

Process Philosophical Adventures of Applied Ontology

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The paper is devoted to the new sphere of applied process ontology. It first makes a short review of the recent investigations in that area. Then it stresses on the importance of applied process ontology. Next the main methodological approaches of applied process ontology are considered: the “top down” and “bottom up” approaches. It is argued about the necessity and fruitfulness to combine both “top down” and “bottom up” approaches, and not to rely on one of them only. An example is given of the important role of process ontology as a general methodological framework for the building up of regional formal ontology. Finally, the idea of variable ontological categories is stressed on and argued for its fruitfulness.

Keywords: applied ontology, applied process ontology, methodological framework of ontology, regional ontology, ontology as philosophy, ontology as technology, variable ontological categories

1. Introduction: Short Review of the Development of Applied Process Ontology

The paper is devoted to the new sphere of applied process ontology. The area of applied ontology belongs to those themes that have intervened in philosophical and scientific space in the last few decades though according to Whitehead applied metaphysics has its historical origin in antiquity. He says:

One metaphysical fact about the nature of things which it presupposes is that this release is not to be obtained by mere physical death. Buddhism is the most colossal example in history of applied metaphysics. Christianity took the opposite road. It has always been a religion seeking a metaphysics, in contrast to Buddhism which is a metaphysic generating a religion.¹ (1926, 49-50)

The field of applied ontology is interdisciplinary, because it has not only its philosophical dimensions but also purely scientific ones: It is interesting for philosophers, engineers, computer scientists, logicians, etc. However, while recently applied ontology quickly has been widespread in the world, applied process ontology has appeared only within the last 15 years, if we make that conclusion according to the published books in that area. One of the first books (if not the first one at all) devoted to that topic of investigations is the book: *Process Theories: Crossdisciplinary Studies in Dynamic Categories* (Johanna Seibt 2004, Kluwer Academic Publishers).

It is a result of an analogous conference held in Denmark in 2001.

Next we have only several books in that area: *Applied Process Thought I* (Dibben, Mark and Thomas Kelly 2008, Frankfurt: Ontos Verlag), *Applied Process Thought II* (Dibben, Mark and Rebecca Newton 2009, Frankfurt: Ontos Verlag), *Ontological Landscapes* (Petrov, Vesselin 2011, Frankfurt: Ontos Verlag), and *Dynamic Being: Essays in Process-Relational Ontology* (Petrov, Vesselin and Adam Scarfe 2015, Cambridge

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Scholars Publishing, Series of European Studies in Process Thought).

The second parts in the last two books are devoted to different aspects of applied process thinking.

Of course, besides the above listed books, there are a number of papers devoted to applied process ontology.

The conclusion of that short historical introduction is that it is necessary to continue to develop the area of applied process ontology, especially because it is perspective and important one for the development of process philosophical thinking and of other philosophical and scientific areas of knowledge, as it will be argued in the present paper.

2. The Importance of Applied Process Ontology

The paper is entitled “Process Philosophical Adventures of Applied Ontology,” because the theme of applied ontology is investigated from process philosophical point of view. The concept of “adventure,” as it is well known, has been introduced into philosophy by Alfred North Whitehead. In his book *Adventures of Ideas* he says: “To sustain a civilization with the intensity of its first ardour requires more than learning. Adventure is essential, namely, the search for new perfections.”² Then he continues: “Without adventure civilization is in full decay... in their day the great achievements of the past were the adventures of the past” (1933).³

The use of the concept of “adventure” clearly outlines a process philosophical approach to the topic of investigation. It is especially significant for the theme of applied ontology, because not only the chosen methodological approach is outlined and some aspects of the development of applied ontology, i.e., adventures of the ideas of applied ontology in the history and contemporaneity of science and philosophy, but in this way also it is inspired that only with the help of process philosophical approach to that topic it is possible to say something really new about the philosophical aspects of applied ontology and to avoid the static maintenance of status quo, which is disastrous for the development of any science and for the vividness of philosophy itself.

The exposition is based on the thesis that applied philosophy can be so much theoretical as is traditional philosophy itself and that any philosophical theory is potentially applied philosophy, as well as that any natural or human science has begun its development as applied philosophy. The thesis challenges widely accepted differentiation of philosophy into three spheres: descriptive, normative, and applied, and supports that the borders between these spheres are not strong and the spheres merge. That is why the traditional theoretical philosophy has no privilege position in comparison with applied philosophy. The same is valid also for ontology as one of the main parts of philosophy. Let me quote in this regard again Whitehead. In his book *The Aims of Education*, he says:

Science is a river with two sources, the practical and the theoretical source. The practical source is the desire to direct our action to achieve predetermined ends... The theoretical source is the desire to understand. Now I am going to emphasize the importance of theory in science. But to avoid misconception, I most emphatically state that I do not consider one source as in any sense nobler than the other, or intrinsically more interesting. I cannot see why it is nobler to strive to understand than to busy oneself with the right ordering of one's actions. Both have their bad sides; there are evil ends directing actions, and there are ignoble curiosities of the understanding.⁴ (1967, 103-4)

3. Methodological Approaches of Applied Process Ontology

In the paper, I shall consider several aspects of applied process ontology. First, I shall consider the methodological approaches. It is the question that what kind of ontology as philosophy can serve best as a general philosophical framework for the purposes of applied ontology. I argue that the most perspective is

process ontological framework, i.e., I argue in favor of the use of process ontology as a general ontological framework. I shall substantiate the methodological role of process ontology as philosophy by means of combination of the methodological approaches “top down” and “bottom up” without giving a privilege position of some of them. I shall use the accepted in the specialized literature differentiation between ontology as philosophy and ontology as technology.⁵ I also argue that above the ontologies (as technology) at the top level there should be an ontology as philosophy and that it should be a kind of process ontology. Let me first consider the motivation of methodological role of process ontology as philosophy by way of combination of the methodological approaches “top down” and “bottom up,” and not to rely only on one of them. This task is generally in the field of metaontology, because it is connected with the analysis of the problem how a definite type of ontological investigations should be developed, i.e., how a definite type of ontologies should be elaborated, as well as what are their features, characteristics, and tendencies of development: It is here where the analysis of the methodological role of ontological approaches “top down” and “bottom up” belongs to. I shall push forward ideas that are a development of the combination of both “top down” and “bottom up” approaches. The standard “top down” approach has been described in previous years in the following way:⁶

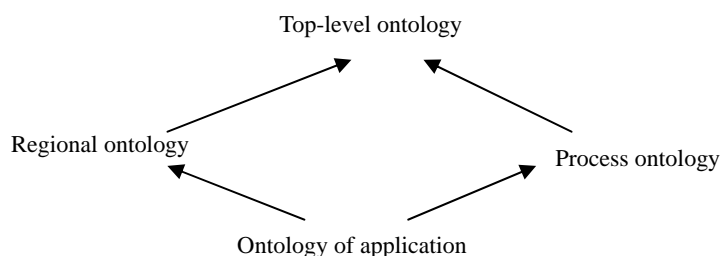


Fig. 1. The “top down” approach.

On the other hand, the situation with the development of the theory of dynamic ontologies can be represented in the following figure:

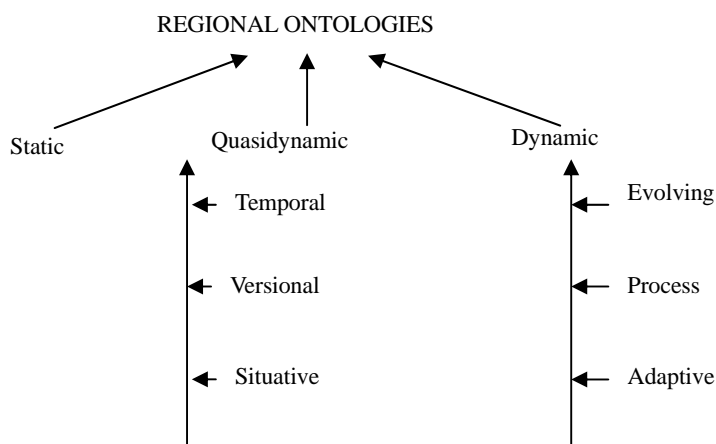


Fig. 2. Regional ontologies.

Fig. 2 can be considered as a better detail and correction of the “top down” approach depicted on Fig. 1, because it is seen that process ontologies can be part (or examples) of regional ontologies, and not separated from them as it is on Fig. 1. The described “top down” approach however—though its deficiencies are important—is interesting for the philosophers with the idea that some top-level ontology should be above (to

control) regional ontologies. This is described in the initial idea of ontology as technology, but it gives an opportunity for suggestions concerning process ontology as technology.

The question arises here: What can be said about ontology as philosophy? We can suppose that above the top-level ontologies as technology there should be some ontology as philosophy. More than that, this ontology as philosophy should be a kind of process ontology in the philosophical sense of the term.

The idea can be presented in the following Fig. 3.

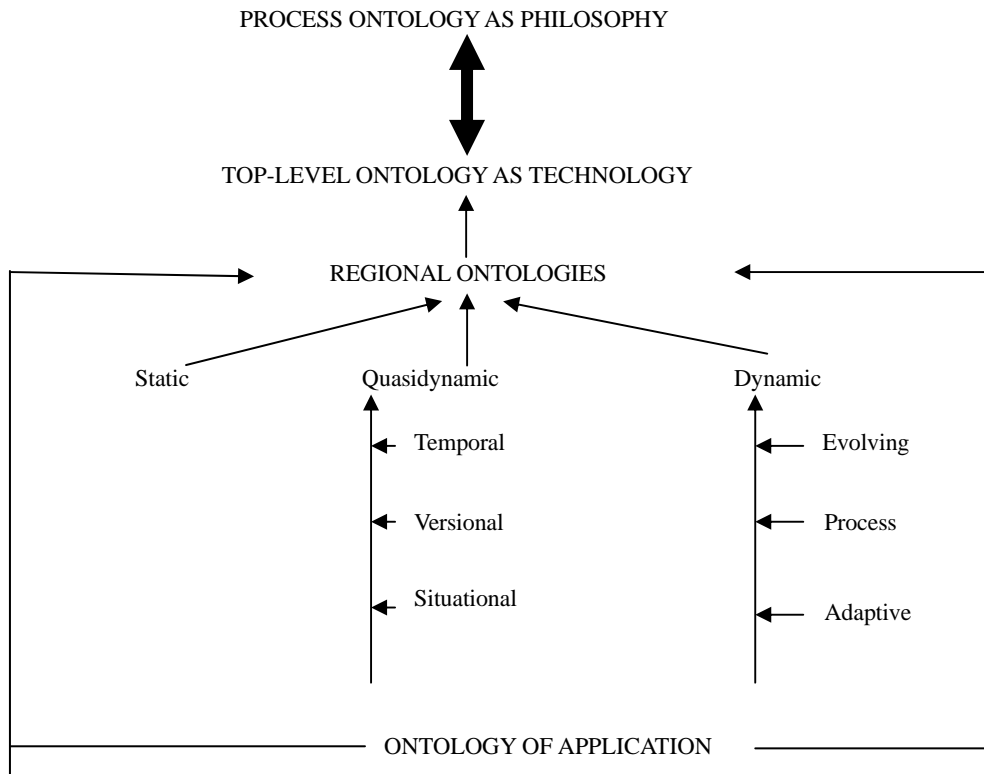


Fig. 3. The relation of process ontology as philosophy with ontology as technology.

On the one hand, this figure represents the “top down” approach in the sense that it is a process of ontological (in philosophical sense) categories, relations between them and rules (and not just static categories), which categories are most proper for control of quasidynamic and dynamic regional ontologies. It is remarkable that in the last years process philosophical ideas penetrate also in such kinds of more or less technical investigations. It is firm evidence in favor of the fruitfulness of the process ontological ideas. Process ontology as philosophy has methodological role in the development of different ontologies as technology.

On the other hand, generalizations of quasidynamic and dynamic regional ontologies to top-level ontologies (as technology) are a good basis for making namely of process philosophical (or rather process ontological) generalizations. It is a realization of the “bottom up” approach.

The intensive development of different quasidynamic and dynamic ontologies as technology gives a strong impetus for the development of process philosophical ideas. In this way, the interrelation of process ontology as philosophy and ontology as technology combines both “top down” and “bottom up” approaches. This situation is mapped on Fig. 3 with a double arrow. Such conclusion is not valid for any type of static ontology as philosophy.

The question that is interesting is namely what type of ontology (as technology) could serve as a general ontology, i.e., what type of “ontological framework” should be used for the purposes of applied ontology in the proper sense. The answer of that question depends on two things: First, what type of ontology (as philosophy) is the best (or the most proper) for description of the world in which we live and part of which is the particular region to which we would like to apply the ontological framework. It is, so to say, “top down” dependence. Second, there is also some “bottom up” dependence, i.e., the type of ontology (as philosophy) that we have to choose depends also on the special (particular) type of the region to which we would like to apply the ontological framework. Of course, the last dependence is not direct; there should be many intermediate relations, but that does not reject the fact of the presence of such kind of dependence.

If we want to meet the first of the above requirements (the “top down” dependence), we have to take into account the history and the present state of ontology (as philosophy). From process philosophical point of view, we have to choose as a most general ontological framework namely process ontology, because it is process ontology that is most adequate to our contemporaneity.

On the other hand, if we want to meet the second requirement (the “bottom up” dependence), we shall have first to answer the question what will be the concrete region to which we want to apply that most general ontology. If it is, for example, medicine (as it is in many contemporary publications), maybe we could choose some static type of ontology. However, if our area of investigation is, for example, “multiagent informational and control systems,” it is definitely clear that in such area that is characterized with great dynamic in control functions, production functions, etc., it would not be a good idea (and even it will be impossible) to stem from any type of static ontology. The general ontological framework should be process one!

Taking into account all these considerations, I reach to the conclusion that we have to choose namely process ontology as a general ontological framework. However, it is not enough just to say: We choose process ontology. What type of process ontology has to be chosen and what will be the concrete expression of the application of that process ontology to the above pointed area? The answer of that question depends on the concrete aim and concrete directedness of the given investigation. In principle, there are different types of process ontology and the possibilities for usage of some of them are many. There is not a common prescription and there could not be such one.

4. An Example of the Methodological Role of Process Ontology as General Methodological Framework for the Building up of Regional Formal Ontology

To illustrate the above argued claims, I shall consider an example of the decisive methodological role of process ontology as general methodological framework for the building up of regional formal ontology that rules the process of self-control in a given manufacture. The example concerns the ontology (as philosophy) of anticipatory systems. Let me remind that the wide spread definition of an anticipatory system is “a system containing a predicative model of itself and/or of its environment, which allows it to change state at an instant in accord with the model’s prediction pertaining to a later instant” (1985).⁷

The specialized literature on anticipatory systems discusses the problem of different levels or degrees of anticipation including the possibility of anticipation in non-living systems. The example that I shall present concerns anticipation in the automated mechanized manufacture. It could be for example a chemical manufacture, a machine manufacture, etc.: Many different cases are possible. In all these cases, the

manufacture systems are artificially created and programmed to be self-control systems. This kind of anticipation can be illustrated graphically in the generalized scheme shown in Fig. 4.

Suppose we have a given self-control manufacture system S . We see from Fig. 4 that the behavior of the system takes into account through “agents” the anticipation and models its present behavior in accordance with this anticipation.

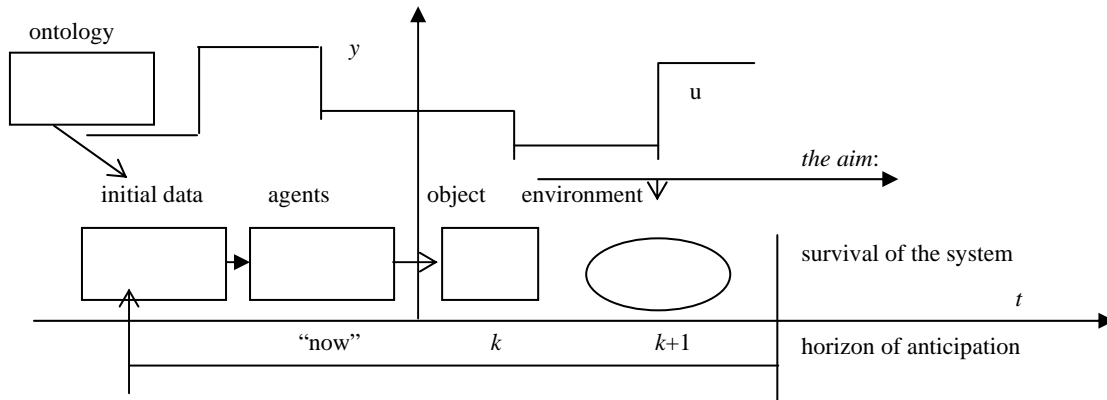


Fig. 4. Anticipation in self-control manufacture system.

The system in this example is not a “thinking” system in the sense in which a man is thinking. The system is programmed preliminarily in such a way that it will be able to “decide” what will be the next step after step k in accordance with the anticipated behavior of the environment. This expected behavior is one amongst a finite number of states, and the system is programmed what to do if the state of environment m is realized. The system is not a proper anticipatory system in the sense that the man who has programmed the system has decided the final result in every single state. But the system is anticipatory in some sense, perhaps better thought of as a *pre-anticipation property* rather than proper anticipation. This is because we do not know in advance exactly which of the states of the environment will be realized at moment k . It follows from the scheme that the types of anticipation are not limited and pre-anticipation is one of them.

As an additional comment on the generalized example illustrated in Fig. 4, some ontology O is supposed on the basis of which the system works and makes its “decisions.” The presence of such ontology is a main component of the scheme that is very important for our line of thought. Here O is not ontology as philosophy, but ontology as technology, and more concretely it is a formalized ontology:

$$O = \langle Ob, A, R \rangle,$$

where Ob denotes a class of objects, A denotes a class of their attributes, and R denotes a class of relations between the objects. This ontology also changes according to the anticipation of the system for its future states. So, it is a dynamic and not a static ontology. But what kind of dynamic ontology is it? We have to take into account that eventual changes in ontology can occur only in accordance with the procedure to follow for anticipating the future of the system at every moment k . So, we have a procedure that produces changes in the components of the ontology. In other words, it is a procedural ontology, because it contains a description of the procedure to follow in order to make changes of the present state of the system in accordance with the anticipation for the future state of the environment. This procedural ontology is a regional one, however there is a top-level formal ontology O^* above it that rules the ontology O . In principal, many different top-level ontologies O^* and regional ontologies O are possible. The successful choice or building of a proper one of both

kinds depends on the principles and basic assumptions of the philosophical ontology that functions as methodology. Here is the role of ontology as philosophy: We can choose one or another philosophical ontology as methodology and the proper choice of such philosophical ontology is decisive for our final success in the concrete task we are dealing with (e.g., concrete self-control manufacture). My claim is that process philosophical ontology can serve best for all cases of anticipation because of the dynamic nature of anticipation itself.

5. Conclusion: The Idea of Variable Ontological Categories

The considered arguments, explanations, and examples convincingly demonstrate the role and significance of process ontology (as philosophy) as methodological framework (or top level ontology) for development of different applied ontologies (as technology) or for its application in other philosophical theoretical areas. It has to be stressed also that the subject area of ontology for which applied process ontology functions as methodology, also has some influence on that methodological framework. For example, if the subject ontology is a dynamic one, then its methodological framework also should be a dynamic one. Within the frameworks of mathematical theory of categories, the problem of the dynamic nature of reality is formalized by stressing on variable categories.⁸ This fact opens the possibility for some predictions about the future development of process ontology in the sense that a tendency can be outlined for variable philosophical categories. In a really dynamic (and not pseudo-dynamic) ontology, its categories should be variable in order to express or reflect the dynamic nature of reality. But a really dynamic ontology should be a process one, because process ontology is the most adequate form of the idea of dynamic in philosophical ontology. I will not go into details, because it is still a problem for further development of process ontology, but I shall mention only that generally speaking the categories can be variable only if they are processes and not substances (in the mechanistic sense of the term substance). A further development of the idea of variable ontological categories will be another new and exciting process philosophical adventure. Anyway, independently on the way the problem will be solved, it is a fact that process ontology is a type of dynamical ontology and that it is its most developed and perspective type. That is why it can be firmly said that it is process ontology that is the best general ontological framework for applied ontology.

Notes

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 2. Whitehead, A. N. *Adventures of Ideas*. New York: The Free Press, 1967. First edition by The MacMillan Company, 1933, 258.
 3. *Ibid.*, 279.
 4. Whitehead, A. N. "The Aims of Education." New York: The Free Press, 1967 (first edition 1929 by The MacMillan Company), 103-4.
 5. See for example Poli, R., Obrst, L. "The Interplay between Ontology as Categorial Analysis and Ontology as Technology." *Theory and Application of Ontology*. In 2 vols.: Vol. 1. R. Poli, J. Seibt, J. Symons (eds.), *Philosophical Perspectives*; Vol. 2. R. Poli, M. Healy, A. Kameas (eds.), *Computer Applications*, Springer, 2010.
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 8. See for example, Poli, Roberto (2007). "What Is Ontology?" Eds. Hdjiski, M. and Vesselin Petrov (2007). *Ontologies. Philosophical and Technological Problems*. Sofia: Prof. Marin Drinov Academic Publishing House, 22.

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