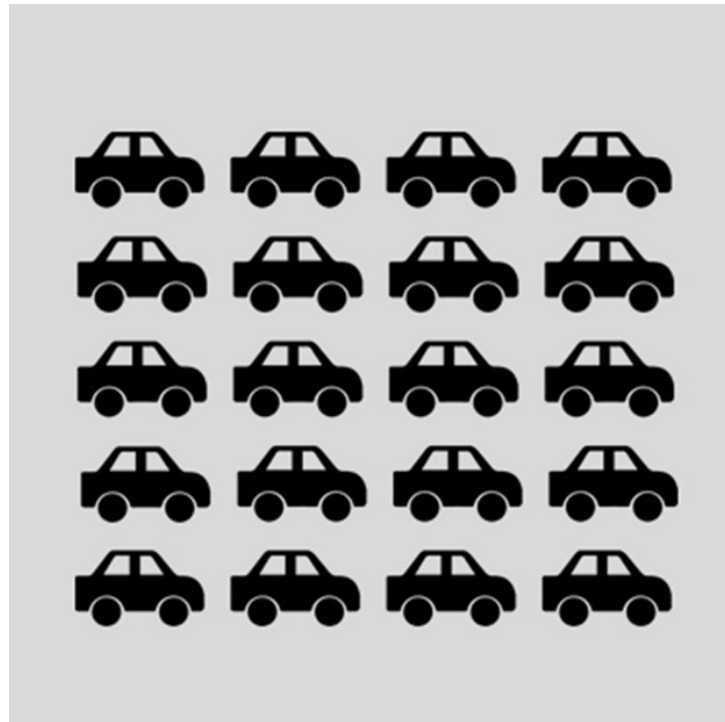


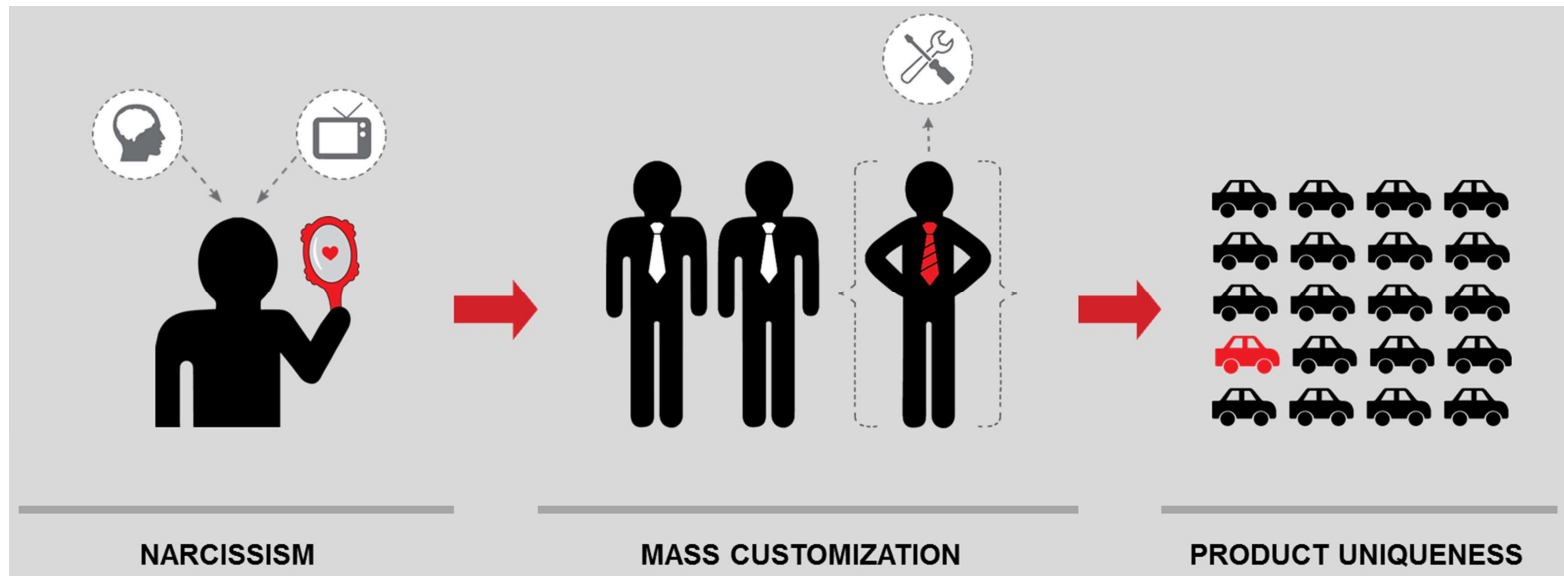
Esercitazione

- Software Product Lines
- Come condurre un esperimento di ingegneria del software empirica
- Conduzione di un esperimento di elaborazione del linguaggio naturale con modelli linguistici di grandi dimensioni (LLMs quali Bing creative o chatGPT)

Once upon a time there was mass production



And then one day mass customization appeared



Customization is now in most sectors



Customized labels on Coca-Cola bottles.

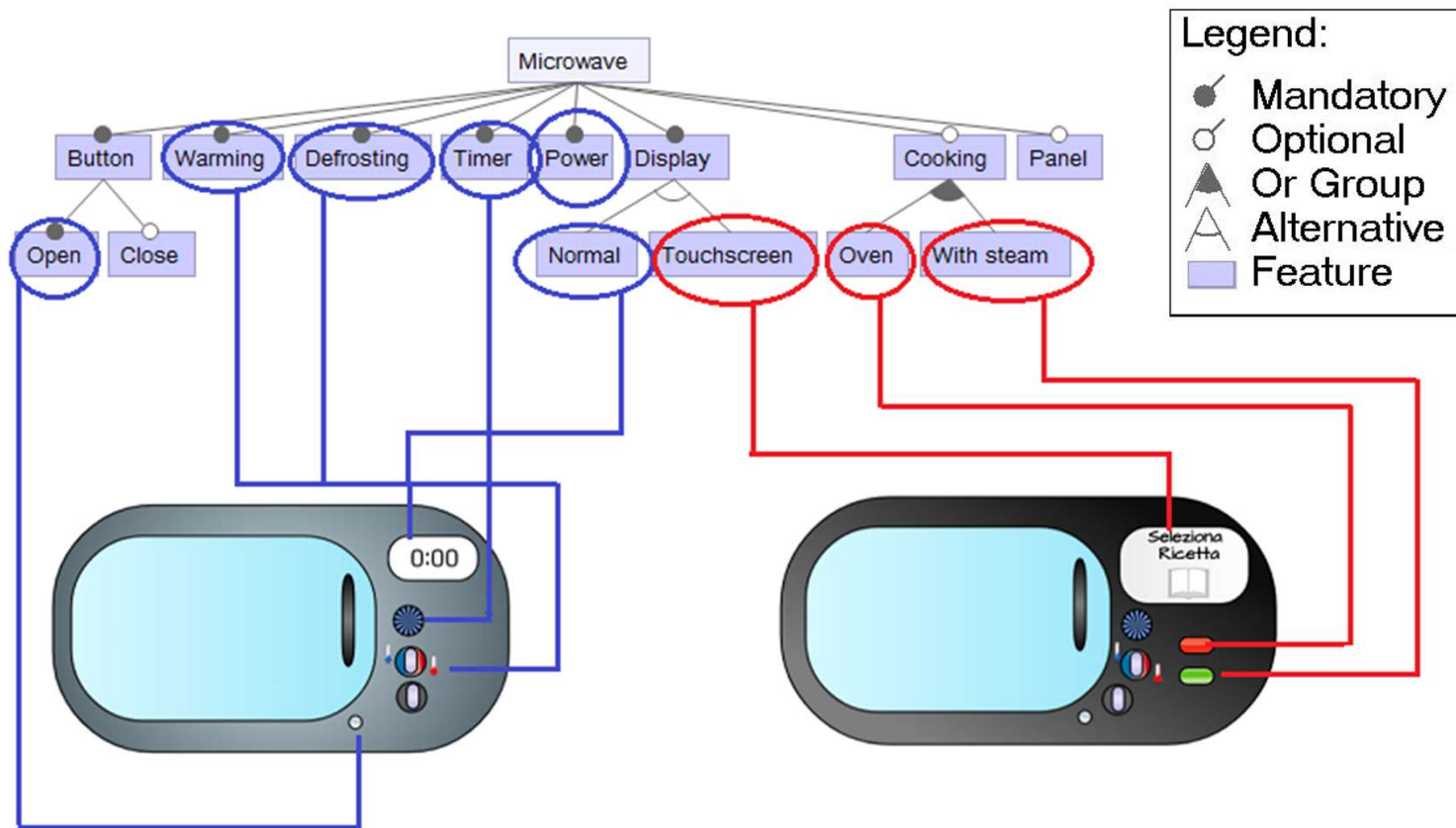
Photo credit: photo from Coca-Cola company website. All product names, trademarks and registered trademarks are property of their respective owners.

The individual products, differentiate themselves with respect to particular features typically to serve different markets

Software Product Lines (SPL): New production strategies are needed

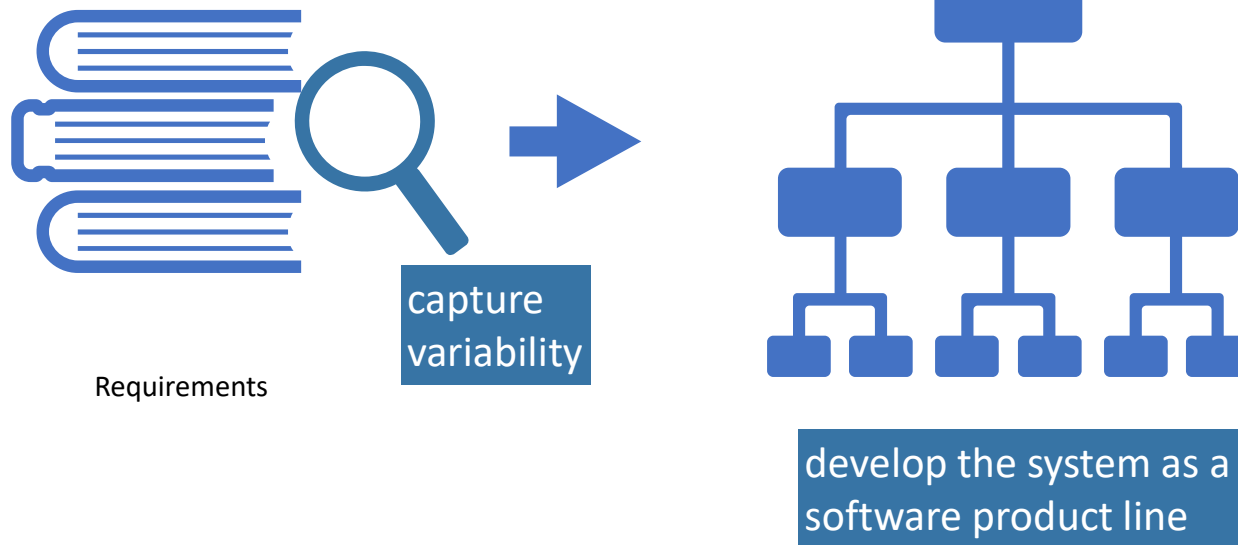
- The **Software Product Line** (SPL) paradigm is an approach to develop product families, characterized by:
 - a common platform and
 - easily customizable products
- Among the fundamental activities of SPL engineering there is
- the identification of the **features**
- the identification of **variability**
- **Implementation:**
 - assembling components OR
 - Directives to the preprocessor

SPL specification: Feature Diagrams



Our long term goal

- identify **sources of variability** in natural language requirements documents



Conduzione degli esperimenti

- 2 documenti dei requisiti:
 - coffee machine
 - eshop
- Chiediamo a un LLM di estrarre features e variabilità
 - Con un prompt già pronto
- Analisi dei dati: falsi positivi e falsi negativi
- Assessment: precision e recall

Example, let

Ground truth

Coffee

Tea

Cappuccino

Beverage Selection

LLM answer

Tea

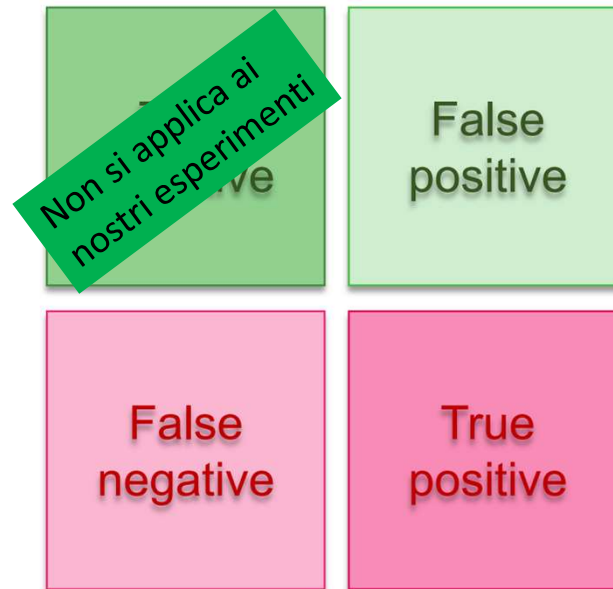
Caffé

Hot Chocolate

Data Review



joint meeting



Data review

Ground truth

Coffee

Tea

Cappuccino

Beverage Selection

LLM answer

Tea

Caffé

Hot Chocolate

ASSESSMENT

tp

tp

fp

fn

Assessment

$$\textit{precision} = \frac{tp}{tp + fp} = \frac{|found \cap ground\ truth|}{|found|}$$

$$\textit{recall} = \frac{tp}{tp + fn} = \frac{|found \cap ground\ truth|}{|ground\ truth|}$$

Ground truth

Coffee

Tea

Cappuccino

Beverage Selection

LLM answer

Tea

Caffé

Hot Chocolate

ASSESSMENT

tp

tp

fp

fn

Precision= 2/3

Recall 2/4



- <https://docs.google.com/forms/d/1OB0BSzubv0rooEoGU9oTq30jD7qlgHb7vww8sTCaK00/edit>