Syntax & Compositionality Issues

Directed relationship and global predicate

$\mathsf{Type}(x) \leftrightarrow \Diamond(\exists y(y :: x))$

- $Type(x) \leftrightarrow \ \exists y(y :: x)$
- $Particular(x) \leftrightarrow \left(\nexists y(y :: x)\right)$
- $x \sqsubset y \stackrel{\text{def}}{=} x \subseteq y \wedge \neg(y \subseteq x)$

UFO Semantics

2021 – Page 3

- UFO has since evolved, always focused on the requirements of the conceptual modeling discipline. In
- particular, ontological foundations for conceptual modeling would demand micro-theories to address its
- most fundamental constructs, namely, entity types and relationship types1.

Matthew West – page 6

- The principles of the 3D paradigm are:
- 1. Objects are three-dimensional objects that pass through time and are wholly present
- at each point in time.
- 2. Objects are viewed from the present. The default is that statements are true now.
- 3. Objects do not have temporal parts.
- 4. Different objects may coincide at a point in time, i.e. occupy the same 3D extension
- (non-extensionalism).
- Thus, to talk about an object at different times it is necessary to time index statements in
- some way (e.g., *X* at *t*). In contrast, a 4D ontology treats all individuals - things that exist in
- space-time - as spatio-temporal extents (i.e., as 4D objects). The 4D paradigm is usually
- associated with an extensional view of objects and its principles are:

Matthew West – page 6

- The 4D paradigm is usually
- associated with an extensional view of objects and its principles are:
- 1. Individuals exist in a manifold of four dimensions, the three of space plus time. So
- things in the past and future exist as well as things in the present.
- 2. The four dimensional extent is viewed from outside time rather than in the present.
- 3. Individuals extend in time as well as space and have temporal parts as well as
- spatial parts.
- 4. When two individuals have the same spatio-temporal extent they are the same thing
- (the extensionalist criteria of identity).

- The difference here between a time-indexed property and a temporal stage reflects different metaphysical choices, not an empirical feature of the world.

Matthew West – page 11

- In a 4D ontology, accidental properties (in the Aristotelian sense) are temporal states of the 4D whole. Where the whole is emporally non-dissective (a **whole_life_individual**) these properties (temporal states) are potentially not of the same type as the whole – and so cannot be subsumed into the same type hierarchy.

A Comparative Illustration of Foundational : BORO - UFO

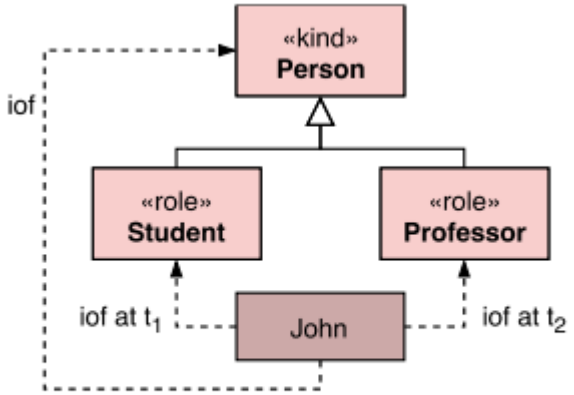

Figure 1: Roles in UFO

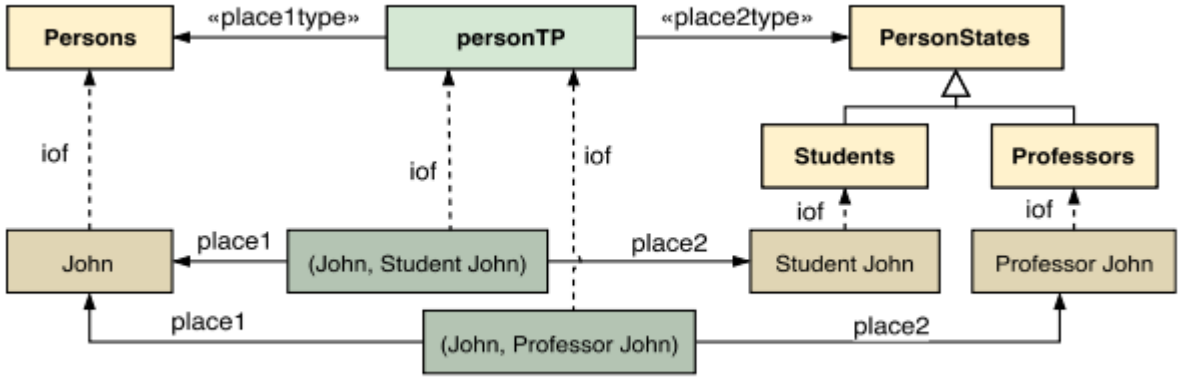

Figure 2: States in BORO, based upon [16].

- On doit à l'ingénieur informaticien Thomas Gruber la définition générique la plus souvent retenue de ce qu'est une ontologie[3]. Une ontologie est d'après Gruber la « spécification explicite d'une conceptualisation ». Une ontologie n'est donc pas en tant que telle un ensemble de concepts nouveaux, dont on apporterait une définition essentielle, mais elle suppose une conceptualisation déjà existante dont elle a pour tâche de préciser – de la manière la plus claire et explicite possible, c'est-à- dire formellement – le fonctionnement et les règles. Soit un domaine donné, ainsi qu'un vocabulaire comprenant des termes aux relations déterminées sur ce domaine (autrement dit, une « conceptualisation » de ce domaine : par exemple les termes « cellules », « organes », « organismes » dans le domaine de la biologie). Une ontologie est un langage caractérisant formellement ces termes et les règles déterminant leurs relations sémantiques. Cette spécification, une fois achevée, permet de définir les inférences légitimes qu'il est possible d'établir sur ce domaine. C'est en ce sens qu'une ontologie est l'*explicitation* d'une conceptualisation, constituée formellement par un ensemble d'axiomes, et représentable sous forme de graphe.

UFO 2021 : Model and reality

- *[t]his is not to say that ontological items or entities—objects, properties, states of affairs, etc.—are ways of taking the world. Tables,*
- *detente, machinists, and love affairs are absolutely not merely epistemic entities… In that sense, [this view]*
- *is stubbornly realist: all these entities are things beyond us, things in the world. [They] are not 'ways*
- *of taking the world', They are the world taken a certain way.".*

UFO 2021 - Perdurant and Changes – Page 5

- UFO
  - Perdurants are individuals that unfold in time accumulating temporal parts. They are manifestations of dispositions and only exist in the past. As such, perdurants are *modally fragile*, i.e., there is no cross-world identity between them and, hence, they cannot be in any way different than what they are (Guizzardi et al., 2016).
  - Changes are perdurants but perdurants cannot be the subject of change. Any apparent change to a perdurant is either a variation (i.e., different temporal parts of an event having incompatible properties), or a change happening to some underlying endurant that is the focus of that event.
- SysFEAT:
  - The progress of a process can produce events that the course of other processes:
    - The end of a process produces the start of another one.
  - So changes in a perdurant (a process) can produce changes in other perdurants (other processes).

- UFO:
  - An endurant then *participates in* a perdurant if that perdurant has a part that is a *manifestation of* a *disposition inhering in* that endurant (Benevides et al., 2019b)
- SysFEAT:

- UFO:
  - So, there is a special perdurant (which we may call a process, in a very particular sense) that is the life of an endurant, i.e., the sum of everything that is a manifestation of the dispositions inhering in) that perdurant (Guizzardi et al., 2016). As previously discussed, perdurants have all their parts and constituents necessarily. So, every single manifestation of that endurant literally changes its life (a change *of* life, not a change *in* the life!). In other words, this particular perdurant represents the *current life of an endurant* at each point in time (Guizzardi et al., 2016).
- SysFEAT:
  - ????

RDF: triple

- **DeepSeek**
  - **Analogy**
    - Think of a library:
    - A **triple** is like a sentence in a book: ("Romeo", "loves", "Juliet").

- SysFEAT:
  - Comparison with sentences leads to confuse directed relationships and natural language subject->predicate->object