cannot establish relevant axioms for describing the domain. An inappropriate choice of the basic concepts for a domain leads to the problems of irrelevance and conceptual incompleteness. Furthermore, the relevance of change of concepts must be taken into consideration

Ontologies exhibit different levels of abstraction; top-level ontologies, for example, apply to any domain of interest, whereas upper-domain and domain ontologies are related to more restricted domains. There are no established rules to separate these levels of abstraction, though there is tendency to understand the axioms of a top-level ontology as analytic truths. Quine (1951) emphasized that a clear separation between analytic and synthetic truths cannot be made; on the other hand, top-level ontologies are the most basic and they play—in a sense—a pseudo-analytical role. The interrelations between ontologies of different levels of abstraction needs further investigation, and a contribution to a formal-logical analysis is presented in Palchunov (2005). We distinguish four basic types of domains: the domain of the material world, the domain of the mental-psychological world, the domain of the social world, and, finally, the domain of abstract, ideal entities. Basic ideas on these ontological regions were established by Hartmann (1964), and further elaborated by Poli (2001). It is an important task of the onto-axiomatic method to develop means to support the solution of the basic problems mentioned above. This is work in progress.

3.0 The GFO-framework

In this section, we give an overview of the GFO-framework; a more detailed exposition is presented in Herre (2010) and Herre et al. (2007). General Formal Ontology (GFO) is a top-level ontology which is being developed at the university of Leipzig.

3.1 Categories, instances, and modes of existence

The term "entity" covers everything that exists, where existence is understood in the broadest sense. We draw on the theory of Ingarden (1964) who distinguishes several modes of being: absolute, ideal, real, and intentional entities. The basic distinction of entities is between categories and instances. A category is an entity, being independent of time and space, which can be predicated of other entities. The predication relation is closely related to the instantiation relation, and the feature of being instantiable holds only for categories.

On the opposite, individuals are singular entities which cannot be instantiated. The instances of a category are not necessarily individuals, they can be categories again. Categories are entities expressed by predicative terms of a formal or natural language that can be predicated of other entities. Predicative terms are linguistic expressions which specify conditions to be satisfied by an entity. There is a close relation between categories and language, hence, any analysis of the notion of a category must include the investigation of language.

3.2 Universals, concepts, and symbols

We draw on the ideas of Gracia (1999), who distinguished various basic types of categories. We distinguish at least three kinds of categories: universals, concepts, and symbol structures. Universals are categories which are independent of the mind; they are classified into intrinsic and ideal universals. Intrinsic universals are constituents of the mind-independent material world; they are associated to invariants of the spatio-temporal real world, and they are something abstract that is in the things. Ideal universals are existentially independent of the material real world and of the mind, as for example numbers, geometric entities, and platonic ideas.

Concepts are categories that are represented as meanings in someone's mind. Concepts are a result of common intentionality which is based on communication and society. We hold that universals can only accessed through concepts, hence for the establishing of knowledge the category of concepts is the most important one. Symbols are signs or texts that can be instantiated by tokens. There is a close relation between these three kinds of categories: a universal is captured by a concept which is individually grasped by a mental representation, and the concept and its representation are denoted by a symbol structure being an expression of a language. Texts and symbolic structures may be communicated by their instances that a physical tokens.

3.3 Ontological basic distinctions

Entities are classified into categories and individuals. The basic entities of space and time are chronoids and topoids; these are considered as individuals. The ontology of space and time is inspired by ideas of Brentano (1976). The GFO theory of time is presented in Baumann et al. (2012). Individuals are divided into concrete and abstract. Concrete individuals exist in time or space, whereas abstract individuals are independent of time and space. According to their relations to time, concrete individuals are classified into continuants, presentials and processes. Processes happen in time and are said to have a temporal extension. Continuants persist through time and have a lifetime, which is a chronoid. A continuant exhibits at any time point of its lifetime a uniquely determined entity, called presential, which is wholly present at the (unique) time boundary of its existence.