



Event

SpatioTemporal Extent Stub

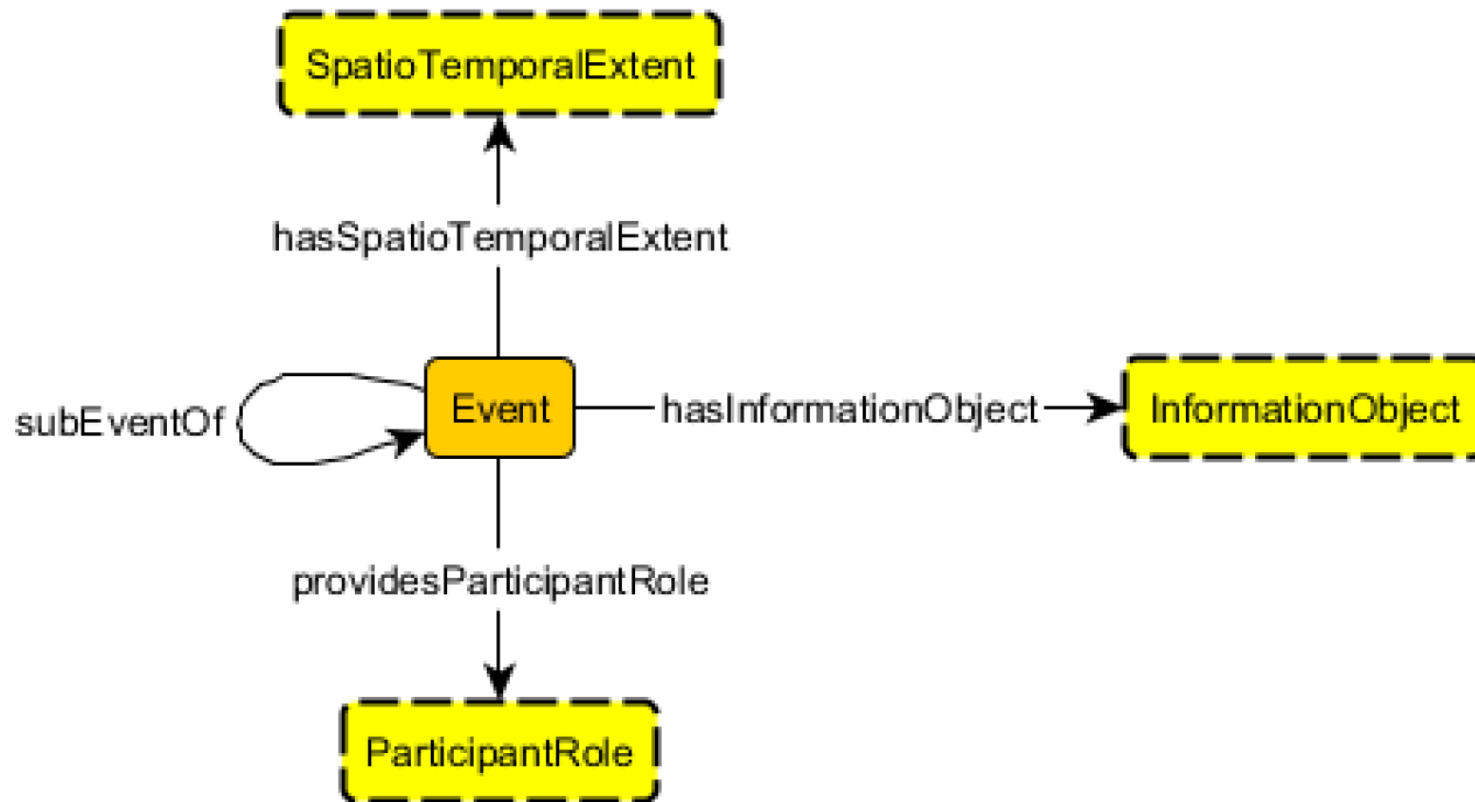
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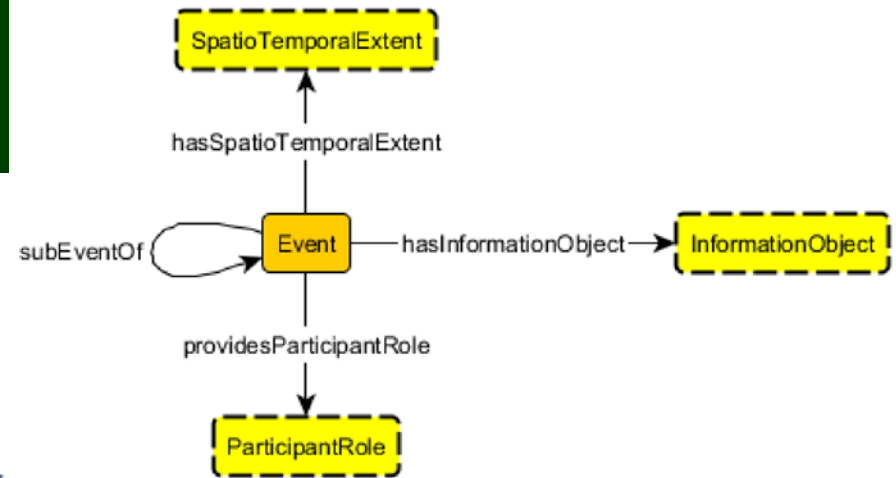


1. **Adila A. Krisnadhi, Pascal Hitzler, A Core Pattern for Events. In: Proceedings WOP 2016 at ISWC 2016.**
2. **Adila A. Krisnadhi, Pascal Hitzler, Krzysztof Janowicz, A Spatiotemporal Extent Pattern based on Semantic Trajectories. In: Proceedings WOP 2016 at ISWC 2016.**
3. **Adila A. Krisnadhi, Pascal Hitzler, The Stub Metapattern. In: Proceedings WOP 2016 at ISWC 2016.**





Events



$\text{subEventOf} \circ \text{subEventOf} \sqsubseteq \text{subEventOf}$

$\exists \text{subEventOf} . \top \sqsubseteq \text{Event}$

$\top \sqsubseteq \forall \text{subEventOf} . \text{Event}$

$\text{Event} \sqsubseteq \exists \text{hasSpatioTemporalExtent} . \text{SpatioTemporalExtent}$

$\top \sqsubseteq \forall \text{hasSpatioTemporalExtent} . \text{SpatioTemporalExtent}$

$\text{Event} \sqsubseteq \exists \text{providesParticipantRole} . \text{ParticipantRole}$

$\top \sqsubseteq \forall \text{providesParticipantRole} . \text{ParticipantRole}$

$\text{Event}(x) \wedge \text{providesParticipantRole}(x, p) \wedge \text{subEventOf}(x, y)$

$\rightarrow \text{providesParticipantRole}(y, p).$

$\text{Event}(x) \wedge \text{hasSpatioTemporalExtent}(x, w) \wedge \text{subEventOf}(x, y)$

$\wedge \text{Event}(y) \wedge \text{hasSpatioTemporalExtent}(y, z) \rightarrow \text{subSTEOf}(w, z)$

$\top \sqsubseteq \forall \text{hasInformationObject} . \text{InformationObject}$

$\text{AllDisjointClasses}(\text{Event}, \text{SpatioTemporalExtent}, \text{ParticipantRole}, \text{InformationObject})$

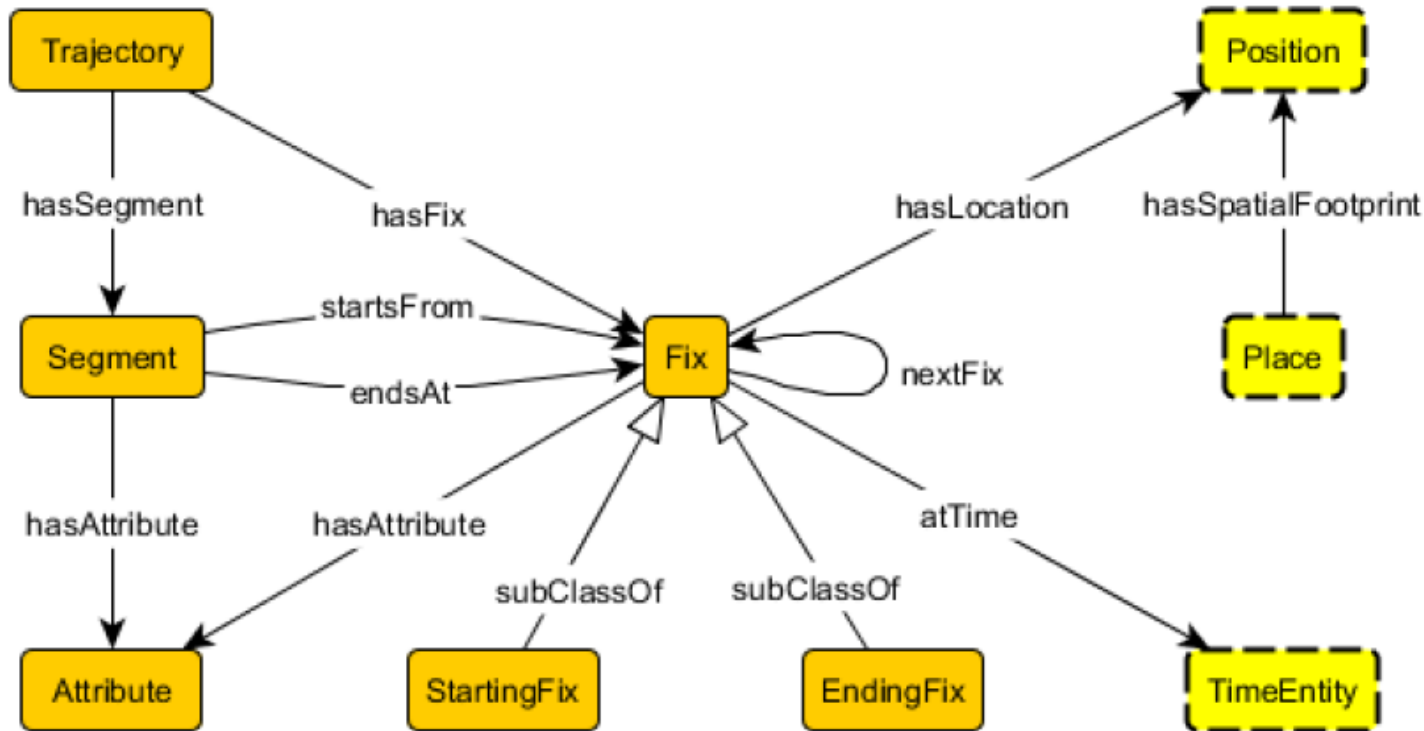


Fig. 1. Partial class diagram of the Trajectory Pattern from [2]. The dashed boxes indicate classes which are themselves (external) patterns, i.e., they need to be specified using a concrete module, or partial ontology.

Yingjie Hu, Krzysztof Janowicz, David Carral, Simon Scheider, Werner Kuhn, Gary Berg-Cross, Pascal Hitzler, Mike Dean, Dave Kolas, A Geo-Ontology Design Pattern for Semantic Trajectories. In: Thora Tenbrink, John G. Stell, Antony Galton, Zena Wood (Eds.): Spatial Information Theory - 11th International Conference, COSIT 2013, Scarborough, UK, September 2-6, 2013. Proceedings. Lecture Notes in Computer Science Vol. 8116, Springer, 2013, pp. 438-456.

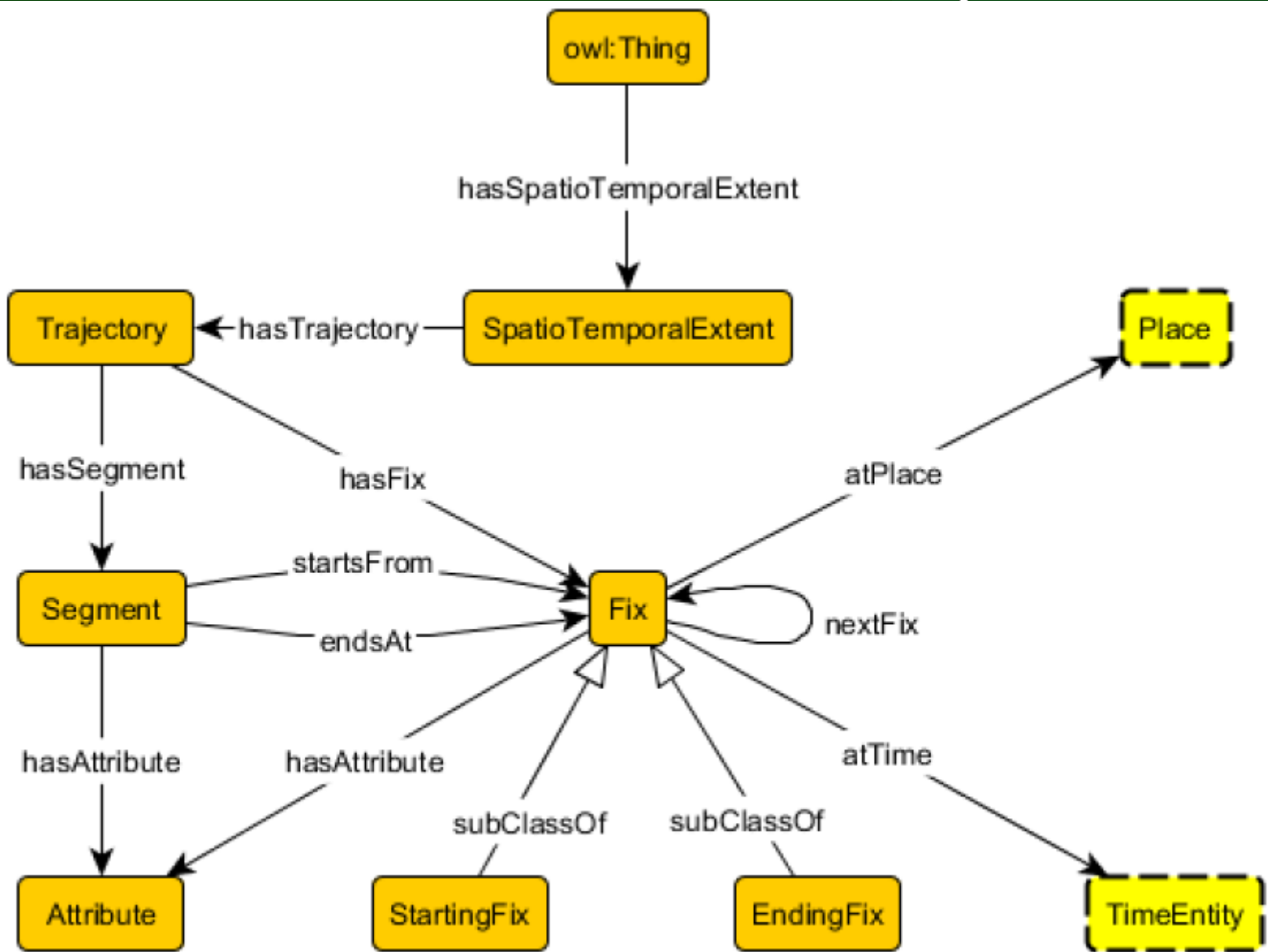


Fig. 2. Class diagram for the Spatiotemporal Extent pattern.



Those inherited from the trajectory pattern, plus

$\text{SpatioTemporalExtent} \sqsubseteq \exists \text{hasTrajectory.Trajectory}$

$\text{SpatioTemporalExtent} \sqsubseteq \forall \text{hasTrajectory.Trajectory}$

$\top \sqsubseteq \forall \text{hasSpatioTemporalExtent.SpatioTemporalExtent}$

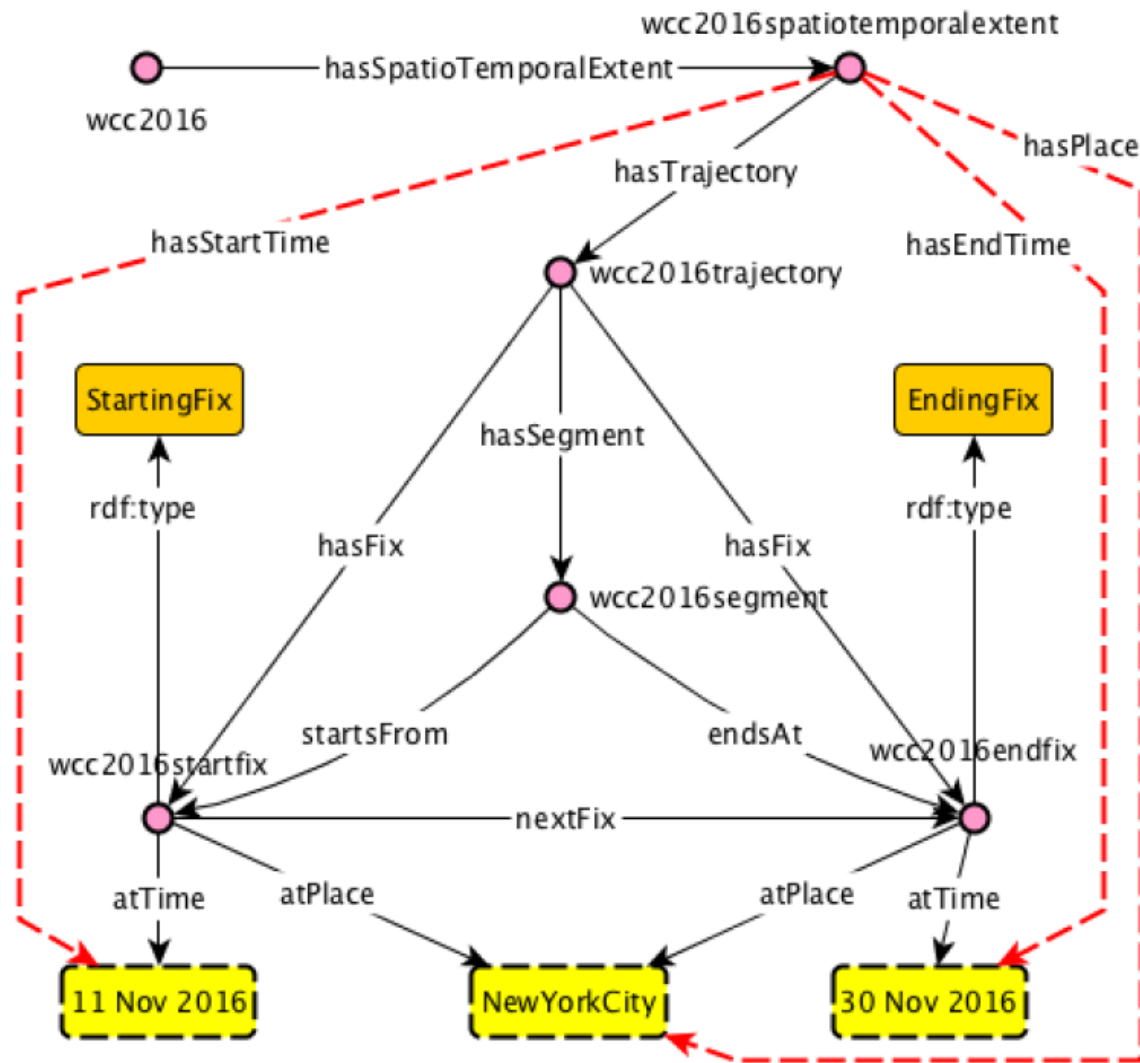


Fig. 3. Example for stationary trajectory: World Chess Championship 2016. The dashed red arrows indicate so-called shortcuts, which are discussed in the text.

Spatiotemporal Ext

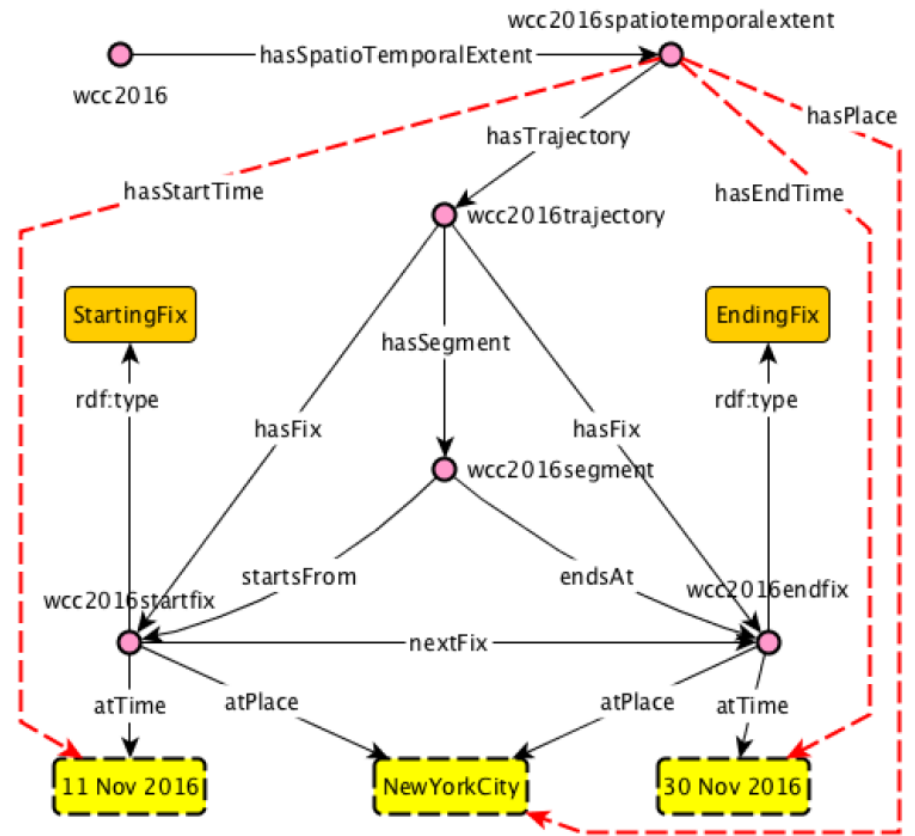
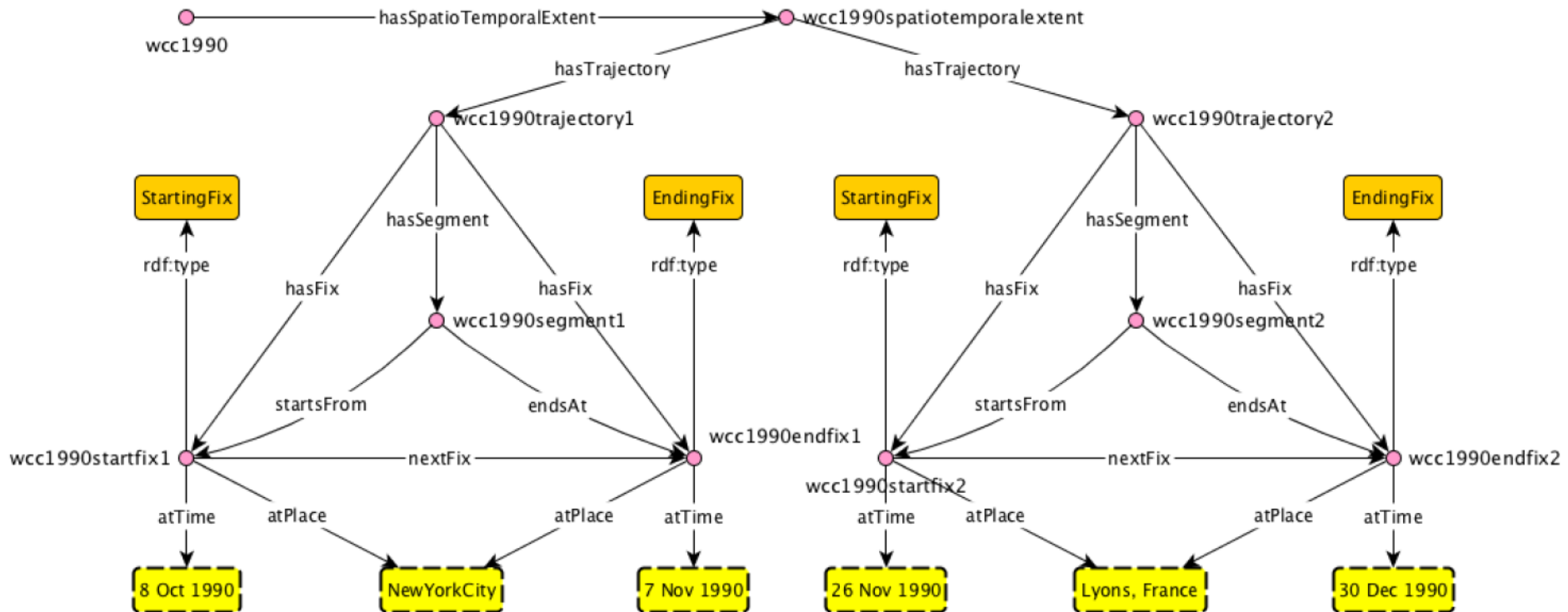


Fig. 3. Example for stationary trajectory: World Chess Championship 2016. The dashed red arrows indicate so-called shortcuts, which are discussed in the text.

$$\text{SpatioTemporalExtent}(x) \wedge \text{hasTrajectory}(x, y) \wedge \text{hasFix}(y, z) \\ \wedge \text{StartingFix}(z) \wedge \text{atTime}(z, w) \rightarrow \text{hasStartTime}(x, w)$$

$$\text{SpatioTemporalExtent}(x) \wedge \text{hasTrajectory}(x, y) \wedge \text{hasFix}(y, z) \\ \wedge \text{EndingFix}(z) \wedge \text{atTime}(z, w) \rightarrow \text{hasEndTime}(x, w)$$

$$\text{SpatioTemporalExtent}(x) \wedge \text{hasTrajectory}(x, y) \wedge \text{hasFix}(y, z) \\ \wedge \text{atPlace}(z, w) \rightarrow \text{hasPlace}(x, w)$$



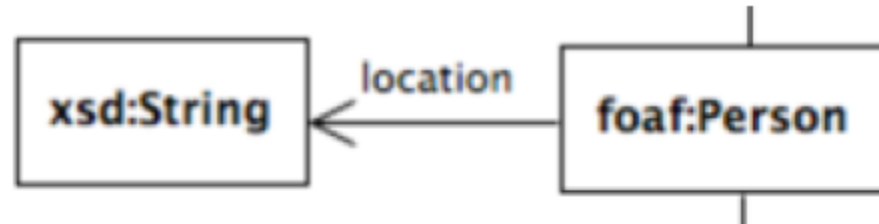


Fig. 1. Snippet from the class diagram of the W3C Organization Ontology [3].



Fig. 2. Places Stub

Stub Metapattern

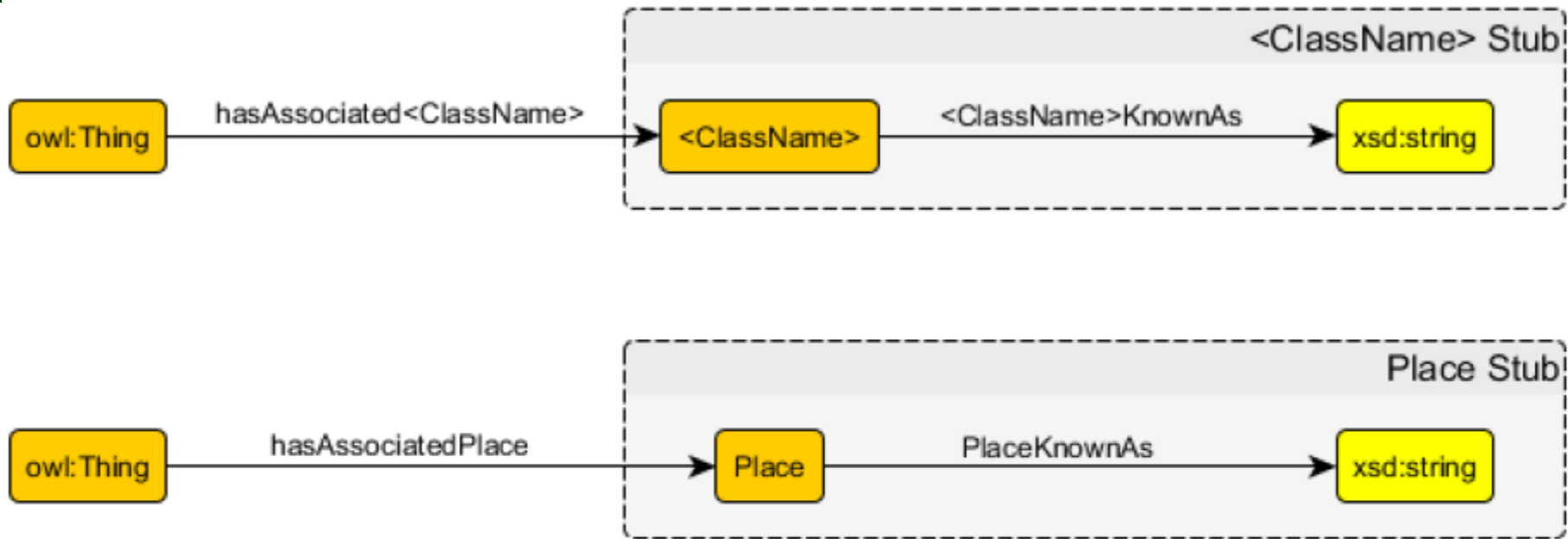


Fig. 3. The Stub metapattern (top) with an instance for Place (bottom)

$$\top \sqsubseteq \forall \text{hasAssociated}\langle \text{ClassName} \rangle. \langle \text{ClassName} \rangle$$

$$\top \sqsubseteq \forall \langle \text{ClassName} \rangle \text{KnownAs}. \text{xsd:string}$$

$$\exists \langle \text{ClassName} \rangle \text{KnownAs}. \text{xsd:string} \sqsubseteq \langle \text{ClassName} \rangle$$

$$\langle \text{ClassName} \rangle \sqsubseteq \exists \langle \text{ClassName} \rangle \text{KnownAs}. \text{xsd:string}$$

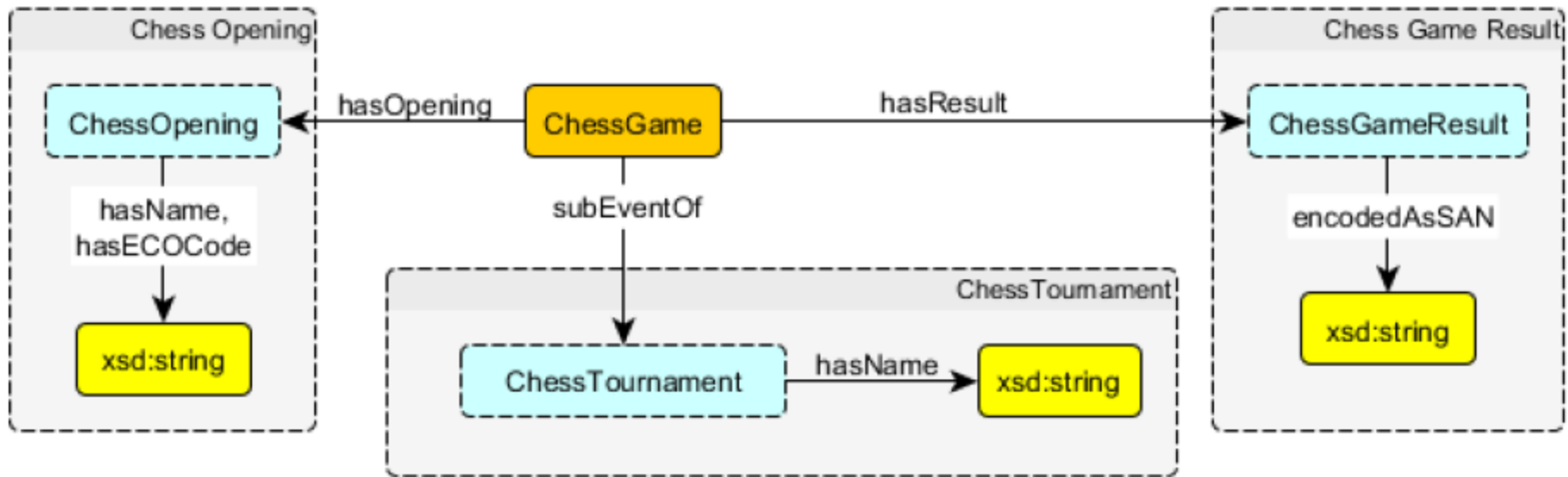


Fig. 4. Three stubs used in the Chess Ontology [2,4]



What we need is a critical mass of simple, easy to understand, and often needed patterns for basic ontology modeling.

Thanks!



Yingjie Hu, Krzysztof Janowicz, David Carral, Simon Scheider, Werner Kuhn, Gary Berg-Cross, Pascal Hitzler, Mike Dean, Dave Kolas, A Geo-Ontology Design Pattern for Semantic Trajectories. In: Thora Tenbrink, John G. Stell, Antony Galton, Zena Wood (Eds.): Spatial Information Theory - 11th International Conference, COSIT 2013, Scarborough, UK, September 2-6, 2013. Proceedings. Lecture Notes in Computer Science Vol. 8116, Springer, 2013, pp. 438-456.

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