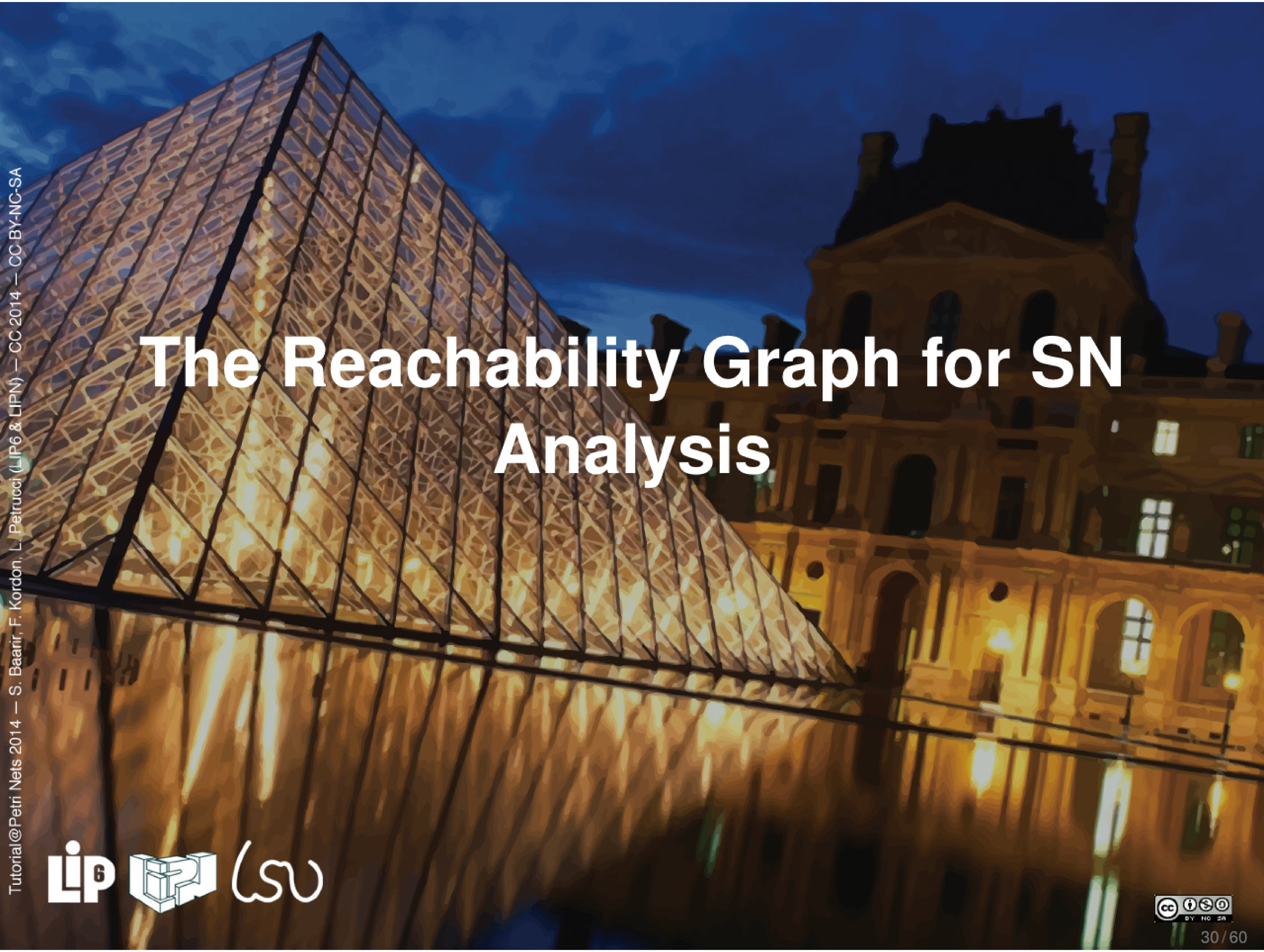
# The Reachability Graph for SN Analysis



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**Let's see the Reachability Graph for analysis**

# Analysis of SNs



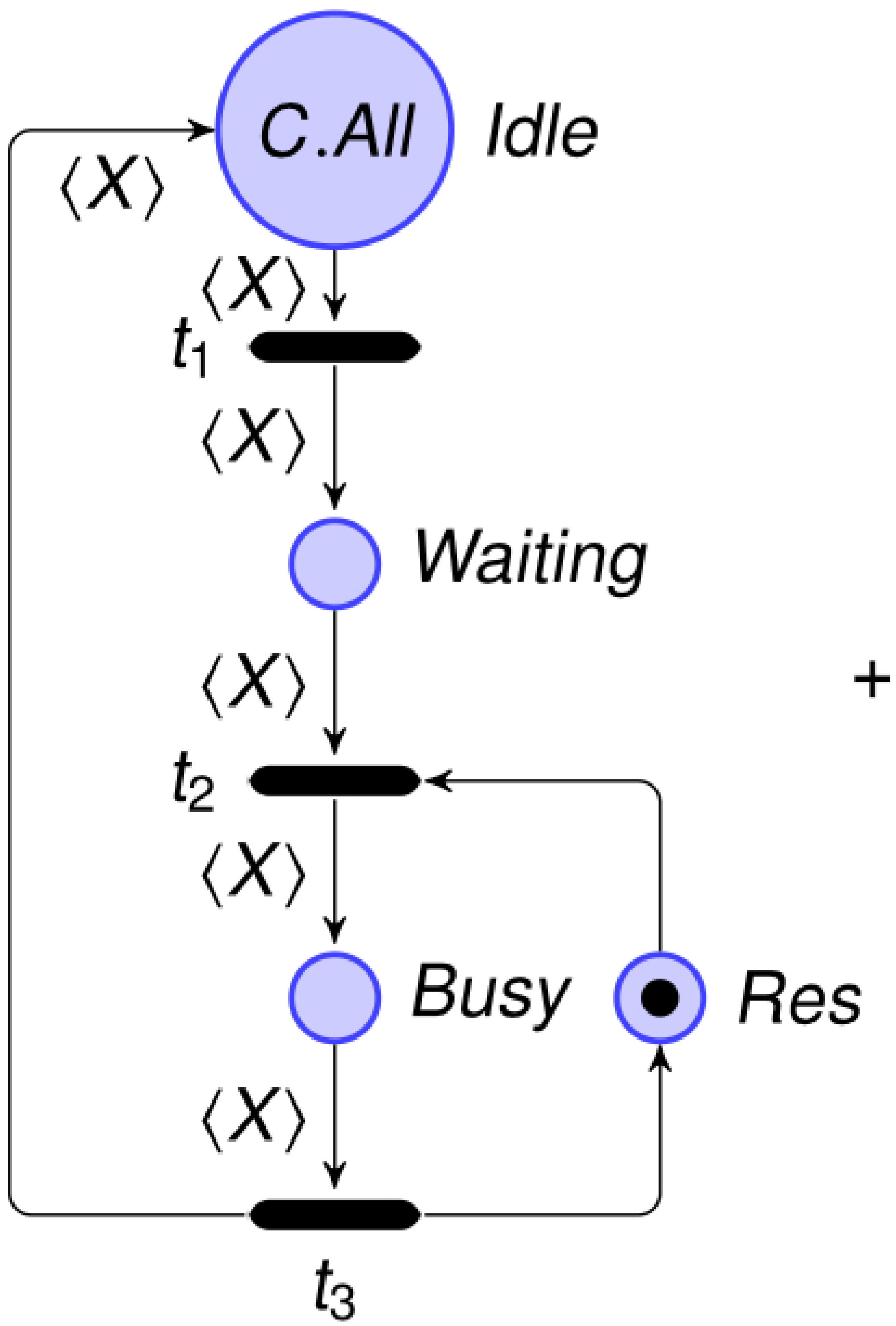
- Does a model conform to the specification ?
- Possibility of answers thanks to:
  - Linear invariants.
  - The reduction theory.
  - The construction of the reachability graph (when the system is finite!)
- Try to take benefits from the structure of the model induced by the colour functions.

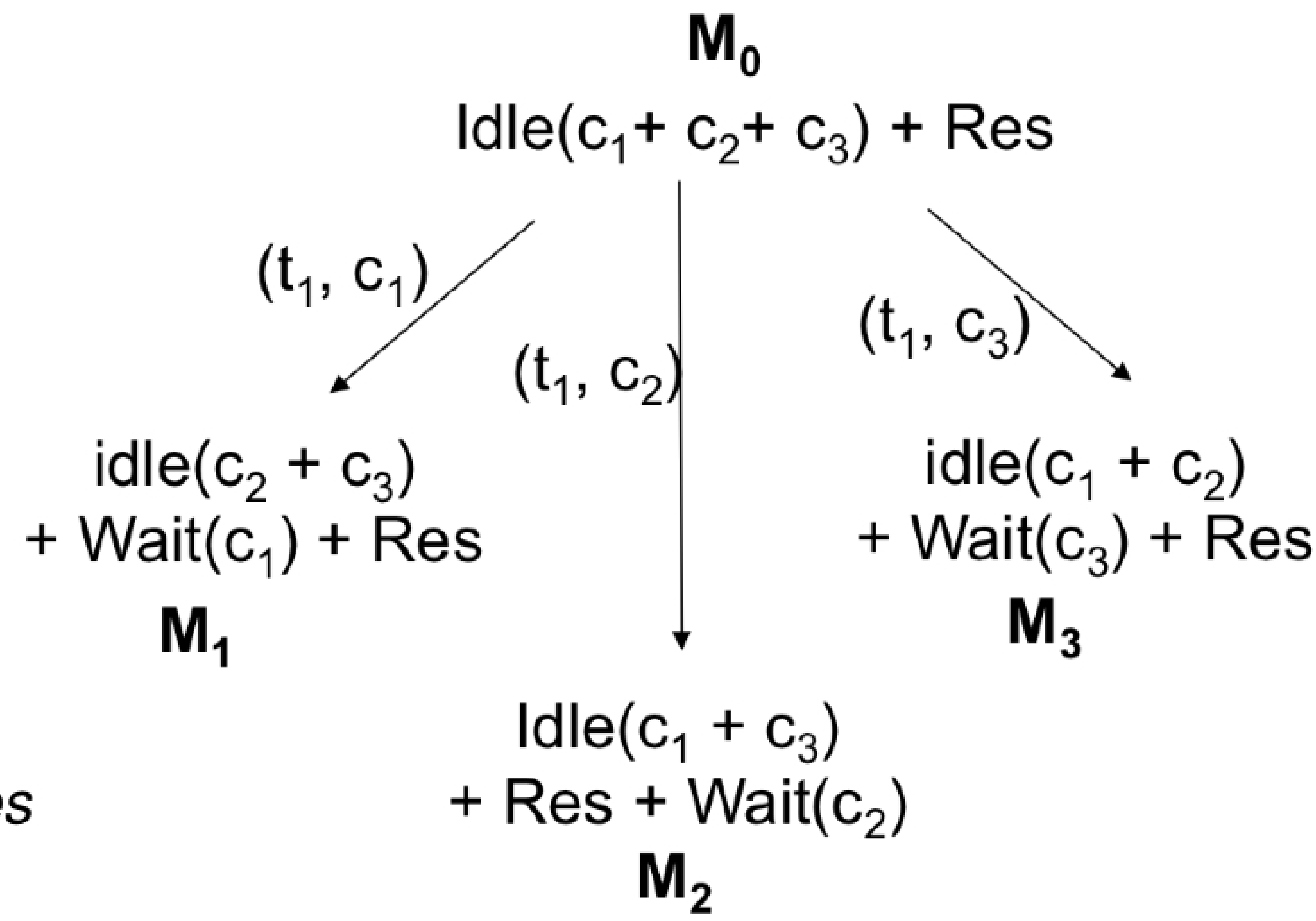
# Reachability Graph (RG) Construction Algorithm

**RG_Construction**$(N = \langle P, T, C, W^-, W^+, M_0\rangle)$
  $RG.Q = \{M_0\}$; $RG.\delta = \emptyset$;
  $RG.q_0 = M_0$; $States = \{M_o\}$:
  **While** (States <> $\emptyset$) {
    s = pick a state in States ;
    States = States \ $\{s\}$;
    **for each** $t \in T, c \in C(t)$ {
      **if** $(s[(t,c)\rangle)$ {
        $s[(t,c)\rangle ns$;
        **if** $(ns \notin RG.Q)$ {
          $RG.Q = RG.Q \cup \{ns\}$ ;
          $States = States \cup \{ns\}$;
        }
        $RG.\delta = RG.\delta \cup \{(s, ns)\}$;
        $RG.\lambda(s, ns) = (t, c)$;
      }
    }
  }
  **return** $RG$;

# Example of RG construction

$C = \{c_1, c_2, c_3\}$



# More advanced verification of finite systems

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   → **Temporal properties:** two particular semantics are generally admitted:
   - the linear time semantics (an execution of the system is an infinite path in the Kripke structure);
   - the branching time semantics (the execution of the system is represented by the underlying infinite tree).

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**Let's see two logics to express properties (next two sequences)**