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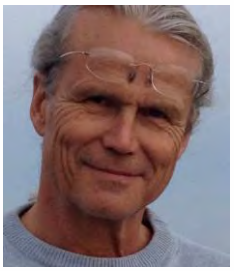
STEEN RASMUSSEN CV

PARTICIPANT AT:

SYNTHETIC BIOLOGY. FROM STANDARD BIOLOGICAL PARTS TO ARTIFICIAL LIFE



September, 17th-18th, 2015, Barcelona

Steen Rasmussen, Professor in Physics and Director at the Center for Fundamental Living Technology, University of Southern Denmark, and Research Professor at the Santa Fe Institute, New Mexico, USA.

1985 PhD in physics and postdoc at the Technical University of Denmark. Since 1988 at Los Alamos National Laboratory and the Santa Fe Institute New Mexico, USA. During his 20 years in the USA (1988-2007, Alien of Extraordinary Abilities) he contributed to a variety of interdisciplinary research projects ranging from artificial life and human genome to disaster mitigation and urban transportation. He eventually became the Scientific Team Leader of the Self-Organizing Systems (SOS) team in 2002. Over the last twelve years his main effort has been to construct minimal protocells bottom up from nonliving organic and inorganic components. To do that he has organized, sponsored and lead international research teams in the US, across Europe and in Denmark, where he returned in 2007. More recently he has also engaged as a science policy advisor and in exploring likely societal impacts of intelligent and living technologies.

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ABSTRACT

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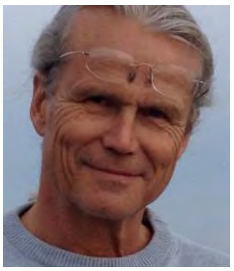

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How to Assemble Minimal Life Bottom Up?

A design strategy to achieve a minimal self-reproducing and evolving physicochemical system was outlined in Rasmussen et al. (2003, 2004). To reach this goal we have defined a chemical dependency between three component subsystems, a metabolism, an informational system and a container. In this arrangement, the replication of the information molecules depends on the formation of the container, while the production of new container- and information molecules depends on the work of the metabolism. Finally, the information molecules control the metabolic rate. We present our main results regarding the individual components as well as an integration of the three physicochemical systems, the metabolism, information system and the container (Ikari et al., 2015, Cape et al., 2012; Fellermann et al., 2011; DeClue et al., 2009, Rouchelau et al., 2007). Further, we discuss the main open questions we have regarding implementing a non-enzymatic replication of container attached conjugated DNA molecules. Finally, we outline the more general open issues about which kind of evolution we might expect for bottom up self-assembled protocells, ranging from simple optimization to open-ended evolution of functionalities (Tanaka et al., 2014, Bedau et al., 2003).

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