

# Finite system composition and interaction

Johannes Reich

Gerbersruhstraße 147  
69168 Wiesloch  
Johannes.Reich@sophoscape.de

**Abstract:** In this article, it is proven for finite systems that if by reciprocal interaction, one finite system determines the action of another finite system, then both systems become subsystems of a larger supersystem.

To achieve this result, the notion of a finite system is formalized and the rules for sequential and parallel system composition are provided. The reciprocal interaction is captured by the protocol concept.

Being part of a larger supersystem is shown not to be a property which can be attributed to the system itself but depends on the context of its interaction, namely whether its interactions determine its behavior or not.

The result seems to be especially relevant in Information Systems and eCommerce, as it raises concerns about what end-to-end for example in a security context in a system theoretic sense really means. It also demonstrates the tight connection between our system and our function notion and thereby contributes to a better understanding, why approaches that rest mainly on the function notion struggle so much with networklike interacting systems and the necessary "loose coupling" in the sense of a sensible interaction with only little information about the internal state of the other actors.