Domain-Specific Metamodeling, and language families

Specifying families of packet filtering languages.

DGA

informatics mathematics

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- Introduction
- Scenario
- Challenge
- Overview of solutions
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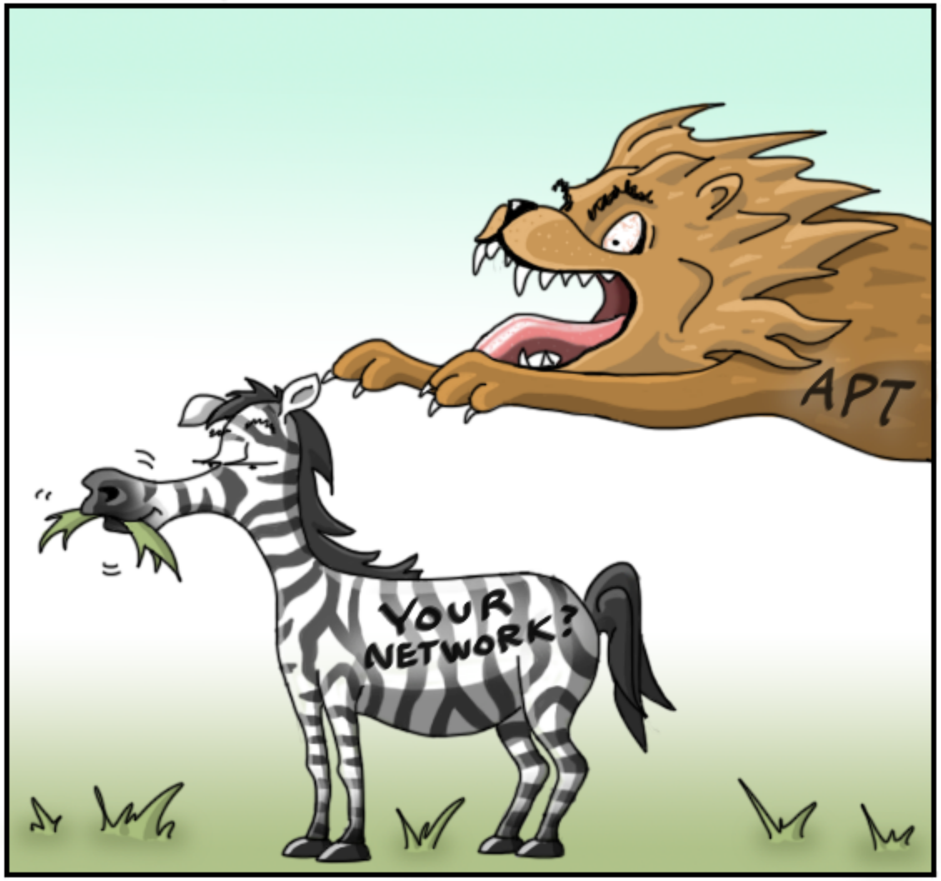
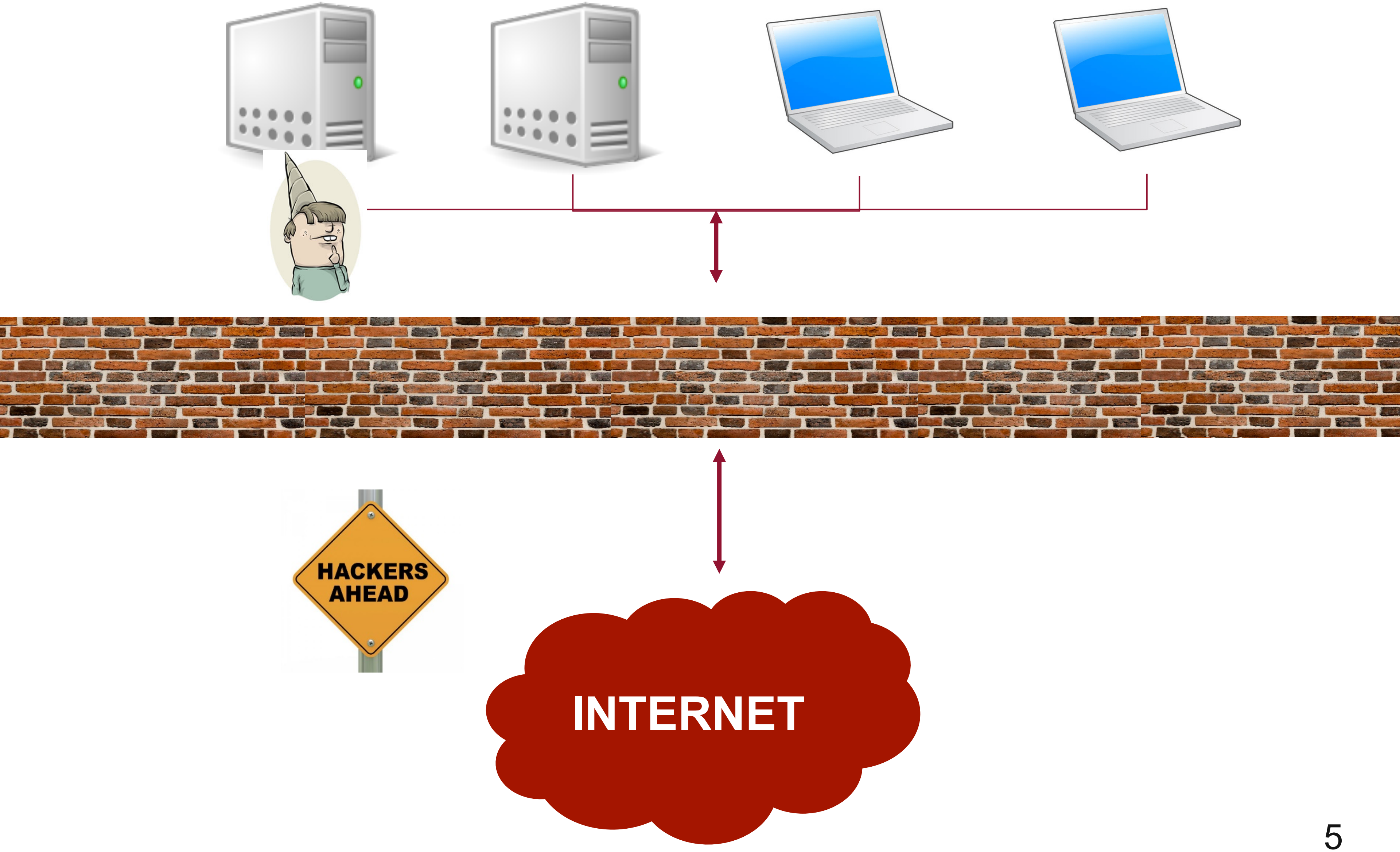
Cybersecurity

THREAT Toons™ by: Alex Savchuk

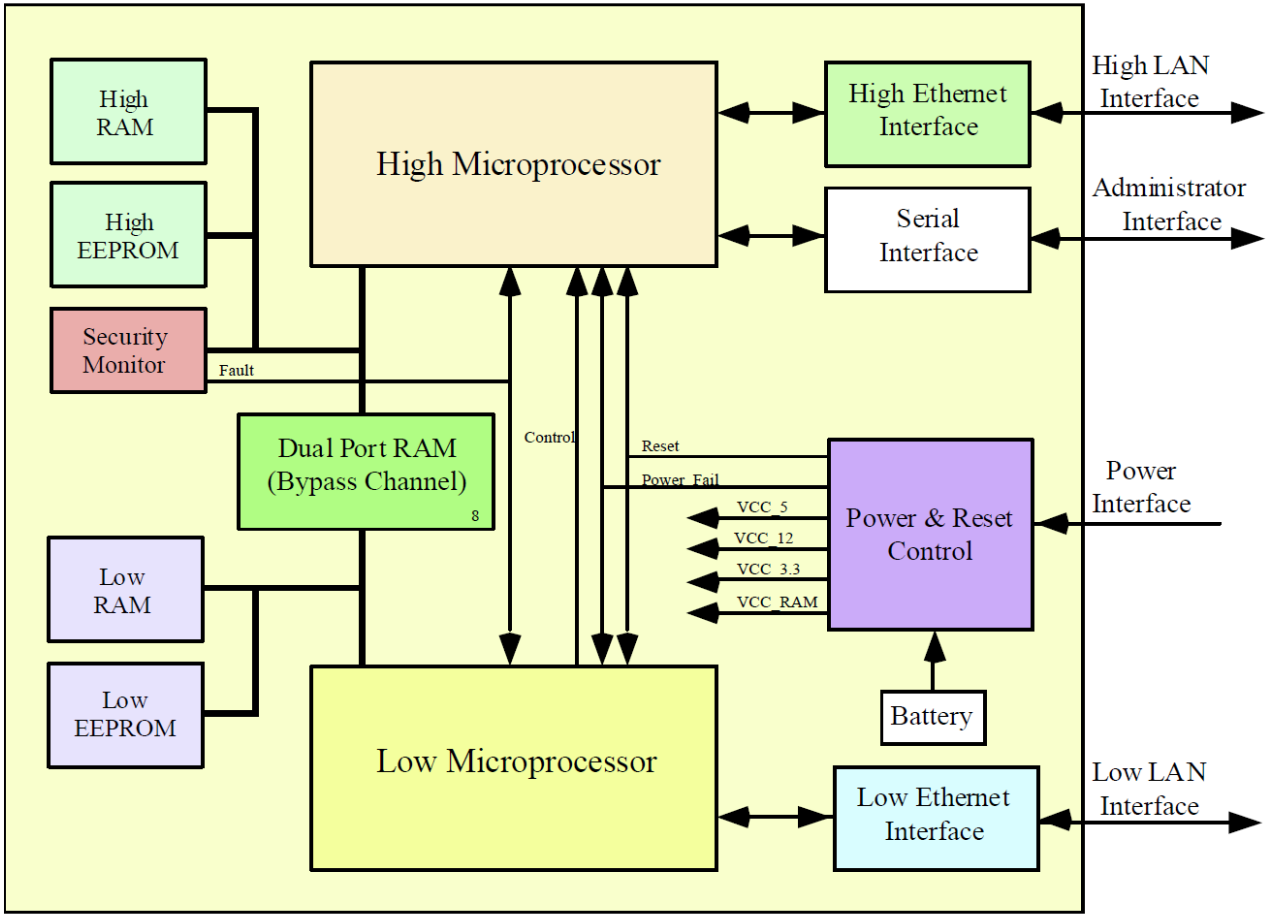


THE CYBERSECURITY SAVANNA

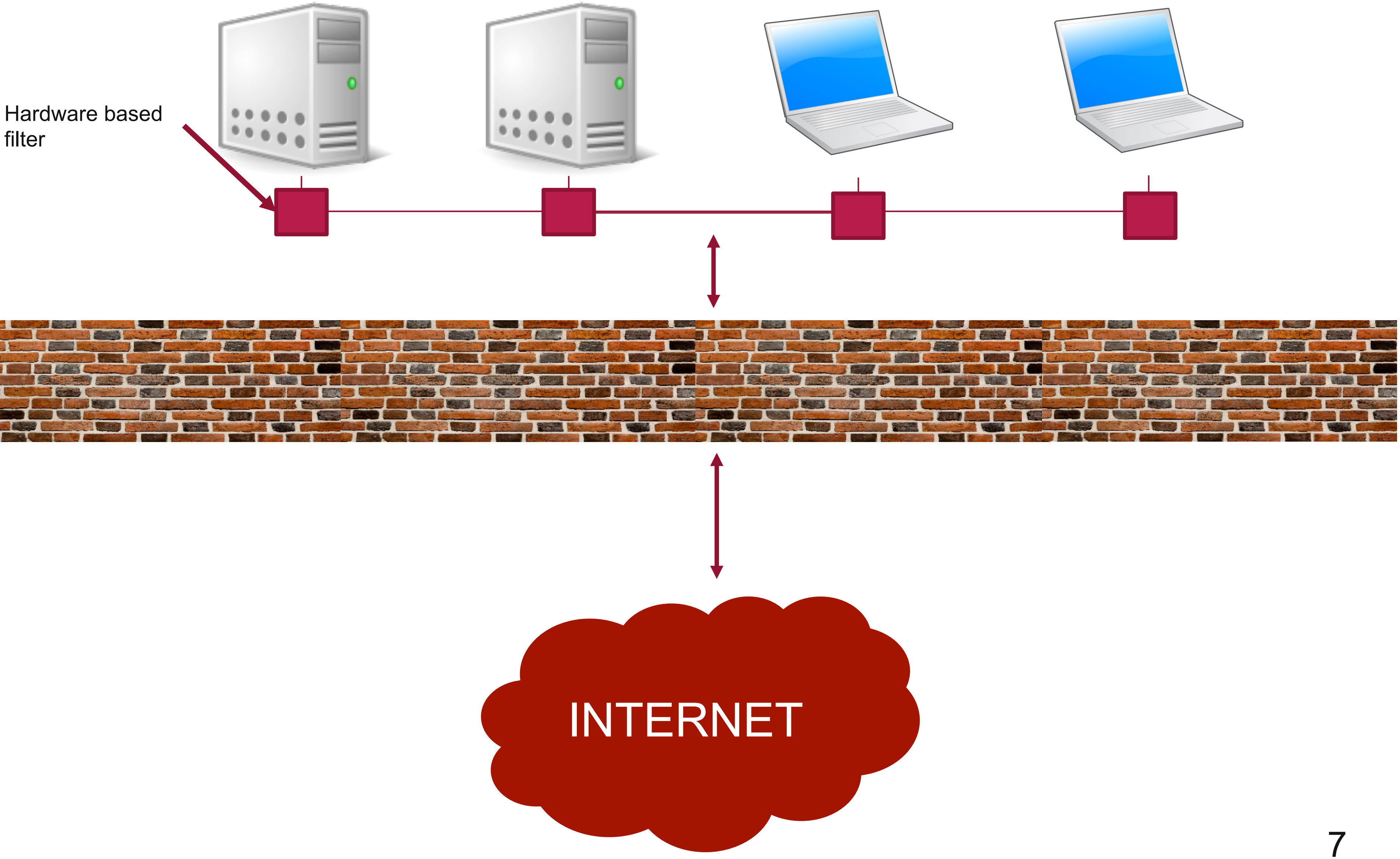
Hackers everywhere



Idea!! A real hardware filter



Idea: Packet filtering domain



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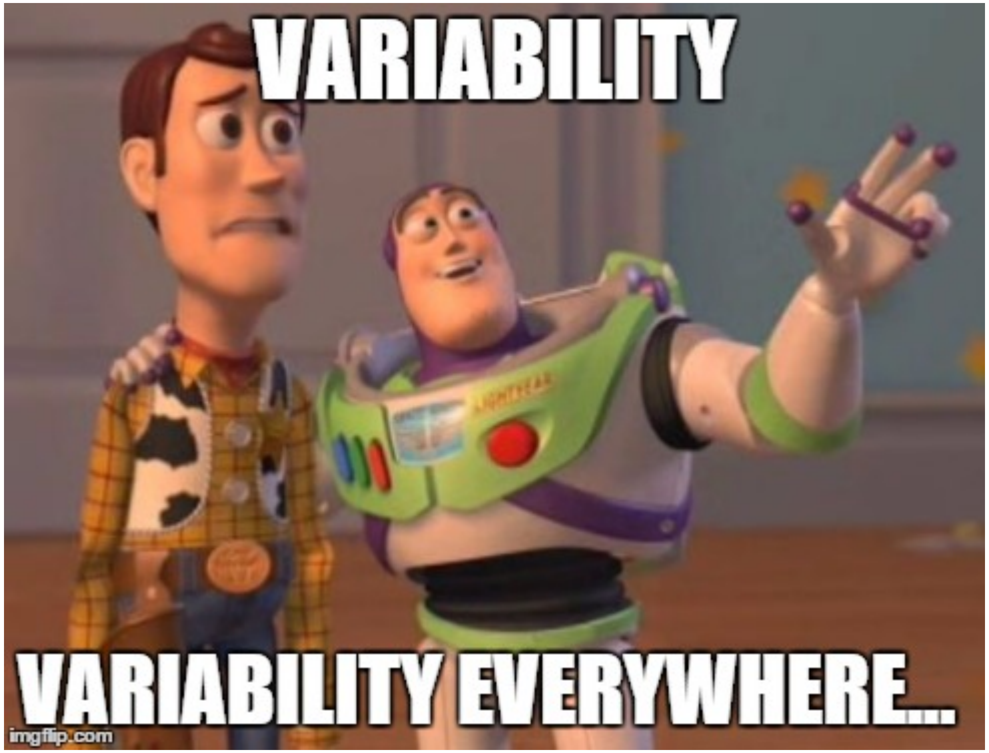
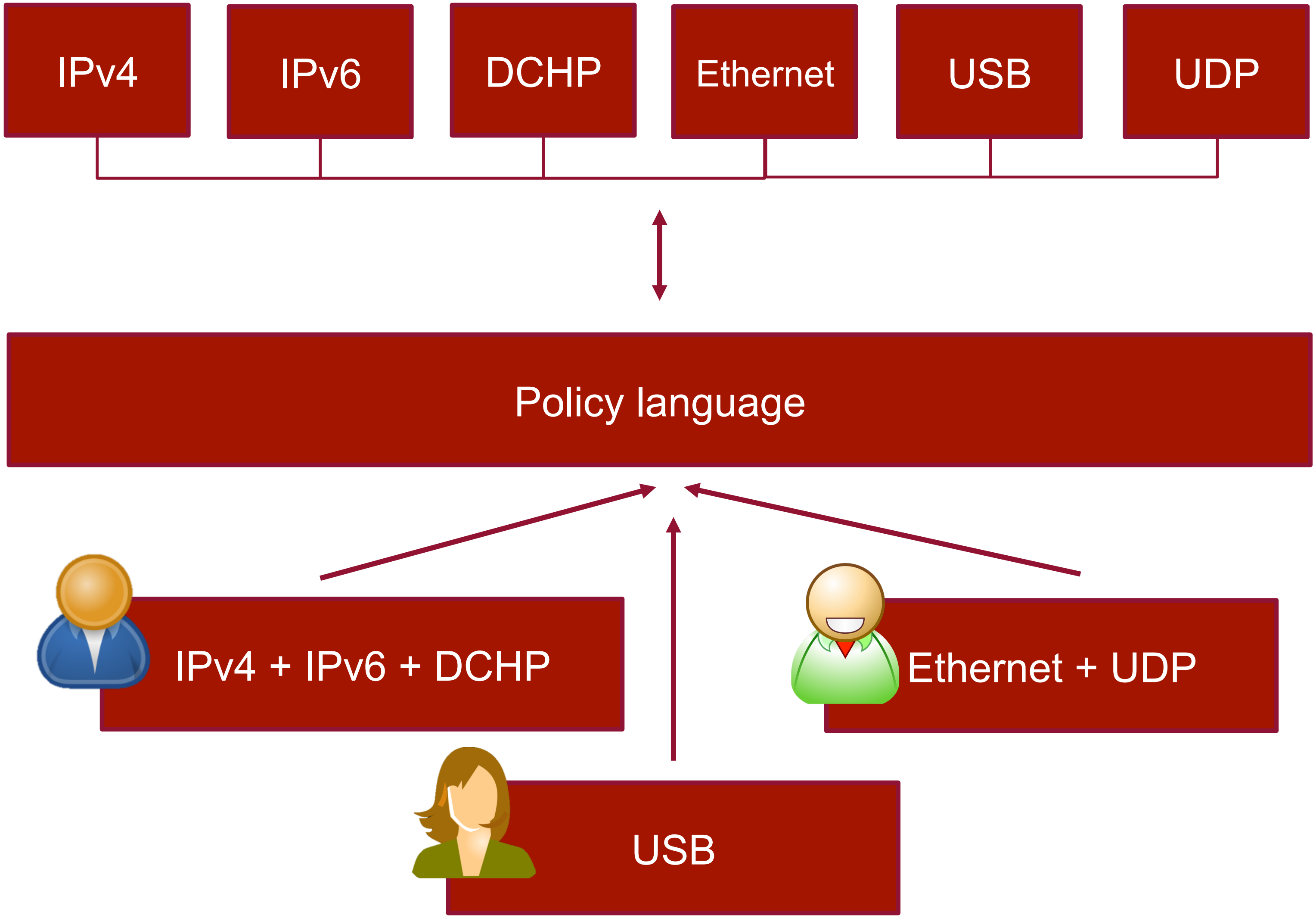
Variability everywhere obsessive compulsive syndrome



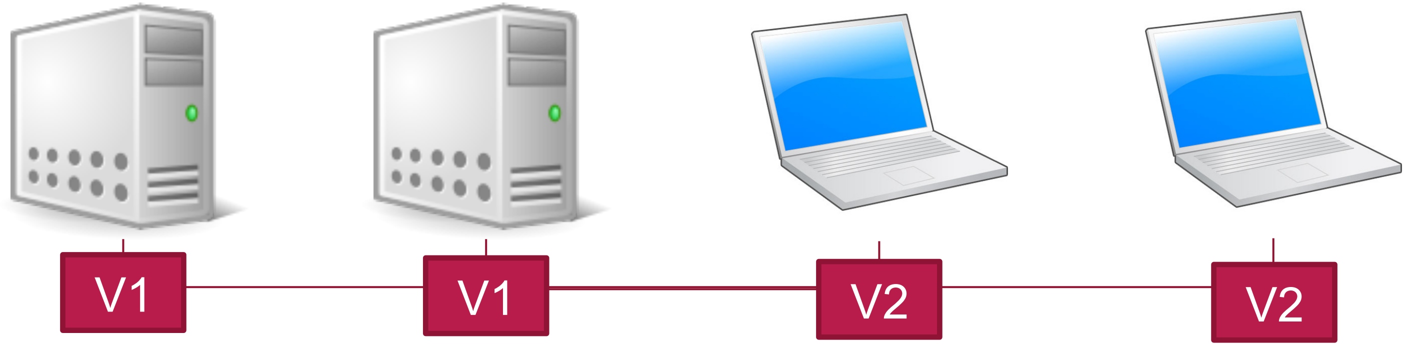
Challenge: How do we write our policies?

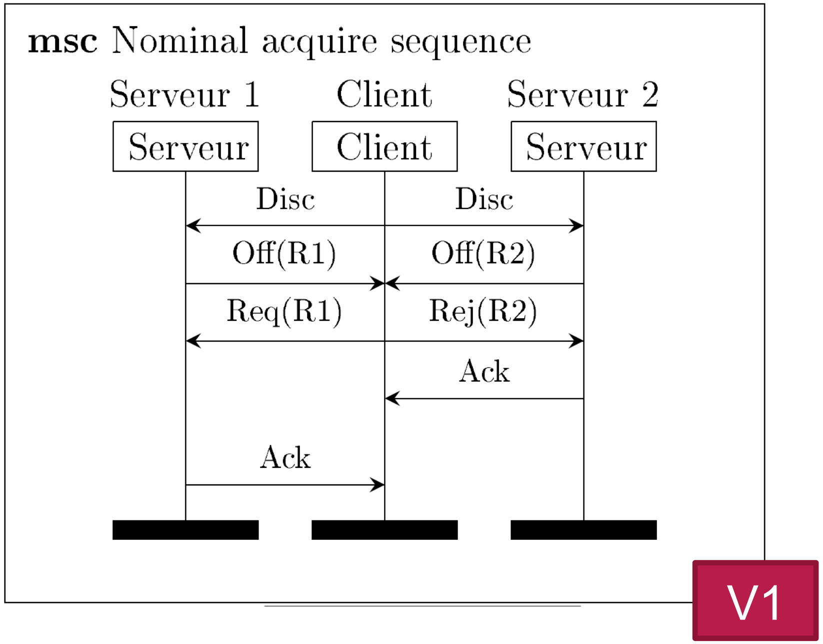


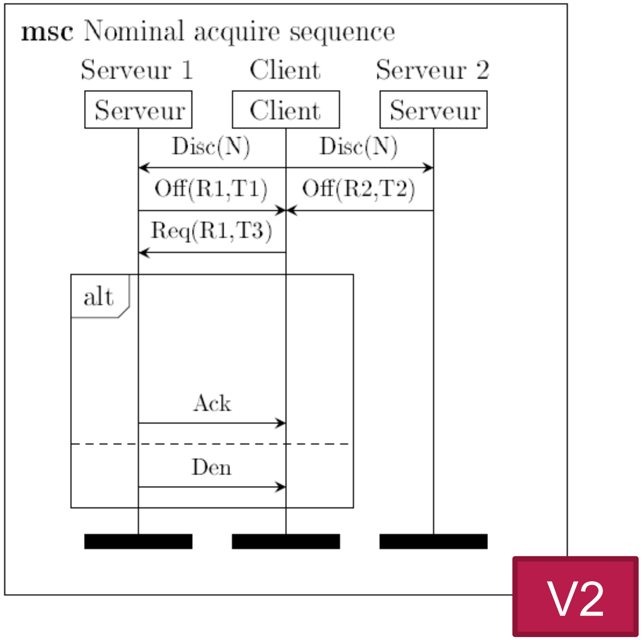
Filtering messages

- Expressiveness, precision and correction
- One policy, multiple protocols
- Policies may change over time

A policy example: From DCHP cherry to DCHP cherry 2







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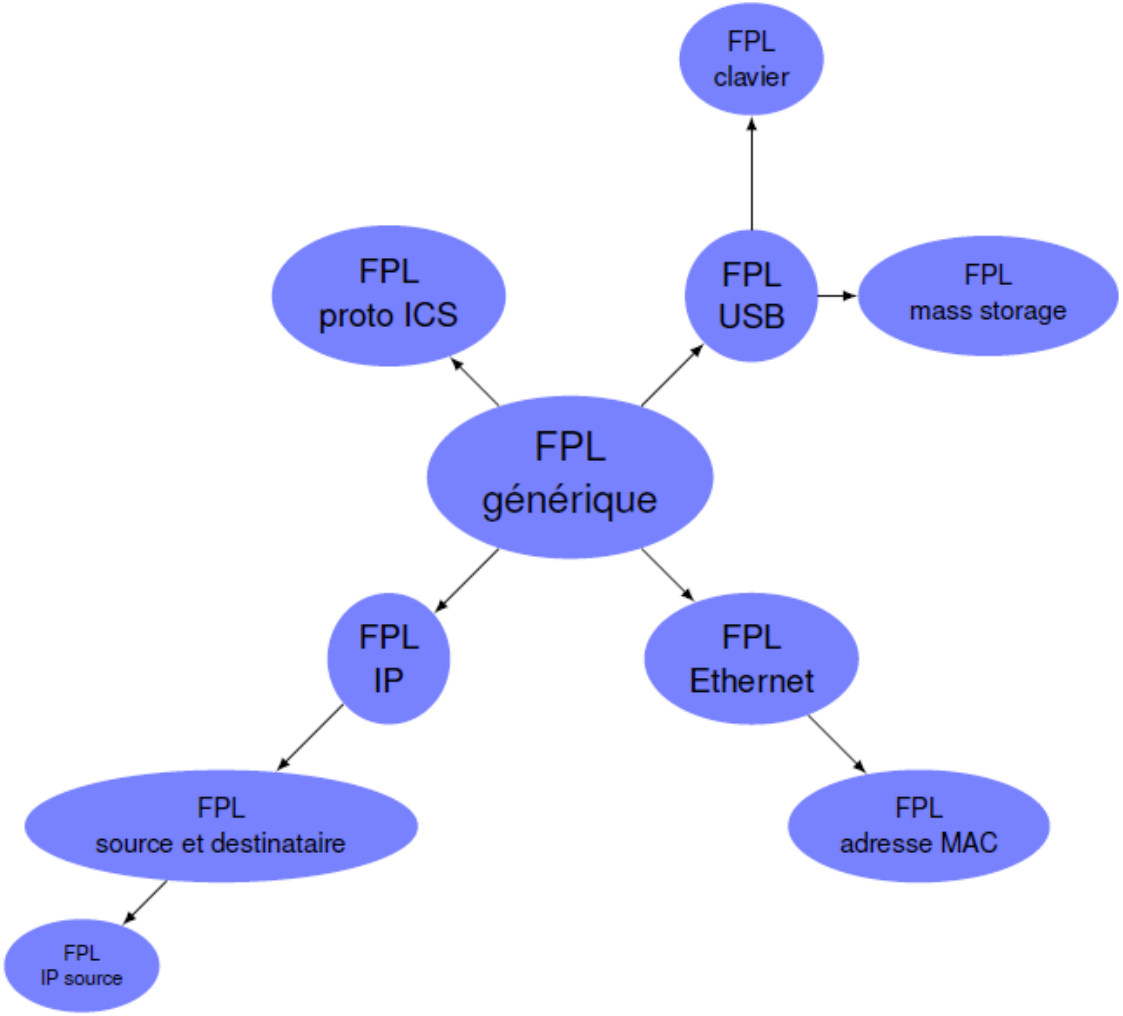
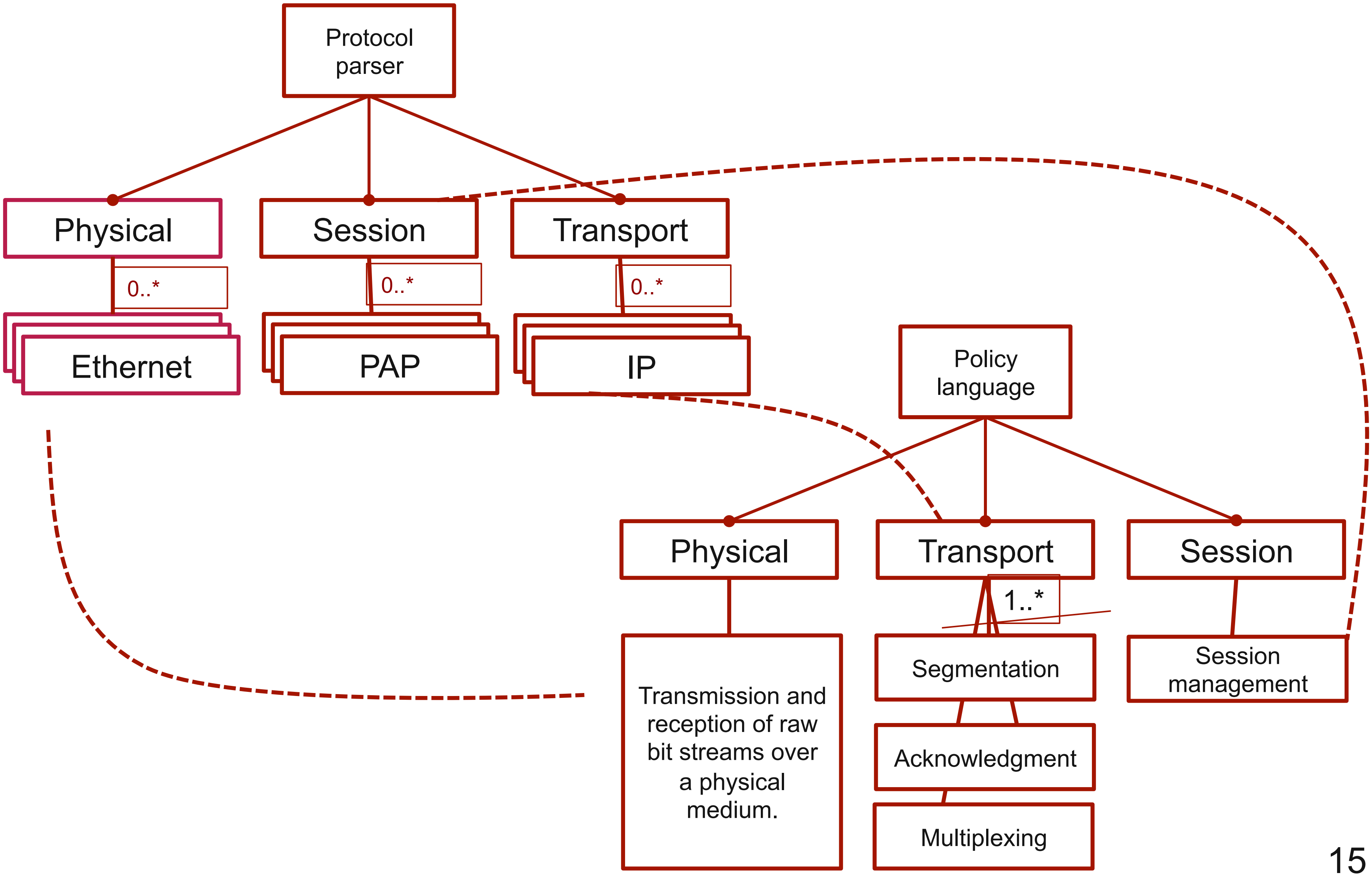
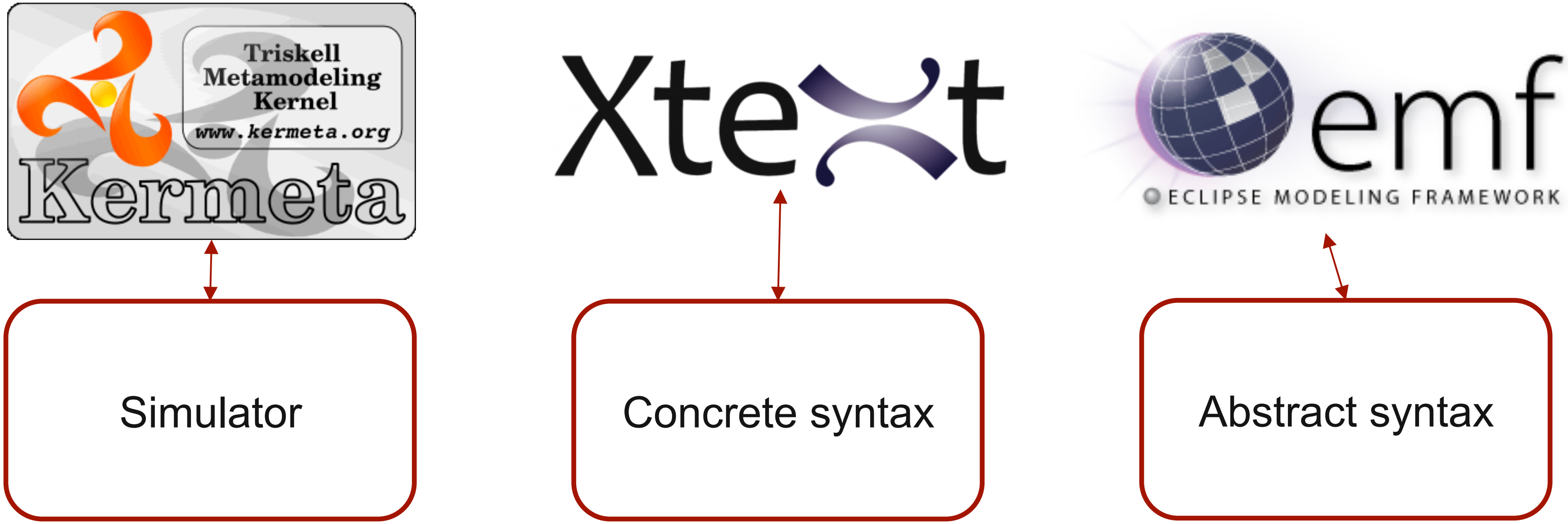
Example: A family of languages for packet filtering



Example: A family of languages for packet filtering



Tooling



Simulator

Concrete syntax

Abstract syntax

Configuration 1: | Segmentation | Acknowledgment | IP

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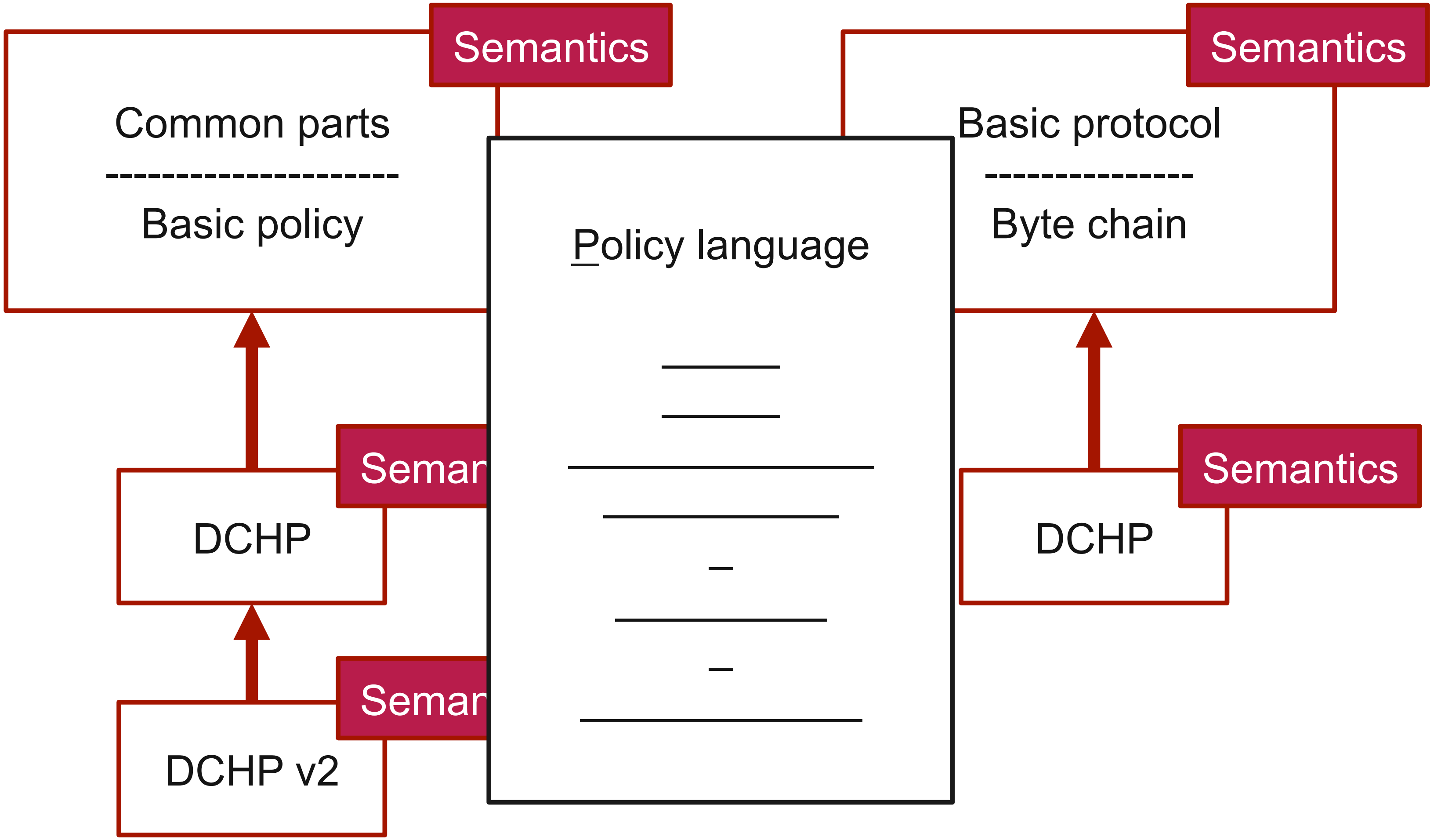
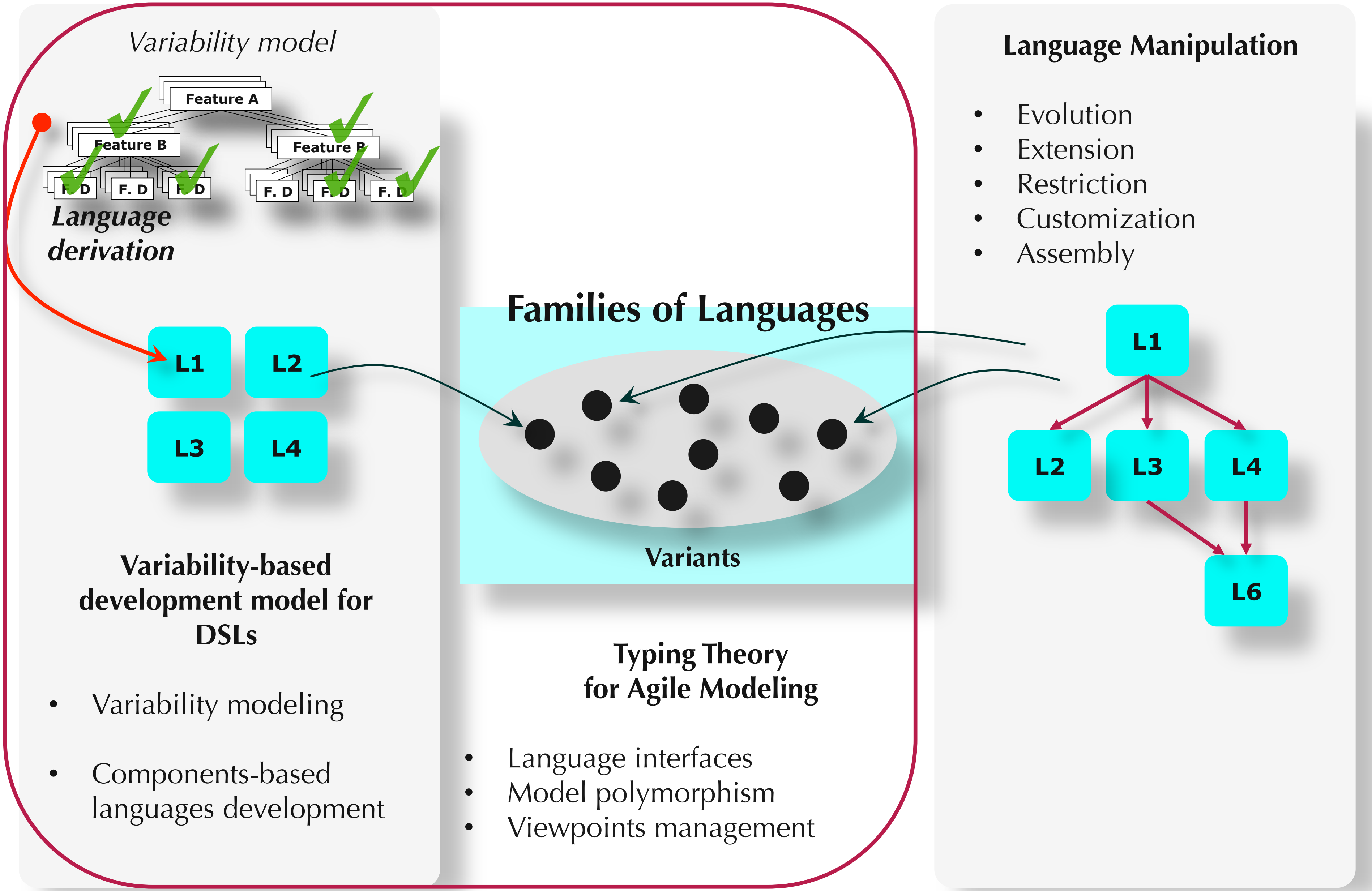
A case study for families of languages



A set of approaches



Variability-based development model for DSLs

- Variability modeling
- Components-based languages development

Typing Theory for Agile Modeling

- Language interfaces
- Model polymorphism
- Viewpoints management

Language Manipulation

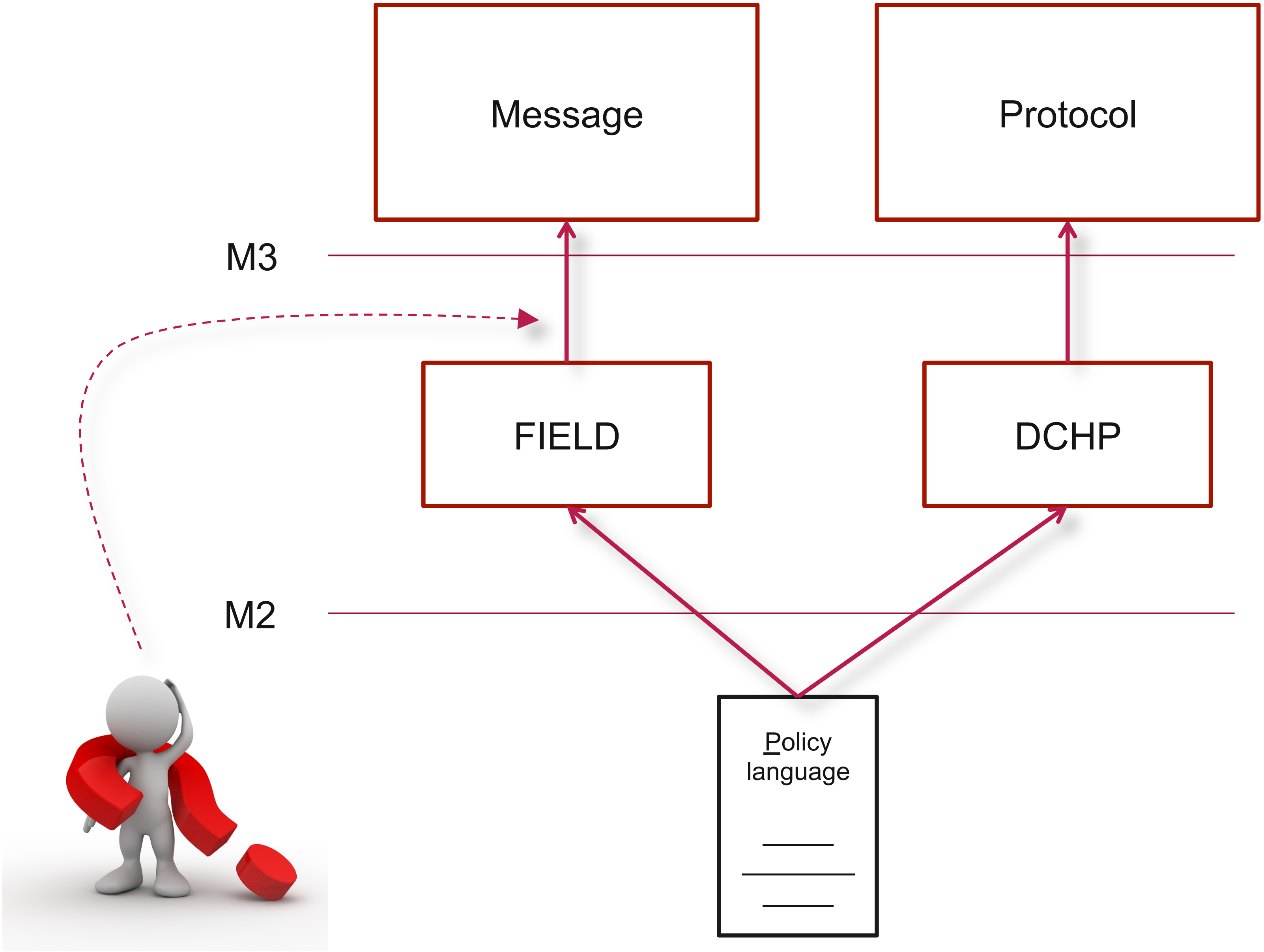
- Evolution
- Extension
- Restriction
- Customization
- Assembly

Insights

- Enables reuse of abstract syntax, concrete syntax and semantic.
- Allows us to configure the most convenient language for each case.

Can we increase the reuse between concepts?

Another solution to explore: Deep meta-modeling



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Lot’s of things to be done

- Integrate David and Thomas solutions within the case study.
- Investigate the Deep meta-modeling solution
- Explore and quantify of many reuse do we get in each case.

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