Chapter 3
Model Instantiations

ABSTRACT

In three specific model instantiations, this chapter demonstrates how URANOS can be applied to other research domains. The first instantiation, referred to as the body-mind continuum, addresses humans as holistic and spiritual beings embedded in their natural, informational and socio-cultural environments. The second instantiation provides a framework for integral thinking and designing based on the AQAL-model from K. Wilber (2007). The third instantiation addresses holistic and cognitive coordination processes in the context of multi-agent and cyber-physical systems. These three instantiations together build the core of our human-centered modeling approach. Each of them holds our generic system model at its core, but at the same time has its own specific extensions.

INTRODUCTION

We aim to instantiate URANOS for three distinct but related models, which together build the core for human-centered systems. These models are described in depth in this chapter. On the one hand, they handle human beings and technical systems, and on the other hand, they promote holistic approaches for a better understanding of complex systems. The new findings, that URANOS contributes to modeling are emphasized.

The first model deals with living systems, especially human beings. The comprehension of human beings is fundamental for human-centered systems. From a holistic perspective, people can be regarded as bodies with a

mind, but also as spiritual beings. They are also not completely autonomous systems, but must be considered in the larger context of their environments. This model illustrates how body, mind and spirit are interrelated and interact with other humans and the environment.

The second model is concerned with integral thinking. It's a holistic approach that aims to integrate as many perspectives as possible to obtain a comprehensive picture of a complex system. The AQAL-model is chosen as an instantiation of URANOS. Our approach is to extend it with the perspective of system dynamics. This allows a deeper understanding of how complex systems behave, and how realities and their entities influence each other.

Finally, the third model outlines the coordinative aspects of allopoietic and computerized systems, such as multi-agent and cyber physical-systems. The model provides a deeper insight into coordination and dynamics within these systems. Once human beings and allopoietic systems enter into a symbiosis, a new high level coordination aspect emerges, called cognitive coordination. Coordination processes emerge at this level due to the cognitive and empathic capabilities of human beings.

Section "Body-Mind Continuum of Human Beings" presents an instantiation of living systems, in particular a model for human beings. We call this model the *body-mind continuum* expressing the fuzziness between body, mind and spirit. The second instantiation in section "Integral Thinking" addresses integral thinking and the AQAL model. Section "Coordination Model" provides a coordination model, designated for technical systems like multi-agent and cyber-physical systems. Finally, section "Conclusion" concludes the instantiation of URANOS.

BODY-MIND CONTINUUM OF HUMAN BEINGS

Living systems, and human beings in particular, are among the most complex systems which are known to us. We consider such systems as holistic, because they cannot solely be described by their parts, but must be also considered as wholes.

This section first addresses the mind-body problem, where some of the philosophical and epistemological key points have to be clarified. Then, we turn to the actual model for human beings, called the *body-mind continuum*. It expresses the fuzziness between body, mind and spirit. In particular, the model describes the relationships and dynamics between body, mind and spirit. Human beings can interact with each other and are embedded in an

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