



# Market-oriented Variant Management (*position paper*)

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Mit dem Thema Konfiguration ist Thorsten Krebs seit seinem Informatik-Studium eng verbunden. Über eine Diplomarbeit an der Uni Bremen und eine Dissertation an der Uni Hamburg ging sein Weg im Jahr 2009 zur encoway GmbH. Seine Tätigkeit bei encoway ist im Wesentlichen die Beratung im Umfeld der Themen Variantenmanagement, Modularisierung und Standardisierung sowie Analyse und Optimierung der Geschäftsprozesse Produktentstehung, Angebotserstellung und Auftragsabwicklung.



**Christoph Ranze**

*Managing Director, encoway GmbH*

Christoph Ranze ist Gründer und Gesellschafter der encoway. Nach seinem Informatikstudium begann seine Karriere bei der IBM Deutschland. Als wissenschaftlicher Mitarbeiter wechselte er an die Uni Bremen und baute dort später das Technologie-Zentrum Informatik (TZI) mit auf. Im Jahr 2000 gründete er mit Unterstützung der Lenze-Gruppe das heutige Unternehmen encoway.

Als Geschäftsführer verantwortet er die auf Nachhaltigkeit ausgelegte Wachstumsstrategie des Unternehmens.

Start with the “why” ...

*Megatrend:*  
Individualization

### Megatrend: Individualization

#### Megatrend: Individualization

- Expressing individuality is a natural desire
- Trends are rather short-lived

#### Supported by these facts

- Receiving product information is easier than ever before
- The digital product representation enables comparison

#### Leading to:

- Increasing product diversity
- Decreasing lot size *per variant*



*Megatrend:*  
Individualization

drives

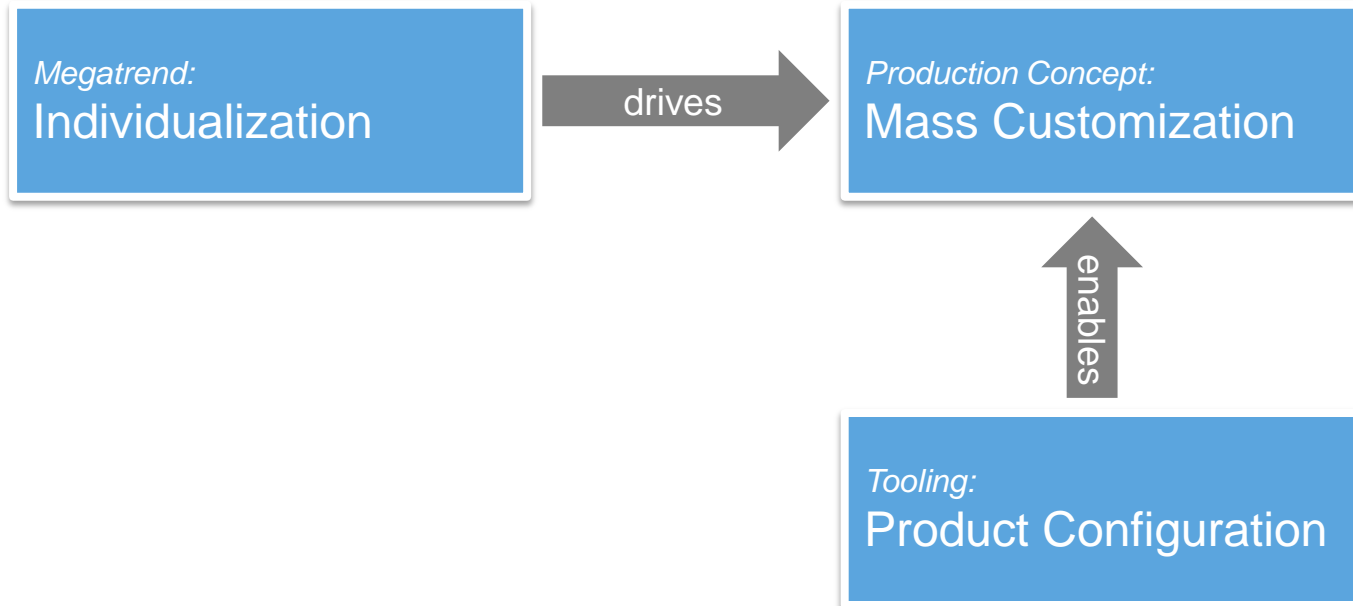
*Production Concept:*  
Mass Customization

### Mass Customization

- Is a production concept that combines
  - Mass production benefits (e.g. scale effect, automation, ...) with
  - Product individualization (by allowing customer-specific changes)

### Leading to

- *customer-individual mass production*





*Megatrend:*  
Individualization

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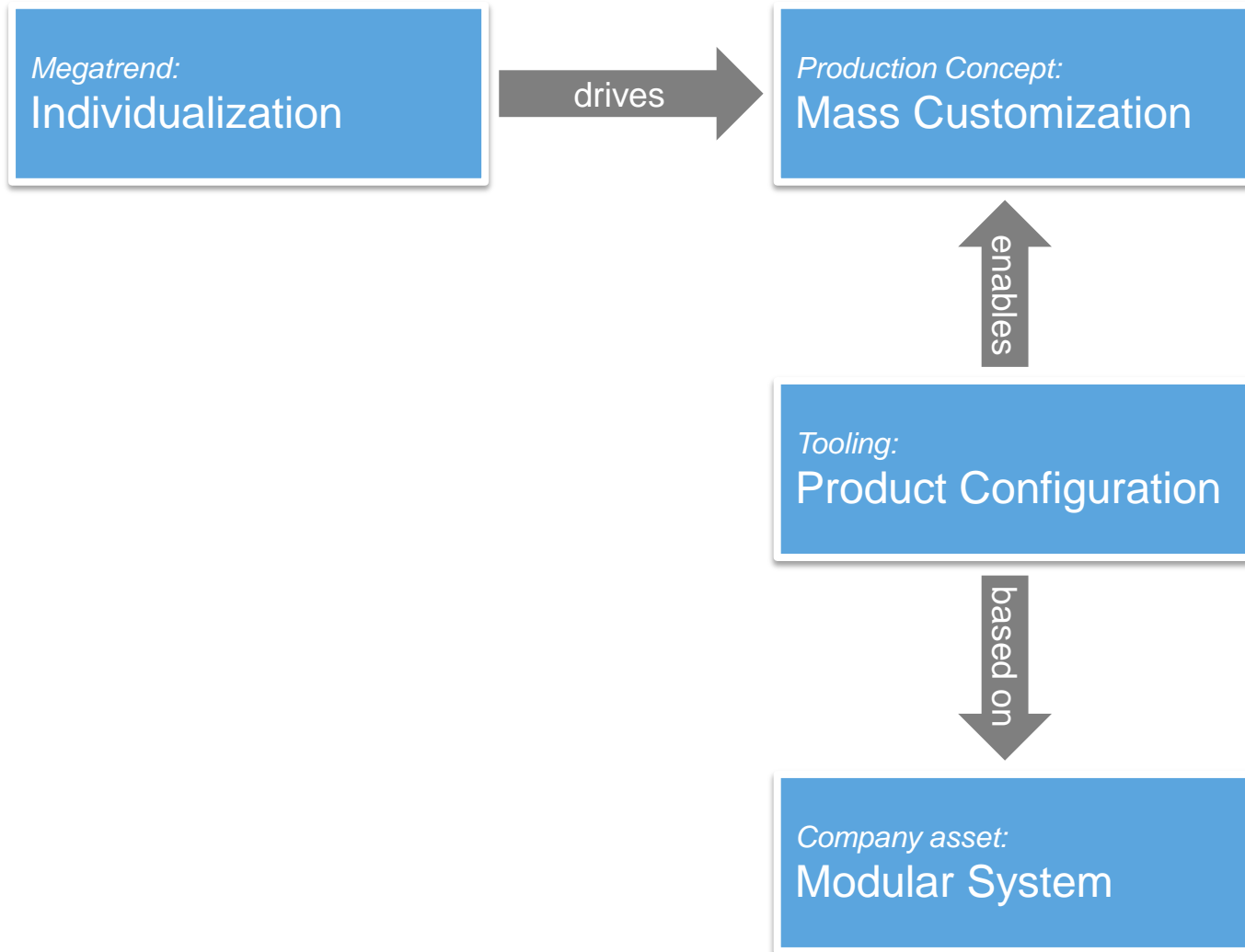
*Production Concept:*  
Mass Customization

### Product configuration

- Is seen as the key enabler to communicate product variety into the market.

### The task of composing a product

- Is based on a set of pre-defined modules
- *The modular system*



*Megatrend:*  
Individualization

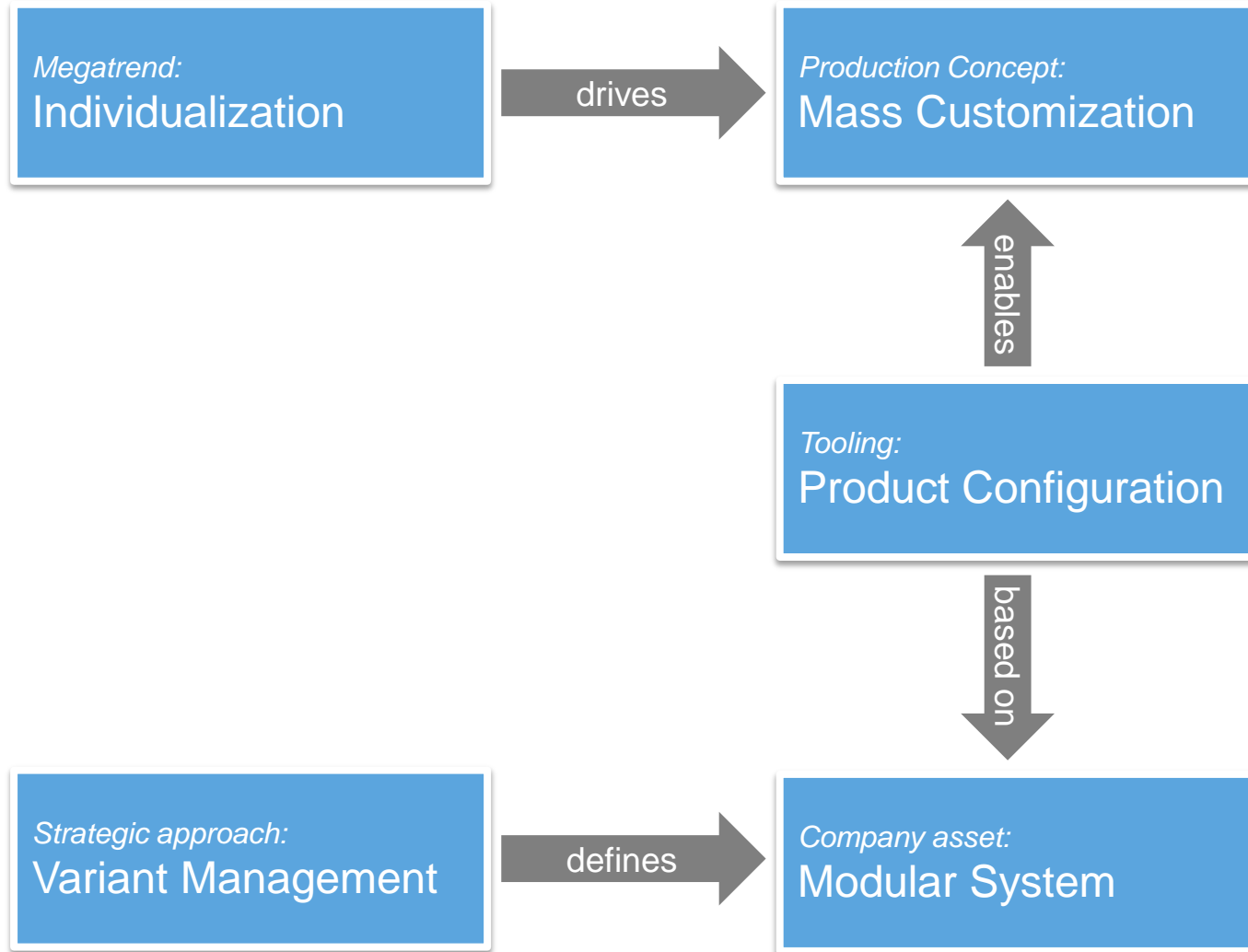
drives

*Production Concept:*  
Mass Customization

### Modular system

- A set of pre-defined components and assemblies that are recurring over given product variants
- Modularity is expressed by defining reusability between modules (in terms of interfaces)

*Company asset:*  
Modular System



*Megatrend:*  
Individualization

drives

*Production Concept:*  
Mass Customization

**Variant management** is a holistic approach to

- Control and optimize
  - Product diversification
  - With respect to production costs
  - And market strategy

**Outer variety vs. inner variety**

- Optimizing the number of product variants that can be manufactured / offered
- Reducing the product development and manufacturing costs

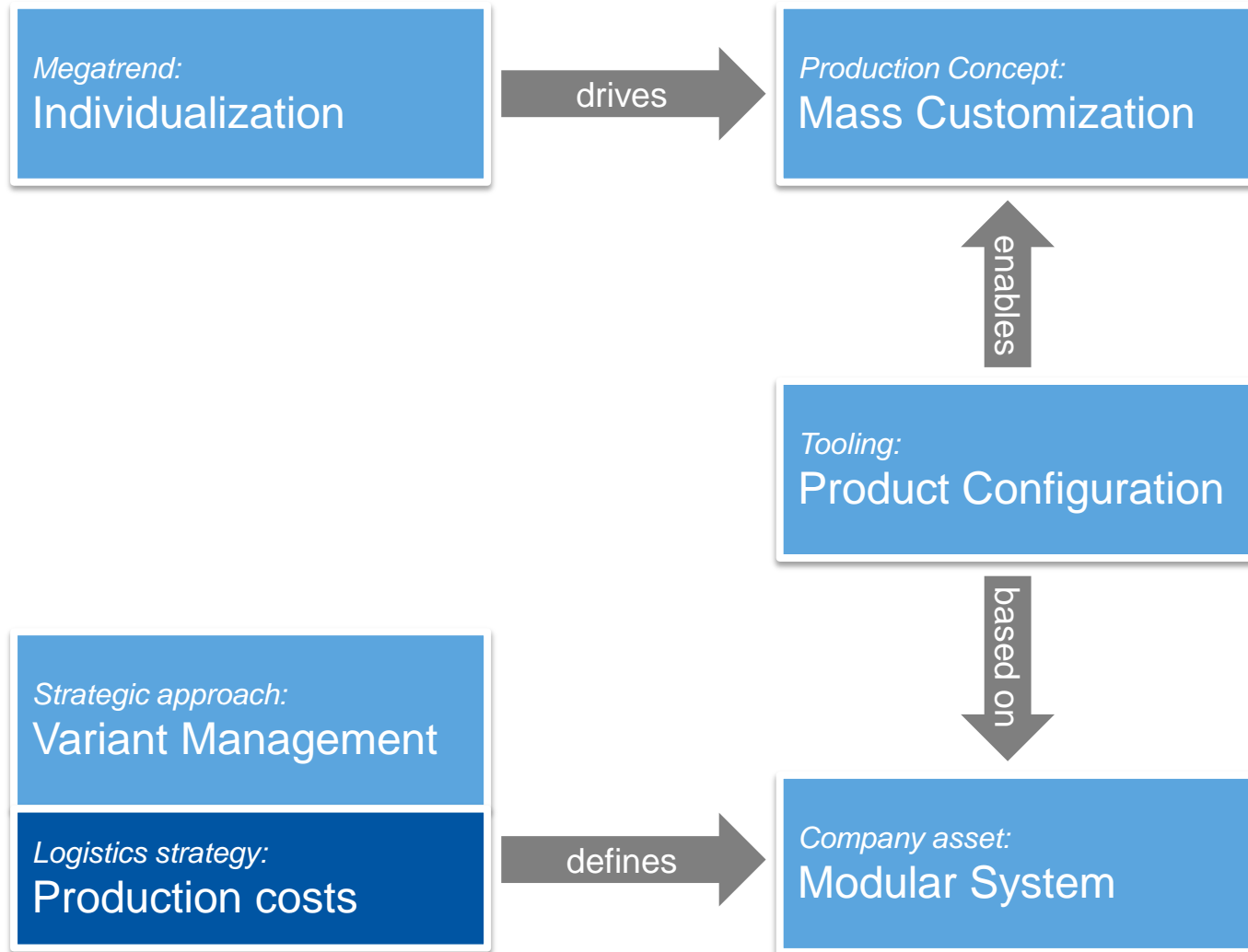
*Strategic approach:*  
Variant Management

defines

*Company asset:*  
Modular System

# Motivation

## Variant management – the logistics view



*Megatrend:*  
Individualization

drives

*Production Concept:*  
Mass Customization

**Variant management** stems from the area of product design, engineering and production

- Separating development and manufacturing of recurring modules (→ *order-neutral*) from
- Manufacturing of products that are based on these modules (→ *order-specific*)

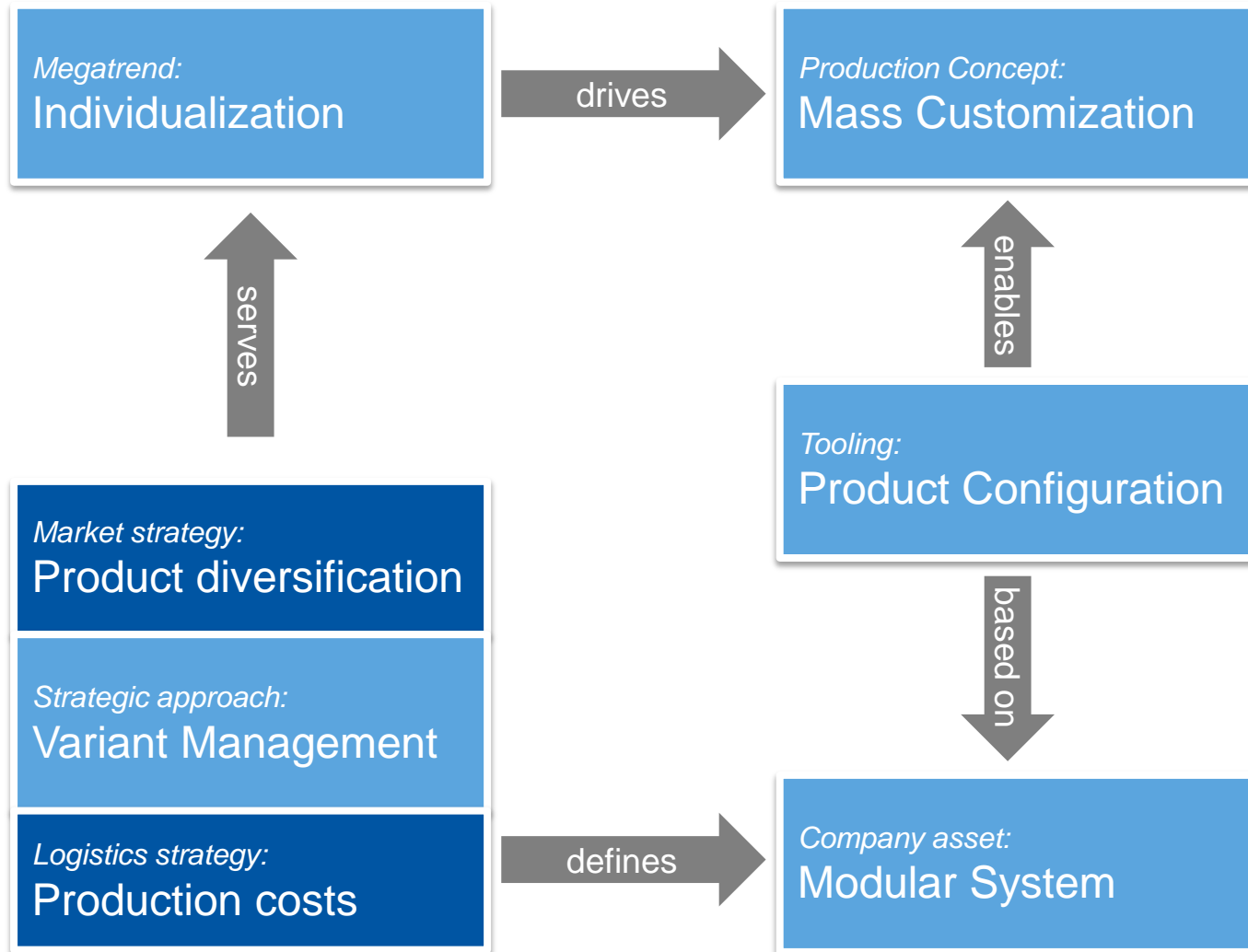
*Logistics strategy:*  
Production costs

defines

*Company asset:*  
Modular System

# Motivation

## Variant management – the sales view





*Megatrend:*  
Individualization

drives

*Production Concept:*  
Mass Customization

### Scoping product diversification

- Defining the right amount of product variants is a major activity for effective sales.
- Optimal product diversification must be based on the market's demand!

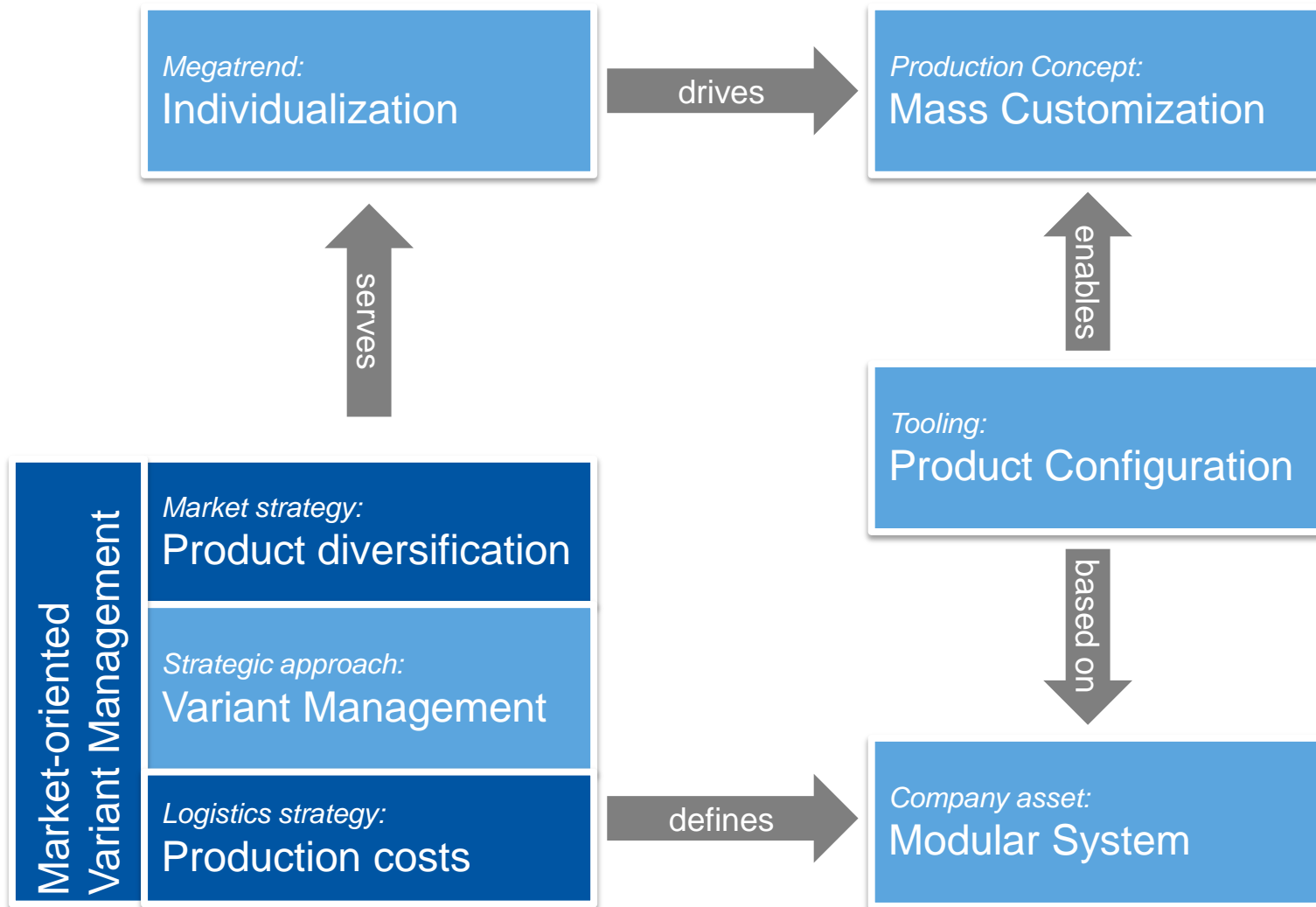
*Logistics strategy:*  
Production costs

defines

*Company asset:*  
Modular System

# Motivation

## Market-oriented variant management



*Megatrend:*  
Individualization

drives

*Production Concept:*  
Mass Customization

**Market-oriented variant management** uses the idea of modular strategy on another level:

- Between sales
  - Optimizing the scope for product diversification
  - Managing the outer variety (from the sales view)
- and logistics
  - Optimizing the scope of modularization
  - Managing the inner variety (from the logistics view)

Market-oriented  
Variant Management

*Logistics strategy:*  
Production costs

defines

*Company asset:*  
Modular System

What's the relation to...  
...business economics?

### ***Economies of scale* describe**

- ▶ Reducing engineering and production costs per unit
- ▶ Spreading fixed costs over more units of output
- ▶ This is the base principle of *mass production*!

### ***Economies of scope* describe**

- ▶ The common and recurrent use of modules
- ▶ Lowering average costs by sharing production costs or recurring resources over a variety of products
- ▶ *Product diversification* is an efficient economic activity!



The key idea behind:  
market-oriented  
variant management

# Market-oriented variant management

## The logistics view



**Focus on product design, engineering, manufacturing, supply-chain management, shipping, ...**

- ▶ Optimizing the scope of modularization
- ▶ Benefit from both
  - *Economies of scale* (producing recurring modules in large scales)
  - *Economies of scope* (sharing production costs or other recurring resources over a variety of products)



This is the “**classic**” variant management approach.

### Focus on product management and sales / marketing

- ▶ Optimizing the scope of product diversification
- ▶ The simple case:
  - Managing a *product portfolio*
- ▶ The complex case:
  - Selling not only single components, but selling extra benefit: *product combinations* and *systems*
  - Supporting the customer in his *buying decision*
  - *Solution configuration*: hiding technical details from the customer, talking in “his language”



Offering **exactly those product variants** that a specific market segment desires – **not less but also not more!**



### European component manufacturers are under pressure in order to compete with Asian low-price mass production

#### ► Component manufacturers turn into system vendors

- *Components* are products that are not functional as such but that are to be used in larger contexts
- The component itself has no direct benefit
- A composition builds up functionality with extra benefit

#### ► Systems may consist of discrete and configurable products

- *Discrete products* are non-configurable products without customization options
- *Configurable products* are customizable; typically based on a modular strategy



### How can a customer decide on functionality that is made up by more than one component / product?

#### ► Challenge of advertising, configuring and selling systems

- System compositions have extremely high variance
- They are hardly “graspable”
- Advertising such a composition is only possible by focusing on the functionality

#### ► Support the customer in the buying decision process

- Customers need guidance
- The buying decision needs to “feel good”



# Market-oriented variant management

## The sales view – solution configuration



**Customers often do not know which products they need...**

**...but they do know the application problem for which they need a solution!**

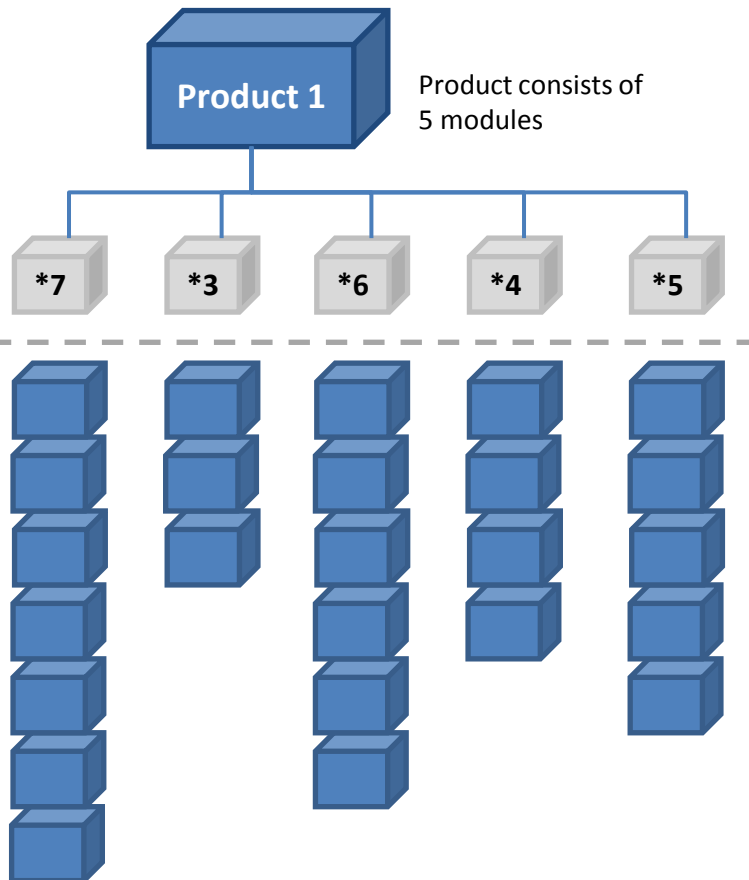
- ▶ *Solution configuration* is one of the major improvements in market-oriented variant management!
- ▶ The process:
  - Starting the configuration process with a problem definition
  - Customer decides on *application* characteristics, not on technical details
  - Selecting the best-fitting product and inferring technical product characteristics is hidden from the customer



# Market-oriented variant management

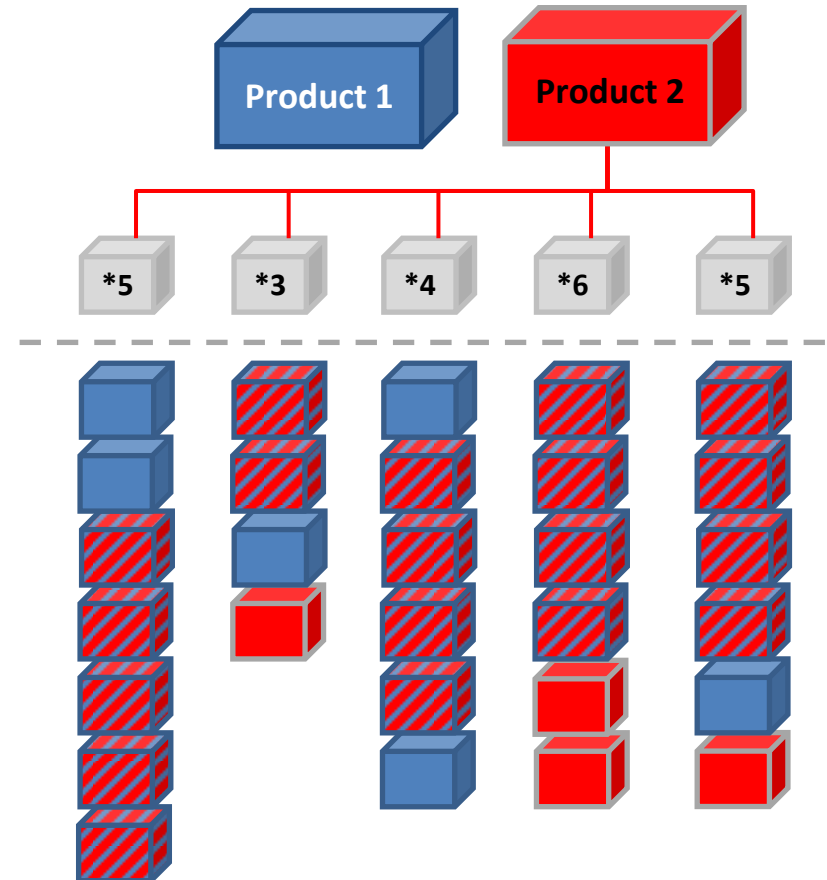
Interplay between the logistics view and the sales view

Modular system = 2.520 variants



Modular system = 25 modules

Modular system = 4.320 variants  
(2.520 + 1.800)



Modular system = 29 modules

**Obviously, both scoping activities influence one another!**

- ▶ Reducing the number of order-neutral modules has impacts on the potential product variety
- ▶ Broadening the variety of products has impacts on the underlying modular system

**Nevertheless it is important that both scoping activities are addressed individually!**

- ▶ Scoping modularization affects the efficiency
  - Being able to provide the expected outcome, i.e. the products, with the least possible use of resources.
- ▶ Scoping product diversification affects the effectiveness
  - Being able to provide exactly those products that the market desires; at the right time, the right place and the right price.



Change...  
...is a matter of attitude!

# Capability of Change

The need to communicate a change's potential

**Variant management is an approach to control and optimize product diversification – hence it significantly influences business processes, among others:**

- ▶ New product development
- ▶ Quote generation
- ▶ Order processing

**These business processes are crucial for companies and are typically not changed unless really necessary**

- ▶ The decision to change a business process needs management-ready analysis and presentation of the change's potential!



***Efficiency of process describes how well the things are done right.***

Criteria include but are not limited to:

- ▶ Total processing time
- ▶ Resource utilization per unit of output
- ▶ Non-value added cost, non-value added time
- ▶ Cost of quality



**Efficiency of process** describes how well the things are done right.

Criteria include but are not limited to:

- ▶ Total process
- ▶ Resource
- ▶ Non-value
- ▶ Cost of quality

**Managing the logistics view** focuses on efficiency:

*optimizing the scope of modularization*

- Cost reduction
- Most important internally
  - Relates to the business processes
    - *New product development* and
    - *Order processing*
  - Setting up required tools for logistics processing, quote generation and order processing

***Effectiveness* of a process describes how the right things are done.**

Outlining customers' expectations and needs in detail and converting them into measurable targets is hard to set up because customer expectations are not readily available or clearly specified!

- ▶ Product quality
- ▶ Frequency of new products or updates
- ▶ Quality of service
- ▶ Overall customer experience

**Effectiveness** of a process describes how the right things are done.

Outlining customers' expectations and needs in detail and converting them into a process is a challenge because customers' needs are often not clearly specified. **Managing the sales view** focuses on effectiveness: *finding the right scope for product diversification*

- ▶ Product diversity
- ▶ Frequency of change
- ▶ Quality of change
- ▶ Overall customer satisfaction

- Selling more products
- Most important externally
  - Relates to the business process
    - *Quote generation*
  - Relates to marketing and sales strategies
  - Influences a customer's buying decision

### Some first thoughts

- |  |                                 |
|--|---------------------------------|
| ▶ Doing exactly one thing in a perfect way               | 100% efficiency                 |
| ▶ Doing the same thing with half the efficiency          | 50% efficiency                  |
| ▶ Doing one perfectly right thing                        | 100% effectiveness              |
| ▶ Doing one thing that is half as effective              | 50% effectiveness               |
| ▶ Doing a perfectly right thing with half the efficiency | 50% overall process performance |
| ▶ And vice versa...                                      |                                 |



Both, **efficiency and effectiveness need to be measured and combined** in order to give input for an overall process measurement.

## Some first thoughts

- ▶ The ideal performance of a process is assumed to be 100%  
*(we do the right things and we do them perfectly right)*
- ▶ Nevertheless, a desired target state may be less than 100%
  - E.g. reaching that goal is too expensive
  - A viable goal may be “pareto-optimal” 80/20

## The potential that a change can raise

- ▶ Distance between the current state and the target state
- ▶ How can a management-ready presentation look like?
  - Low potential → low willingness to invest
  - High potential → investments despite risks along the way



Wrapping it up...  
...and looking ahead!

### Market-oriented variant management is a combination of

- ▶ Logistics view (i.e. “classic” variant management)
- ▶ An additional sales view
- ▶ Both complement one another
- ▶ Relation to business economics

### First ideas on

- ▶ Measuring business processes
- ▶ Calculating the potential of a change



# Conclusion and Future Work

Yet a long way to go...

## Future work should focus on

- ▶ Fully understanding the relation and interplay between
  - product configuration,
  - mass customization,
  - variant management and
  - business economics
- ▶ Presenting the potential in meaningful numbers
  - Measuring efficiency and effectiveness
  - Doing this for the current state and the target state
  - Defining a metric for presentation





Feedback welcome!

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