SWEST 2011

Successfully Migrate to Software Product Lines

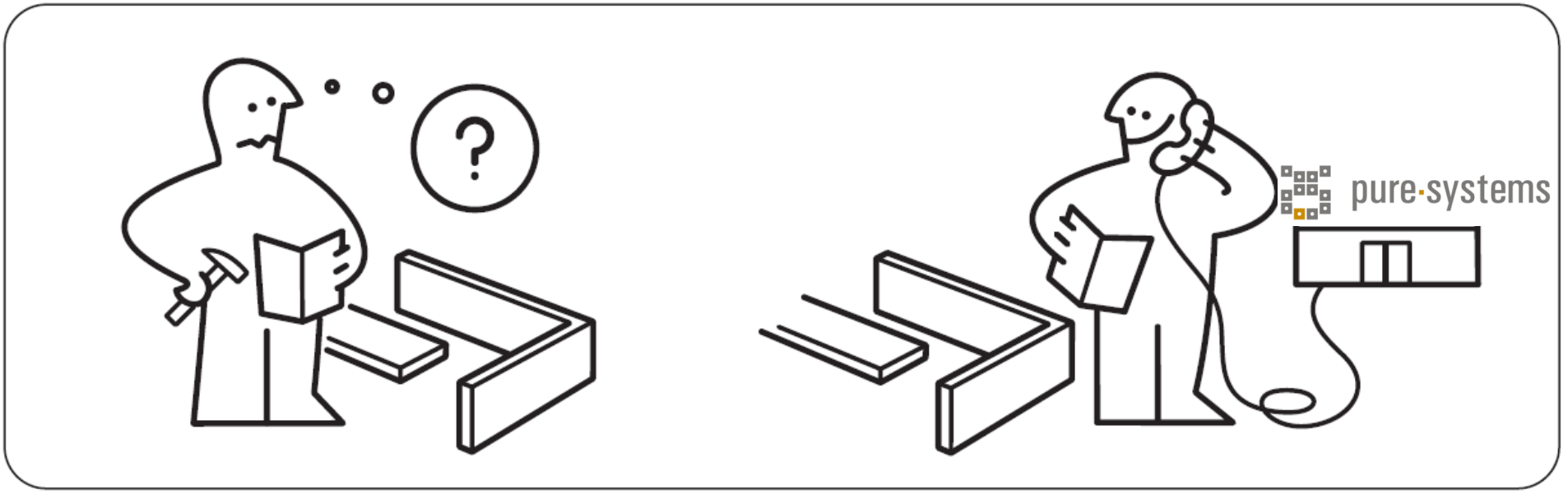
Danilo Beuche
danilo.beuche@pure-systems.com

pure-systems

pure-systems – Variant Management Toolbox

pure::variants

pure-systems – Product Line Consulting

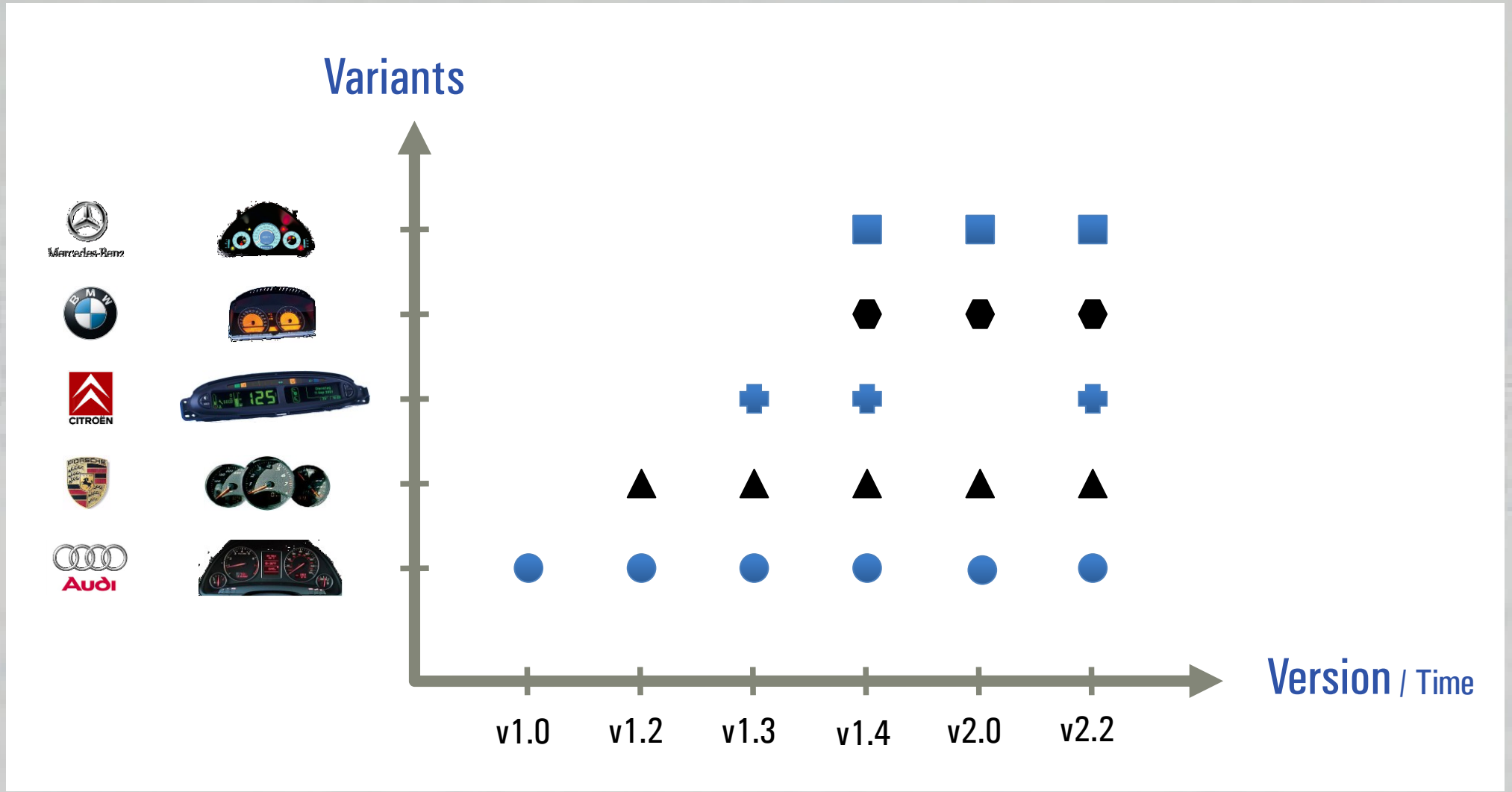


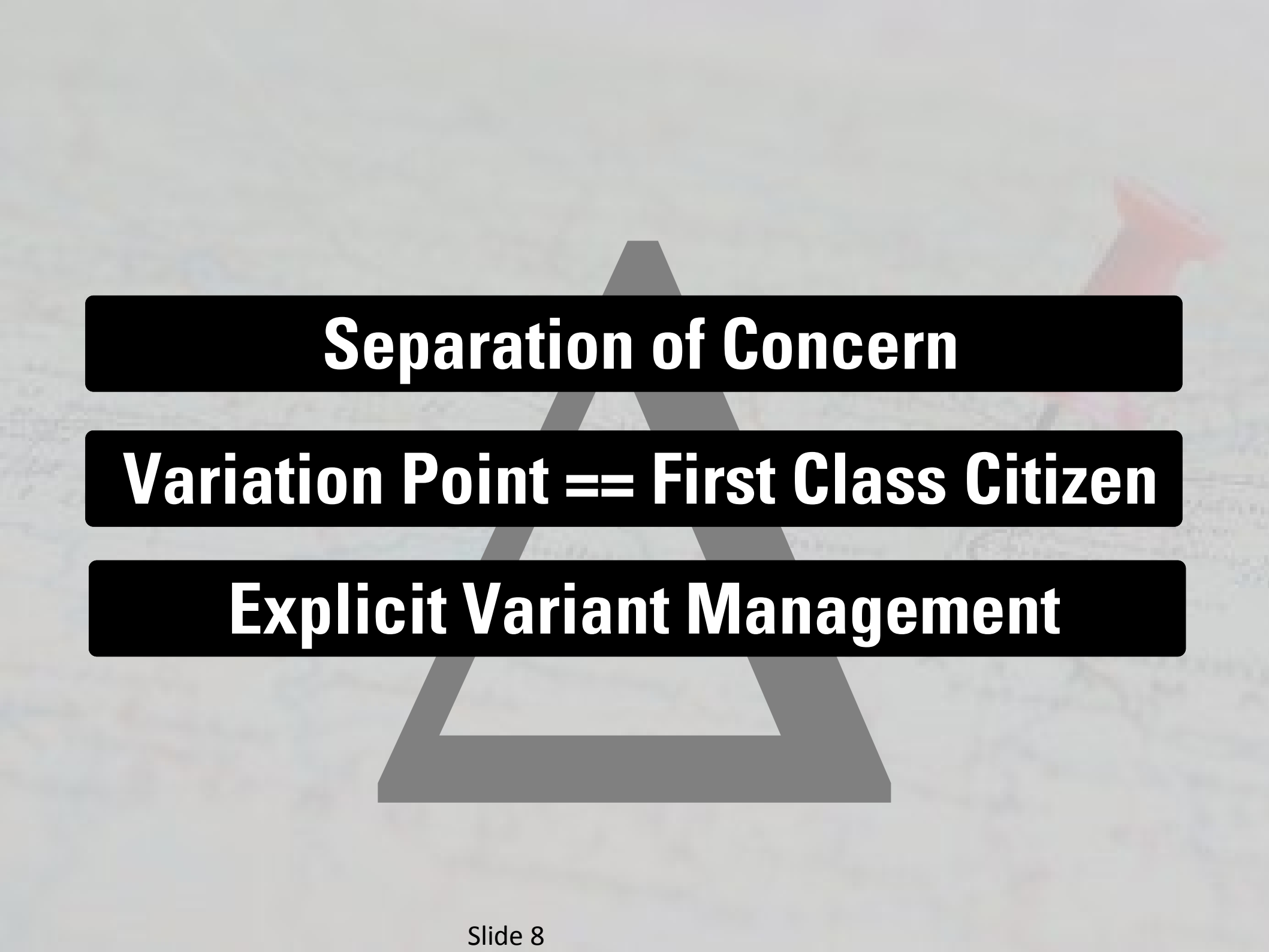

Start

Sohar
Bardi
Chopan
Kon
Untari
Chattarpur
Patan

The Version Hell

Separation of Variants and Versions

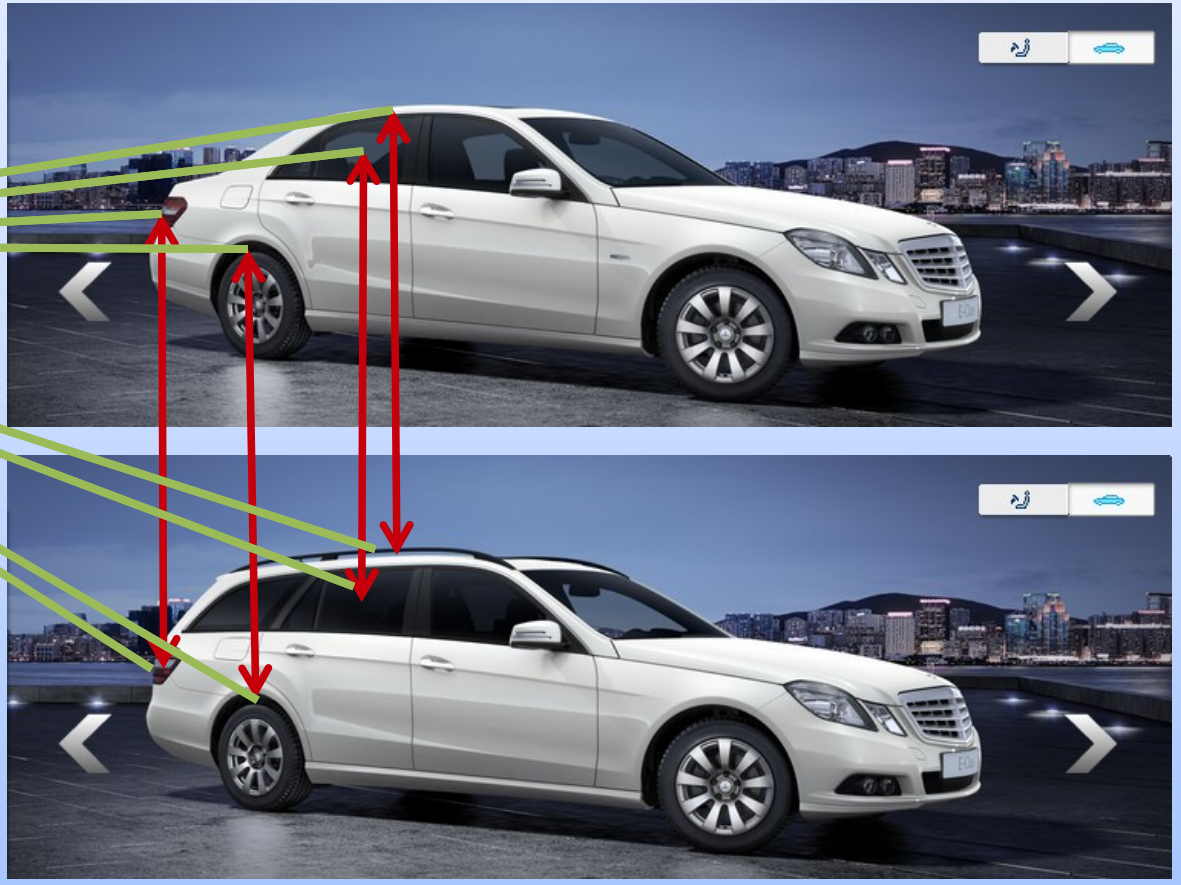



Separation of Concern
Variation Point == First Class Citizen
Explicit Variant Management

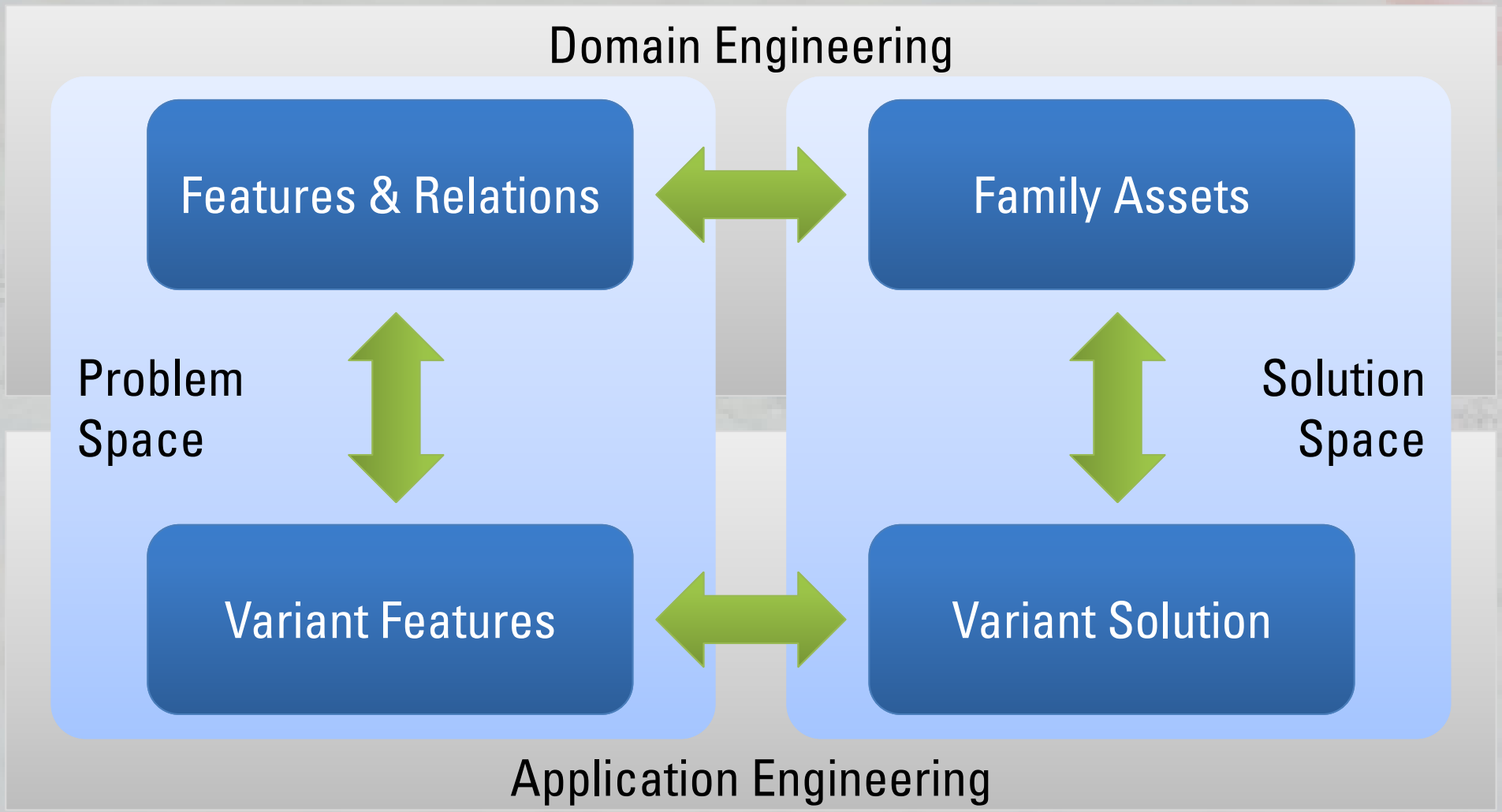
Variation Points

Problem Space

Solution Space



Separation of Concern




N
E
S
W
NW
SE
360
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340

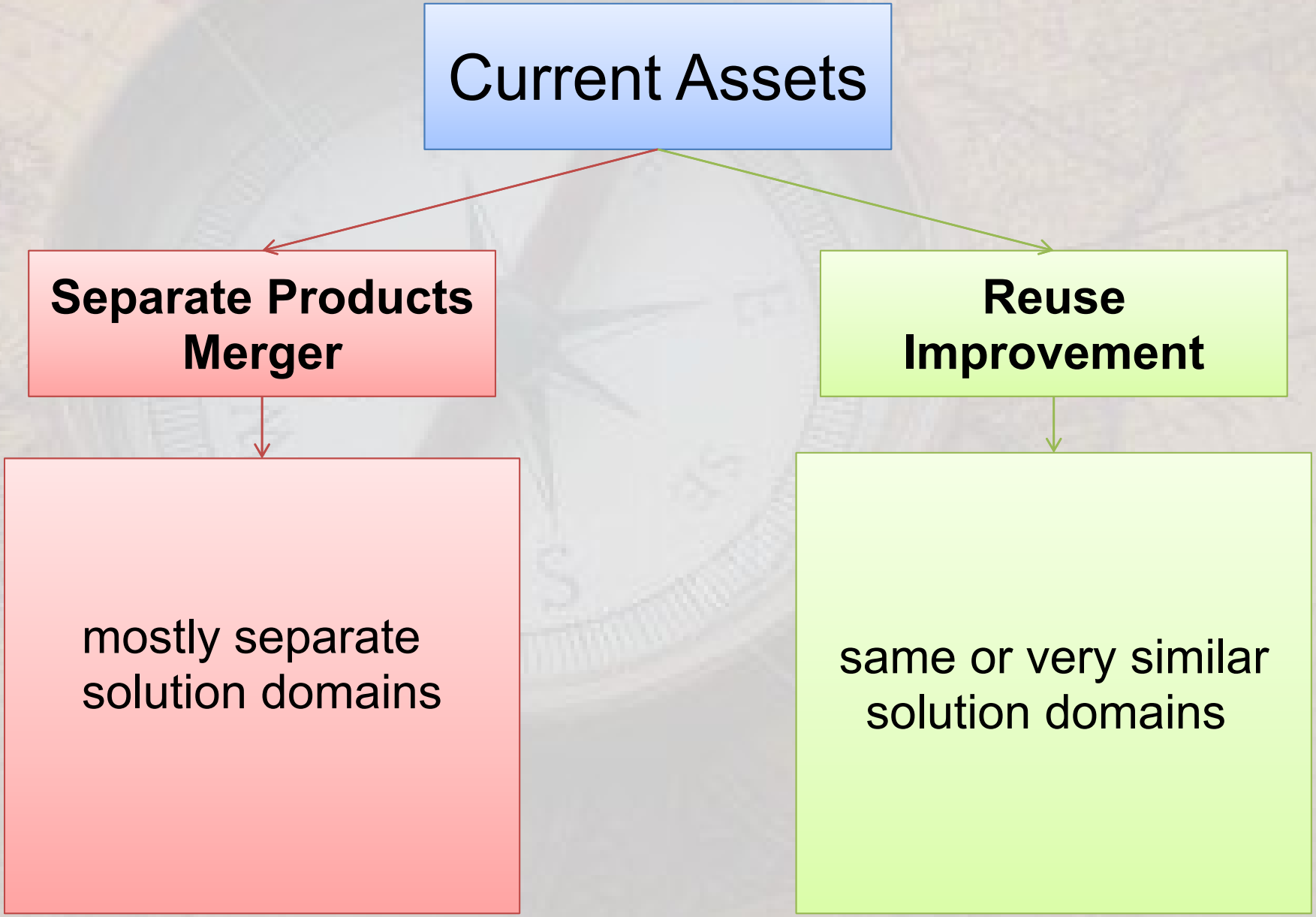
Questions Before Starting

People: Main Driver / Sponsor?

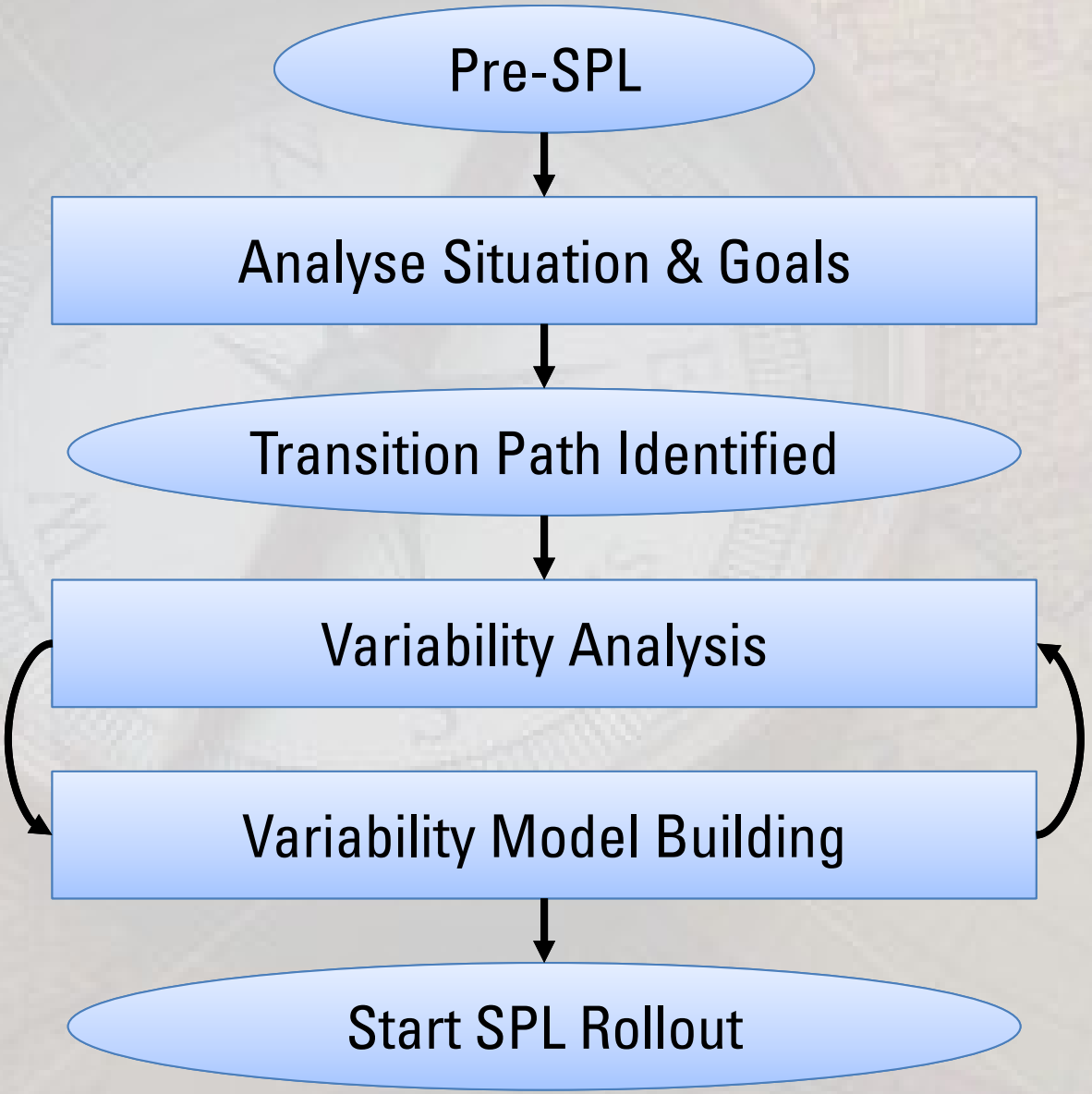
Business: What to achieve?

Development: What is missing?

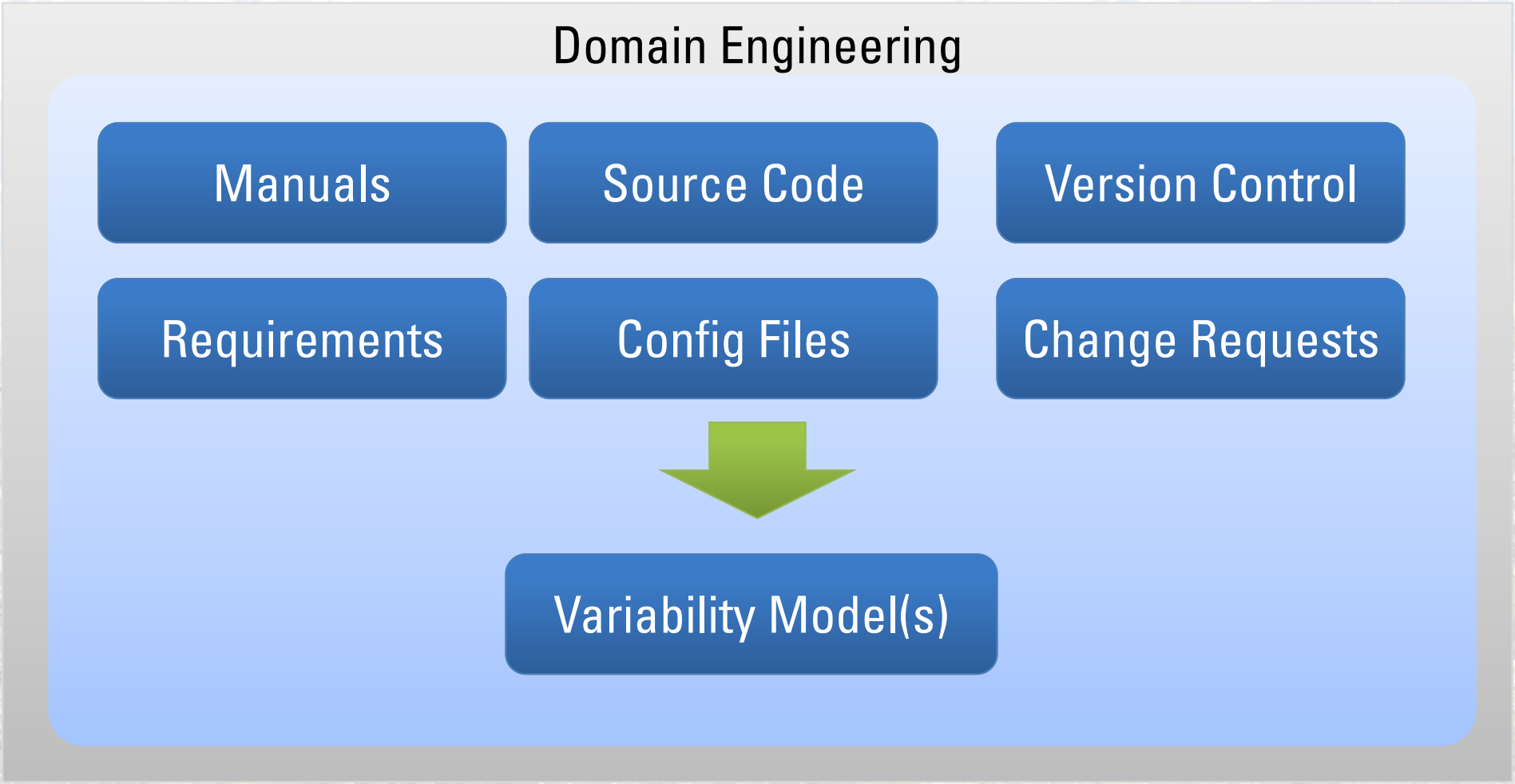
Assets - Transition Scenarios



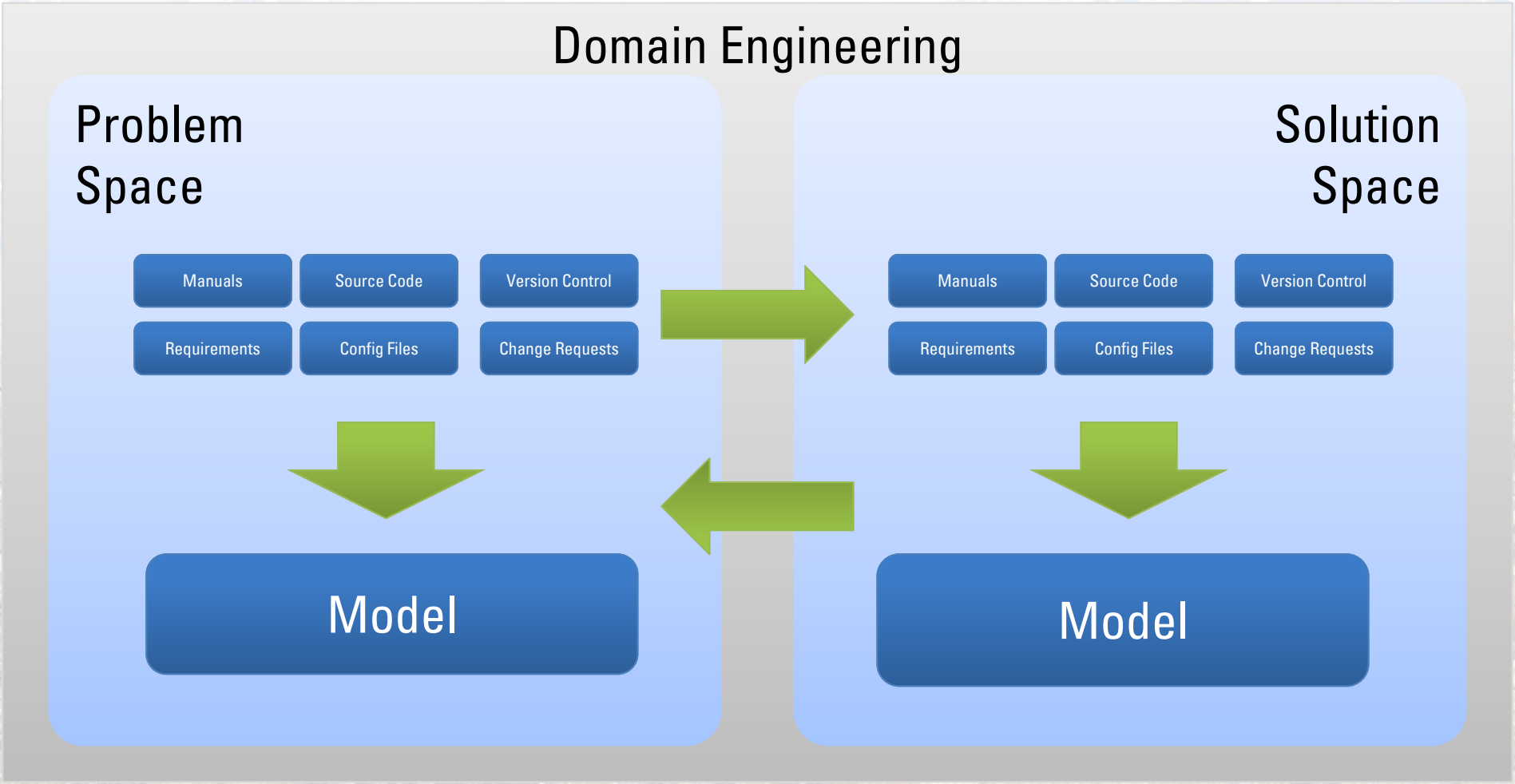
Assets - Transition Steps



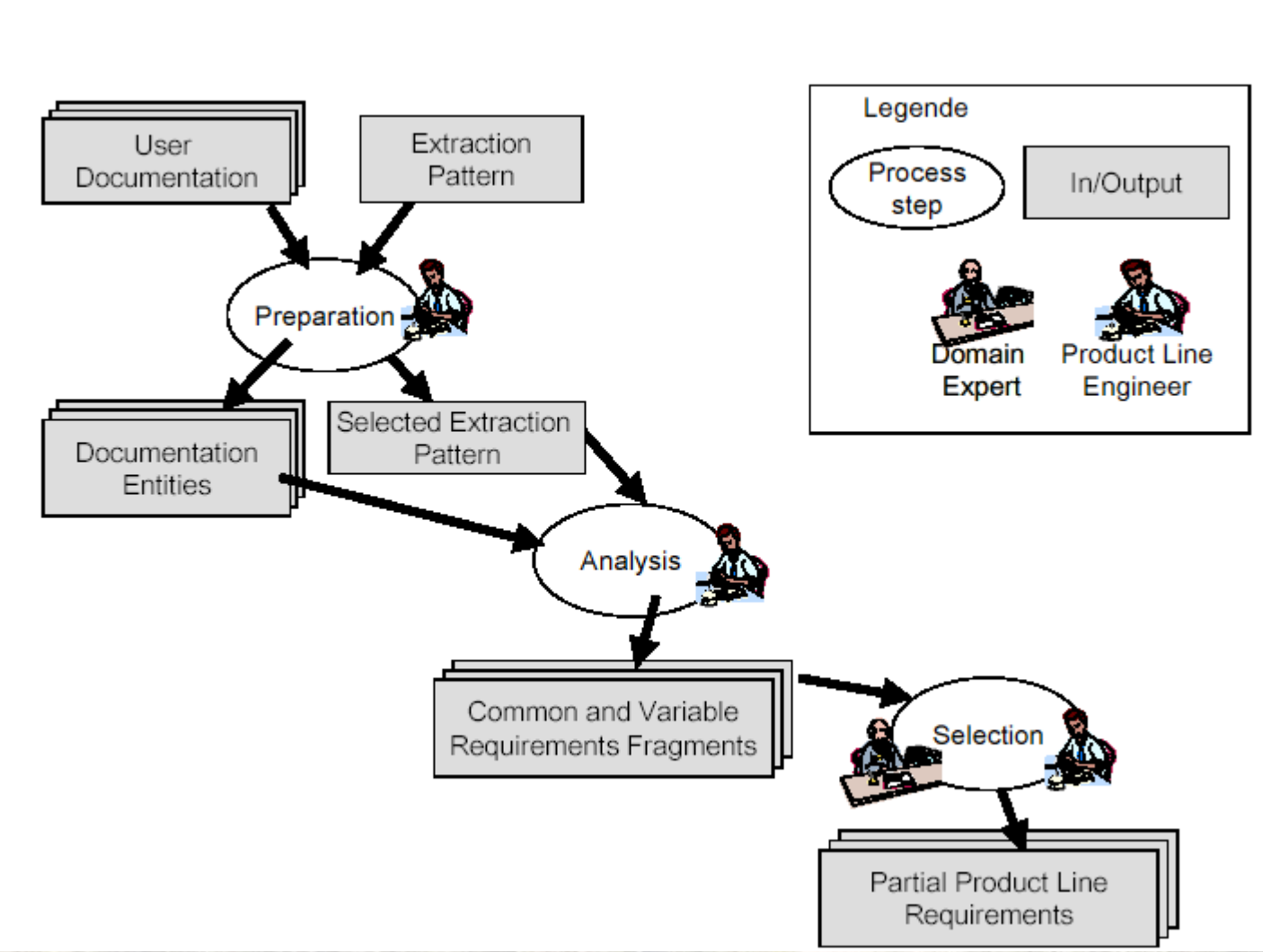
Variability Analysis



Analysis Direction



CaVE - Approach



Documentation Pattern Example

Name	Headings
Short Description	Headings usually represent features
Input	Headings
Output	Feature
Transition	Transition Documentation -> Product Line Artifact
Long Description	Since features describe functionalities that are of importance for the user, they are found at prominent places in the user documentation.
Example	In a mobile phone user documentation “Sending an SMS” is a heading that describes a feature

Problem Space Modelling

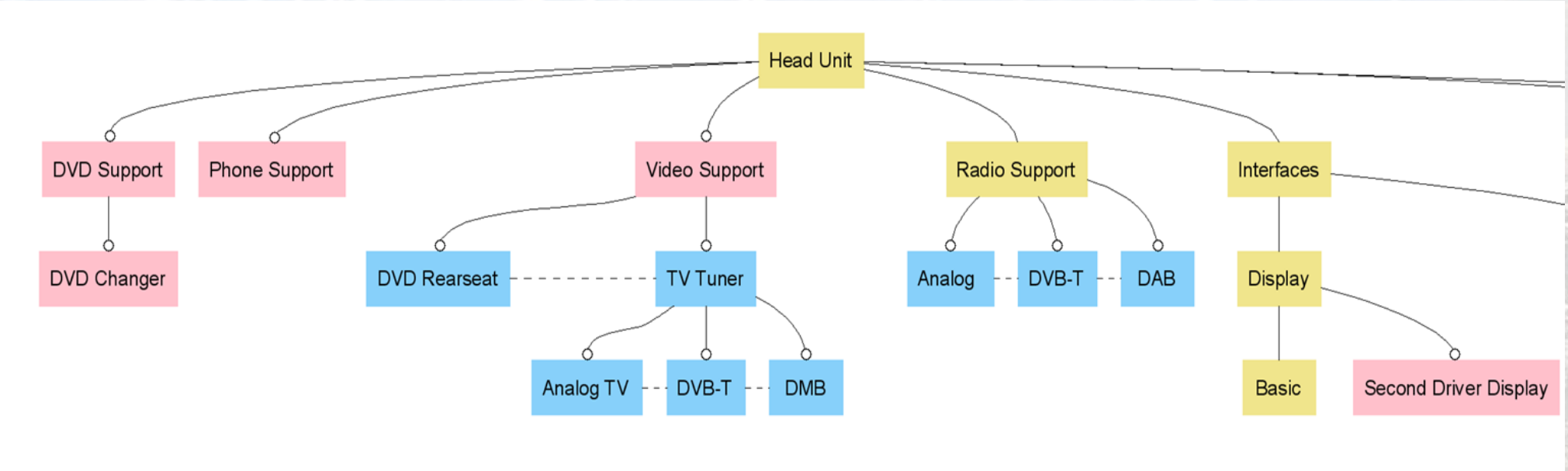
Connects isolated variation points

Modelling approaches:

- variable use cases
- variable textual requirements
- decision tables (PuISE/IESE)
- feature models (FODA, FORM, ...)

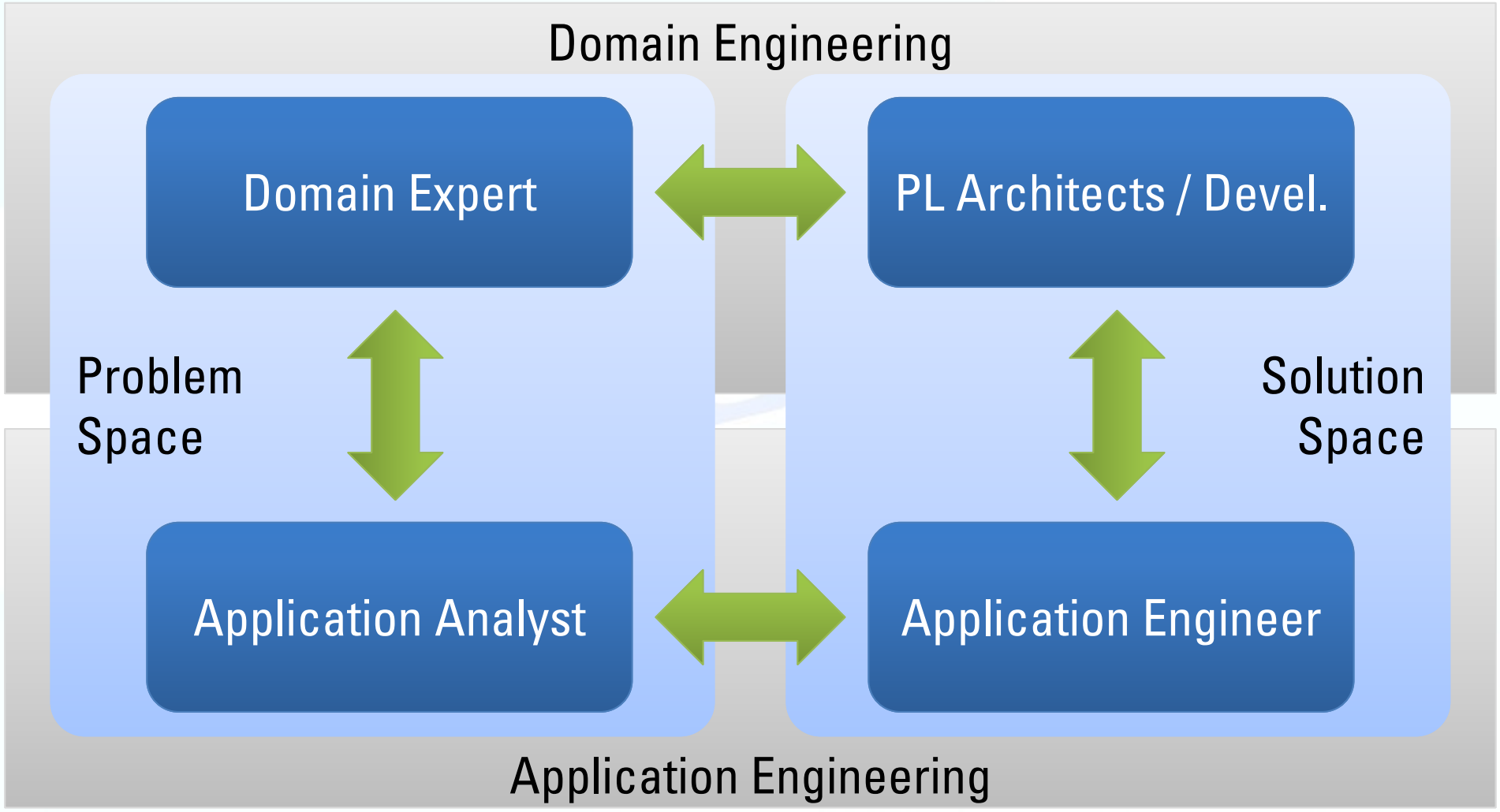
Problem Space – Feature Modelling

Simplified Model of a Modern Car Radio

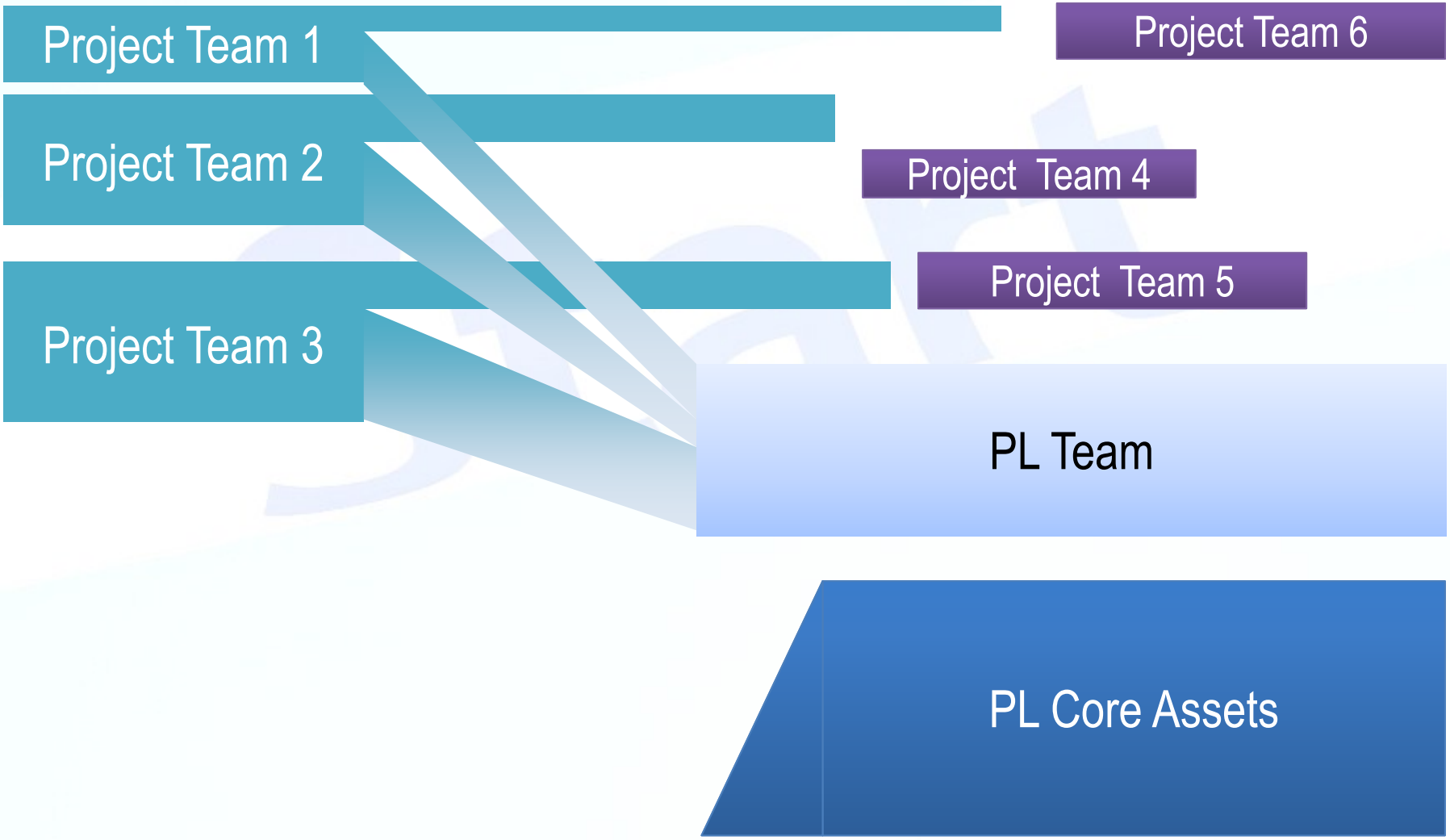



Start

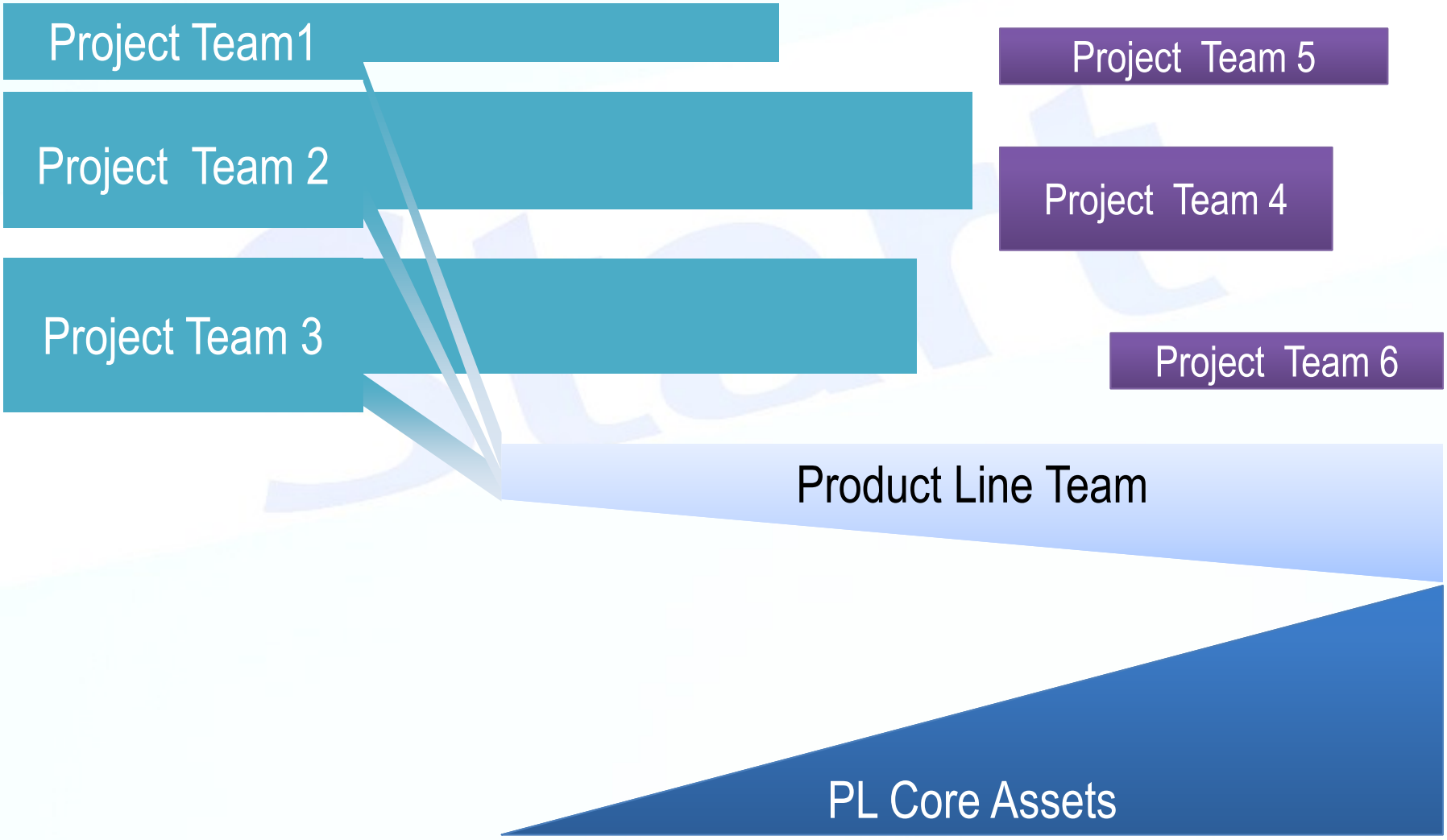
Organisational Mapping



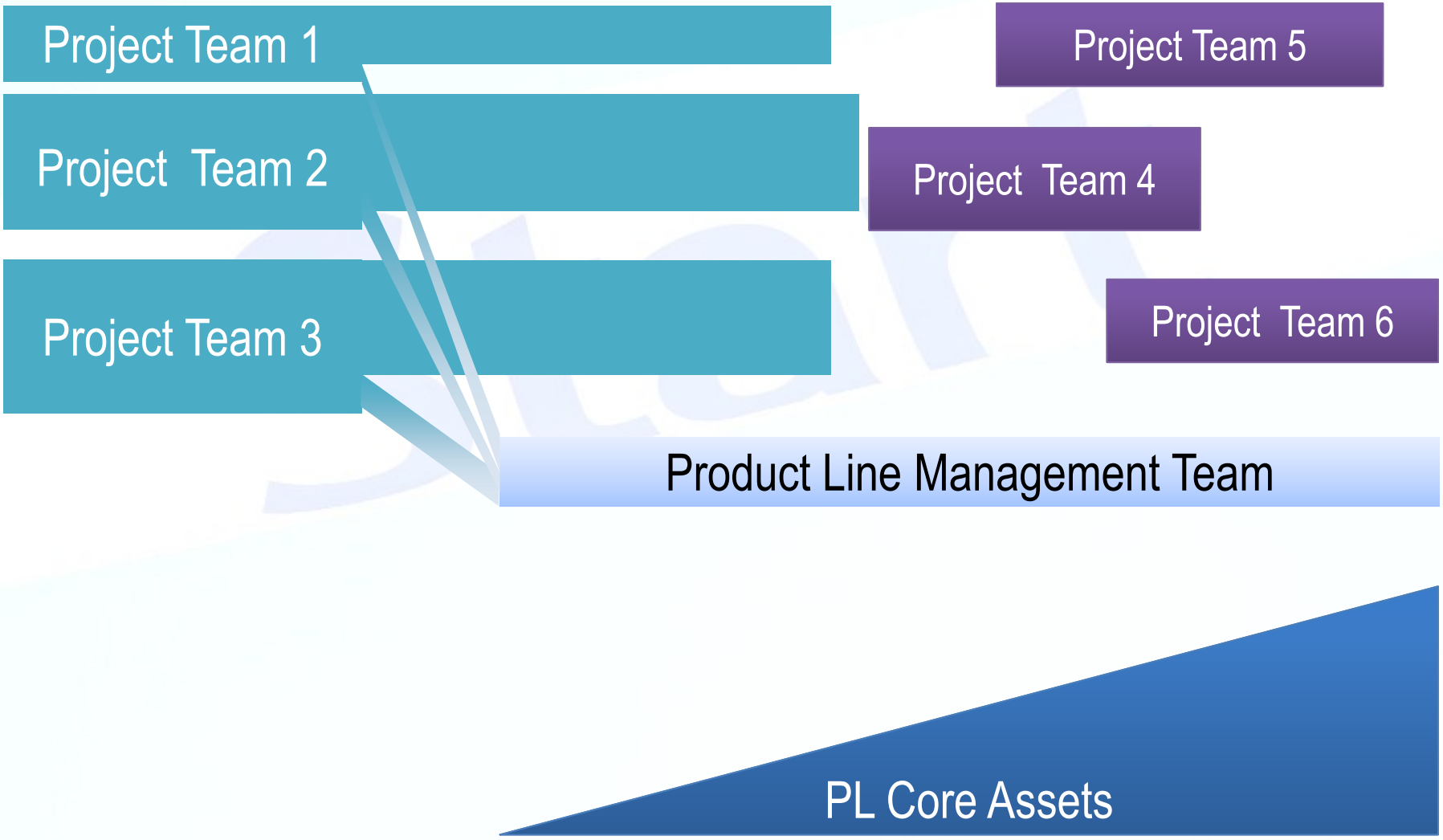
Approaches: Platform-Centric



Approaches: Incremental Platform-Centric



Approaches: Project-Centric




Get all running!


Check and revise your way often

$$x^2 + px + q = 0 \qquad W = \int_{s_1}^{s_2} F(s)\cdot\cos\alpha\, ds \qquad v = \frac{ds}{dt}$$

$$x_{1/2} = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q} \qquad \tanh x = \frac{e^x - e^{-x}}{e^x + e^{+x}} \qquad \theta = \underline{I}\cdot N$$

$$u_C = U\left(1 - e^{-t/RC}\right) \qquad C + O_2 \rightarrow CO_2$$

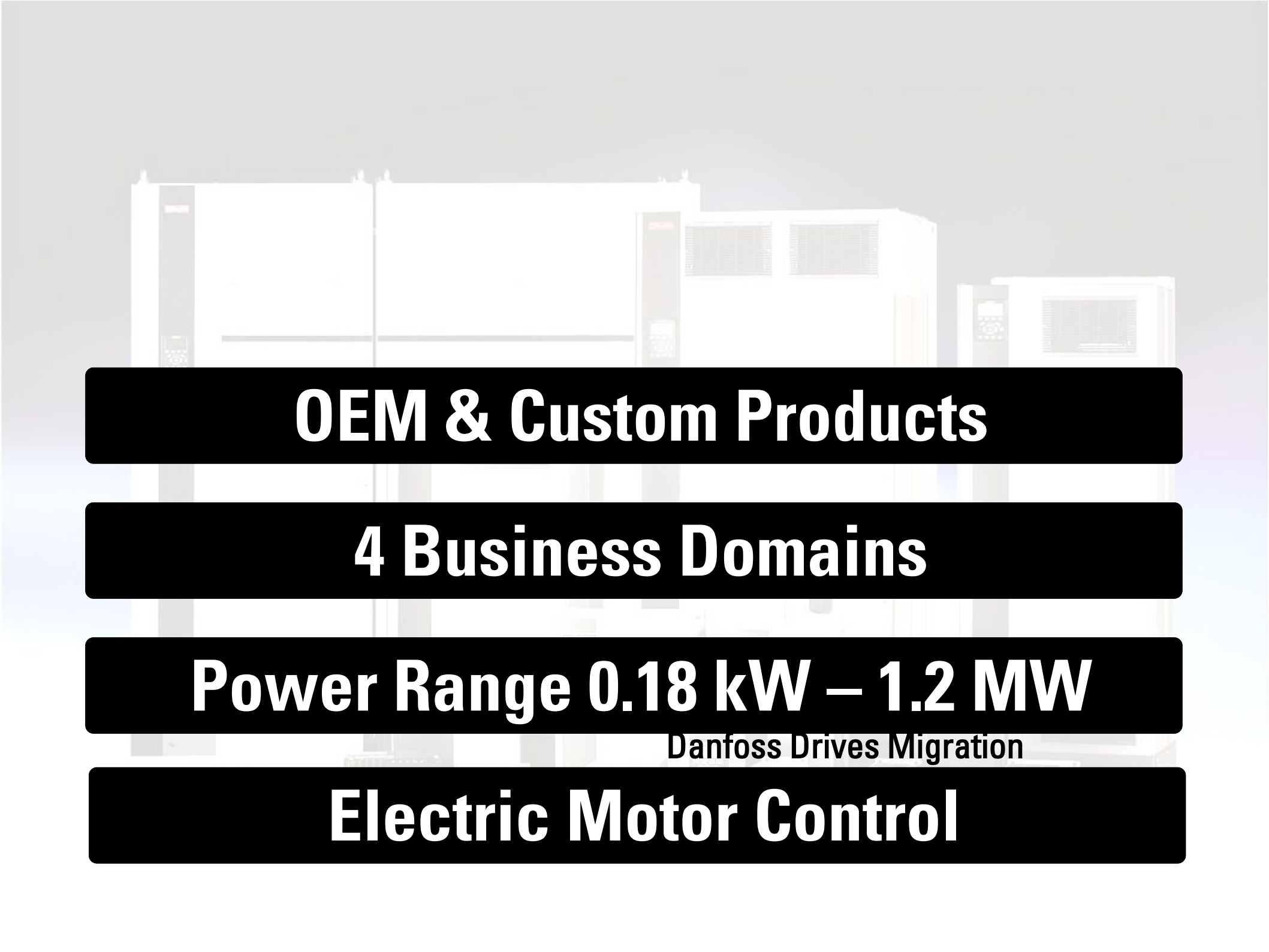
$$f_r = \frac{1}{2\pi}\cdot\frac{1}{\sqrt{LC}}\,; \quad \omega = 2\pi f_r \qquad 4\,FeS_2 + 11\,O_2 \rightarrow 2\,Fe_2O_3 + 8\,SO_4$$

$$-\frac{d}{dt}\int_A \vec{B}\,dA = \oint_L E'\,dl = -\int_A \left(\frac{\partial \vec{B}}{\partial t} + \mathrm{rot}\,(\vec{B}\times v)\,dA\right) \qquad ?x \,\#\, y;\ z = x$$

$$W_{rot} = \frac{1}{2}\cdot J\omega^2$$

$$HCl + H_2O \rightleftarrows Cl^- + H_3O^+ \qquad a^2 = b^2 + c^2$$

$$V = \frac{1}{6}\pi h\left(3a_1^2 + 3a_2^2 + h^2\right) \qquad P_v = \int_{\varphi=0}^{2\pi}\int_{\vartheta=0}^{\pi} \frac{r^2}{S\Omega_2} H_\varphi H_\varphi^* \sin\vartheta\, d\vartheta\, d\varphi$$



OEM & Custom Products

4 Business Domains

Power Range 0.18 kW – 1.2 MW

Danfoss Drives Migration

Electric Motor Control

5 Locations

100 Developers

500.000 LOC

20+ Products

Feature Requirements

HVAC

AQUA

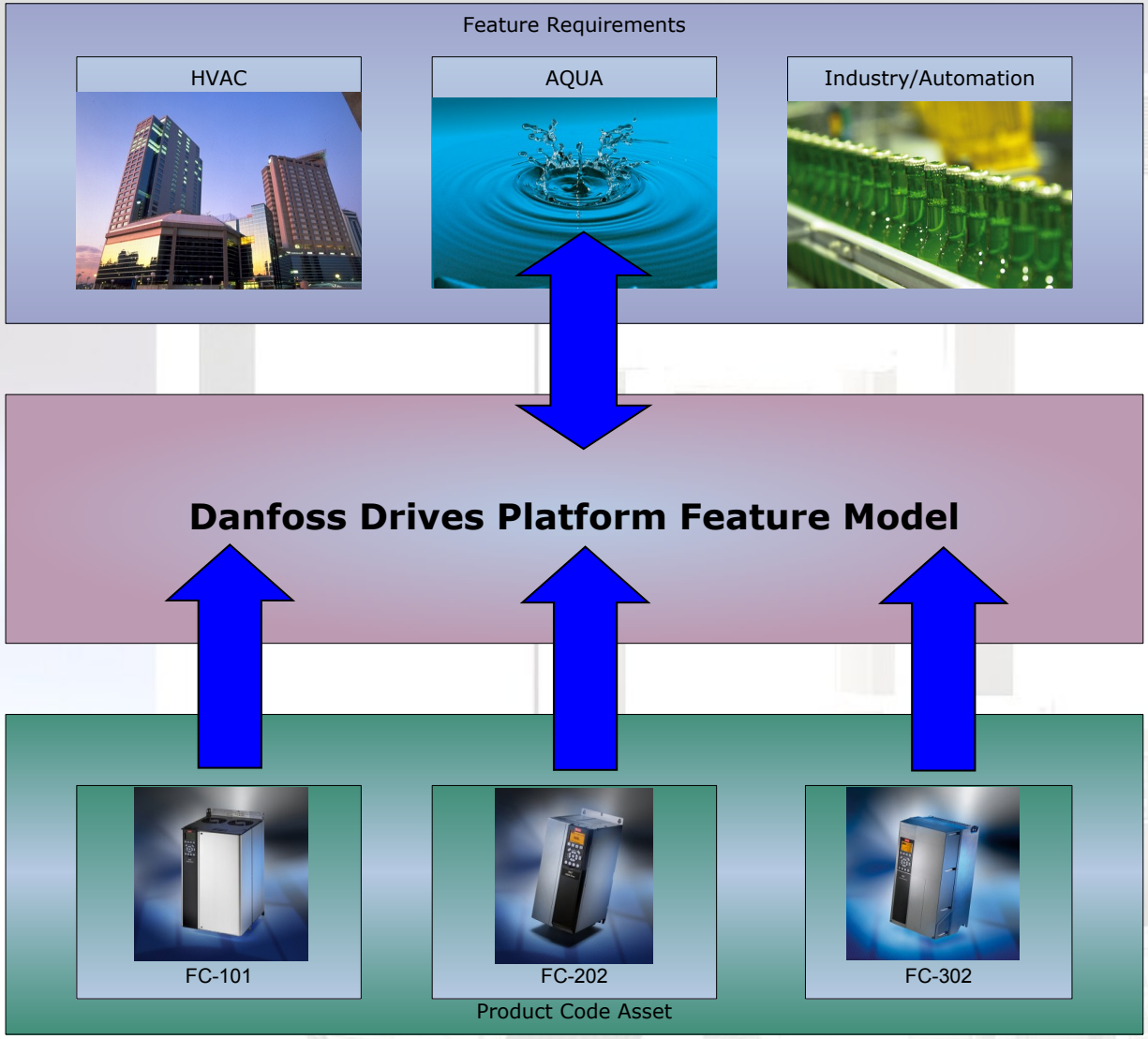
Industry/Automation

FC-101

FC-202

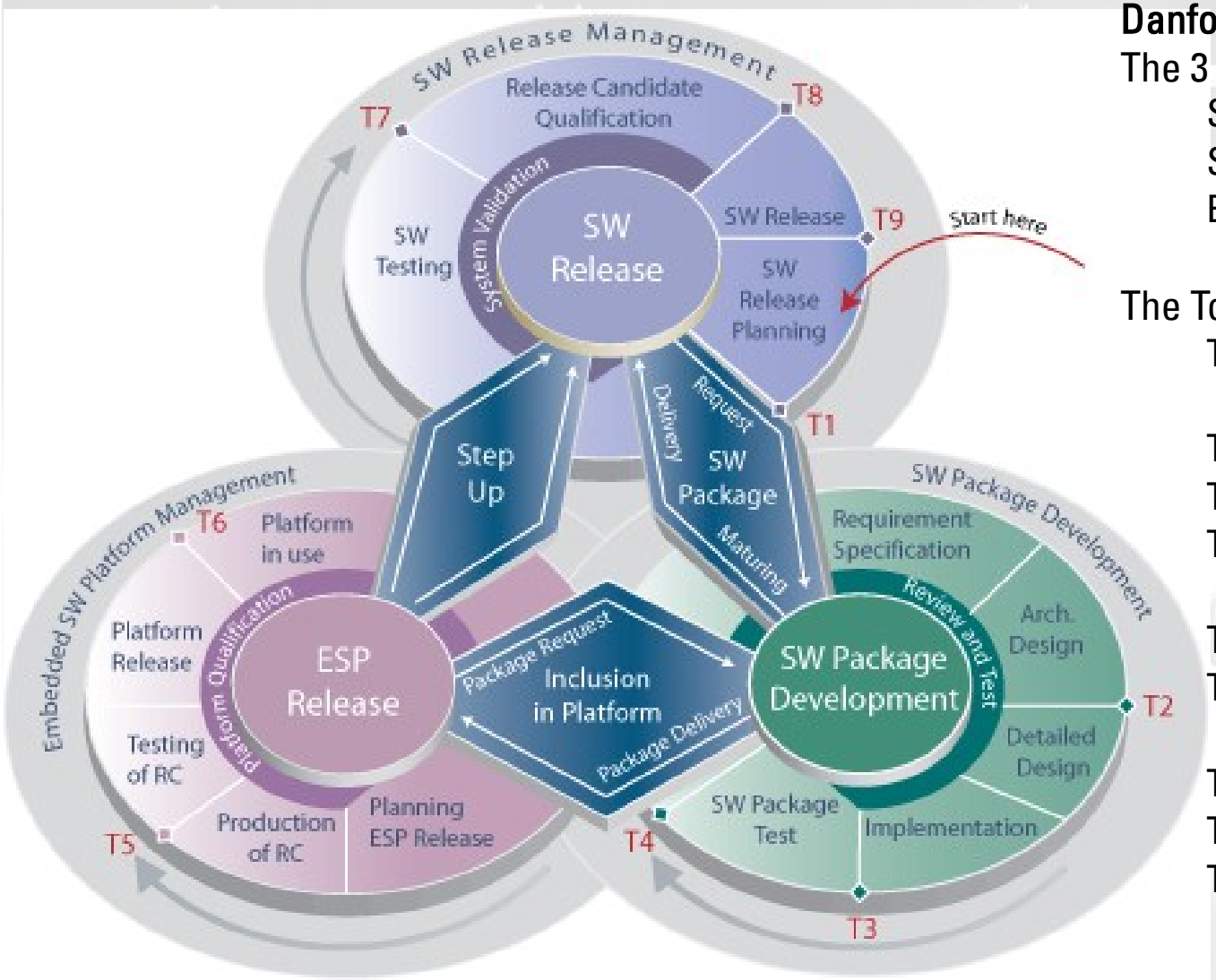
FC-302

Product Code Asset



- SPLE project (2005-2006)
- Bottom-Up approach
- SPL in products (2006-)
- 80/20% on 13 products
- Feature model
- Code unification
- Database unification

Process



Danfoss Drives SPL-Process

The 3 Circles

- SW Release cycle
- SW Package cycle
- ESP release cycle

The Toll Gates

- T1 – Release Planning is in place
- T2 – Arch design acceptable
- T3 – Implementation acceptable
- T4 – Test & platform elements acceptable
- T5 – ESP Release Candidate available
- T6 – ESP Official Release available
- T7 – Planned SW Testing completed
- T8 – Final Release Candidate Approved
- T9 – Official SW Release is completed

Summary

Avoid Variability

Start Small

Improve Stepwise

Look for Quick ROI

Involve SPL Experience

More:

Danilo Beuche
danilo.beuche@pure-systems.com
www.pure-systems.com