LIFTS: Learning Featured Transition Systems
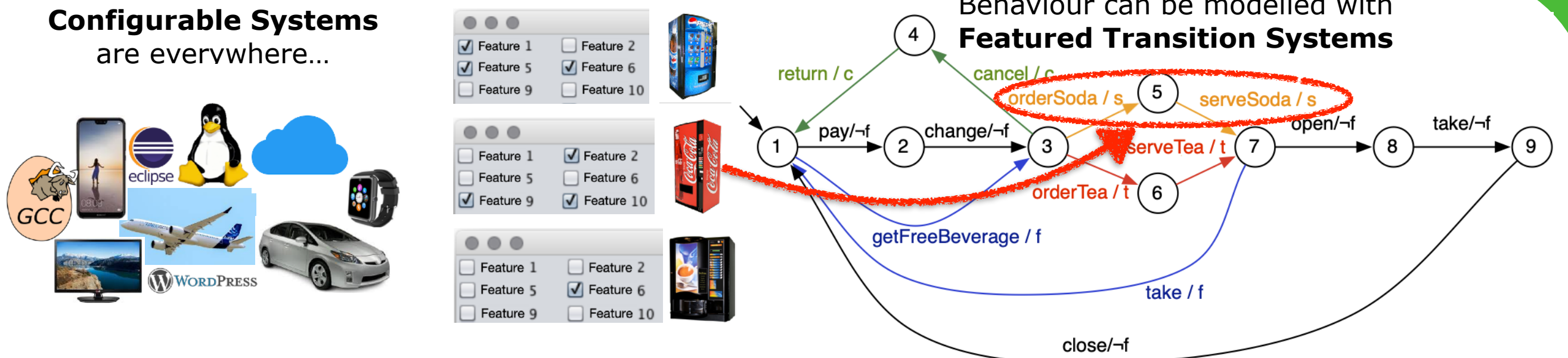
Sophie Fortz, Gilles Perrouin, Patrick Heymans

Faculty of Computer Science, ✉ *sophie.fortz@unamur.be*

Problem Statement

Configurable Systems are everywhere...

Behaviour can be modelled with **Featured Transition Systems**

And using such **family-based models** models allows scale economies on various tasks (such as software testing and formal verification)

Research Question:

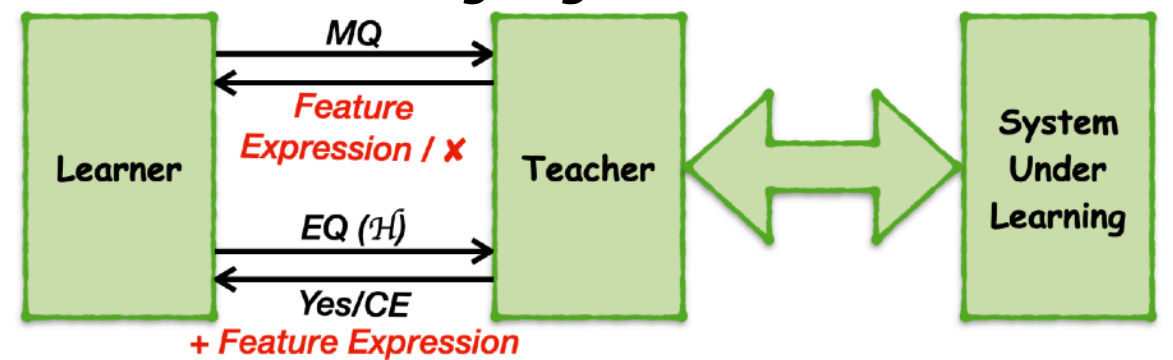## *How to automatically learn Featured Transition Systems?*

VaryMinions

Uses Machine Learning to map traces to configurations

Recurrent Neural Network

LSTM   GRU

[Hochreiter and Schmidhuber, 1997]
[Cho, van Merriënboer *et al.* 2014]

Log-Variant Mapping

- Up to 87% of accuracy with great stability
- Similar results for LSTM and GRU

FTSLearnLib

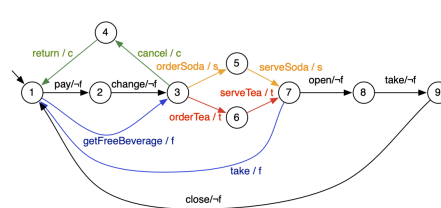*Adapts state-of-the-art learning algorithm to FTS*

- FE as first-class citizen
- Direct mapping on transitions
- Family-based

What's next?

- How to improve data representation?
- How to improve Classification?

- How to generate counterexamples?
- How to optimise the generated FTS?

Fortz, S., 2021. *LIFTS: learning featured transition systems.* Proceedings of the 25th ACM International Systems and Software Product Line Conference-Volume B, pp. 1–6.

Fortz, S., Temple, P., Devroey, X., Heymans, P., Perrouin, G., 2021. *VaryMinions: leveraging RNNs to identify variants in event logs.* Proceedings of the 5th International Workshop on Machine Learning Techniques for Software Quality Evolution, pp. 13–18.

fnrs — FREEDOM TO RESEARCH

PReCISE — Namur Digital Institute — NADI

UNIVERSITÉ DE NAMUR