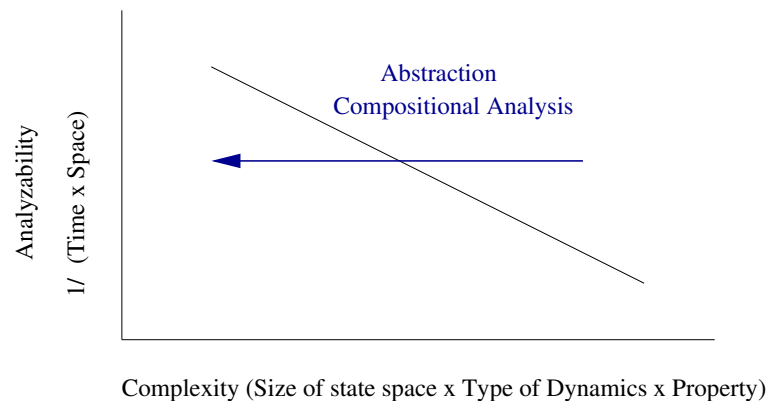


# Relational Abstraction: A new abstraction concept

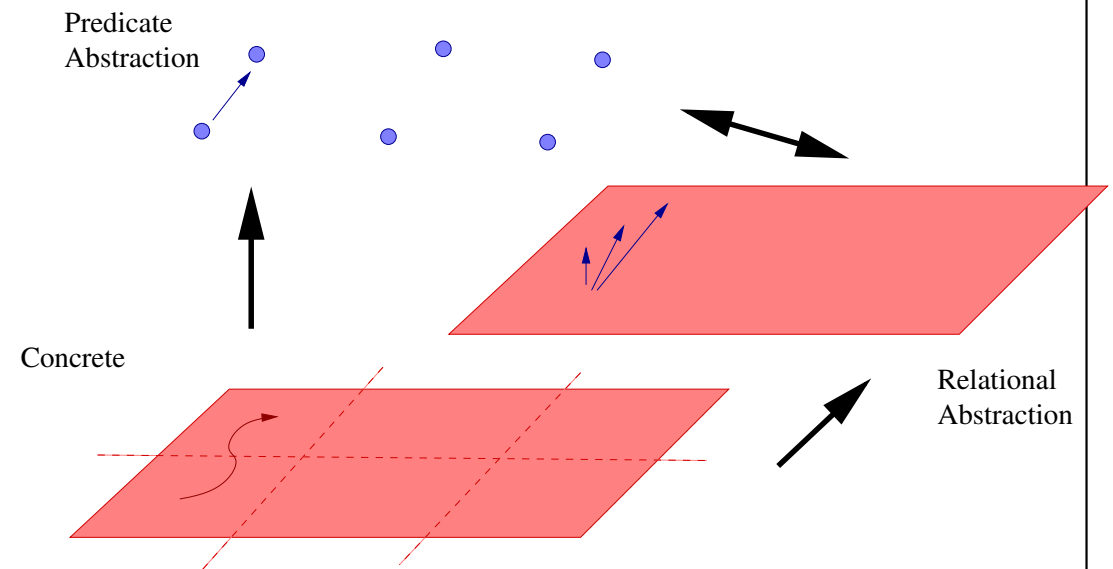
**Benefit:** Enables analyzability of complex systems



**Feature:** Compositional analysis: Abstracts open components with hybrid dynamics

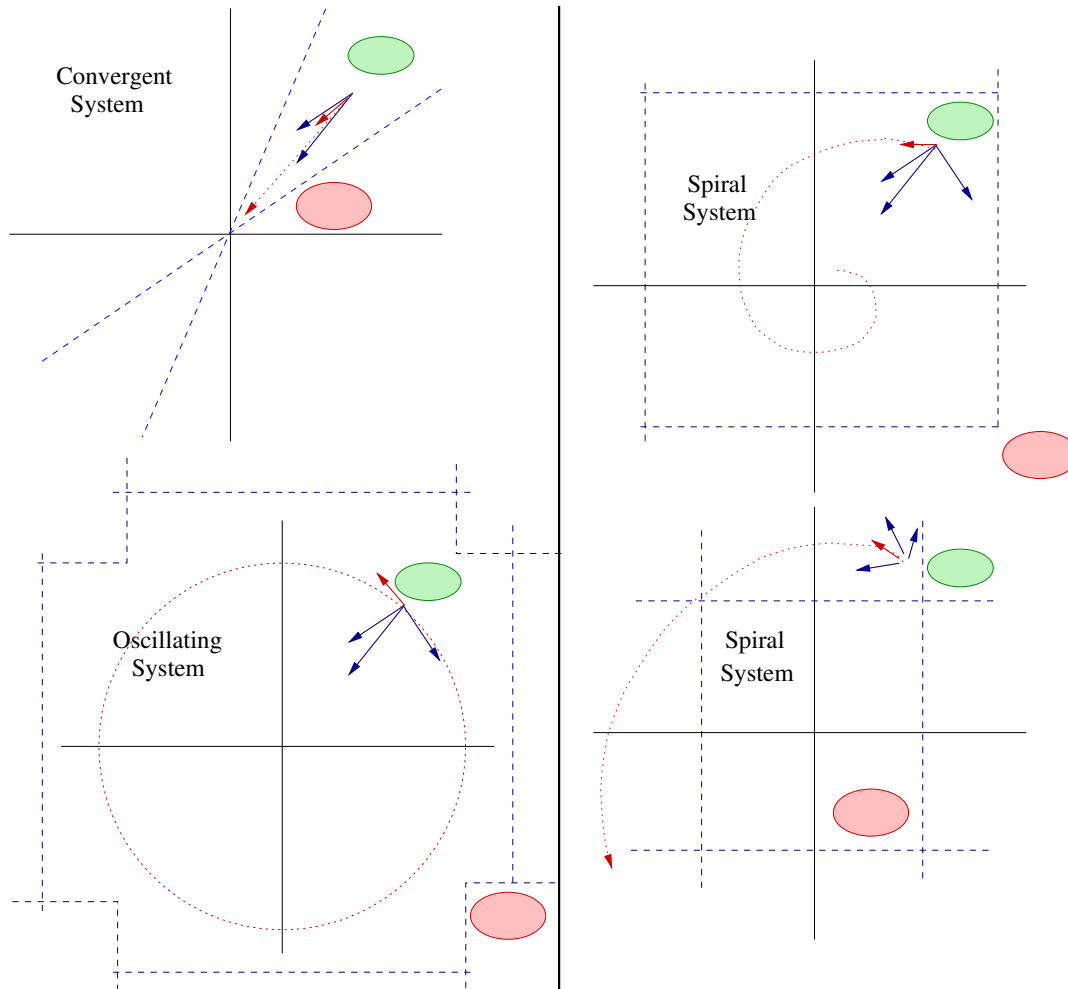
**Feature:** Compatible with other abstraction and model checking techniques

**Novelty:** Abstracts the transition relation, not the state space



**Scope:** Applies to all dynamical systems. Effective relational abstractions can be computed for several classes.

## Relational Abstraction: Examples



Class	$\frac{d\vec{x}}{dt}$	RelAbs
Timed System	$\dot{x} = 1,$ $\dot{y} = 1$	$x' - x =$ $y' - y$
Multirate System	$\dot{x} = 2,$ $\dot{y} = 3$	$\frac{x' - x}{2} =$ $\frac{y' - y}{3}$
Linear Hybrid System	$\dot{\vec{x}} =$ $A\vec{x}$	$(0 \leq$ $p' \leq p$
...	...	...

On Hybrid System benchmarks, verification time reduces from **10 hours** to a **few minutes** (100x improvement).