

# Module Product Families and Generic Developments

by *Gerrit Muller* Embedded Systems Institute  
e-mail: `gerrit.muller@embeddedsystems.nl`  
`www.gaudisite.nl`

## Abstract

This module addresses product families and generic developments.

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Embedded Systems  
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# Product Families and Generic Aspects

by *Gerrit Muller* Buskerud University College

e-mail: `gerrit.muller@embeddedsystems.nl`

`www.gaudisite.nl`

## Abstract

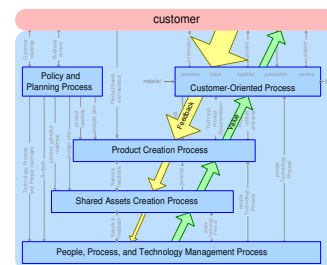
Most products fit in a larger family of products. The members of such a product family share a lot of functionality and features. It is attractive to share implementations, designs et cetera between those members to increase the efficiency of the entire company.

In practice many difficulties pop up when product developments become coupled, due to the partial developments which are shared. This article discusses the advantages and disadvantages of a family approach based on shared developments and provides some methods to increase the chance on success.

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version: 2.3



# Typical Examples of Generic Developments

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Platform

Common components

Standard design

Framework

Family architecture

Generic aspects, functions, or features

Reuse

Products (in project environment)

# Claimed Advantages of Generic Developments

Reduced time to market	building on shared components
Reduced cost per function	build every function only once
Improved quality	maturing realization
Improved reliability	
Improved predictability	
Easier diversity management	modularity
Increases uniformity	less learning
Employees only have to understand one base system	
Larger purchasing power	economy of scale
Means to consolidate knowledge	
Increase added value	not reinventing existing functionality
Enables parallel developments of multiple products	
“Free” feature propagation	product-to-product or project-to-project

# Experiences with reuse, from counterproductive to effective

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## bad

longer time to market  
high investments  
lots of maintenance  
poor quality  
poor reliability  
diversity is opposed  
lot of know how required  
predictable too late  
dependability  
knowledge dilution  
lack of market focus  
interference  
but integration required

## good

reduced time to market  
reduced investment  
reduced (shared) maintenance cost  
improved quality  
improved reliability  
easier diversity management  
understanding of one base system  
improved predictability  
larger purchasing power  
means to consolidate knowledge  
increase added value  
enables parallel developments  
free feature propagation

# Successful examples of reuse

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homogeneous domain

cath lab  
MRI  
television  
waferstepper

hardware dominated

car  
airplane  
shaver  
television

limited scope

audio codec  
compression library  
streaming library

# Limits of successful reuse

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struggle with integration/convergence with other domains

TV: digital networks and media  
cath lab: US imaging, MRI

poor/slow response on paradigm shifts

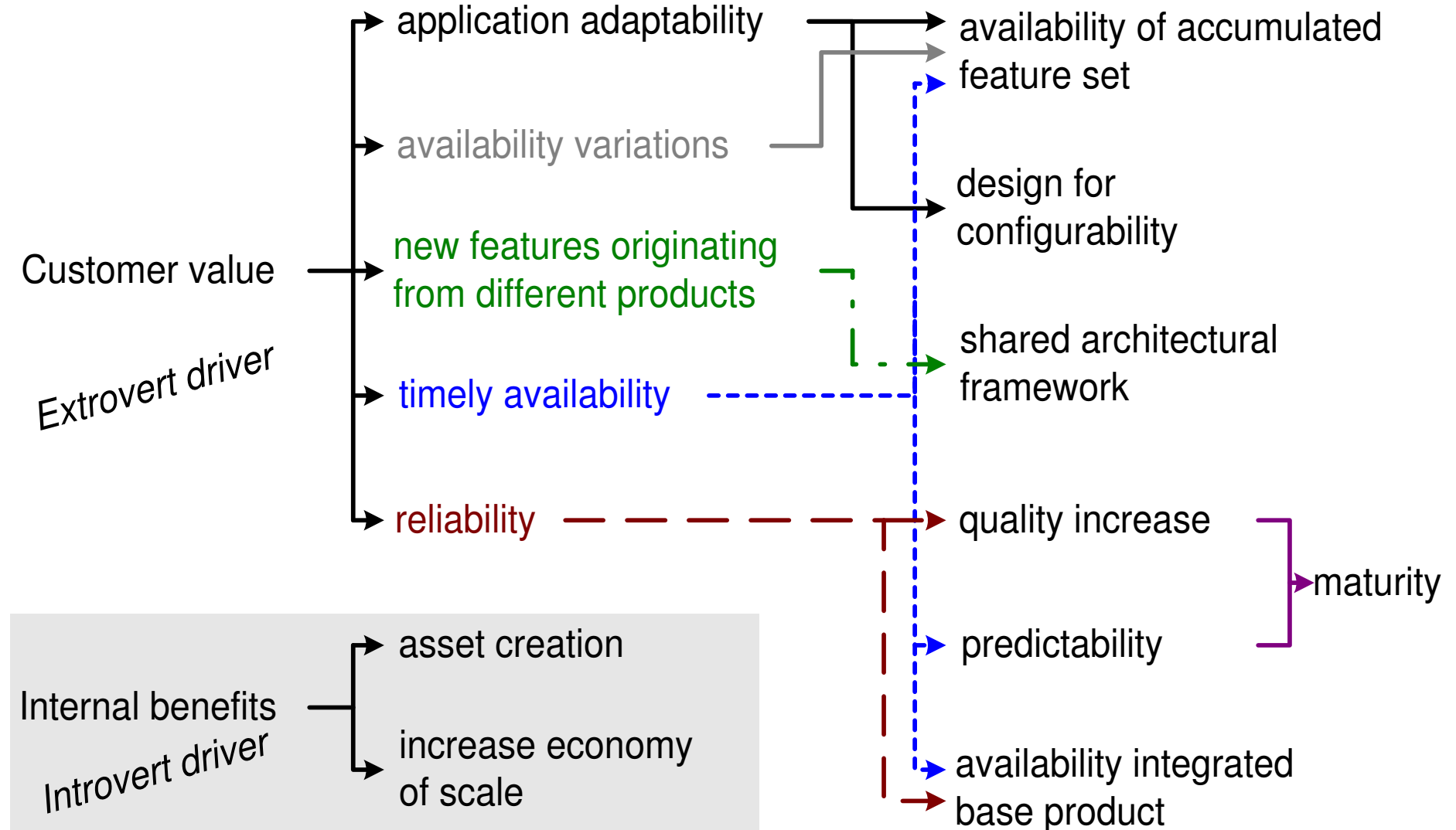
TV: LCD screens  
cath lab: image based acquisition control

software maintenance, configurations, integration, release

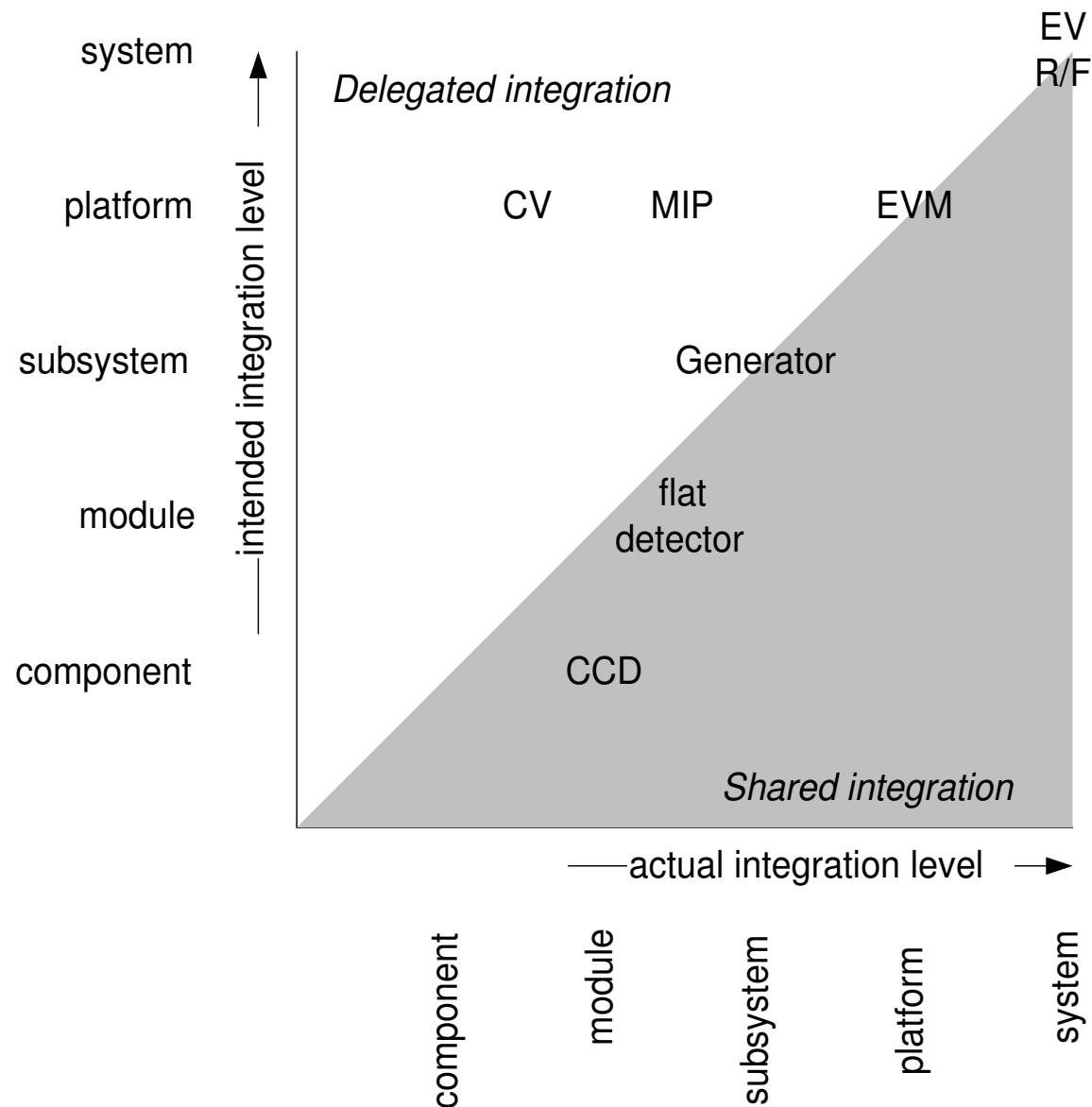
MRI: integration and test  
wafersteppers: number of configurations

*how to innovate?*

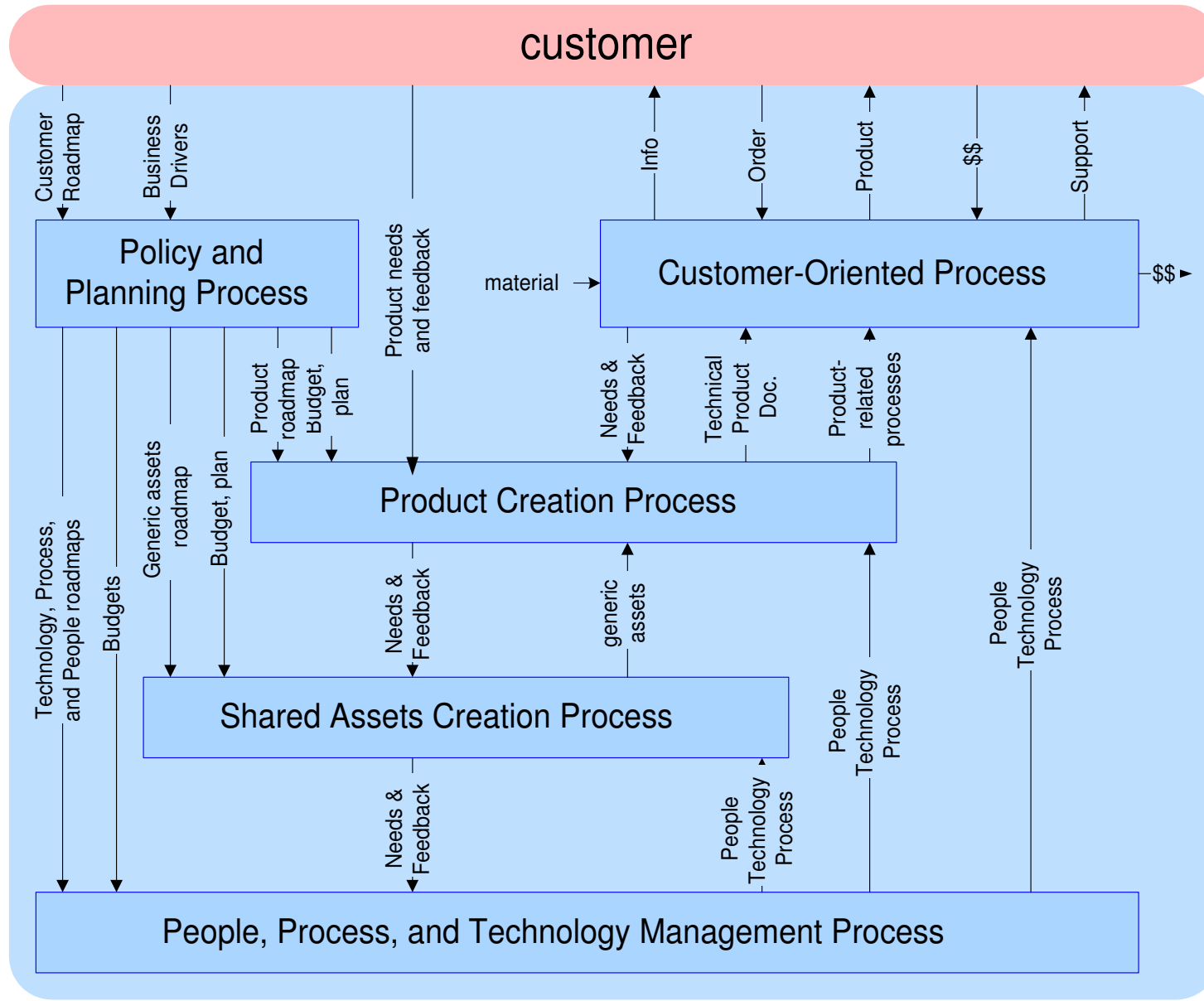
# Drivers for Generic Developments



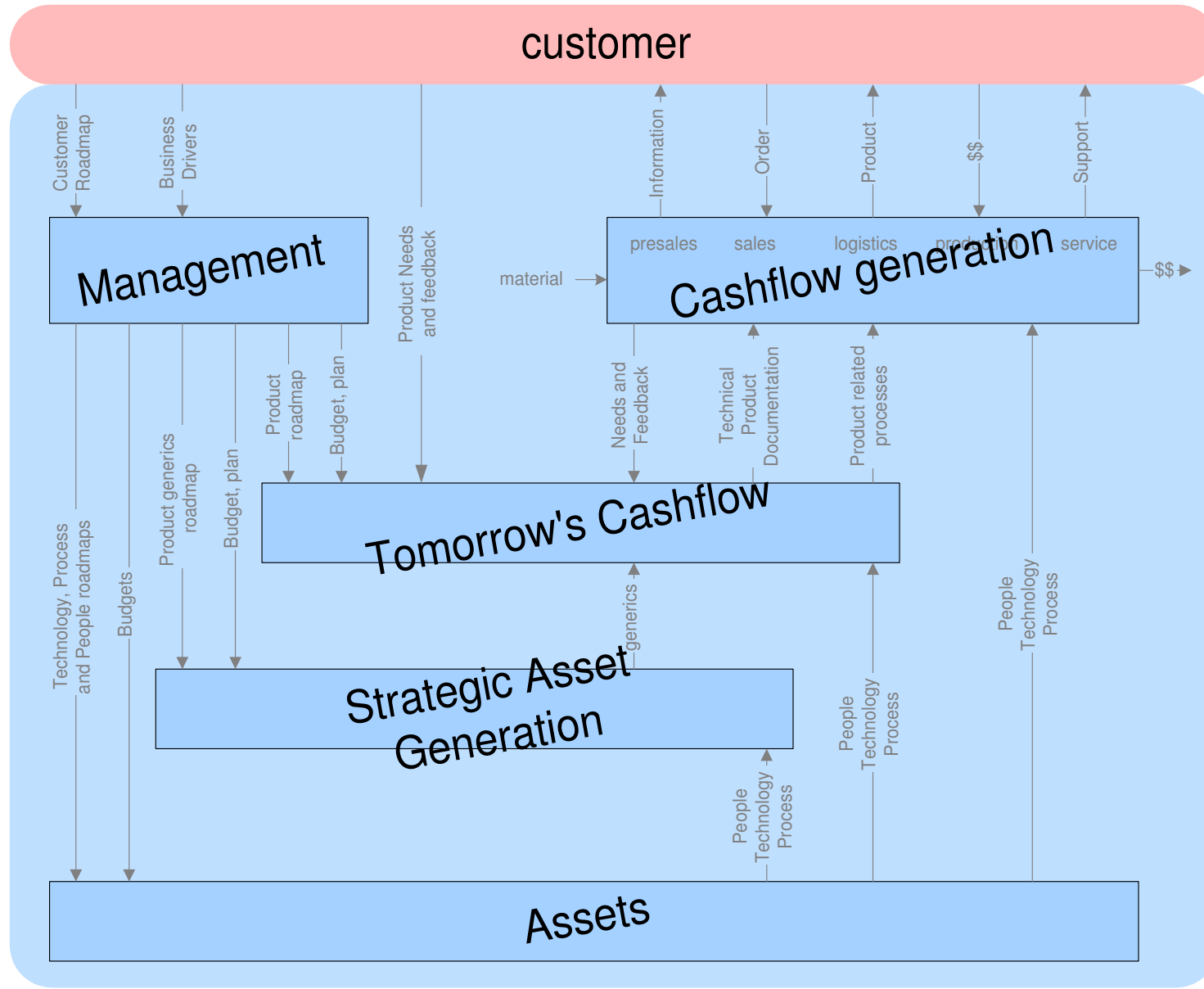
# Granularity of generic developments shown in 2 dimensions



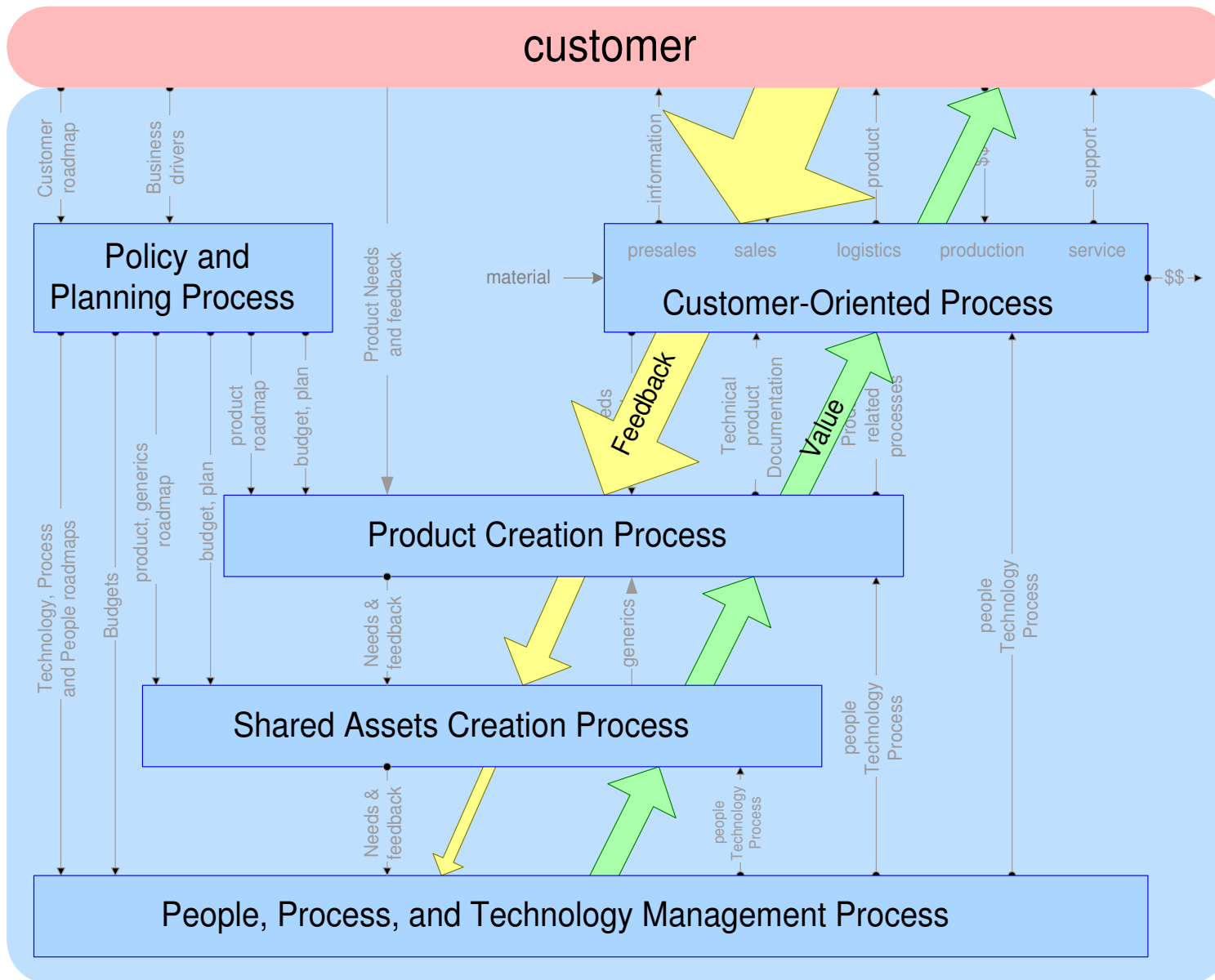
# Modified Process Decomposition



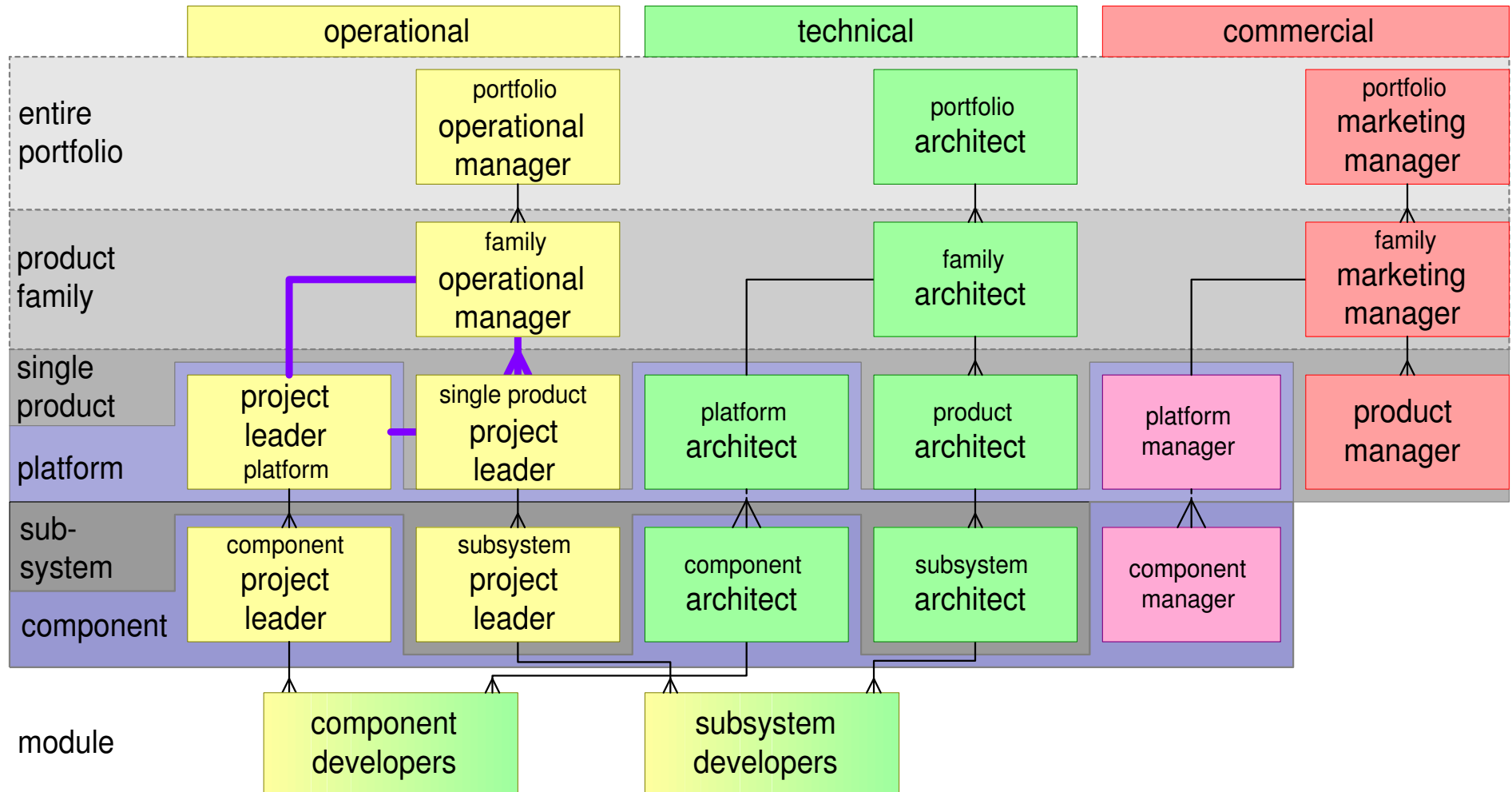
# Financial Viewpoint on Process Decomposition



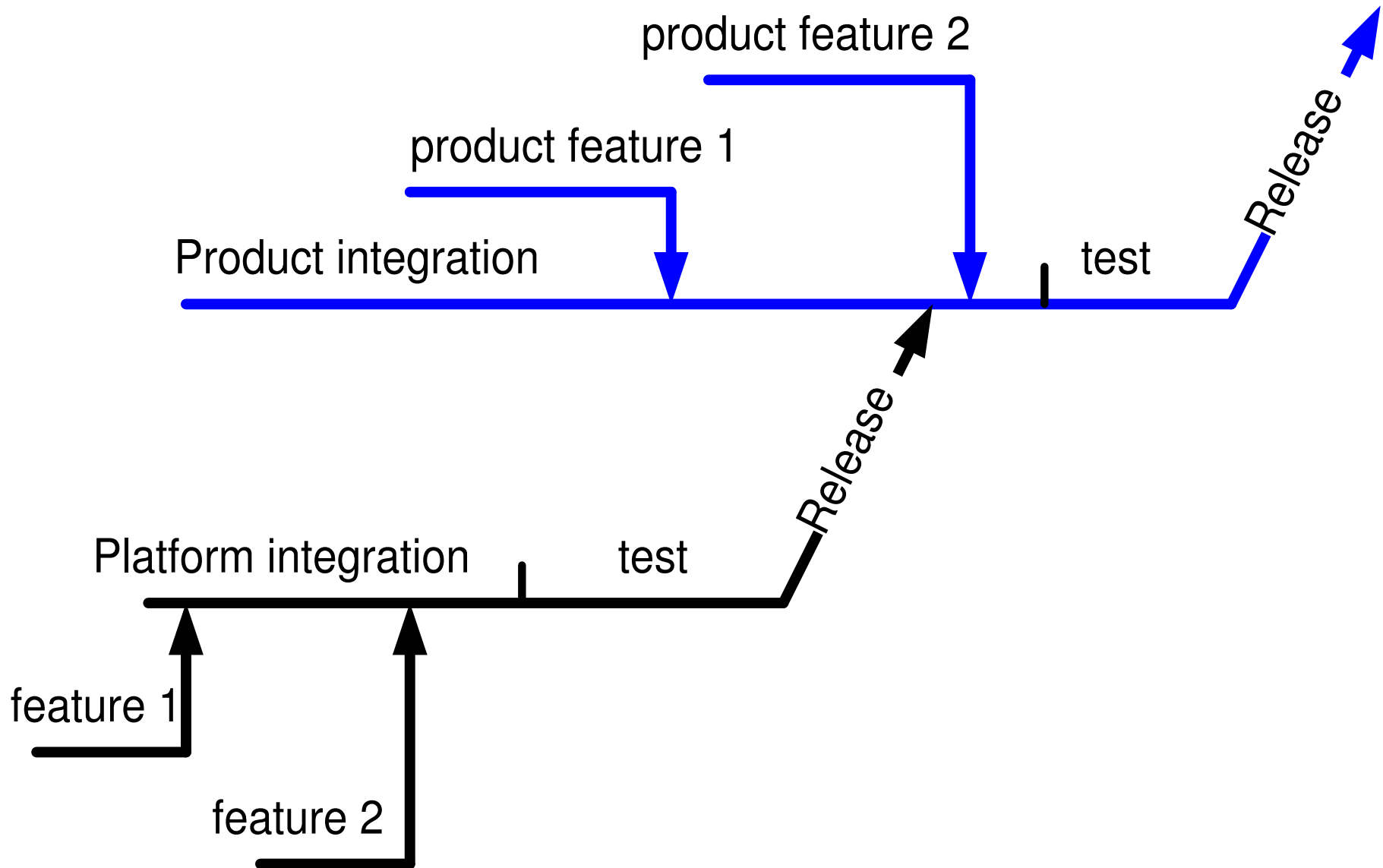
# Value and Feedback Flow



# Modified Operational Organization PCP



# Propagation Delay Platform Feature to Market



# Sources of Failure in Generic Developments

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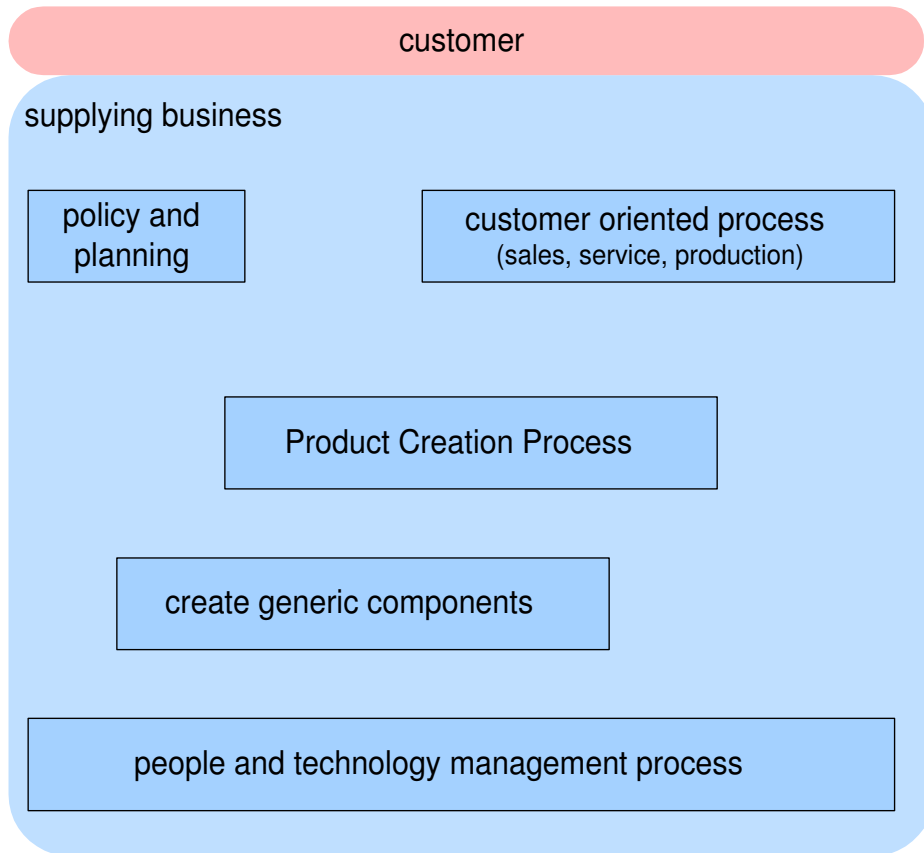
## *Technical*

- Too generic
- Innovation stops  
(stable interfaces)
- Vulnerability

## *Process/People/Organization*

- Forced cooperation
- Time platform feature to market
- Unrealistic expectations
- Distance platform developer to customer
- No marketing ownership
- Bureaucratic process (no flexibility)
- New employees, knowledge dilution
- Underestimation of platform support
- Overstretching of product scope
- Nonmanagement, organizational scope increase
- Underestimation of integration
- Component/platform determines business policy
- Subcritical investment

# Models for Generic Development



lead customer

direct feedback  
too specific?

carrier product

product feedback  
product specific?

platform

feedback problem  
too generic

technology push

no feedback

# Exercise Generic Developments

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What are the top 3 benefits for your product family or generic development?

What are the top 3 disadvantages?