# Tile Logic: Rewriting with side-effects* (Abstract)

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## Summary

*Tile logic* [13] offers a general paradigm for modular descriptions of concurrent systems, which is based on a set of rewriting rules with side-effects. In particular, such framework generalizes several *structural operational semantics* (SOS) approaches proposed in the literature such as De Simone [19] and GSOS [1] rule formats, Larsen and Xinxin's *context systems* [14], and Corradini and Montanari's *structured transition systems* [10]. It also extends Meseguer's *rewriting logic* [15] (in the unconditional case) by adding a rewriting synchronization mechanism.

In this presentation we illustrate the main features of tile logic, showing that most CCS-like process algebras can be naturally represented using tile logic (see e.g. [13, 5, 11]) and that the tile paradigm can give appealing new insights in well-established formalisms such as *P/T Petri nets* [18]. In particular, the analogy between tiles and net transitions yields an original model, called *zero safe net* [6], naturally equipped with a notion of *transition synchronization*, which is very important for compositionality issues. This notion is missing in ordinary nets and is usually achieved only through complex constructions.

A second part of the talk will focus on a suitable translation of tile logic into rewriting logic (presented in [17, 3]). The relevance of this translation relies on the fact that rewriting logic is the semantic basis of several language implementation efforts (e.g., CafeOBJ [12], ELAN [2], Maude [7]), and therefore a conservative mapping of tile logic back into rewriting logic is useful to obtain executable specifications of tile systems. The new model theory required to relate the two logics is presented using *partial membership equational logic* [16] techniques that are particularly suitable to deal with categorical structures.

The comparison yields a correct rewriting implementation of tile logic that uses a meta-layer to make sure that only tile proofs are performed. Exploiting the reflective capabilities of the Maude language [8], such meta-layer has been specified in [4], in terms of internal strategies [9].

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