Chapter 2
URANOS:
A Generic System Model

ABSTRACT

This chapter presents a generic system model called URANOS, that allows to design complex human-centered systems. It is not aligned to any particular discipline. Rather, it helps to build integral systems in different domains of science and engineering, even though it was originally intended to participate in the design of complex human-centered systems in the framework of ICT. URANOS aims at encouraging interdisciplinary work and reinforces the understanding of complex systems in general. It combines different epistemological standpoints and their corresponding realities into a wholeness. Concretely, the three fundamental standpoints of objectivism, subjectivism and holism are used to holistically handle all relevant entities such as humans, animals, machines and environments. This chapter also addresses systemic features like consciousness, collaboration and symbiosis providing a generic and abstract understanding of them.

INTRODUCTION

In many sciences, like computer science, biology or sociology, complex and non-linear systems cannot be completely understood in a dualistic world view. This means that certain system properties cannot, or only with difficulty, be described by their models. We propose to use a more comprehensive and generic approach to modeling such systems.

This chapter presents the generic system model, URANOS, that we propose for designing complex human-centered systems. The goal of this

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model is to look at things holistically. It combines various epistemological standpoints and their corresponding realities into a wholeness. Concretely, the three fundamental standpoints of objectivism, subjectivism and holism are represented. Each of them brings new aspects and dynamics to our system model. URANOS is not aligned to any particular discipline, rather, it helps to build integral systems in different domains of science and engineering, even though it was is originally intended to participate in the design of complex human-centered systems in the framework of ICT. It aims at encouraging interdisciplinary work and reinforces the understanding of complex systems in general. Therefore, systemic features like consciousness, collaboration and symbiosis are described from a generic standpoint.

The chapter starts with the epistemological background in section "About Epistemology". It shows how different epistemological standpoints are combined in URANOS. Sections "First-order: Observable Entities", "Second-order: Smart Entities" and "Third-order: Enactive Entities" present the three systemic orders that result from the three fundamental epistemological standpoints. In section "Entity Collaboration" we show how the dynamics between entities leads to collaboration and symbiosis. The development of complex systems is presented in section "System Development". URANOS is not limited to the three systemic orders. Section "Towards n-th order Systems" illustrates how URANOS can be extended with further epistemological standpoints. Finally, this chapter closes with the summary in section "Summary".

ABOUT EPISTEMOLOGY

Complex systems like living systems, and particularly human beings, can be described from a variety of standpoints. To be able to understand a system as a whole, all these realities have to be taken into account. For example, a person can be described as a physical body, or as a psychic apparatus (Freud, 1993). None of the views are wrong, but none describes the human being completely. To understand human beings all of them must be considered, the body, the mind, and the spirit (Wilber, 2007). The generic approach of URANOS takes on this epistemological insight, in which multiple standpoints and realities can exist in parallel and form a new cosmology.

This approach also leads to the insight that any kind of classification is subjective and incomplete. Subjective, because a classification depends on the standpoint of the observer (e.g. designer, architect, analyst). Incomplete, because no one knows all possible classes, and between two classes an infinite