

Research Framework for Interaction Computing



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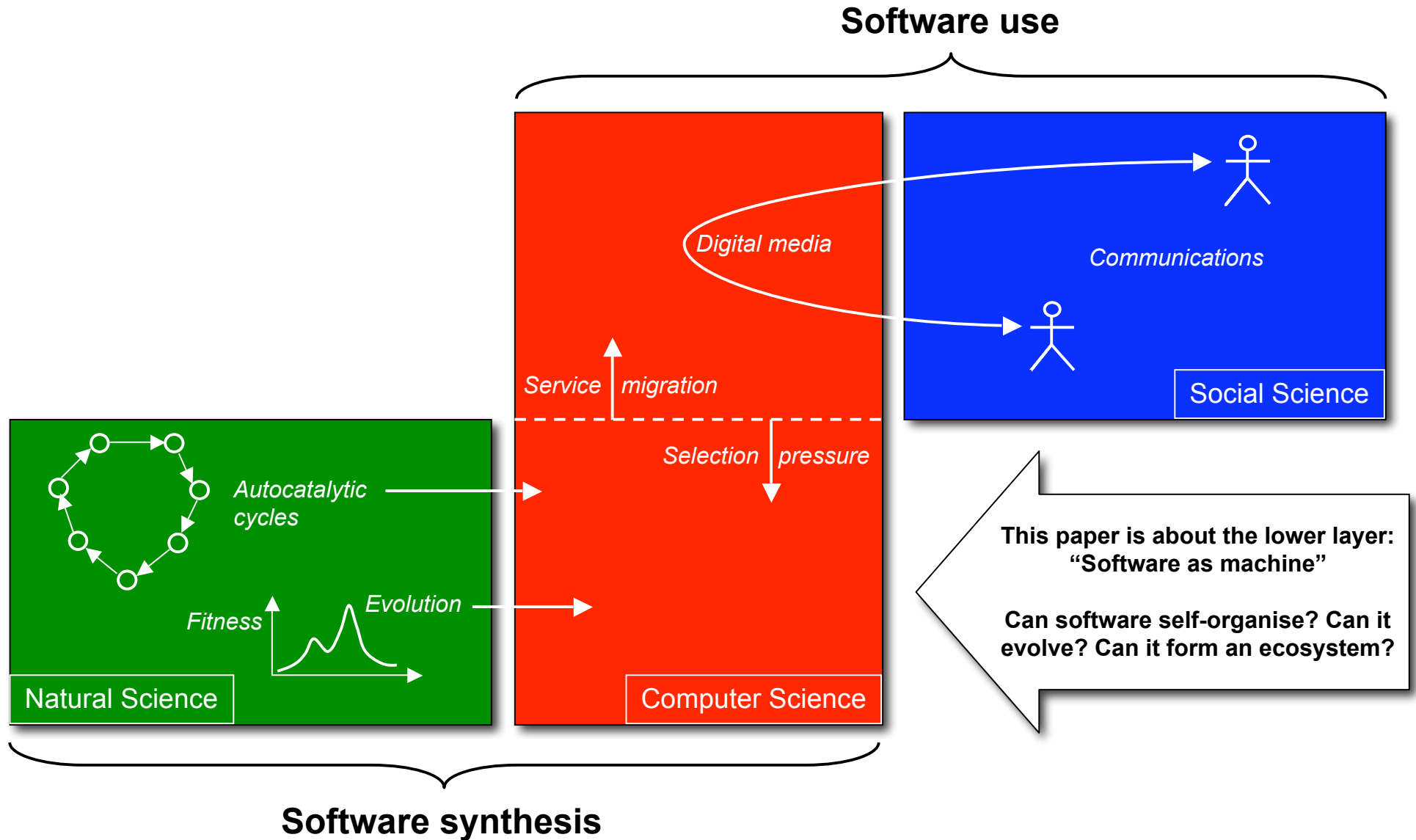
3rd International OPAALS Conference on Digital Ecosystems
Aracajú, Sergipe, Brazil
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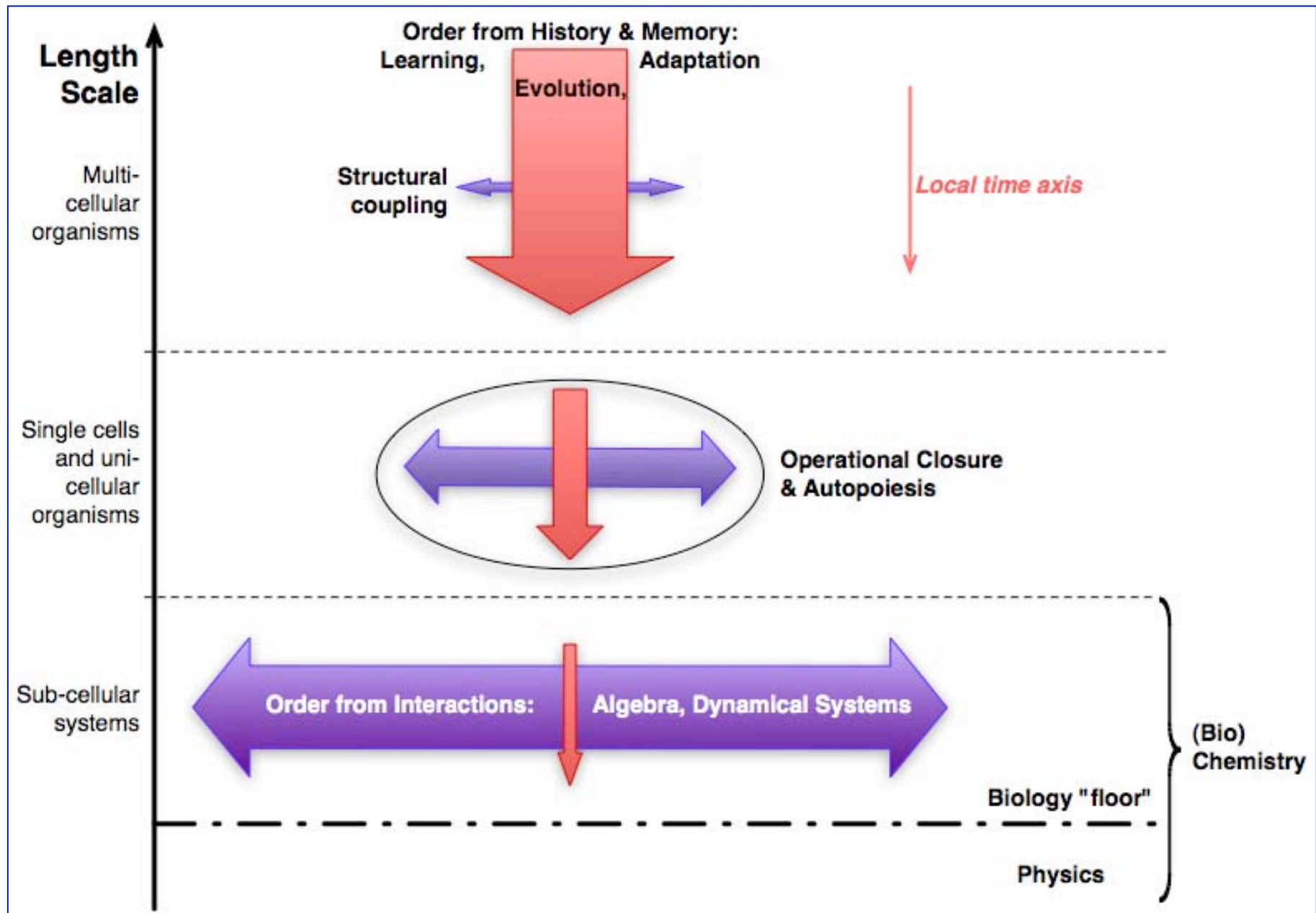
Overview

- **Contextualisation of bio-computing research in OPAALS**
- **Global framework for all types of bio-computing**
- **Taxonomy for cellular and sub-cellular bio-computing**
- **Mathematical framework for interaction computing (8 years on...)**
- **Examples of algebraic automata structure**

The Three OPAALS Disciplinary Domains

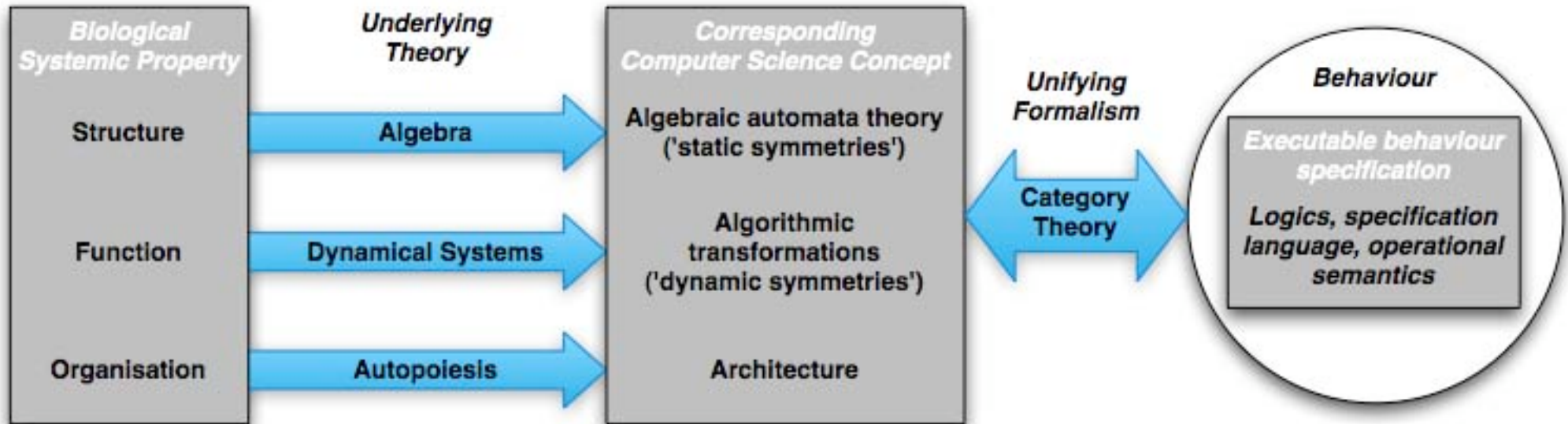


Global Framework for All Types of Bio-Computing



The Three Fundamental Concepts of Biology

(for the lower two layers in the previous slide)



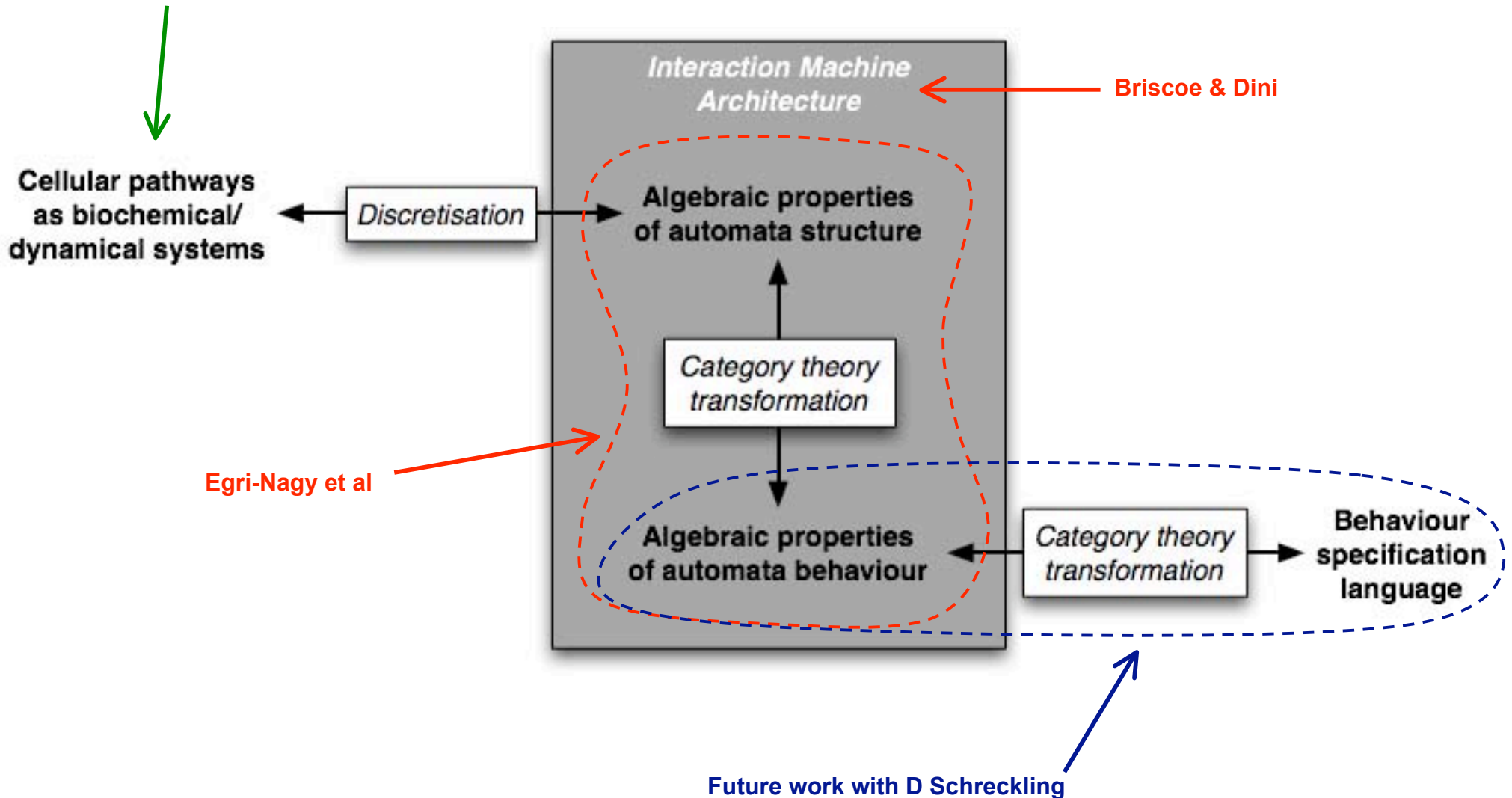
	Biology	Mathematics	Computer Science
Structure	<i>Shape of nerve cell</i>	<i>Group structure of cellular pathways</i>	<i>Sequential/concurrent/parallel computation Also: Network topology</i>
Function	<i>Nerve signal conduction</i>	<i>Metabolic pathway (e.g. as system of ODEs)</i>	<i>Algorithm, behaviour specification</i>
Organisation	<i>Operational closure</i>	<i>Group closure property</i>	<i>Autopoietic architecture</i>

Next slide

Interaction Computing Framework (after 8 years of work...)

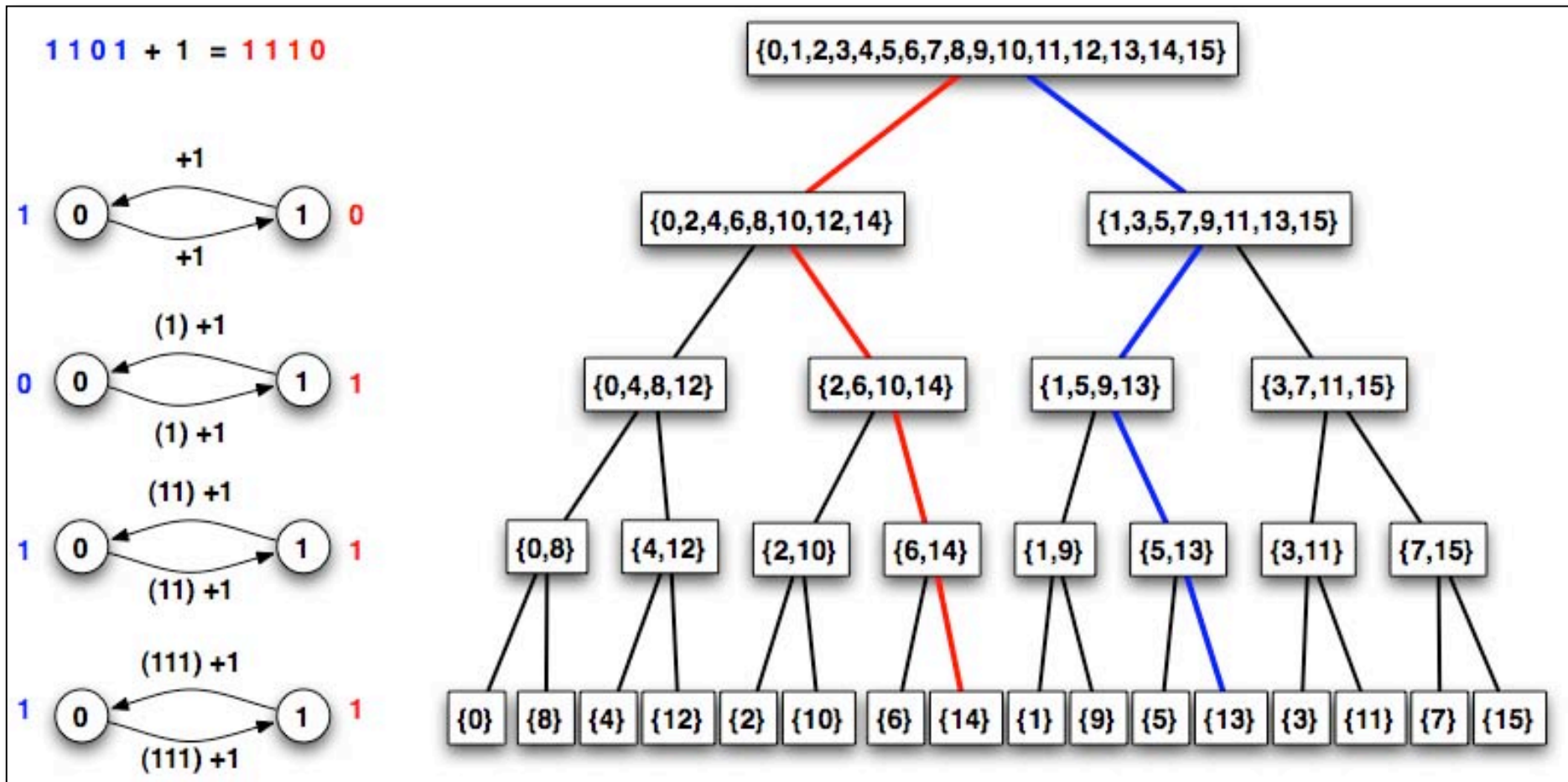
And other papers at this conference that address it

- Van Leeuwen et al
- Horvath & Dini



Example of Algebraic Automata Structure

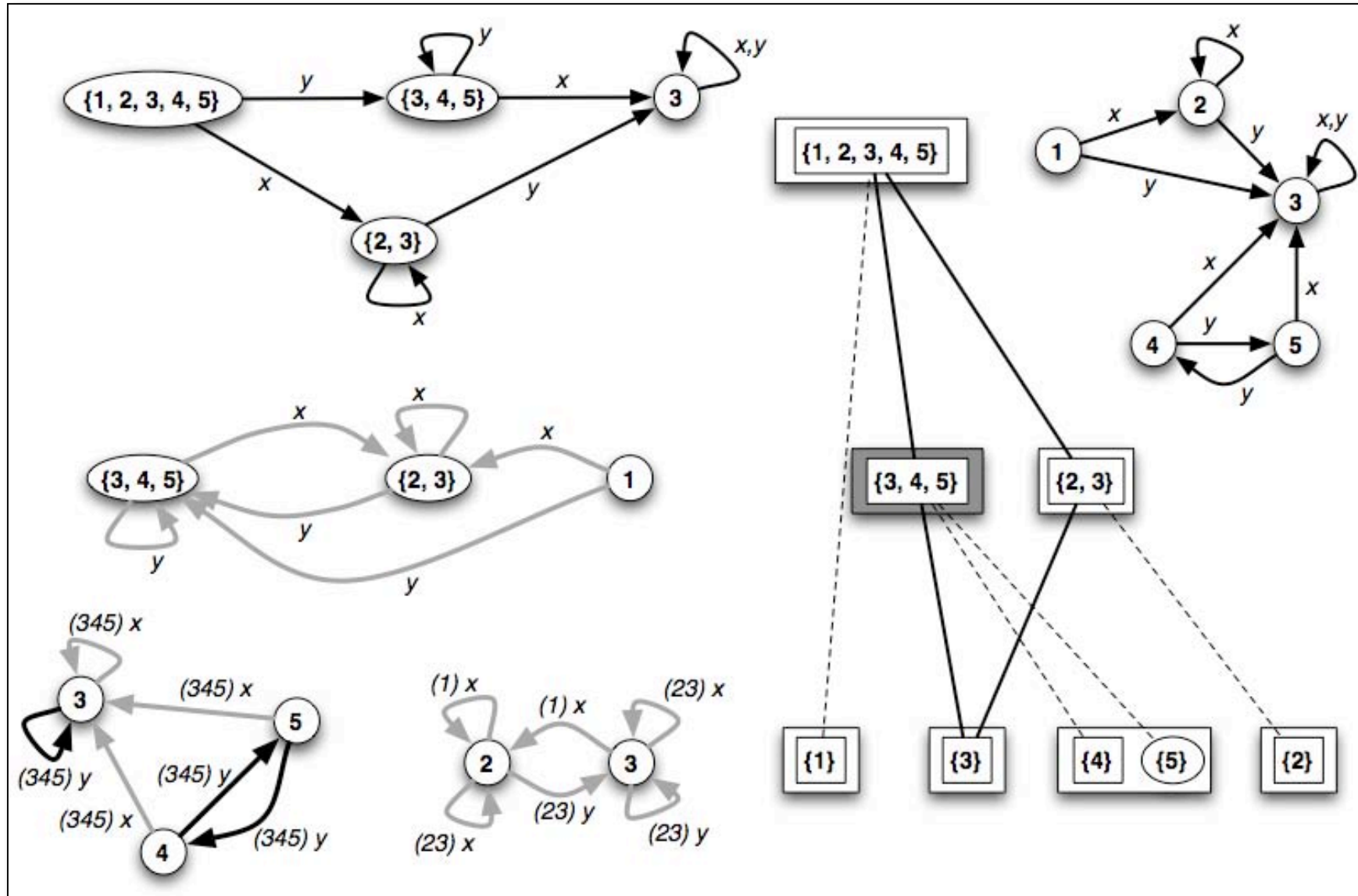
Addition as a state transition



(Based on Egri-Nagy & Nehaniv's work)

Example of Algebraic Automata Structure

Automaton as abstract number system (Rhodes, 1960something)



(Based on Egri-Nagy & Nehaniv's work)