

Self-adaptive systems are advocated as a convenient solution to the problem of mastering the complexity of modern software systems, networks and architectures. In particular, self-adaptation is considered a fundamental feature of autonomic systems, one that can specialise to several other self-\* properties like self-configuration and self-optimisation. Despite some valuable efforts, there is neither a general agreement on the conceptual notion of adaptation, nor a widely accepted foundational model.

Adaptable transition systems (ATSs) have been proposed as a concrete instance of a methodological approach to white-box adaptation for software systems. More precisely, the CoDa (for Control Data) approach provides the designer with a criterion to specify where adaptation is located and, as a consequence, which parts of a system have to be adapted, by whom and how. It assumes the possibility to inspect, to some extent, the internal structure of a system, and requires to identify a set of *control data*, which can be changed to adapt the component's behaviour. Adaptation is, hence, the run-time modification of such control data.

ATSs extends interface automata by equipping them with a set of control propositions evaluated on states, which represent the formal counterpart of control data. As for control data, the choice of control propositions is arbitrary but it imposes a clear separation between the ordinary, functional behaviours and the adaptive ones. Control propositions can then be exploited in the specification and analysis of adaptive systems, formally recovering various notions proposed in the literature, such as adaptability, feedback control loops, and control synthesis.

The talk presents ATSs and introduces the use of Awareness Data, ideally intended as those "sensor" data that are exploited at the control level in order to possibly enforce an adaptation. Awareness and control data complement each other in answering the question regarding *where* adaptation takes places, selecting which artifacts indicate that it may be necessary to perform an adaptation, and precisely stating when that may occur.