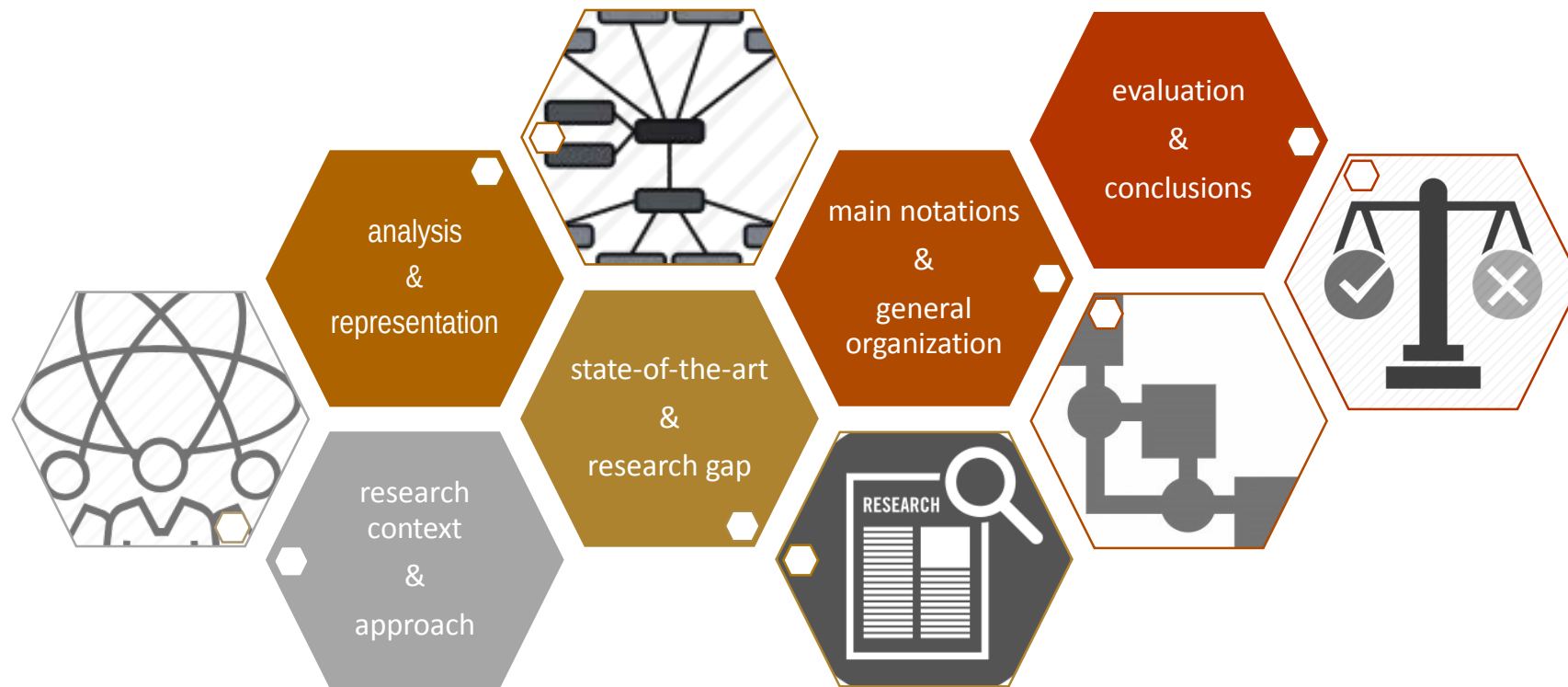


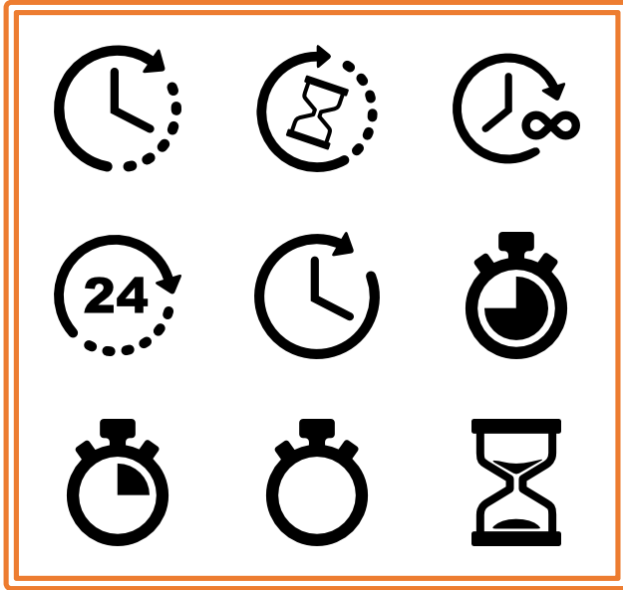
# Temporal hints in the cultural heritage discourse: what can an ontology of time *as it is worded* reveal?

Gamze Saygi, Jean-Yves Blaise, Iwona Dudek

UMR CNRS/MCC 3495 MAP  
Modèles et simulations pour l'Architecture et le Patrimoine  
Centre National de la Recherche Scientifique







« time » concept



« In the 12th century, a priory was installed in this place; From the 15th century it was attached to the abbey of Boscodon; The chapel was damaged by Protestant troops in 1574 and rebuilt in the 17th century; The date 1700 is engraved on the carpentry of the west door; In 1818, date painted on the vault, it was restored and adorned with a painted decoration; Was it on that date that the gable walls were raised and the bell tower redone?.. »

in the **cultural heritage** discourse  
*evolution, transformation, reuse, status*

- historical analysis
- reasoning task

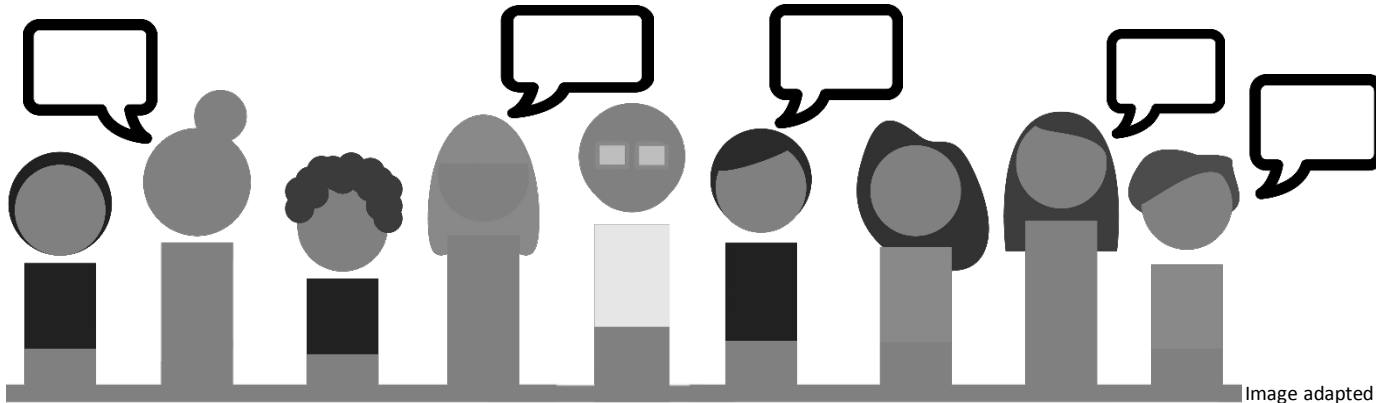


Image adapted from: <https://www.essrg.hu/en/sparks-citizen-science/>

in the CH discourse past events or facts are anchored in time in **a large variety of forms**:

[...] it goes back to the second half of the 13<sup>th</sup> or 14<sup>th</sup> Century.

[...] after the Revolution.

Around 1260 it was restored [...]

It already existed in 1613 [...]

In 1706: [...] built for more than 60 years ago.

...

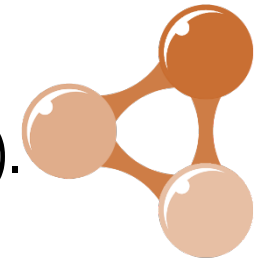
*do not fit “classical” quantification systems.*

There is a need to **identify** and *if possible* to **formalise** the way past events are *reported*, the way temporal hints are *worded*.

The idea behind this research is to **understand** and **depict** in a **structured and sharable manner** the **nature** of the temporal statements used as historical evidence.

*The approach is:*

- ❑ a comprehensive analysis
- ❑ a **formalization** targeting reasoning tasks on **verbalization patterns**
- ❑ the extraction of temporal hints
- ❑ an experimental implementation using the OWL (Web Ontology Language).





helps reaching a **formal model of time** “*as it is worded*”



could renew **the way wording patterns can be correlated with factors** such as historical period under scrutiny, type of CH element documented, type of source, point of view (or discipline) of the information provider, etc...



highlight **particular tendencies of wording** in the CH discourse and focus on typical challenges



can give heritage specialists **means to compare** and discuss their different interpretations

**Not a generic ontological framework** considering dependency on distinctive parameters

- region, typology, collection



TIME community

> theories, logics, representation languages, reasoning



ISO 8601

> **presenting** dates and times

ISO 19108

> **interchanging** of temporal information

TimeML

> NLP tasks for creating **controlled** temporal **expressions**



OWL-Time

> expressing facts about **topological relations**



CIDOC CRM (21127)

> **core ontological model in CH**



research direction

- extending regular time concept to a wider **non-absolute perspective**
  - (e.g., qualitative expressions, recurrent events, diverse granularities)
- **temporal reasoning** in the context of supporting AI applications



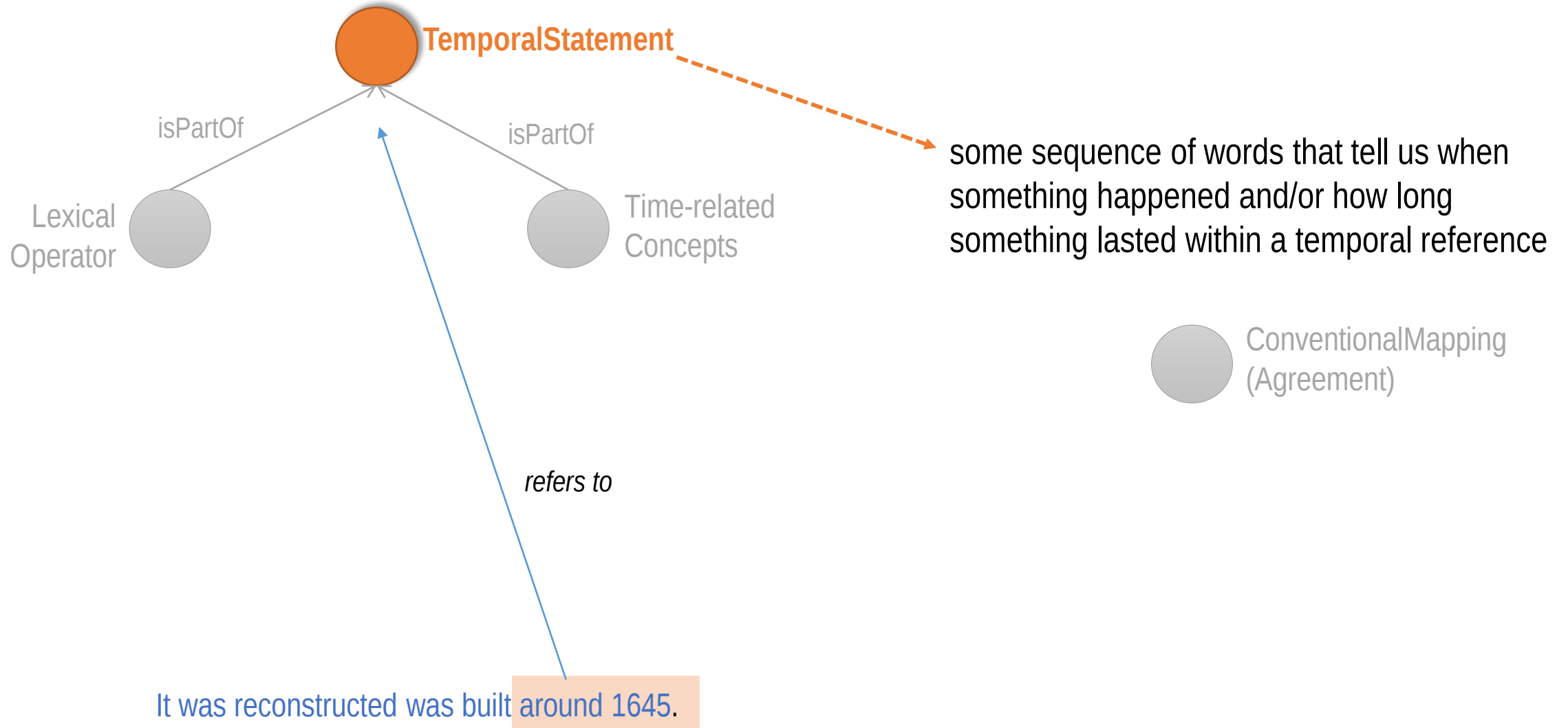
research gap

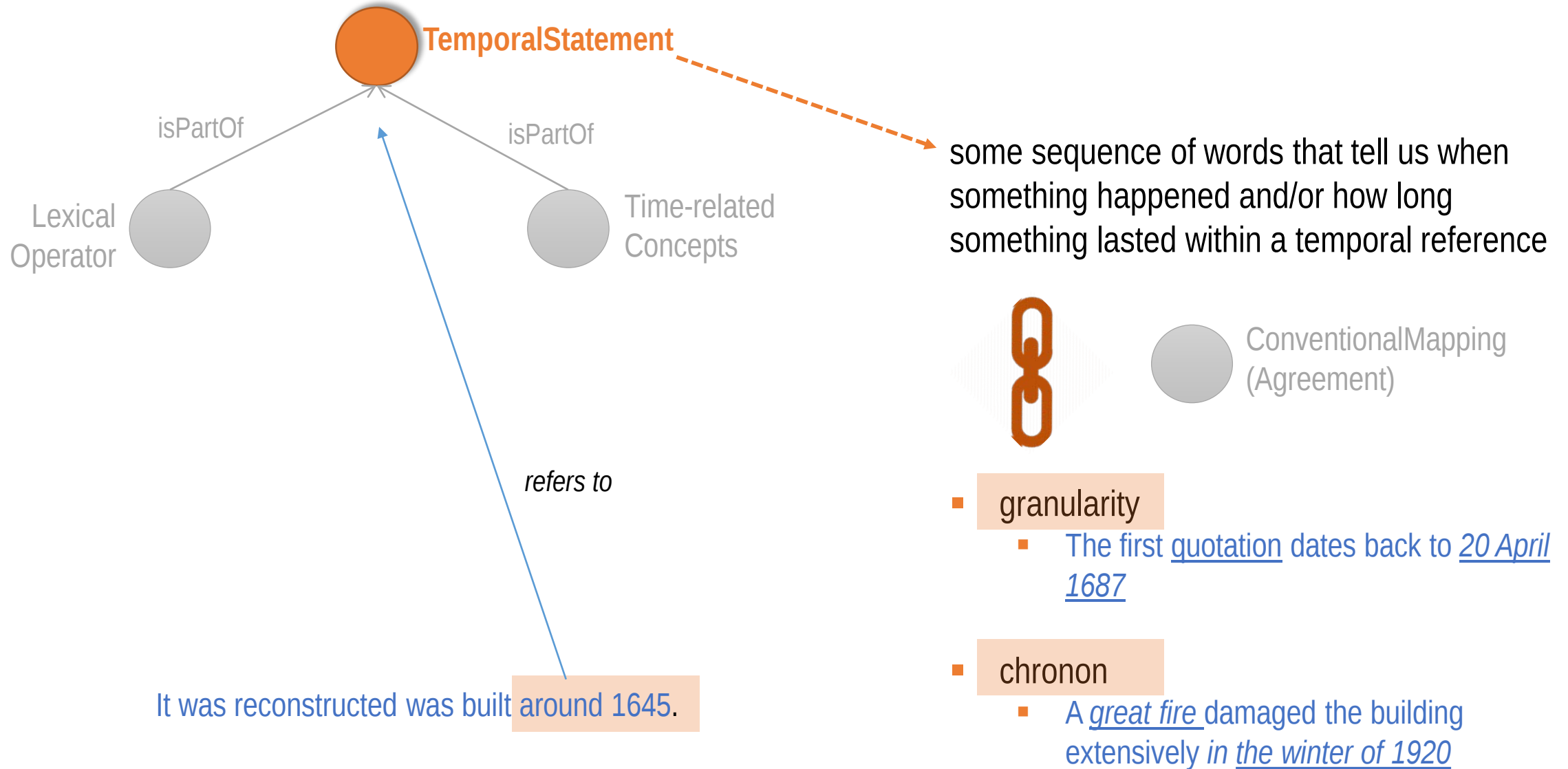
**A comprehensive basis in forms of a complete formal model**  
a priori to efficient temporal reasoning

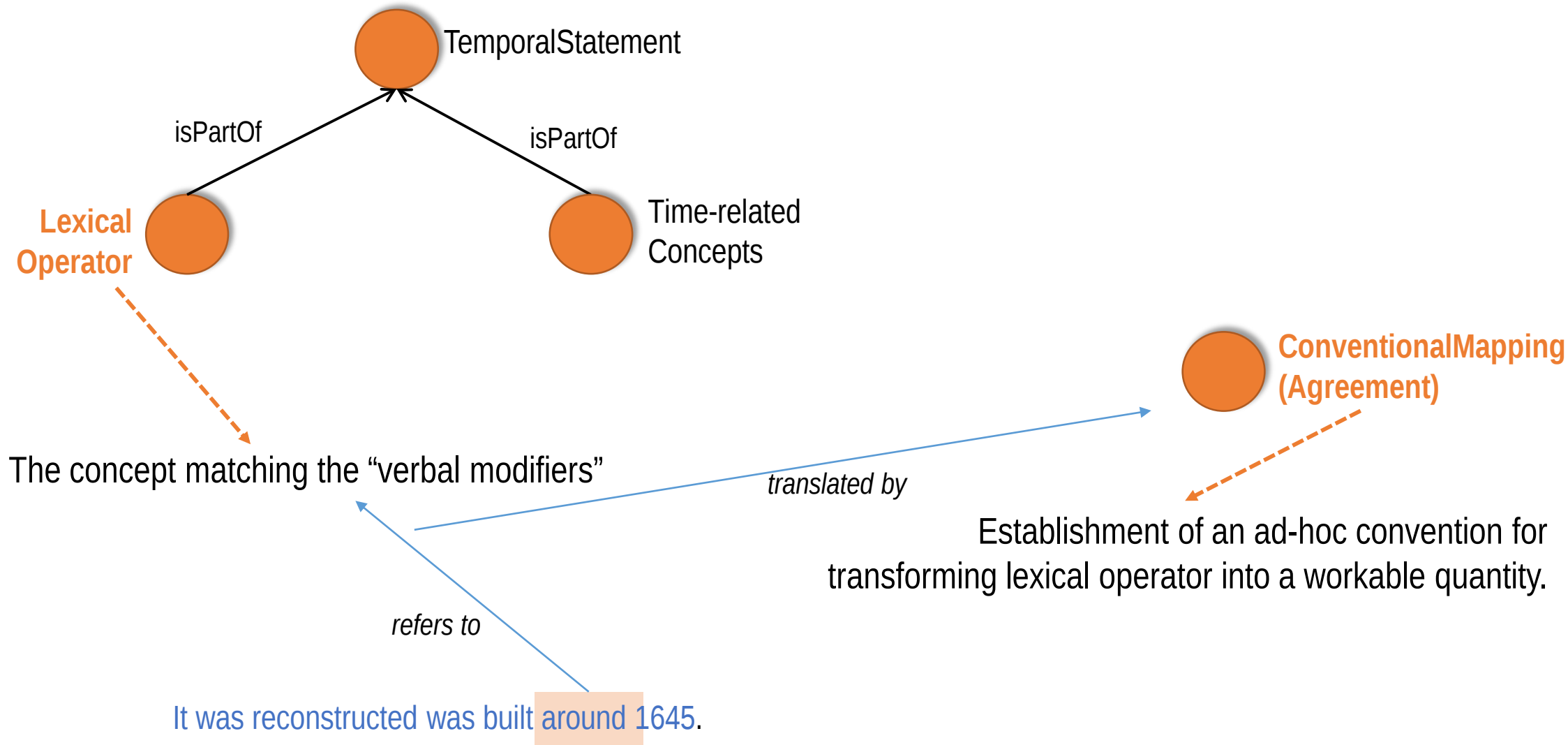


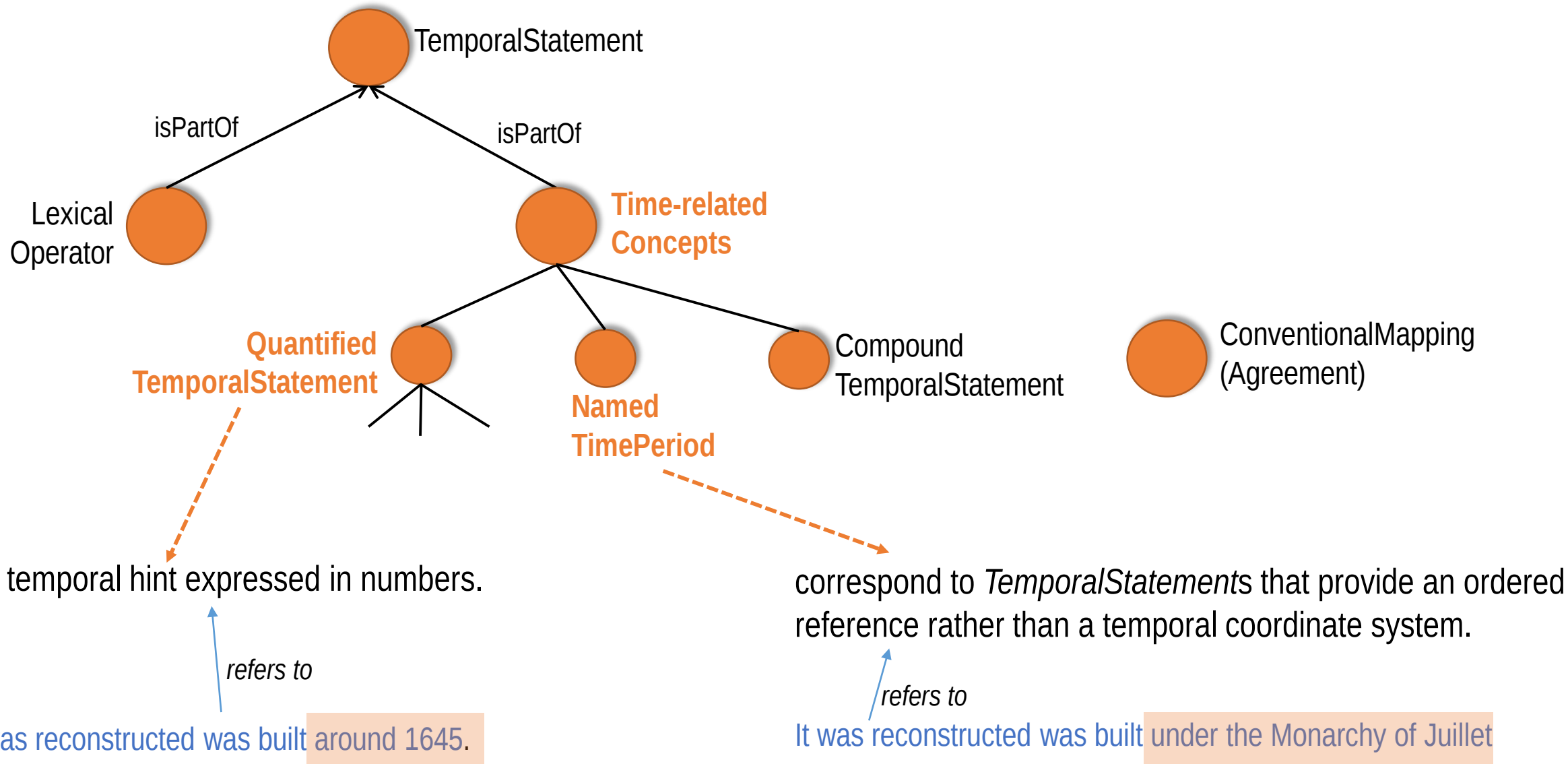
objective

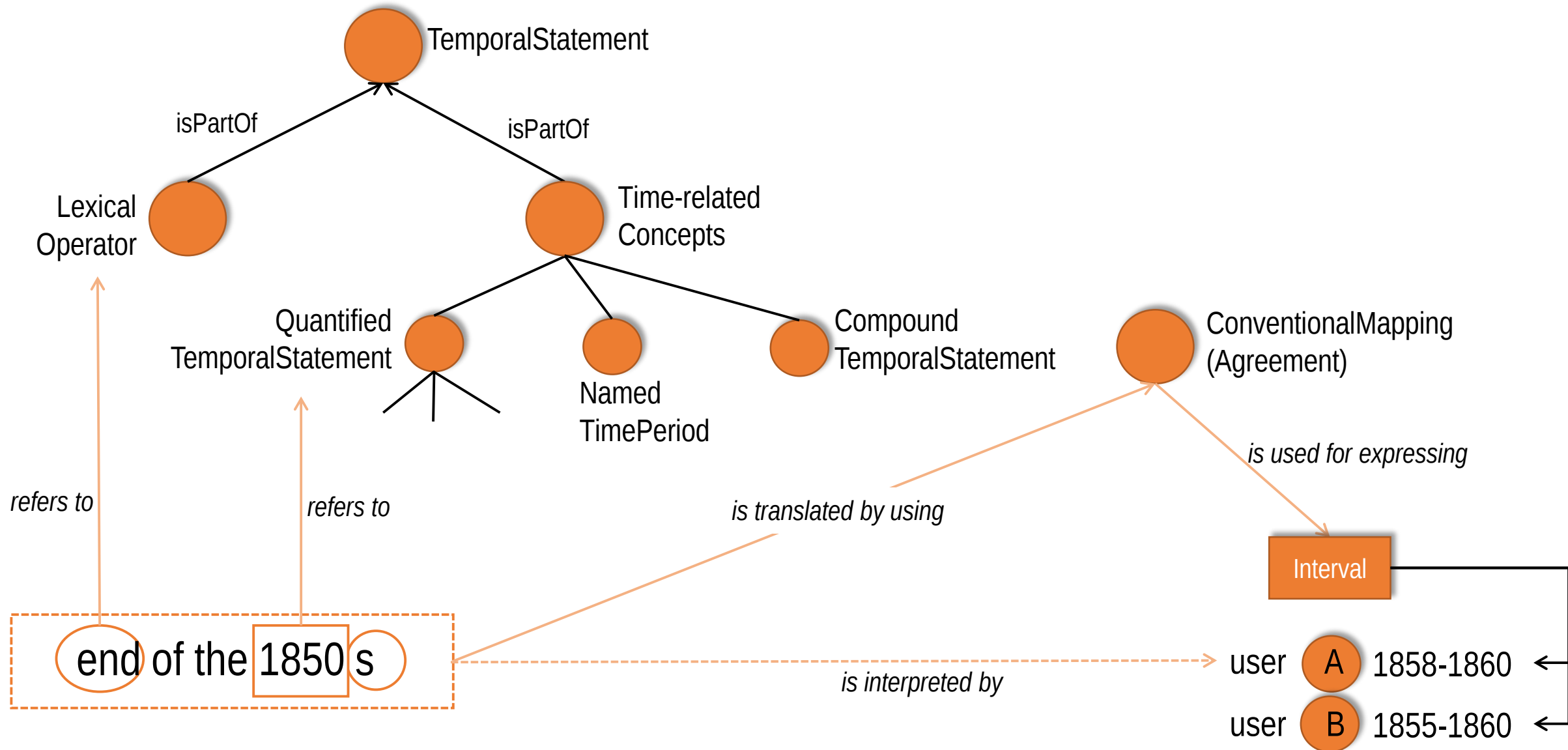
- extraction for temporal statements (quantitative values and lexical modifiers)
- uncovering their structure
- fine-grain analysis of temporal expressions





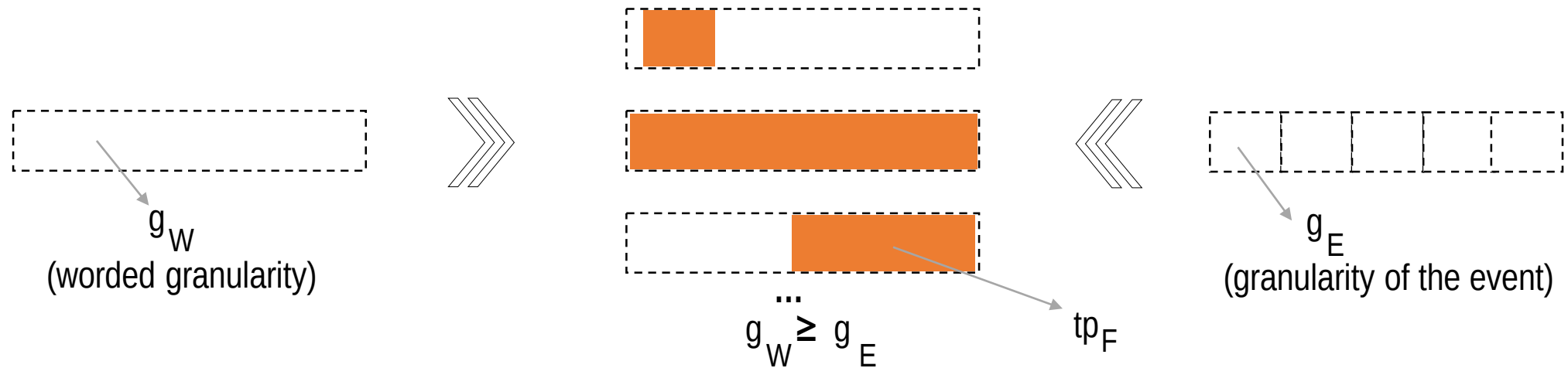






## TimePoint

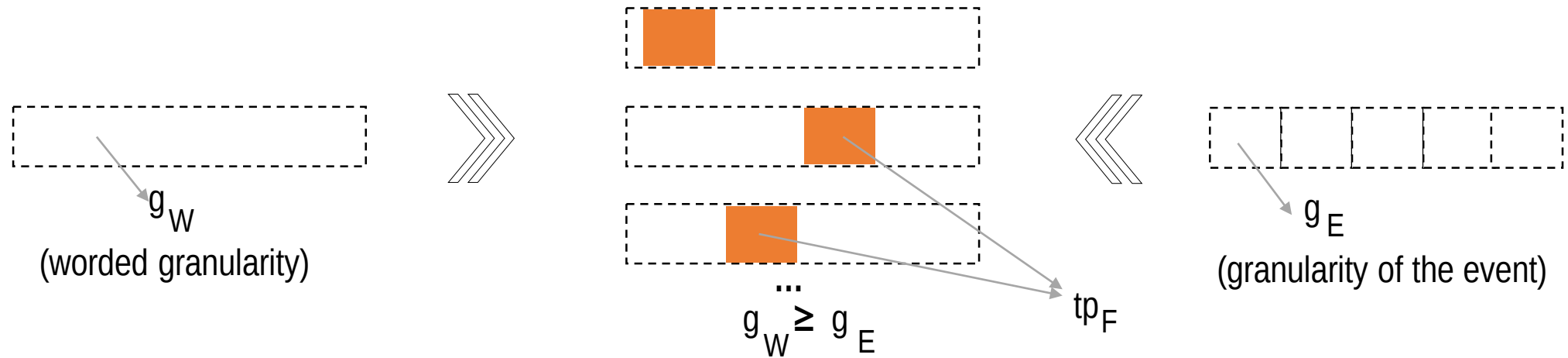
**FuzzyTemporalStatement** ( $tp_F$ ) is a wording that refers to an event confined in an ambiguous way to a *TimePoint*.



**Example:** *Elle a été reconstruite au milieu du 18e siècle.* // *It was rebuilt in the middle of the 18<sup>th</sup> century.*

## TimePoint

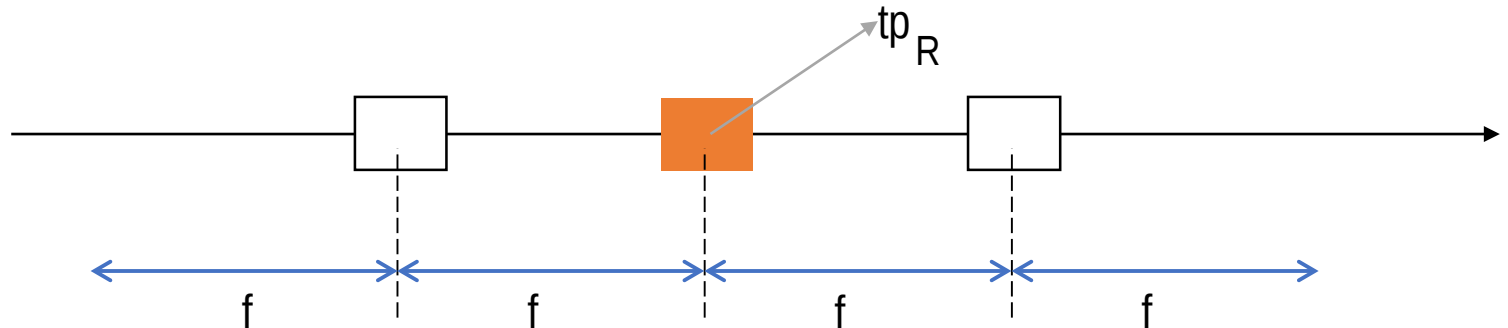
### UnfoldableTemporalStatement ( $tp_U$ )



**Example:** *La toiture a été emportée par l'avalanche de 1978.* // The roof was washed away by the 1978 avalanche.

## TimePoint

**RecurrentTemporalStatement** ( $tp_R$ ) is dedicated to *TemporalStatements* for periodic/cyclic occurrences.

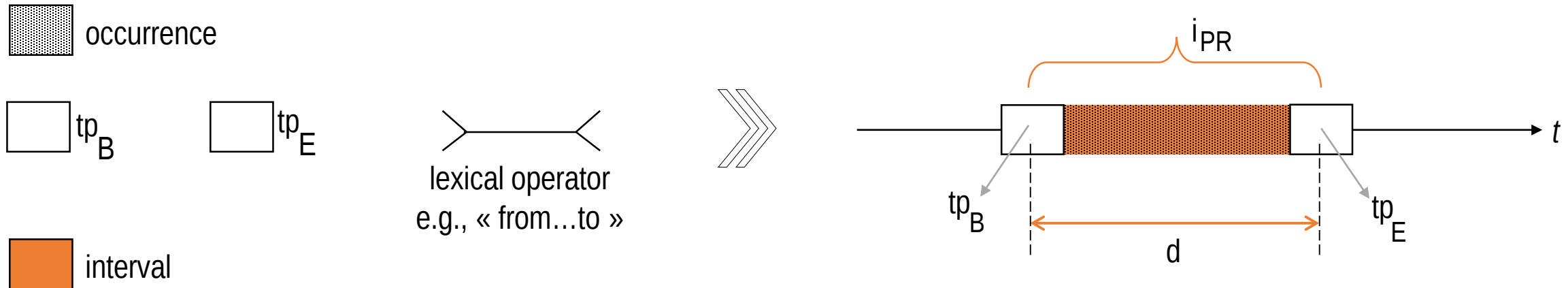


**Example:** *Aujourd'hui, Notre-Dame-de-Vie fait toujours l'objet d'un pèlerinage annuel le 15 août.*

Today, Notre-Dame-de-Vie is still the subject of an annual pilgrimage on August 15th.

## Interval

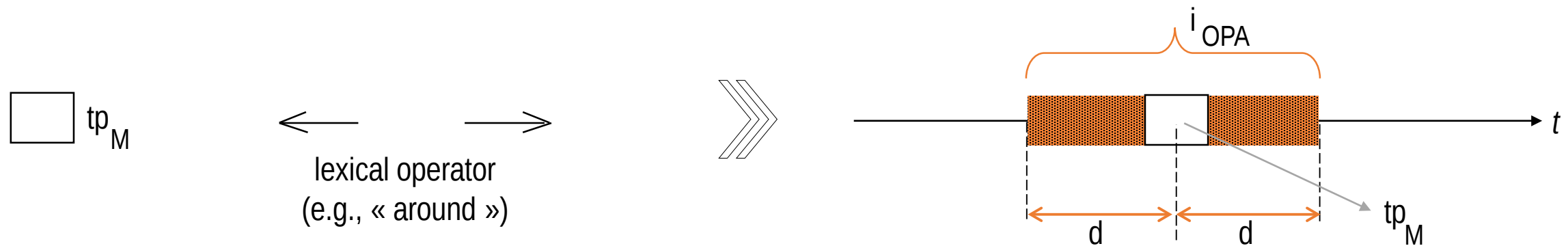
**ProperIntervalStatement** ( $i_{PR}$ ) is a wording corresponding to an *Interval* expressed with 2 *TimePoints* (beginning boundary  $tp_B$ , and end boundary  $tp_E$ ).



**Example:** [...] *Bâti en pierre entre 1815 et 1825.* // [...] Built in stone between 1815 and 1825.

## Interval

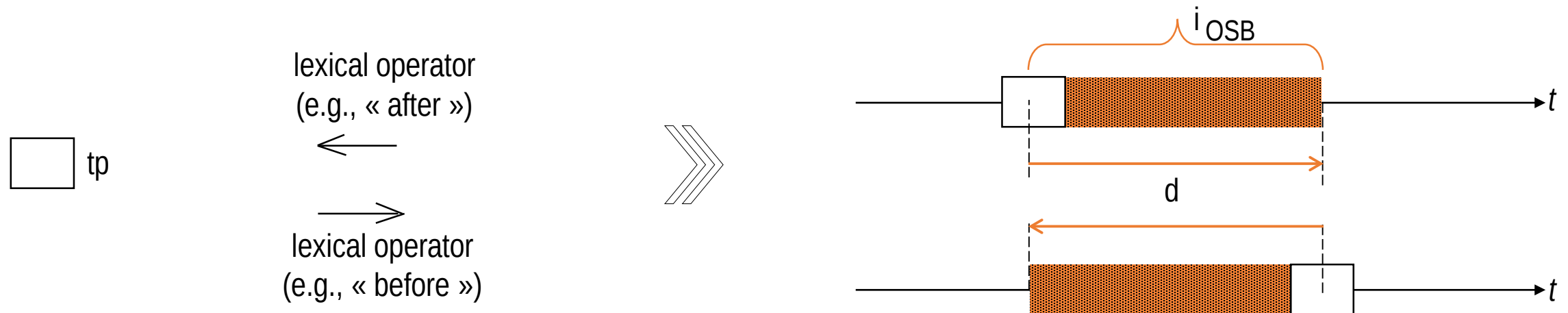
**OnePointAnchoredIntervalStatement** ( $i_{OPA}$ ) is a wording that refers to an occurrence expressed by a *TimePoint*, and accompanied by a *LexicalOperator* such as "around".



**Example:** *Bâtiment actuel édifié autour de 1645.* // Current building was built around 1645.

## Interval

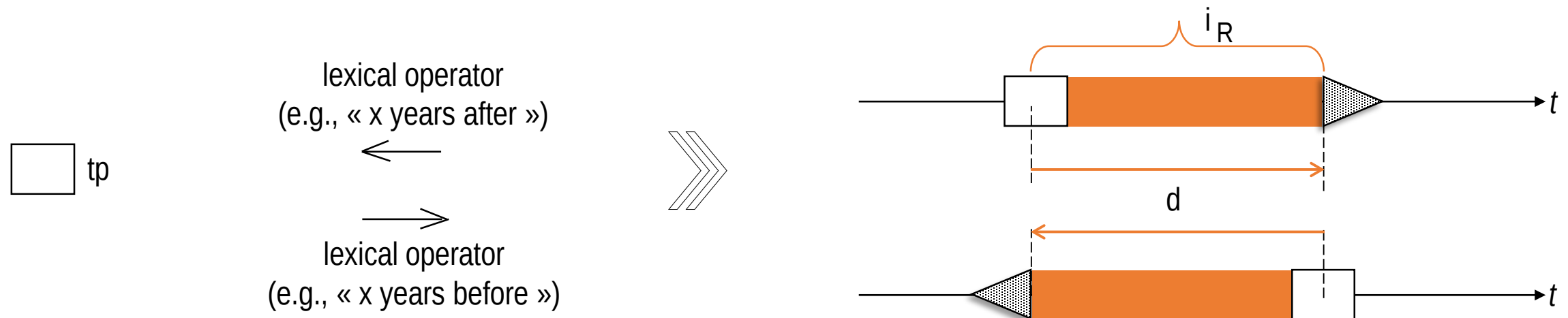
**OneSideBoundedIntervalStatement** ( $i_{OSB}$ ) is a wording that refers to an occurrence expressed by a *TimePoint* (tp), and accompanied by a *LexicalOperator* such as "before" or "after".



**Example:** *Elle a été construite après 1720 par souscription publique.* // It was built after 1720 by public subscription.

## Interval

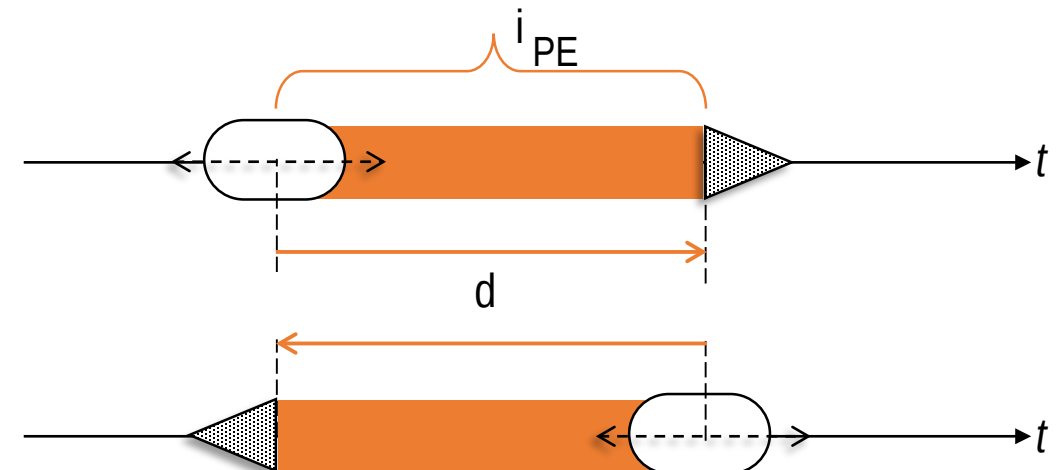
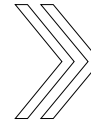
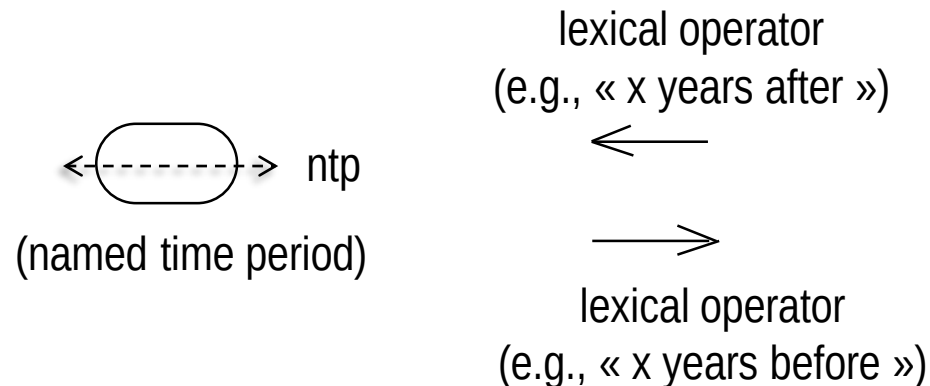
**RelativeIntervalStatement** ( $i_R$ ) is a wording where a *TimePoint* is used to anchor an occurrence located at a distance in the past or in the future of the *TimePoint*.



**Example:** *en 1706: la chapelle ste Anne au hameau appelé Toron, bâtie depuis plus de 60 ans.*  
*in 1706: Ste Anne's chapel in the hamlet called Toron, built more than 60 years ago.*

## Interval

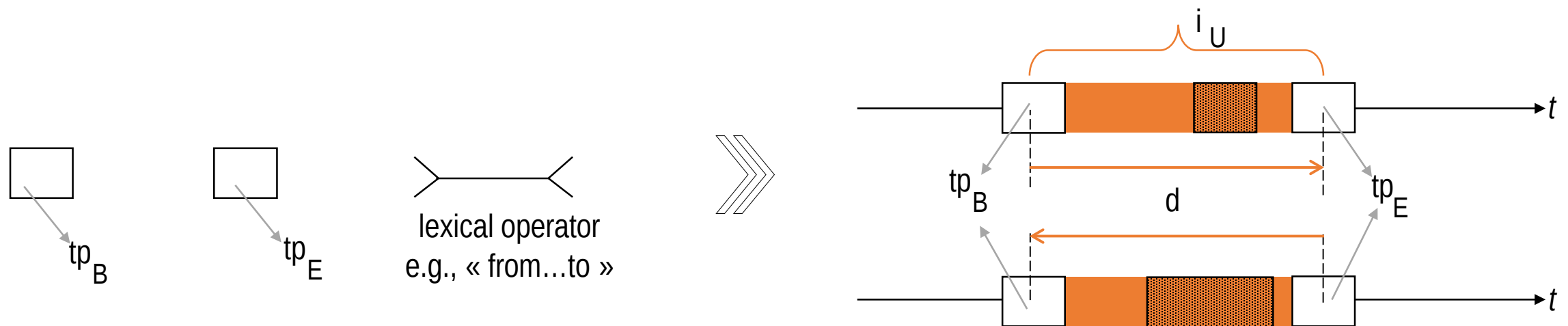
**PertinentIntervalStatement** ( $i_p$ ) is a wording where one only boundary is defined, and by an instance of *NamedTimePeriod* ("WWII", "the great plague", etc.).



**Example:** [...] remaniements après la Révolution. // [...] rearrangements after the Revolution.

## Interval

**UnfoldableIntervalStatement** ( $i_U$ ) is a wording expressed with two *TimePoints*, and where the duration of the occurrence is for sure shorter than the distance separating the two TimePoints.



**Example:** 1160-1164 [...] seigneurs [...] pour y construire une abbaye [...] acte signé [...]  
 1160-1164 [...] lords [...]to build an abbey [...] deed signed [...]

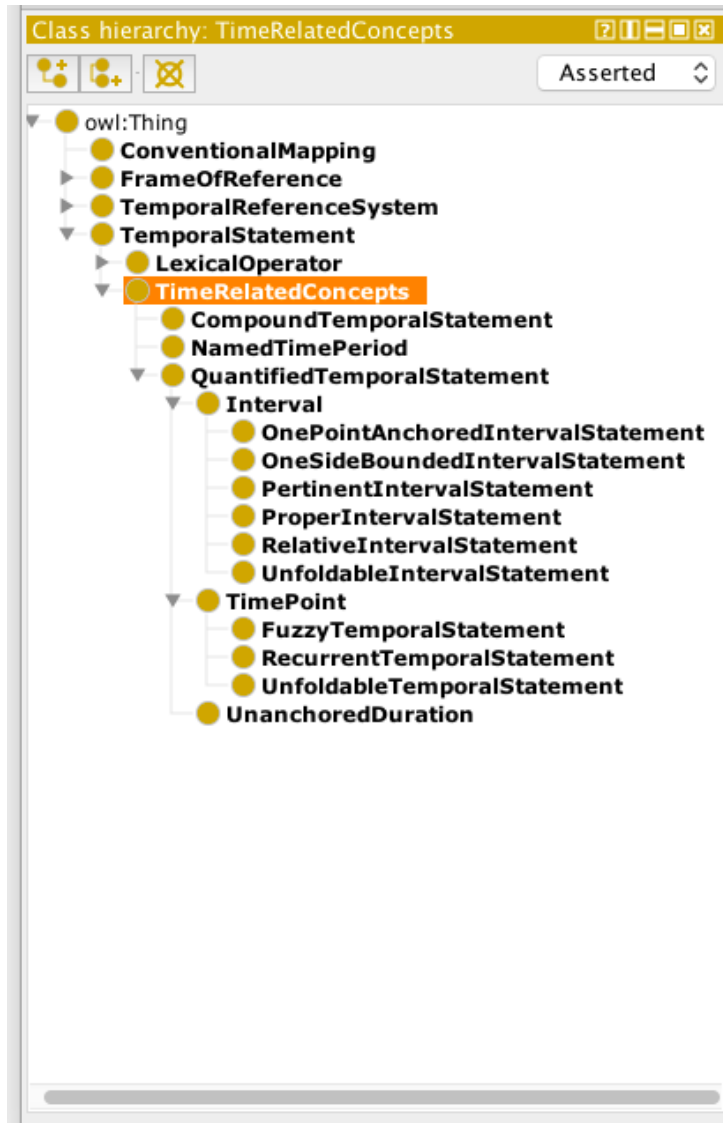
An **UnanchoredDuration** represents any temporal statement that mentions a segment of time with a duration but without explicit boundaries (anchored in time)..”



**Example:** the renovation lasted for 40 days

**CompoundTemporalStatement** represents cases in which the statement contains two or more alternative indications, may they overlap or not, and may they be consistent in terms of wording or not.

**Example:** it dates back to the 13th or 14th century



➡ 1576 temporal statements

➡ Majority: *FuzzyTemporalStatement*

➡ 90 *TemporalStatements*: *CompoundTemporalStatement*

- contradictory indications

[...] *datées du XIème ou du XIIème siècle*

- a sort-of caution in the wording

[...] *doit remonter au XVIIe siècle (vers 1668-1670)*



Test on a significant dataset (in terms of quantity and heterogeneity), but very far from being representative of the CH discourse, and even not representative in the smaller context of the CH discourse on **minor architectural heritage**.



A difficulty to lay down **unambiguous rules** when wanting to populate the ontology.

*Le monastère est fondé vers 960-965 par l'évêque Jean II de Sisteron [...]*

ProperIntervalStatement

*La commanderie de Saint-Maurice est implantée vers les années 1160 [...]*

OnePointAnchoredIntervalStatement



Dealing with “contemporary” hints

*The edifice was reconstructed in the last years.*

Are not subject to classification

- ❑ formalization efforts **highlight the extreme diversity** of temporal information in the CH discourse
- ❑ uncover some significant patterns such as **relative disconnection between lexical operators and temporal granularity**.
- ❑ aims at **facilitating the cross-examination** by analysts of historical evidence of ***the temporal evidence itself*** prior to interpretation steps.

□ the necessity to

- **validation** of the ontology on larger datasets,
- test its extraction **capability** in collections where regional and typological parameters are extensively circumscribed.

□ Future works:

- applicability of the rules of assignment
- visualization effort
- deeper attention to the interdisciplinary issue of elicitation: *not only how a temporal statement is worded but also why*

# TEMPORAL HINTS IN THE CULTURAL HERITAGE DISCOURSE

chapelle érigée en 1684  
époque de built 9e siècle Elle fut consacrée en 105  
Le monastère est fondé vers 960-965  
Si une partie de la crypte située à l  
Cette chapelle édiflée au milieu du XIeme  
procession annuelle qui avait lieu le dimanche de l est pas mentionné  
mitage aurait été fondé en 412 par saint Jean Cassien abside daterait du IXe siècle  
s aux alentours du 24 Durant l est probablement à la fin du Vème siècle que fut bâtie  
fete patronale de Beauvezet qui se célèbre le 3 mai Edifice du Xème siècle pour l  
ens datent la chapelle Saint-Jean-du-Désert du 10e siècle sépultures gallo romaines  
ten pèlerinage une ou deux fois par an notamment le 15 août pour la fete de l  
nt avec prudence une datation plus haute Ville-IXe siècle octave de l'Assomption  
e abbaye de Clairecombe vers 1190 à quelques heures de marche seulement de l  
rait fait construire une chapelle primitive en cet endroit époque de built 10e siècle  
e de la montée au Ciel de la Vierge Marie La chapelle aurait été élevée dès le VIè  
me siècle on trouve des abside  
On peut raisonnablement la dater de la fin du Xe siècle début du XIe siècle  
1751 où il est fait mention pour la première fois de la fête de sainte Anne objet d  
eu du XIème siècle la partie la plus ancienne de cette église date du XIème siècle  
un château dont l'église architecture préromane provençale date du IXème siècle  
n dédicataire n Sur des bases anciennes carolingiennes VIème siècle  
ur du 24 juin hiver 1918-1919: une avalanche très considérable a  
n 1185 qu an 640 mais le lieu fut aménagé dès le V date du IXème siècle  
e toujours l'entrée indique la date de 1682 Date du Xeme  
Assomption époque de built 2e moitié 10e fondation de l  
Notre Dame des Oeufs du Xeme

Thank you...

<http://www.map.cnrs.fr/territographie>  
[territographie@map.cnrs.fr](mailto:territographie@map.cnrs.fr)