PRODUCT-LINE ANALYSIS COOKBOOK
A CLASSIFICATION SYSTEM FOR COMPLEX ANALYSIS TOOLCHAINS

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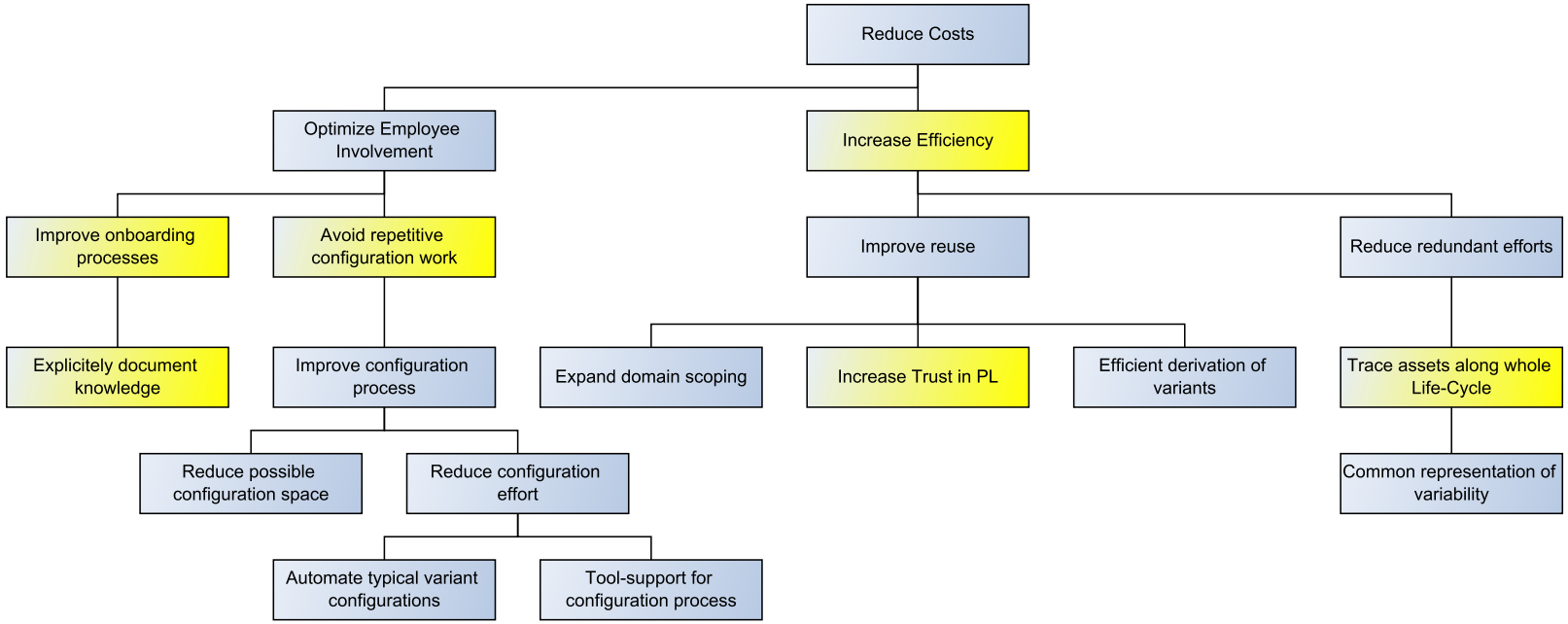
Analysis Tools in SPL

- Analysis tools are useful for
  - Introducing systematic SPL approaches
  - Performing re- and reverse-engineering activities
- Analysis tools
  - Are typically developed in a specific contexts
  - Answer specific questions and fulfil specific goals / needs
  - Provide some level of automation

Goals

- Can be decomposed into higher-level (business) and lower-levels (technical)
- Lower-level goals can contribute to the fulfilment of various higher-level goals at once
  - Thus require a faceted view

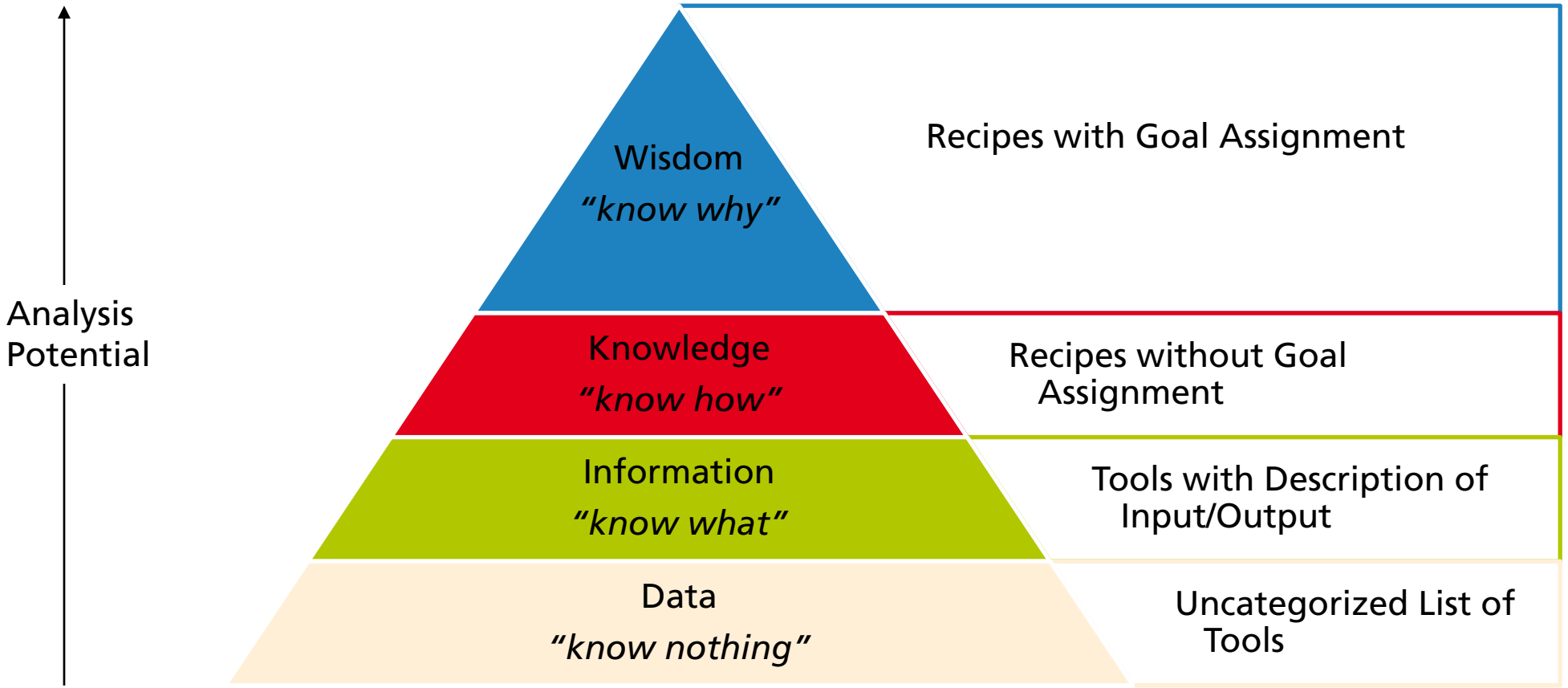


Motivation for a Cookbook

- How to identify the most suitable analysis methods for fulfilling a given goal?
  - The context in which an analysis tool is developed is seldomly documented
  - What if the need is overly complex, and no single analysis tool can provide the answer?
    - Alteration: What if the required input data is not available?

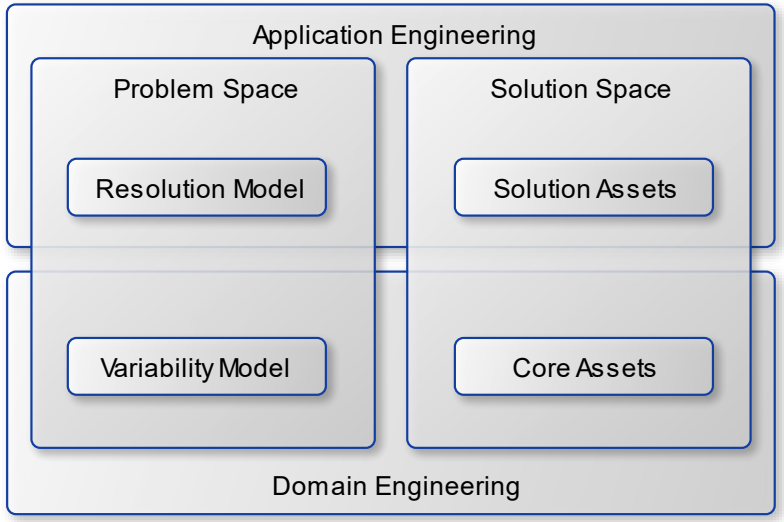
- Thus, from an SPL practitioner's perspective
  - Which tool helps me fulfil my needs (i.e. contributes to my goals)?
  - What data do I need – What data & insights will I gain?
  - Is there a combination of tools (i.e. toolchain) that fulfils my need?
    - → Complex Analysis Toolchains

Hierarchical Overview using a DIKW Hierarchy



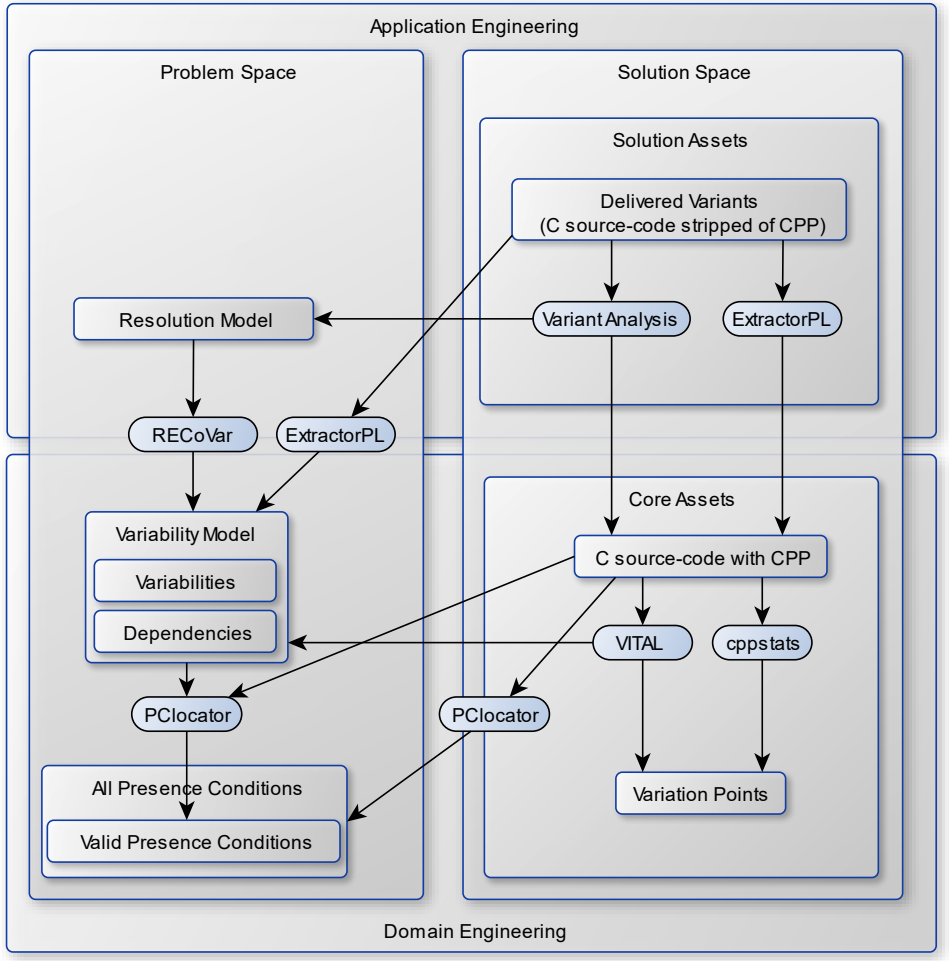
Classification System Proposal

- Contributes to Goal(s)
  - Provide list of goals for which the recipe contributes to
  - Enables practitioners to find recipes, depending on which goal they are following
- Short Description
  - Provide context information for the scenario usage and details on the contribution to the aforementioned goals
- Required Data
  - Which assets are required to perform the analysis
- Required Tools
  - Provides insight into which tools must be procured
- Instructions
  - Step-by-step description of how to perform the analysis
  - The Individual analysis approaches are considered an atomic black-box



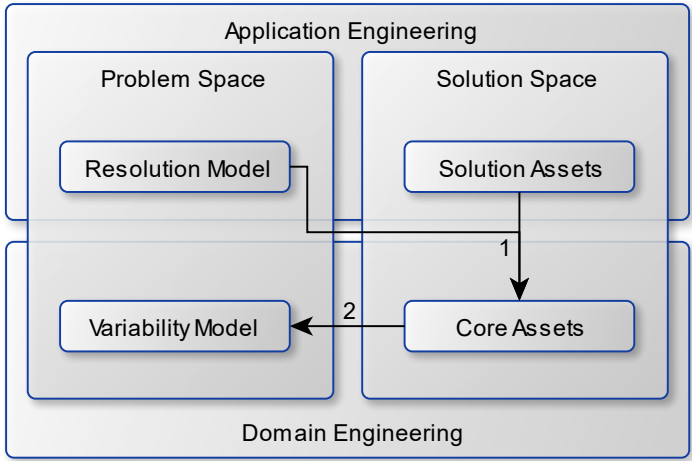
Illustrative Overview of Feasible Transitions between Quadrants

- Tools enable transitions along the SPL process model
- As the cookbook improves, a transition roadmap emerges
- A path of two+ transitions can be described as a toolchain



Recipe 2: Perform a feature extraction from clone-and-own products

Recipe Name	
Contributes to Goal(s)	Reduce Costs, Time-To-Market, Improve Quality
Short Description	Variants are developed by means of ad-hoc clone-and-own, i. e. the most basic mechanism for variability realization. Thus, features are not identified and are not traced to their implementation. This typical scenario, as described by Grüner et al. [9], requires significant reengineering effort to successfully perform a migration to systematic product line engineering approach.
Required Data	Unannotated source code files of all relevant variants, product documentation (Scenario 1 from [9])
Required Tools	FINALIST^2, But4Reuse, KernelHaven, pure::variants, and other unnamed tools.
Instructions	Beginning with unannotated source-code and build traces, FINALIST^2 is able to detect and embed feature annotations within the source-code assets. Then, after attempting to build all the possible variants out of the possible configuration space, But4Reuse is used to detect commonality and variability from the product variants. Once the new insight has been embedded into the relevant assets, the first transition in the SPL process model has been performed (Arrow 1, Fig. 4). To derive a variability model (Arrow 2), KernelHaven, pure::variants, and other unnamed tools are used to identify presence conditions and dependencies for features, after which a feature model can be created.



Conclusion

- Cookbook could be useful for documenting
  - Typical and complex analysis tasks
  - The overall analysis tool landscape
- Cookbook promotes a goal-driven analysis methodology
- Open Platform encourages sharing of information regarding SPL analyses
  - If you already want to contribute, feel free to do so: https://forms.gle/vnPjzKBp2d4E8wobA

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