases, a component that has effective dating as part of its data model may also have effective dating meta data. For example, `EmploymentHistory` includes dating relevant to the tenure of a person at an employer and within a position. Effective dating meta data (using the `EffectiveDateAttributeGroup`) also could be valuable on `EmploymentHistory` to distinguish among different versions of the same persons history.

4.1 Effective Date as part of Data Model

```
<xsd:complexType name="EffectiveDateType">
  <xsd:sequence>
    <xsd:element ref="StartDateTime" minOccurs="0"/>
    <xsd:element ref="EndDateTime" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>
```

Examples:

```
<AvailabilityDates>
  <StartDate>
    <FormattedDateTime>2001-05</FormattedDateTime>
  </StartDate>
  <EndDate>
    <FormattedDateTime>2001-08</FormattedDateTime>
  </EndDate>
</AvailabilityDates>

<EligibilityDates>
  <StartDate>
    <FormattedDateTime>2011-01-01T00:00:00</FormattedDateTime>
  </StartDate>
  <EndDate>
    <FormattedDateTime>2011-12-31T12:59:59</FormattedDateTime>
  </EndDate>
</EligibilityDates>

<EmploymentPeriod>
  <StartDate>
    <FormattedDateTime>2002</FormattedDateTime>
  </StartDate>
  <EndDate>
    <DateText>until present</DateText>
```

```
</EndDate>
</EmploymentPeriod>
```

4.2 Effective Date as Meta Data

HR-XML developed a reusable effective dating attribute group. These attributes would typically be used at the 'top level' of each noun and any other set of data to identify the period of validity for that component. A missing validTo date explicitly infers the date is still in effect.

Note that the UNCEFACT NDR does not allow supplementary components to exist as attributes on ABIEs/OAGIS components. HR-XML breaks from this rule by using the EffectiveDateAttributeGroup as shown below.

```
<xsd:attributeGroup name="EffectiveDateAttributeGroup">
  <xsd:attribute name="validFrom" type="FormattedDateTimeType" use="optional"/>
  <xsd:attribute name="validTo" type="FormattedDateTimeType" use="optional"/>
</xsd:attributeGroup>
```

Sample Code:

```
<xsd:complexType name="CandidateType">
  <xsd:sequence>
    ...
  </xsd:sequence>
  <xsd:attributeGroup ref="EffectiveDateAttributeGroup"/>
</xsd:complexType>
```

Examples:

```
<Candidate validFrom="2011-05-15" validTo="2011-06-30"/>
```

```
<EmploymentHistory validFrom="2008-01"/>
```

```
<PersonName validFrom="1998-04-28" validTo="2011-07-12">
  <FormattedName>Mary Gray</FormattedName>
</PersonName>
```

Specific elements may also need to be effective dated. HR-XML recommends that the validFrom and validTo attributes are used to effective date individual elements.

Examples:

```
<CurrentIndicator validFrom="2009-10-17">true</CurrentIndicator>
<PackageID validFrom="2007-01-24" validTo="2007-05-31">Acct.2002.r1</PackageID>
<PositionOpeningStatusCode validFrom="2010-02-23" validTo="2010-12-31">Active
</PositionOpeningStatusCode>
```

4.3 OAGIS Effective Period Type

TimePeriodABIEType is logically derived from UN/CEFACT TBG17 ABIE PeriodType as defined in the Reusable Aggregate Business Information Entity (RUABIE) XML Schema file. HR-XML schema does not use this data type. It is only referenced here to show similarities to the FreeFormEffectivePeriod below.

```
<xsd:complexType name="TimePeriodABIEType">
  <xsd:sequence>
    <xsd:element ref="InclusiveIndicator" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>
```

```

        <xsd:element ref="StartDateTime" minOccurs="0"/>
        <xsd:choice>
            <xsd:element ref="Duration" minOccurs="0"/>
            <xsd:element ref="EndTimeTime" minOccurs="0"/>
        </xsd:choice>
    </xsd:sequence>
</xsd:complexType>

```

4.4 HR-XML Free Form Effective Period Type

Indicates the period in which the associated component is effective.

This structure is loosely based on the TimePeriodABIEType with the following changes. The xsd:choice between an EndDate and Duration was removed for processing simplicity. Generally, an EndDate or Duration would appear, but not both. The usage rule is not enforced by the schema. The InclusiveIndicator was removed. Effective dating attributes were added.

```

<xsd:complexType name="FreeFormEffectivePeriodType">
    <xsd:sequence>
        <xsd:element ref="StartDate" minOccurs="0"/>
        <xsd:element ref="EndDate" minOccurs="0"/>
        <xsd:element ref="oa:Duration" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attributeGroup ref="EffectiveDateAttributeGroup"/>
</xsd:complexType>

```

Examples:

```

<FreeFormEffectivePeriod>
    <StartDate>
        <FormattedDateTime>2008-08</FormattedDateTime>
    </StartDate>
    <EndDate>
        <FormattedDateTime>2009-12</FormattedDateTime>
    </EndDate>
</FreeFormEffectivePeriod>

<FreeFormEffectivePeriod>
    <StartDate>
        <FormattedDateTime>2008-08</FormattedDateTime>
    </StartDate>
    <oa:Duration>P1Y3M8D</oa:Duration>
</FreeFormEffectivePeriod>

```

5 Appendix B - Document Version History

Version	Date	Description
3.2	2011-Sep-26	Major rewrite of EffectiveDating and DateTime Data Types Best Practice Documents based on new 3.X architecture.

6 Appendix C - References

ISO 8601 Date and Time Formats

<http://www.w3.org/TR/xmlschema-2/#isoformats>