An Ontology Design Pattern for representing Recurrent Events

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What is a recurrent event?

In 1917 Amedeo Modigliani creates an oil painting depicting Hanka Zborowska.

Art Biennale is held biennially.
What is a recurrent event?

Art Biennale has been held biennially, since 1895, and has:
• the Biennale Foundation as event organizer
• Venice as event place
• the promotion of new contemporary art trends as mission
• a time period of ~2 years between two consecutive occurrences
But also...

- Cultural events
- Traditional ceremonies
- The Nobel Prize Award ceremony
- Periodical team meetings
- Seasonal needs
- Medical ultrasound during pregnancy
- Air conditioner filter cleaning
- International Women's Day
- Carnival
- Christmas
- Ramadan
- Birthday
- Movie showtimes
- Bus timetable
Looking around

Venice Biennale
- yago:WikicatRecurringEventsEstablishedIn1895
- rdf:type dbo:Event

New Zealand Fringe Festival
- dbp:frequency Annually

18th Venice Biennale
- instance of art exhibition

17th Venice Biennale 19th Venice Biennale

Venice Biennale (Q205751)
- instance of art biennial
- subclass of biennale
- time period of periodically occurring event
- 2 year
- subclass of recurring event
- has part recurrent event edition
- subclass of event
Looking around

**Proton**

**Recurring Event (OWL Class)**
Recurring sequence of events, such as Olympic Games, etc.
This class is a sub class of **Happening (OWL Class)**
Something that happens.

**Submissions:PeriodicInterval**

The relation between a recurring event and its frequency.
# Competency Questions

<table>
<thead>
<tr>
<th>ID</th>
<th>COMPETENCY QUESTION</th>
</tr>
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<tbody>
<tr>
<td>CQ1</td>
<td>Which are the <strong>events</strong> of a recurrent event series?</td>
</tr>
<tr>
<td>CQ2</td>
<td>Which is the <strong>time period</strong> elapsing between two events of a recurrent event series?</td>
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<tr>
<td>CQ3</td>
<td>What are the <strong>unifying criteria</strong> shared by all the events in a recurrent event series?</td>
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<tr>
<td>CQ4</td>
<td>Which is the <strong>(immediate) next event</strong> in a recurrent event series?</td>
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<tr>
<td>CQ5</td>
<td>Which is the <strong>(immediate) previous event</strong> in a recurrent event series?</td>
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</tbody>
</table>
RecurrentEventSeries ODP

Prefixes

: http://www.ontologydesignpatterns.org/ont/owl/recurrenteventseries.owl#
dul: http://www.ontologydesignpatterns.org/ont/dul.owl#
d0: http://www.ontologydesignpatterns.org/ont/d0.owl#
rdfs: http://www.w3.org/2000/01/rdf-schema#
xsd: http://www.w3.org/2001/XMLSchema#
RecurrentEventSeries

Recurrent event series as an intersection of Collection and Situation

its members are of type Event

\[
\text{RecurrentEventSeries} \supseteq \exists 0\hspace{1pt}\text{hasMemberEvent. Event} \\
\text{Event} \supseteq d0:\hspace{1pt}\text{Eventuality} \\
\text{RecurrentEventSeries} \supseteq d\ell:\hspace{1pt}\text{Collection} \cap d\ell:\hspace{1pt}\text{Situation} \\
\text{RecurrentEventSeries} \equiv \exists\hspace{1pt}\text{hasMemberEvent.} \\
(\geq 0\hspace{1pt}\text{hasNextEvent. Event} \sqcap \geq 0\hspace{1pt}\text{hasPreviousEvent. Event})
\]
:hasNextEvent, :hasPreviousEvent

The member events are in sequence

These properties relate only events member of the same recurrent event series

example for :hasNextEvent

PREFIX recurrentevent: <http://www.ontologydesignpatterns.org/cp/owl/recurrenteventseries.owl#>
CONSTRUCT {?re1 recurrentevent:isLocallyInconsistentWith ?re2}
WHERE {
  ?re1 recurrentevent:hasMemberEvent ?event1 .
  ?re2 recurrentevent:hasMemberEvent ?event2 .
  ?event1 recurrentevent:hasNextEvent ?event2 .
  filter not exists {?re1 owl:sameAs+ ?re2}
  filter (?re1 != ?re2)
  filter (?event1 != ?event2)
}
:isTheLastEvent

Is this event the last event of the series, or not?

✓ ✗

:eventNumber

Which position this event has in the series?

1, 2, 3, …
:UnifyingFactor

at least one element or property occurs in each event member with some degree of flexibility

RecurrentEventSeries ⊎ ∃hasUnifyingFactor.UnifyingFactor

UnifyingFactor ⊎ dul:Concept

e.g., topic, place, organizer, ...
**TimePeriod**

It represents the recurrence of a Recurrent Event Series.

approximated temporal distance between one member event and the next and the previous ones.

\[ \text{RecurrentEventSeries} \sqsubseteq \exists \text{hasTimePeriod. TimePeriod} \]

It works as a parameter for the region of valid values.

**Future work**

Estimated or Observed time period?
e.g. possible implementation
Example

**Umbria Jazz** has been held annually, since 1973, and has:
- the musical genre **jazz** as **topic**
- Umbria as **event place**
- July as **month** in which it usually* takes place
- a **time period** of ~1 **year** between two consecutive occurrences

* always since 1976
1974 and 1975 started in July and ended on August 1st
1973 was held in August
Future work

- Traditional ceremonies, festivals, cultural events, but also:
  
  - sunrise
  - periodic migrations of animals
  
  - natural origin
  - set by humans
  
  - world days
    - train schedule
  
  - medical prescriptions
    - periodical supply of services
  
  - part of a workflow

- Recurrent Event as a fluent?
Thank you!

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