# CommUnity, Tiles and Connectors*

Roberto Bruni

Dipartimento di Informatica, Università di Pisa, Italia.
bruni@di.unipi.it

## Abstract

The *Categorical Approach* (CA) and the *Algebraic Approach* (AA) are two well known frameworks for the study of complex systems: The first is based on colimit constructions, the second on algebraic operators for composition. In CA, category objects model components and morphisms tell how systems are simulated, refined, etc. Complex systems are modeled as diagrams and composition is achieved via universal constructions (e.g., colimit), which encapsulate components and their interactions in a single object. In AA, constants and operations of a signature model basic processes and their admissible compositions. System behaviors are defined by LTSs in the SOS style. Abstract semantics (e.g. bisimilarity) collapse systems that exhibit the same observable behavior.

Reconciling CA and AA is useful for the mutual transfer of concepts and techniques. As a first step, we investigate the relation between two representatives: *CommUnity* [1] (for CA) and the *Tile Model* [2] (for AA). CommUnity is an architectural description language that provides a conceptual distinction between *computation* and *coordination* concerns in communicating distributed systems. The Tile Model [2] is an operational model for concurrent systems that deals uniformly with closed and open systems and where two dimensions coexist: *distribution* in space and *computation* in time. A translation from CommUnity diagrams into the Tile Model is given in [3], which exploits a novel decomposition of CommUnity diagrams in terms of elementary programs. Tile connectors for synchronization, hiding and mutual exclusion are used to coordinate elementary components. The main result of [3] is that the translation of a diagram is *tile bisimilar* to the translation of its colimit.

In the talk, we establish a stronger link between the colimit construction and the abstract semantics by showing that the encoding of a CommUnity diagram is *equal* to the encoding of its colimit up-to a suitable axiomatization of the connectors.

## References

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