Models of Method

Miloš Kosterec

Contents

- Results

- What is the problem?

- Procedural model

- Dynamic model

- Petri-ish Mailbox model

Results

- Each proposed model *can* be used.

- Each proposed model has its limits.

- Therefore we should say what is the purpose of our modelling.

Intro

- I am an Amesh-man.

- What is Amesh?

analytické metódy
v spoločensko-humanitných
disciplínach

- www.amesh.sk

- Amesh has a hypothesis.

- The social sciences/humanities resemble the natural sciences in that they use the core of analytical methods in similar ways in building and/or testing their theories.

What is the problem?

- We need to test the hypothesis.
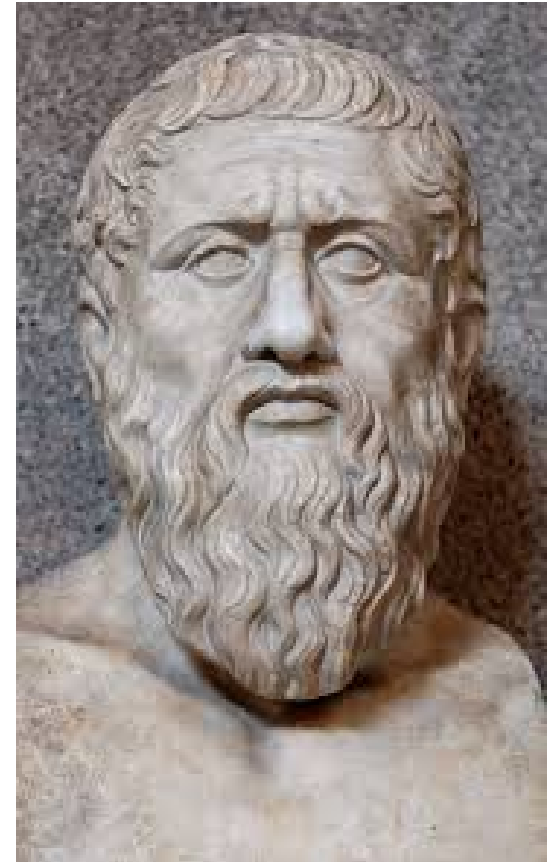- We need tools for testing.

So, what is a method?

- Method is:

  a) General guide how to accomplish the goal

  b) System of activities which leads to the goal

- How can we model it?

Act I – Everything is procedure

- Method is a guide.
- Guide is general.
- Guide is abstract.
- Guide consists of concepts.
- Guide is a concept.

Concept vs. Procedure

- Skip the history.

- There is a difference between recipe and the cake.

- Transparent Intensional Logic

- Procedure – construction

Example

$\lambda(ir\ or)$ [$\lambda list \ \exists xy$ [[ir x] & [or y] &

[$42 \leq x + y + 2b + Rp \leq 44$] &

[list = [^0Map (x,y,b)]]]]

- Číhalová, Duží, Menšík – Logical specification of processes

Problems

- Small differences

- Guide does not have a truth value.

- We want a model of activities, too.

- Algorithms

Act II - Dynamics

- What is an instruction?
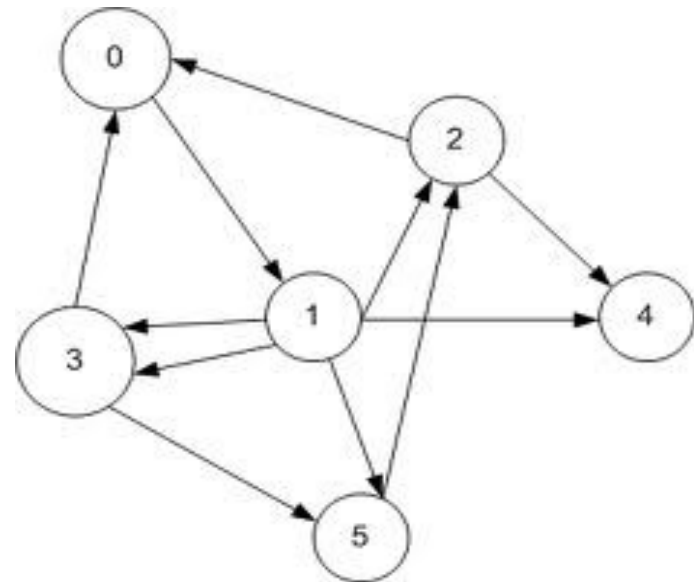- States
- Problem
- Question
- Answer

Transitions

- What is a transition?

- Are there different kinds of transitions?

- How can we model a transition?

- What is an acitivity?

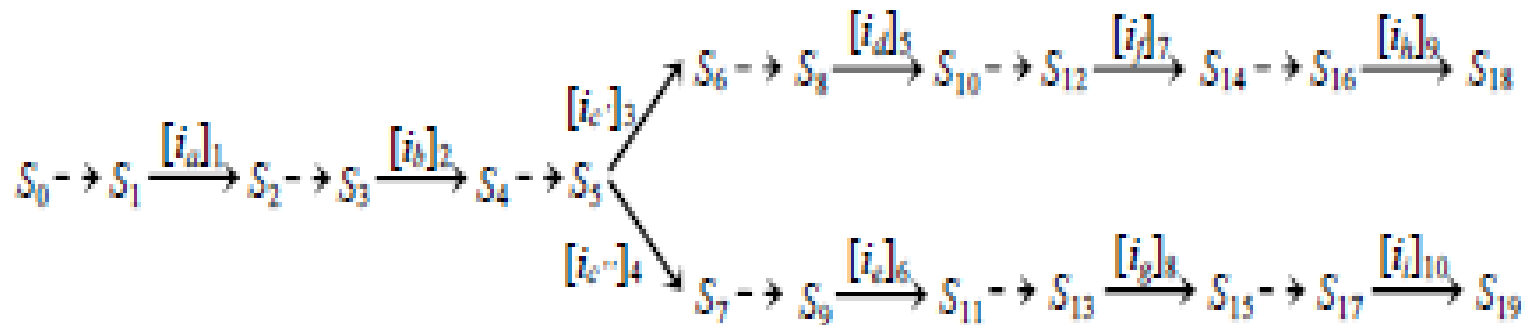# Graphs, graphs, gr...

- Transition is an arc.

- Instruction is a set of transitions.

- Transitions connet states.

- Theory of graphs is a natural choice.

Example

- Pick a natural number!

- Add to it the sqare of its successor!

- If the result is even, then divide it by 2!

  else add 1!

- Add the number of your siblings!

- Subtract the number of people in this room!

- Sing your national anthem as many times!

$$S_0 \dashrightarrow S_1 \xrightarrow{[i_a]_1} S_2 \dashrightarrow S_3 \xrightarrow{[i_b]_2} S_4 \dashrightarrow S_5$$

$$\nearrow^{[i_{e'}]_3} S_6 \dashrightarrow S_8 \xrightarrow{[i_d]_5} S_{10} \dashrightarrow S_{12} \xrightarrow{[i_f]_7} S_{14} \dashrightarrow S_{16} \xrightarrow{[i_h]_9} S_{18}$$

$$\searrow^{[i_{e''}]_4} S_7 \dashrightarrow S_9 \xrightarrow{[i_c]_6} S_{11} \dashrightarrow S_{13} \xrightarrow{[i_g]_8} S_{15} \dashrightarrow S_{17} \xrightarrow{[i_i]_{10}} S_{19}$$

Problems

- Extensionality

- Extensionality

- Extensionality

- Small differences

Act III

- I like graphs.
- I don´t like limits.
- Story of a mailbox.
- State is more like a mailbox.

Executions

- Instructions are executable.

- So there are conditions for their executions.

- Lets put this feature in a model.

Mail-box model

- States can have values.

- States are not identified by the values.

- Method has phases.

- Phases are depicted by the values in states.

- Every executable transition is made.

Example

- Sum numbers *a* and *b*!
- Subtract number *d*!

P_1 I_1 P_2 I_2

S_1:
Pr: { Ø};
On: {Ø };
Op: {Ø };

S_2 S_3 S_4 S_5
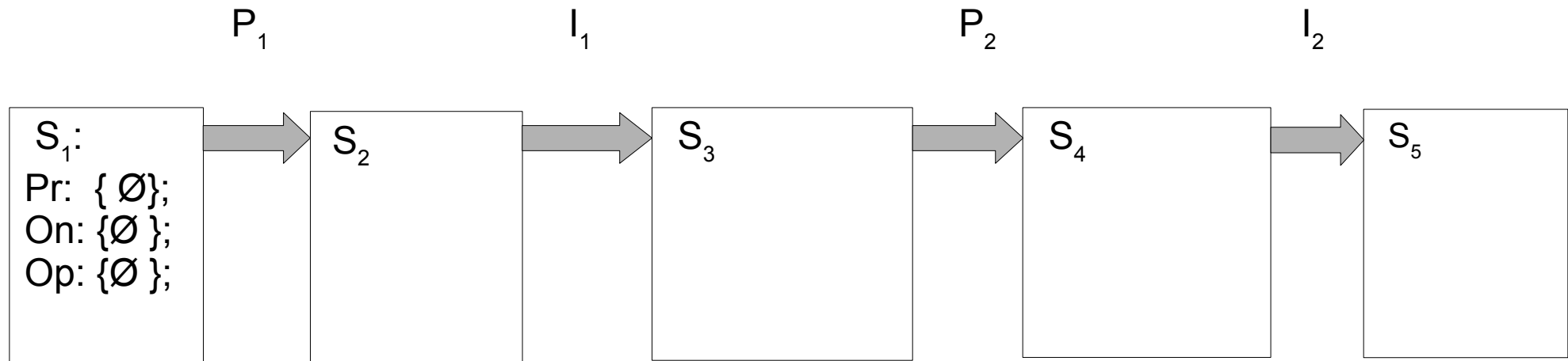
Problems

- Extensionality
- Compositionality
- Small differences

And the winner is?

- It really depends on the goal.

- Different models are not rivals.

- They should be teammates.

- Together, they can be a strong team.

Methods -----

- Thanks for your attention.

Questions?