

AN OUTLINE OF SECOND-ORDER SYSTEMS SCIENCE

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The emergence of second-order science can be considered as a rather recent phenomenon and is based on a differentiation of the overall science system into three distinct levels, namely into

- first-order science as the traditional science system of exploring the world
- zero-order science as the new network of research infrastructures across all scientific disciplines with its catalytic function of enabling and accelerating first-order research through new experiments, data and information resources
- second-order science as the science of reflecting on the explorations of first-order science can be traced back to the rise of meta-analyses in the 1970s, operates as the systematic study of ensembles of building blocks from first-order science like theories, patterns, relations, results, etc. and, like research infrastructures, works across all traditional disciplines and fields as well.

The general goals for second-order science can be summarized in the following way.

- First, second-order science aims at higher levels of robustness with respect to the outputs of first-order science.
- Second, second-order science is able to achieve higher levels of generality or integration, compared to the inputs or outputs of first-order science.
- Third, second-order science opens up new perspectives, produces highly innovative results and is capable of acting as an innovation pump for the overall science system.

In this lecture an outline will be presented on different pathways for the new field of second-order systems science. The presentation will be focused on three different trajectories for second-order systems science which correspond to the three main principal goals of second-order science.

- The first goal for future research design is to be able to provide higher levels of robustness, due to a pooling of data and a much wider data-base.
- The second path for research provides outputs or results with higher levels of generality or integration which can then be used, explored and tested for subsequent investigations by traditional systems science.
- The third trajectory leads to innovative and novel fields for systems science in general which is made possible through a systematic accumulation of available inputs or outputs from conventional systems science.

In this manner an overview can be presented on a new branch within systems science which should and will empower systems science significantly in the future.

Literature:

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