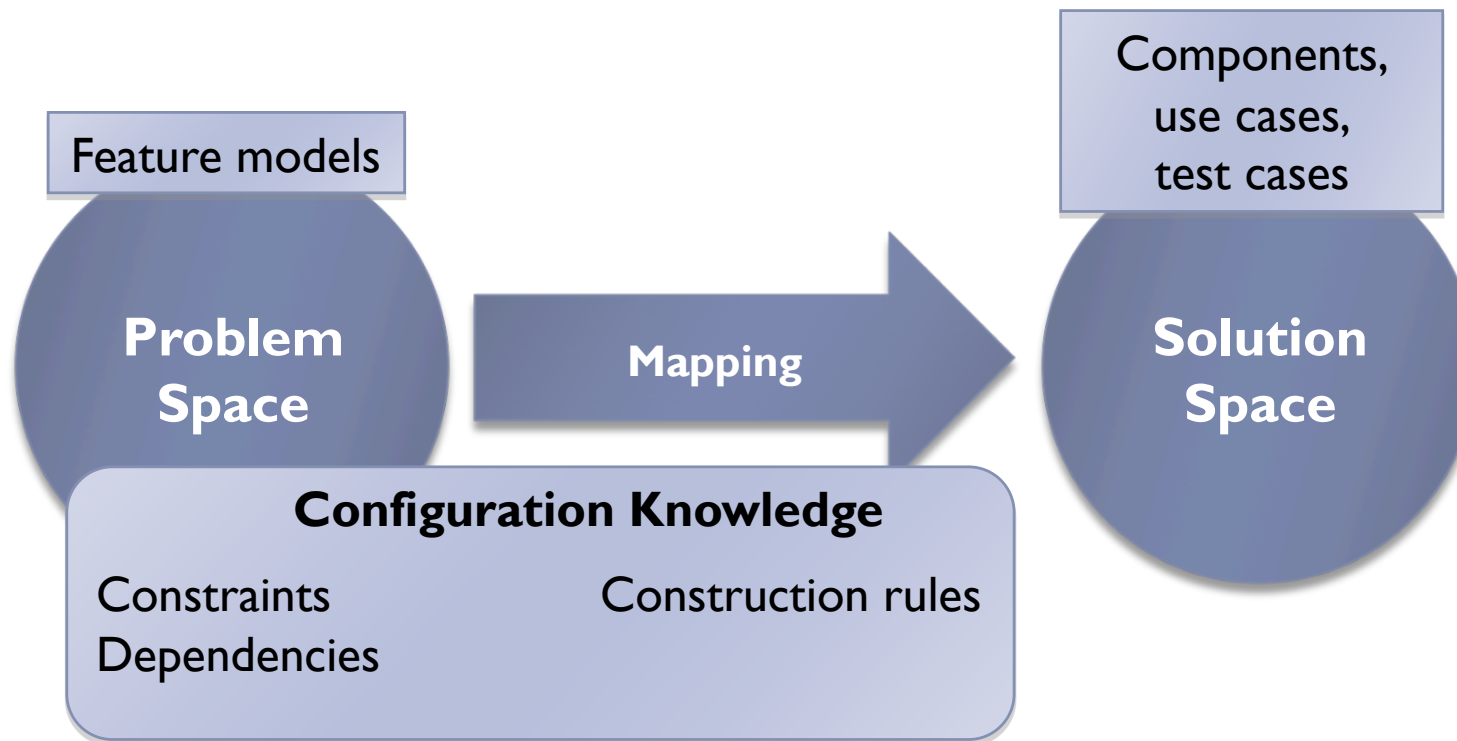# Static Analysis of Configuration Knowledge

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(Configuration-based)
Software Product Lines

Feature models

Problem Space

Mapping

Solution Space

Components, use cases, test cases

Configuration Knowledge

Constraints
Dependencies

Construction rules

Adapted from "Overview of Generative Software Development, Krzysztof Czarnecki"

Mapping Example

Feature → Artifact+

Features \ Use Cases	Identify User	Identify User by Biometrical Analysis	Identify User by Smart Card	Identify User by PIN	Open Front Door	Activate Indoor Security	Activate Outdoor Security	Activate Motion Detection	Activate Glass Break Detection	Activate Camera Surveillance	Configure Security Management
Room Surveillance						x		x		x	x
Indoor Camera Surveillance						x				x	x
Indoor Motion Detection						x		x			x
Admittance Control	x				x						x
Biometrical Analysis		x			x						x
Smart Card			x		x						x
PIN				x	x						x
Intrusion Detection							x				x
Glass break detection							x		x		x
Outdoor Motion Detection							x	x			x
Outdoor Camera Surveillance							x			x	x

Example from AMPLE Project – mapping features to Use Cases

Feature Model
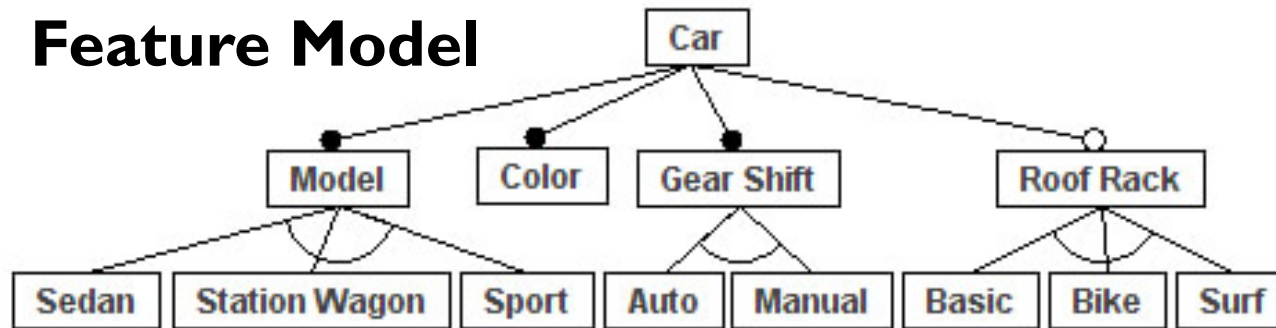
Sedan => Auto
Sedan => not(Roof Rack)
Sport => Manual
Station Wagon => Roof Rack

Surf rack (new feature) is not represented in the Configuration Knowledge

Configuration Knowledge

Feature Expression	Tasks
Station Wagon and Bike	Select component roofRackBike; …
	…
Sedan **and** Bike	Select component roofRackBike; …
Color	Bind parameter color
Station Wagon and Auto	Select component gearAutoSW

Invalid Feature Expression

Depends on component gearSWgeneric

**Generation of incorrect products
Maintenance Cost**

4

Status and next steps

▸ **Defining implementation of Configuration Knowledge**

    ▸ Integration with *fmp* plugin

    ▸ Use on TaRGeT

Main Flow

Description: Create a new contact
From Step: START
To Step: END

Step Id	User Action	System State	System Response
1M	Start My Phonebook application.	My Phonebook application is installed in the phone.Step Setup.	My Phonebook application menu is displayed.
2M	Select the New Contact option.		The New Contact form is displayed.
3M	Type the contact name and the phone number.		The new contact form is filled.
4M	Confirm the contact creation. [TRS_11111_101]	There is enough phone memory to insert a new contact.	A new contact is created in My Phonebook application.

Goal: Generate product-specific test cases

TaRGeT

Test and Requirements Generation Tool
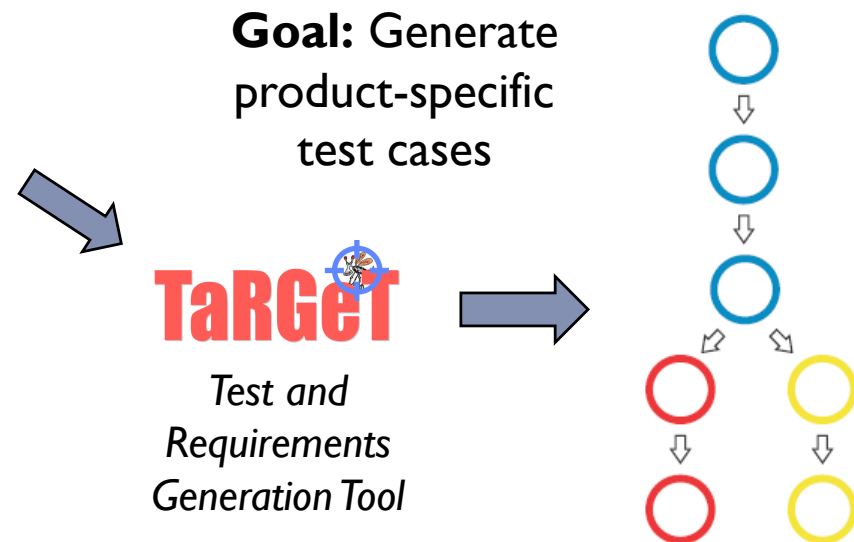
Concluding remarks

▸ Apply our approach in different PL contexts

▸ Comparison with other CK approaches

▸ In other words…

   ▸ Will it have a real impact in my productivity?

      ▸ Ensuring quality of generated product without a significant increase in time to develop or maintain

Thanks!
Questions?

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