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Innovation Management and New Product Development

The New Product Development Process: Models and phases

"The majority of products in most companies are cash traps. They will absorb more money forever than they will generate."

Innovation and New Product Development

New product development is a funnel of a PRODUCT INNOVATION.
The new product can be:

- New to the world
- New to the market
- New to the firm (new product lines)
- Improvements and revisions of existing products
  - Cost reduction
  - Repositioning
  - Brand extensions

The new product can represent an incremental / radical / modular / architectural / design driven / disruptive innovation

It can be market pull and technology push


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Several models of NPD

- Decision-stage models
- Departmental-stage models
- Activity Stage models and Concurrent Engineering
- Cross-functional models
- Conversion-process models
- Response models
- Network models
- Outsourced

Models of new product development

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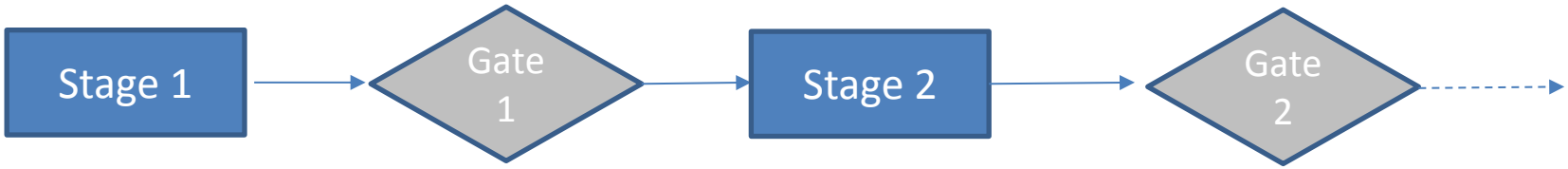
Decision-stage models

- The decision-stage models represent the NPD process as a series of decisions that need to be taken in order to progress the projects



- "In each stage, the project team executes a pre- scribed set of actions, designed to advance the project effec- tively and efficiently. This set is based on best practices, and yields a defined package of deliverables at the end of each stage.
- Each stage is preceded by a gate or go/kill decision point. Here, senior management meets with the team, and decides whether the project should proceed. Each gate has a pre- scribed list of deliverables—the information senior manage- ment needs to make the go/kill decision—and a set of go/kill and prioritization criteria, on which to base that decision. Gates are also where team leaders secure the necessary resources for driving the project forward; they get it on senior management's radar screen".

Models of new product development

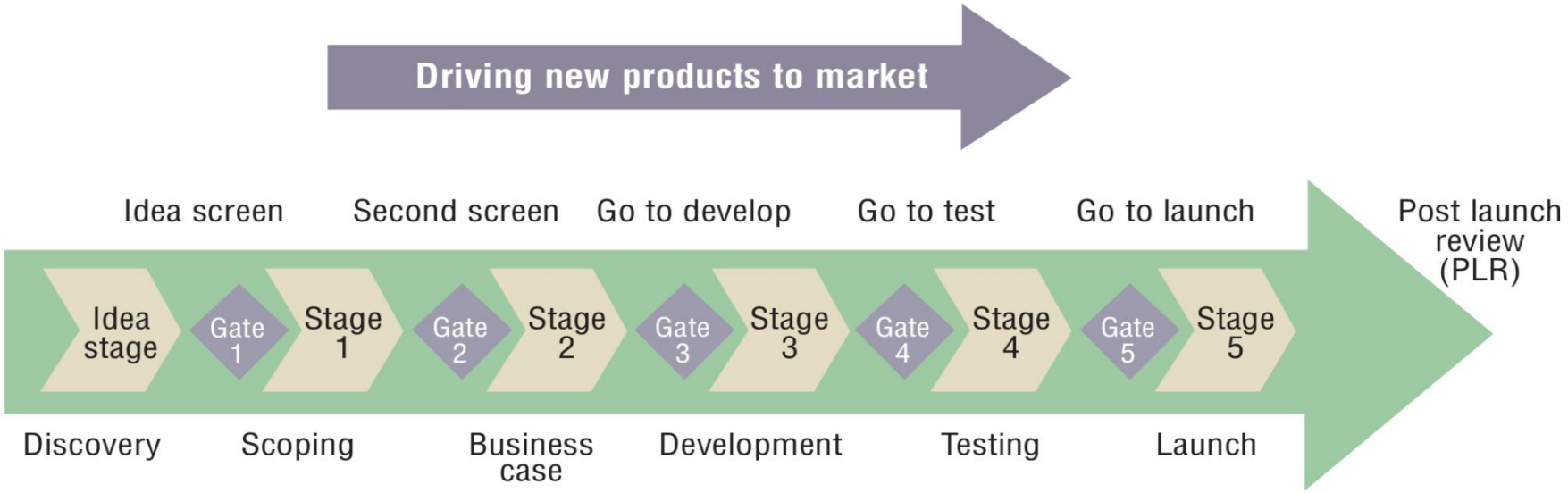
Decision-stage models

- The Cooper original stage-gate model

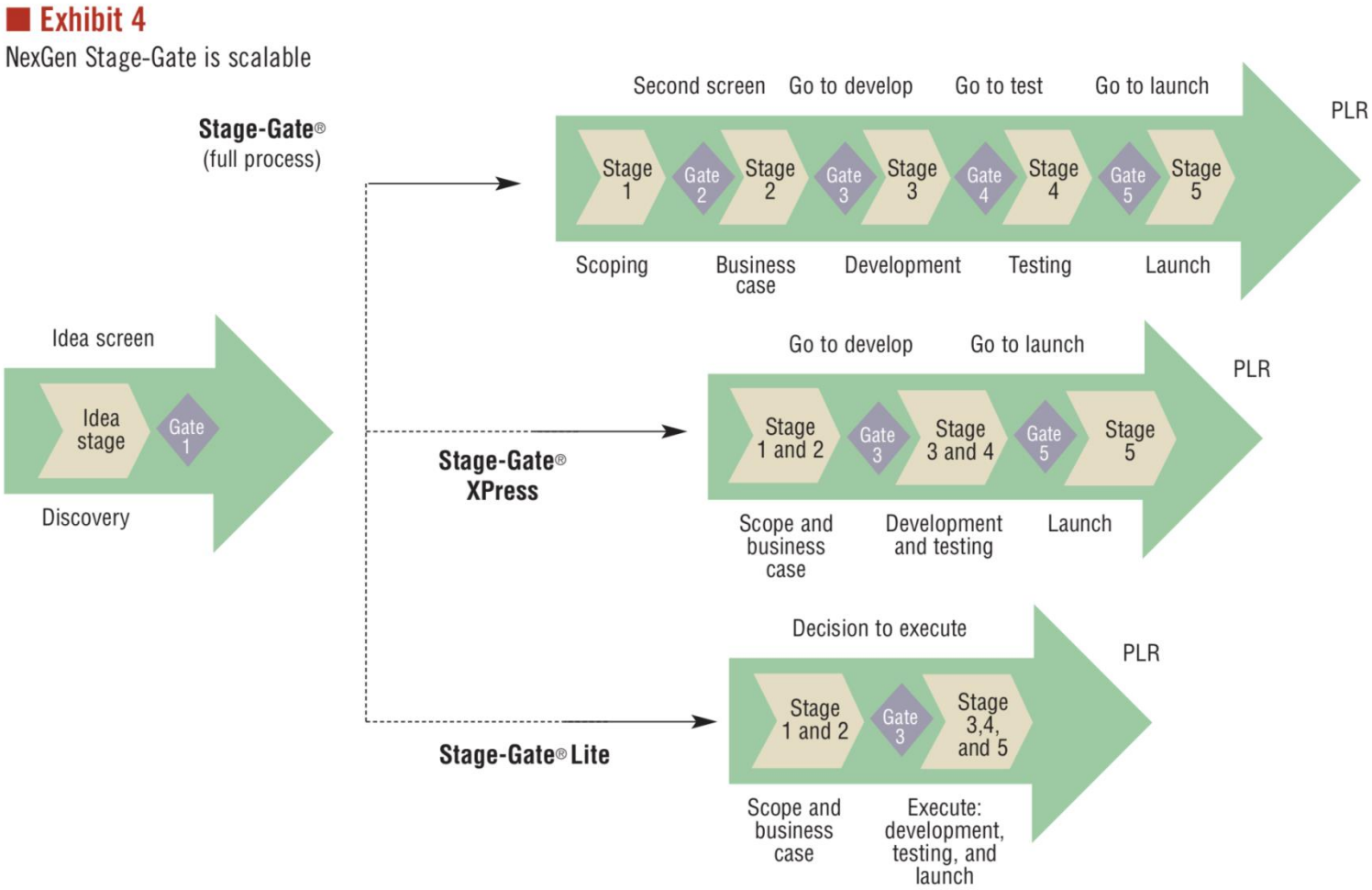
Exhibit 3

An overview of NexGen Stage-Gate:

A five-stage, five-gate framework for significant new product projects



Models of new product development



www.stage-gate.com

Models of new product development

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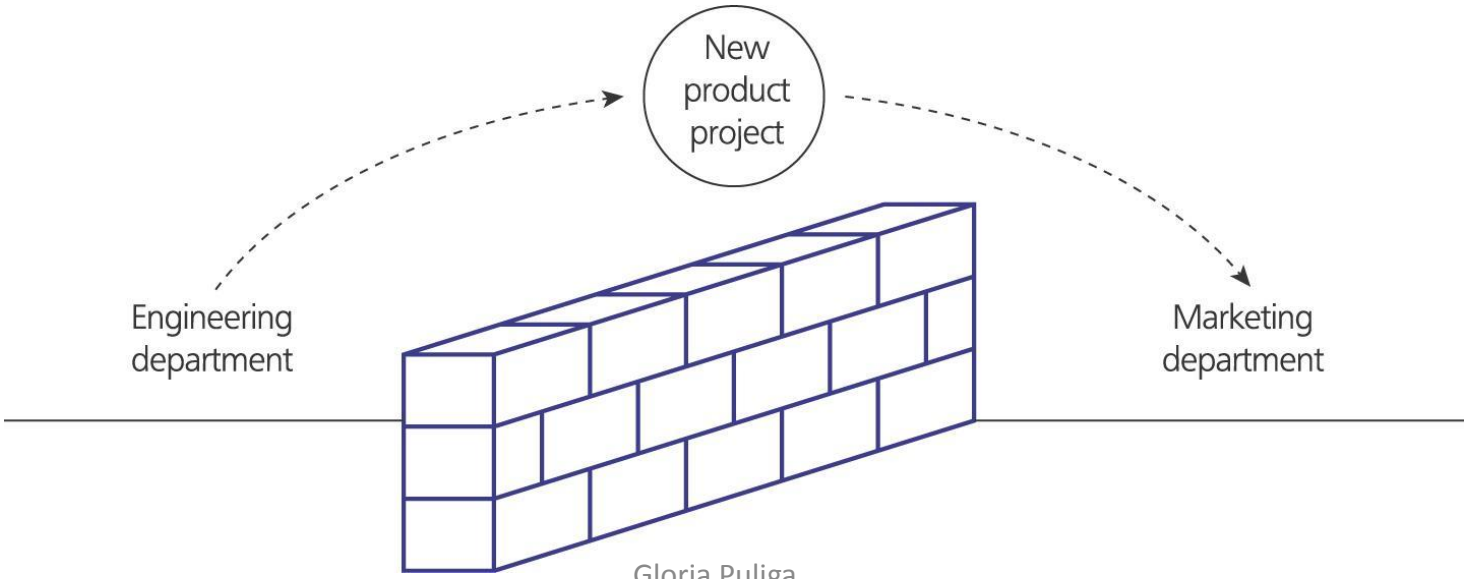
Departmental-stage model

- This is the early stage of new products development (NPD) models.
- This stage refers to the "over-the-wall" model, so called because the departments would carry out their tasks before throwing the project over the wall to the next department



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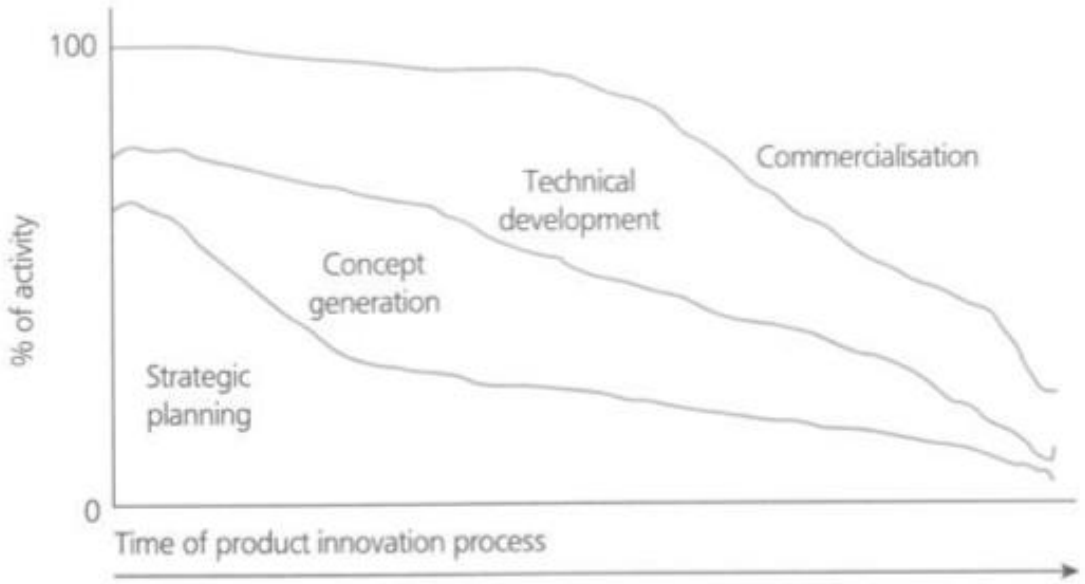
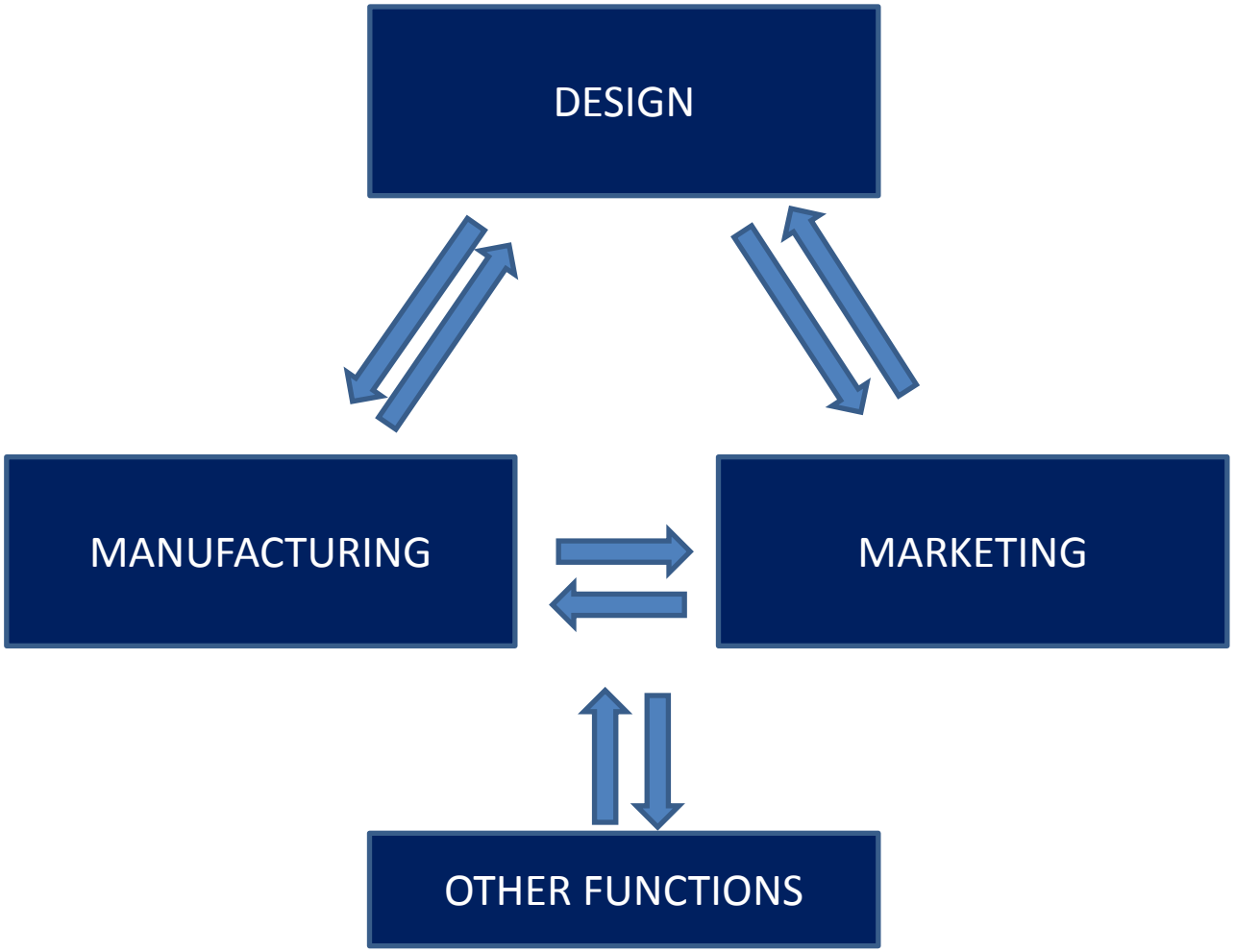
Activity-stage model and concurrent engineering

- This model is similar to the first one but they emphasise activities conducted than they provide a better representation of reality
- They facilitate the iteration of activities



Critical competecies in NPD



Marketing

- The marketing is the interface between the company and the customer.

STRATEGIC ACTIVITY

- It identifies and processes the market opportunities
- It defines the market segmentation
- It identifies the customers expectation

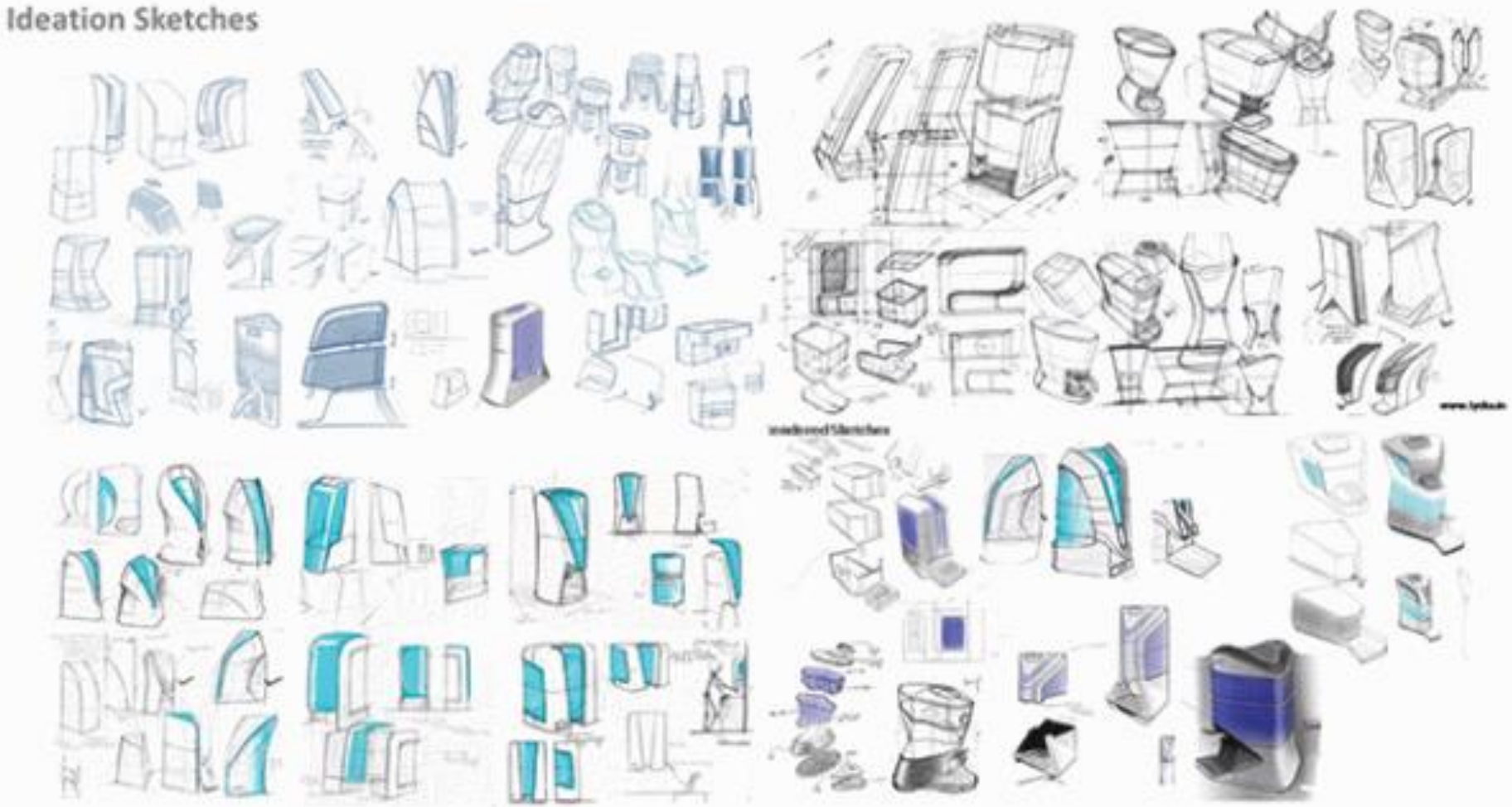
OPERATIVE ACTIVITY

- It defines and manages the communication
- It determines the price
- It planes the product launch
- It defines and managers the sales

Design

- The design searches the best option for the product considering the customers expectation.
    - It defines the product shape
    - It identifies the performances
    - It lays out the components
    - It researches the best option
    - It evaluates the functions of each component
    - It assures the best performances considering the cost limits

Design



Manufacture

- The manufacture researches the best industrial solutions considering the manufacturability, the costs and the quality.
    - It defines and optimises the productive cycle
    - It designs and manufactures the productive system
    - It defines the operational logistics
    - It evaluates the best purchases solution
    - It programs and controls the first production
    - It assures the product in the warehouse

The NPD process: phases

PRODUCT DEVELOPMENT

1. PLANNING

2. CONCEPT DEVELOPMENT

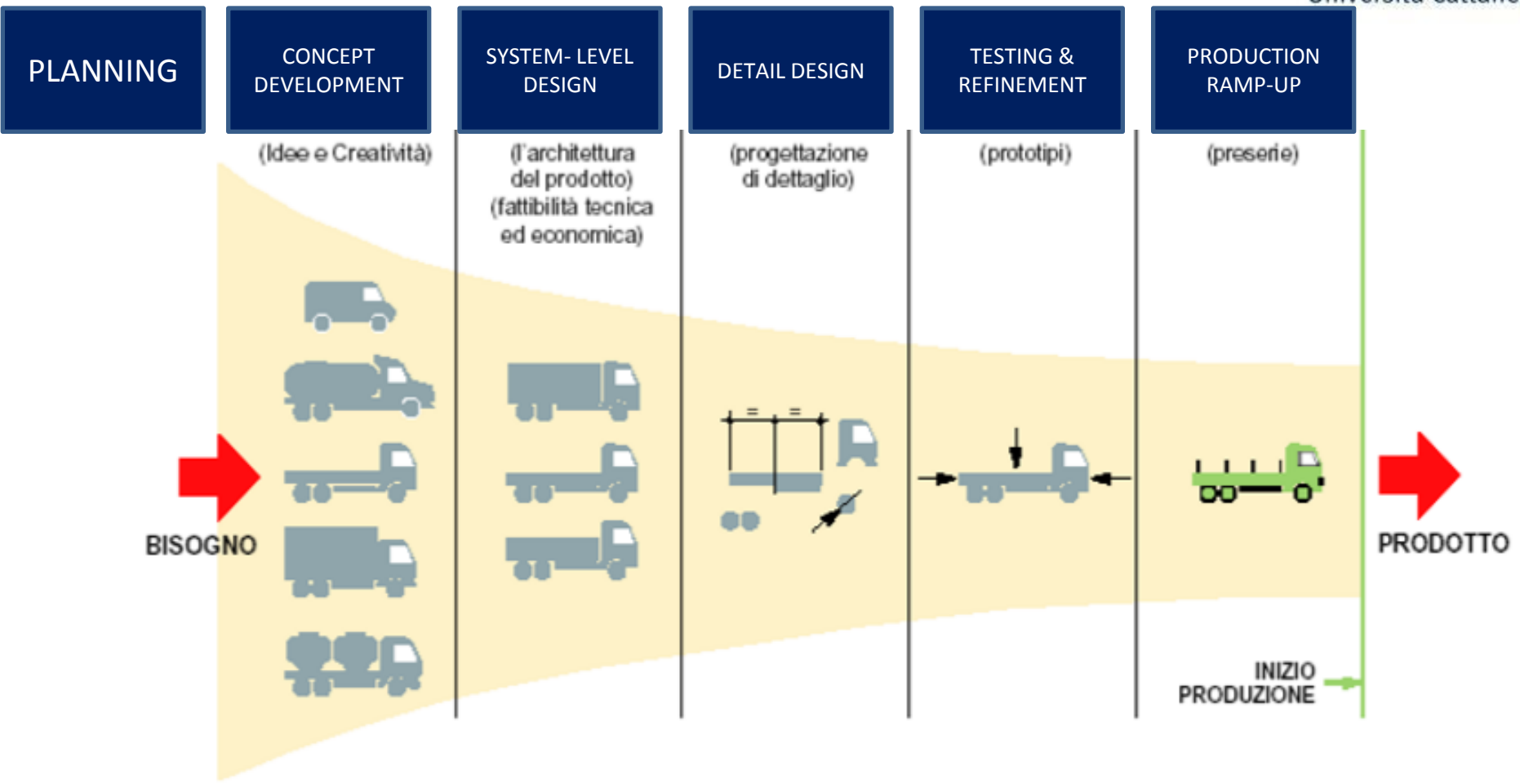
3. SYSTEM-LEVEL DESIGN

4. DETAIL DESIGN

5. TESTING & REFINEMENT

6. PRODUCTION RAMP-UP

The NPD process: phases



Fonte: Product Design Devel., Ulrich / Eppinger

The product development process

1. PLANNING

DESIGN

- Consider product platform & architecture
- Assess new technologies

- Information inputs
- Market trends
- Competitive landscape
- Target segmentation
- Customer research & needs definition

MANUFACTURING

- Identify production constraints
- Set supply chian strategy

MARKETING

- Articulate market opportunity
- Define market segments

- Other fuctions e.g. Research, demonstrates available technologies; Finance, provide planning goals; PM, allocate project resources

The product development process

2. CONCEPT DEVELOPMENT

DESIGN

- Investigate feasibility of product concepts
- Develop industrial design concepts
- Build and test experimental prototypes

- Information inputs
- Market trends
- Competitive landscape
- Target segmentation

MANUFACTURING

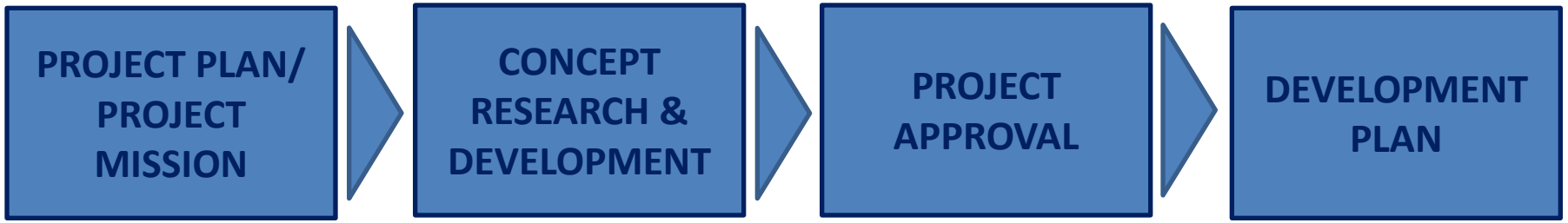
- Estimate manufacturing costs
- Assess production feasibility

MARKETING

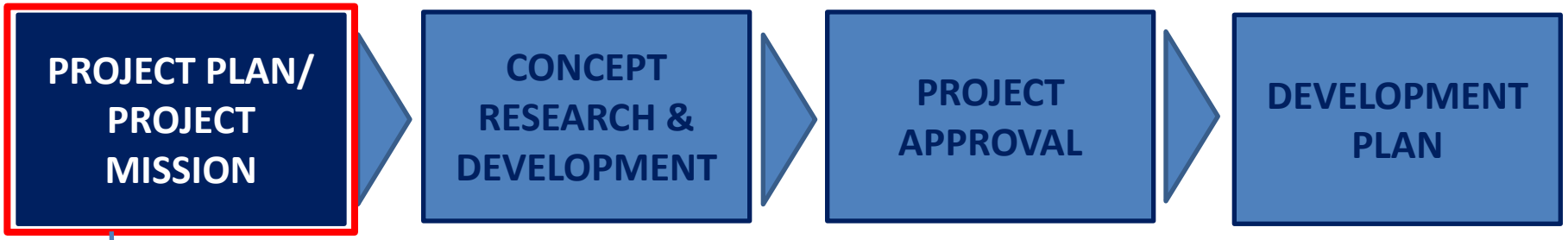
- Collect customer needs
- Identify Lead users
- Identify competitive products

- Other fuctions e.g. Finance, facilitate economic analysis;
- Legal, investigate patent issues

CONCEPT development

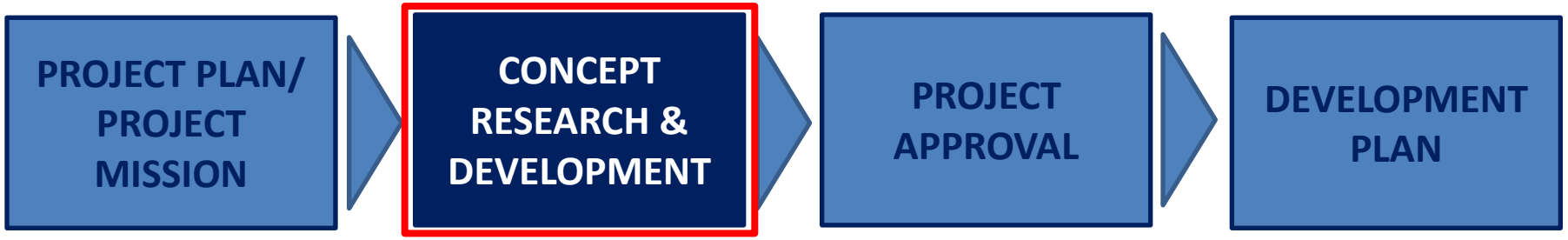


CONCEPT development



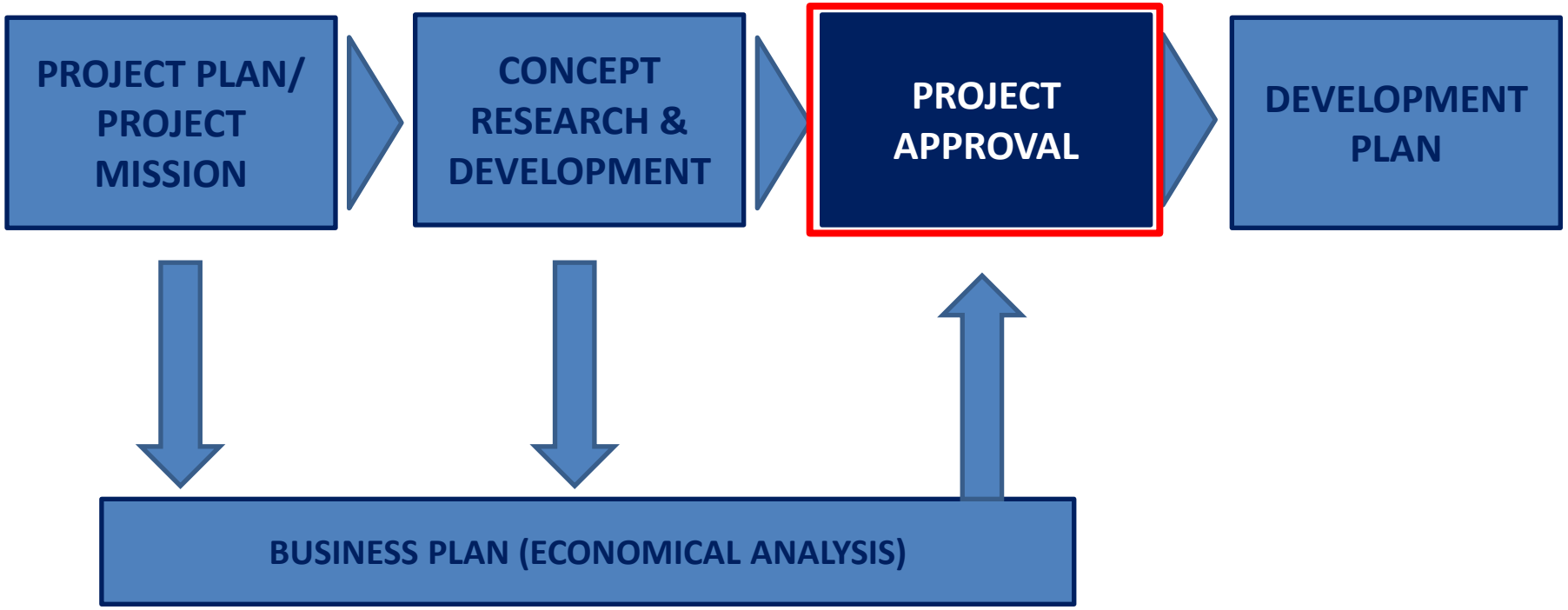
- Identify opportunities
- Screening of ideas
- Define projects (Allocate resources, plan timing, define expected benefits, contraints, budget, collaborations…)

CONCEPT development

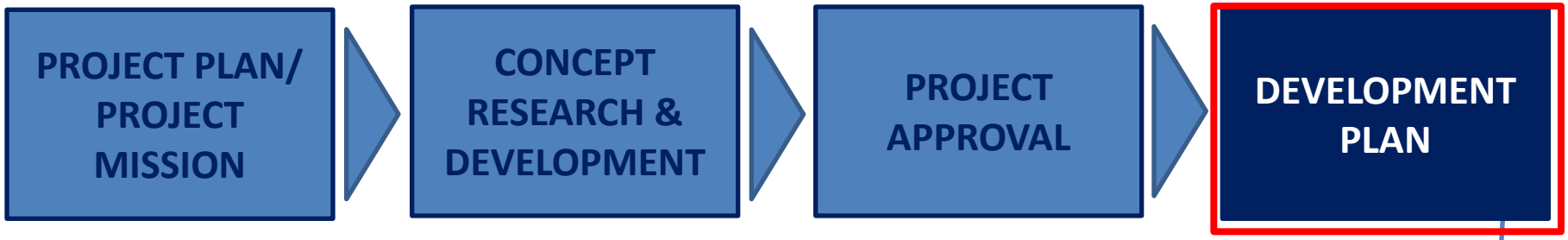


- Customer needs identification
- Target product specification
- Benchmarking
- Concept generation, evaluation, selection TRIZ
- Final target product specification

CONCEPT development



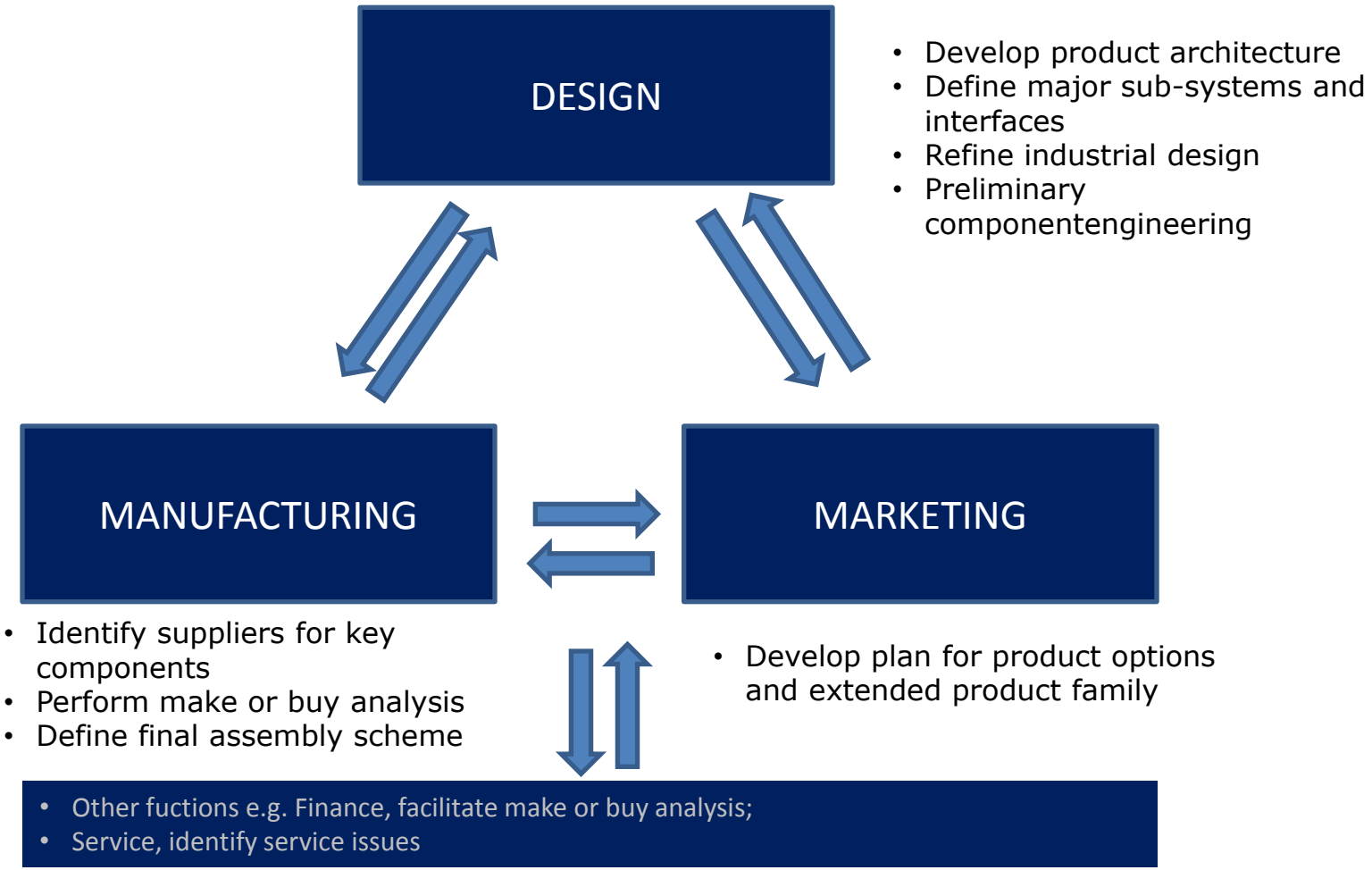
CONCEPT development



- Detailed plan of activities and timing

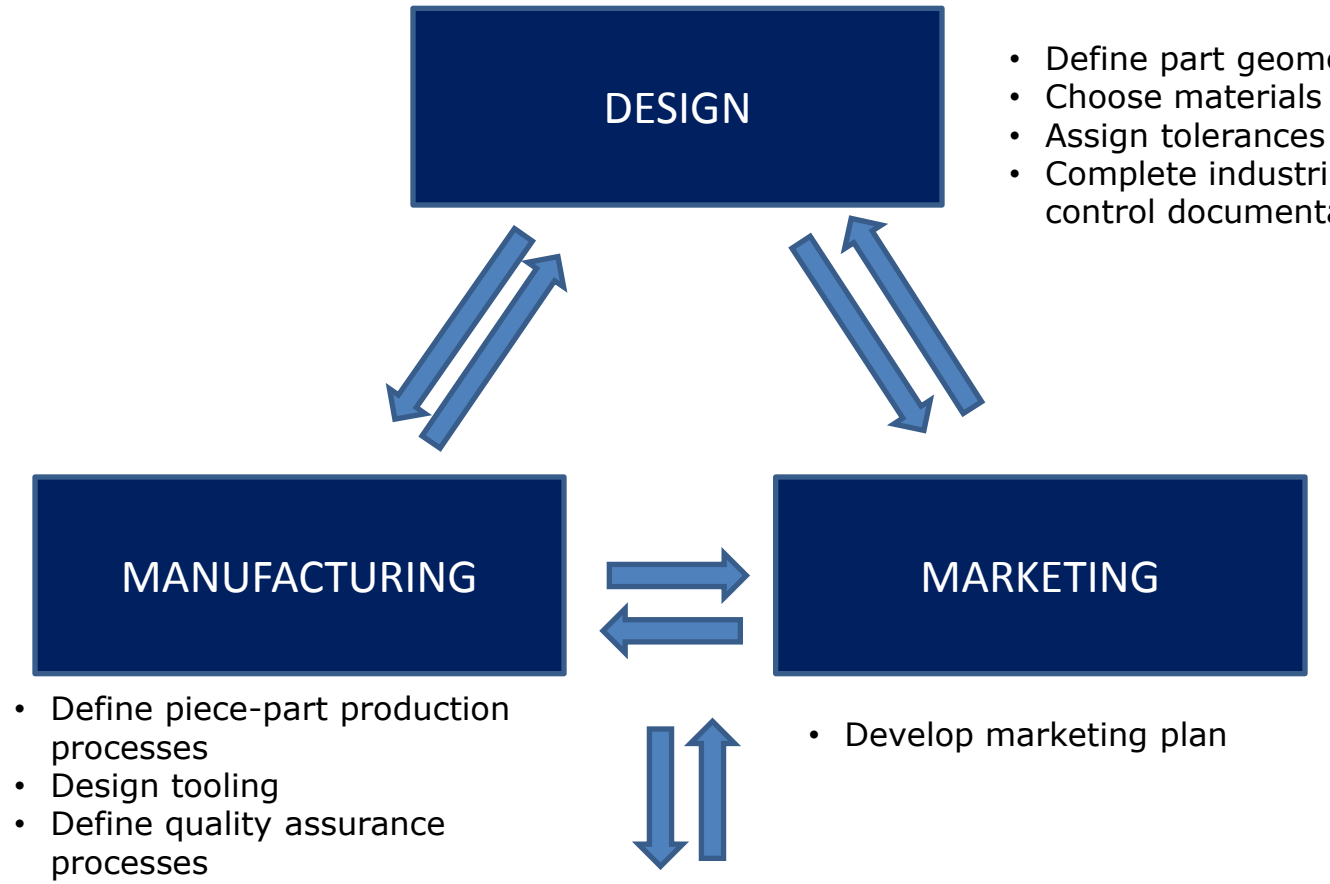
The product development process

3. SYSTEM-LEVEL DESIGN



The product development process

4. DETAIL DESIGN



- Define part geometry
- Choose materials
- Assign tolerances
- Complete industrial design control documentation

- Define piece-part production processes
- Design tooling
- Define quality assurance processes
- Begin procurement of long-lead tooling

- Develop marketing plan

The product development process

5. TESTING & REFINEMENT

DESIGN

- Test overall performance, reliability and durability.
- Obtain regulatory approvals
- Assess environmental impact
- Implement design changes

MANUFACTURING

- Facilitate supplier ramp-up
- Refine fabrication and assembly processes
- Train workforce
- Refine quality assurance processes

MARKETING

- Develop promotion and launch materials
- Facilitate field testing

- Sales: Develop sales plan

The product development process

6. PRODUCTION RAMP-UP

DESIGN

- Evaluate early production output

MANUFACTURING

- Begin full operation of production system

MARKETING

- Place early production with key customers

- General Management: Conduct post project review

Commercialization

- After production rump up the product is ready for commercialization
  → a **DEPLOYMENT STRATEGY** has to be defined

Deployment of innovation

- Failure rates of new products launch are very high (in some industries around 70%)

- Two opposite deployment strategies:
  - Internal deployment
    - Higher risk, higher expected returns
  - External deployment (new ventures and spin offs, licensing, joint ventures, OEM)
    - Lower risk, lower expected returns

External deployment strategies

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- Factors that push companies towards external deployment:
  - Lack of complementary assets;
  - Limited window of opportunity;
  - Lack of familiarity with the technology;
  - Market uncertainty;
  - High novelty of innovation;
  - Protected innovation.

Internal deployment strategies

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- Factors that push companies towards internal deployment :
  - Low pressure on time;
  - Incremental innovation;
  - Need to keep control over production and commercialization;
  - Availability of complementary assets;
  - Need to protect know-how;

Internal deployment

- Two main difficulties:
  - **Customers' resistance**
  - **Markets' interconnections**
    - Network markets imply that the whole network adopts the new technology

Customers' resistance

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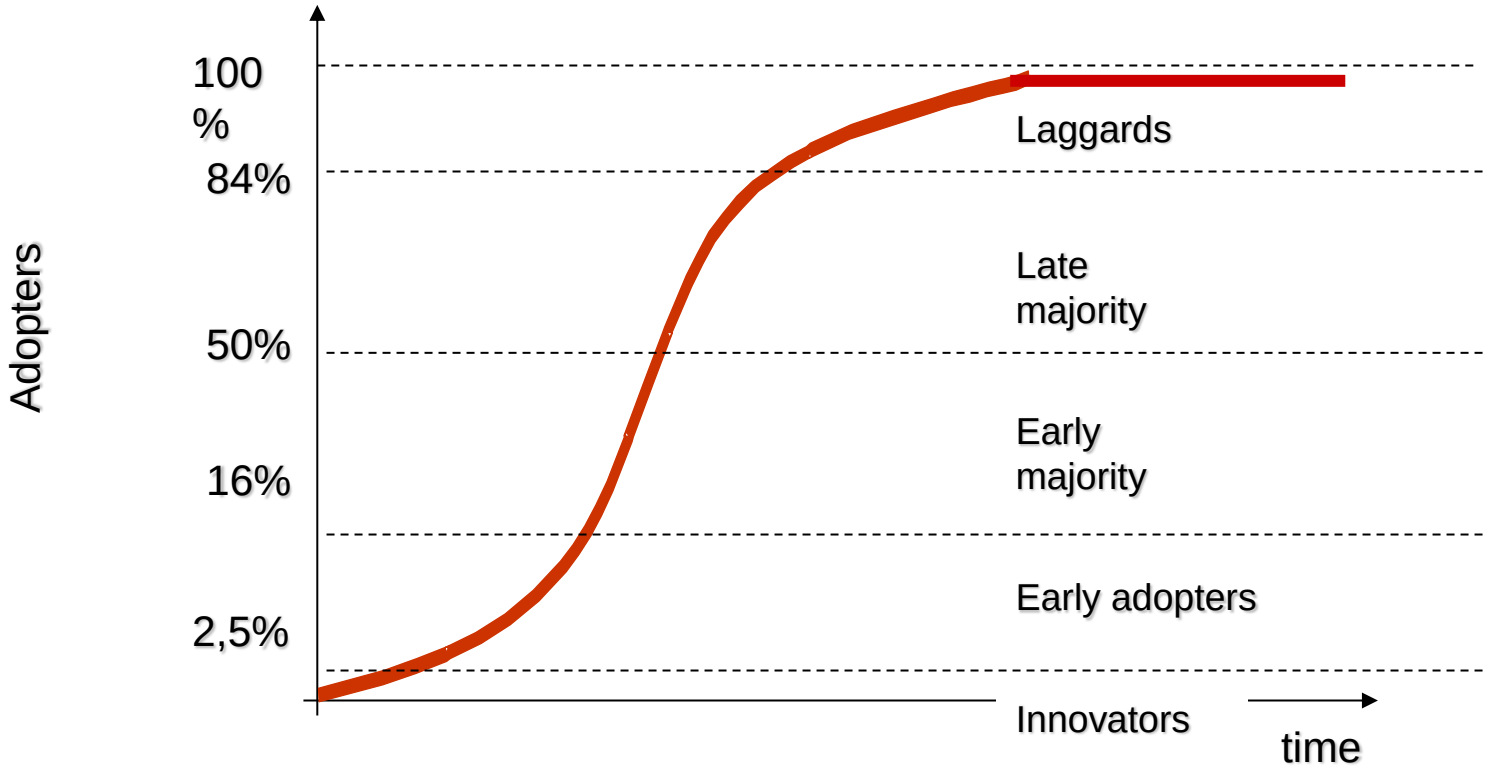
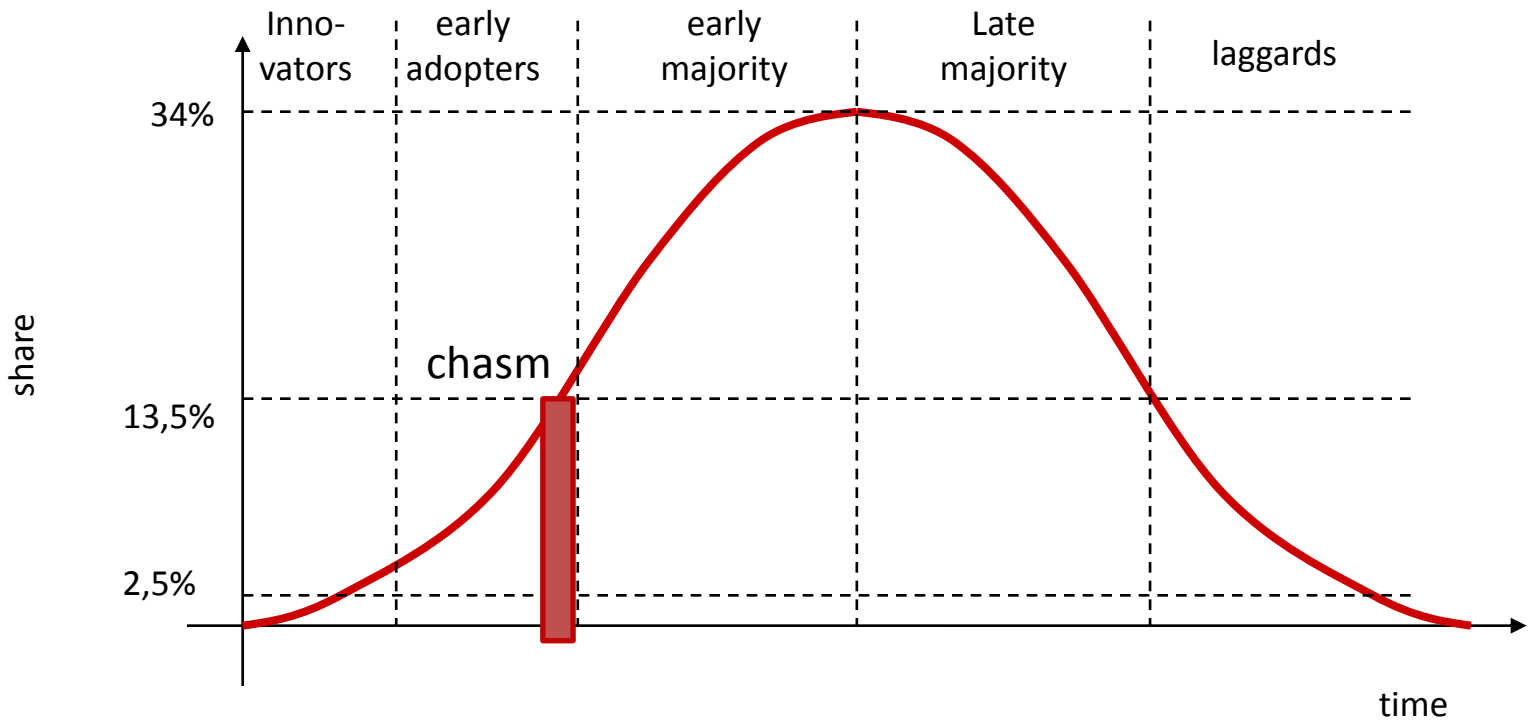
- **Economic switching costs:**
  - Transaction costs
  - Learning costs
  - Obsolescence costs
- **Psychologic switching costs :**
  - Loss aversion
  - Endowment effect
  - Status quo bias

- In high tech markets the customers' resistance is higher because of:
  - high dynamic of technology
  - uncertainty concerning the further development and improvement of the new technology
  - Technology complexity

Innovation adopters



innovation adopters



Marketing of innovation

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- The following marketing choices strongly affect the success of a new technology / product / service:
  - Product Itself
  - Pricing
  - Distribution/Place
  - Communication and promotion
  - Launch timing
  - Range of Markets - Licensing and compatibility
  - Breadth of Technologies
- Marketing tactics are used to shape the clients perceptions and expectations:
  - Preannouncements and press releases;
  - Reputation;
  - Credible commitments

Marketing of innovation

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- The following marketing choices may strongly affect the success of a new technology / product / service:
  - Product Itself
  - Pricing
  - Distribution/Place
  - Communication and promotion
  - Launch timing
  - Range of Markets - Licensing and compatibility
  - Breadth of Technologies

4 P of Marketing – Marketing Mix

- **Product:** the features and appearance of goods and services
- **Price:** how much customers pay for a product
- **Place:** the point where products are made available to customers
- **Promotion:** how customers are informed about products

Product

- **CORE BENEFIT =** the basic product and the focus is on the purpose for which the product is intended
- **GENERIC PRODUCT =** represents all the qualities of the product
- **EXPECTED PRODUCT =** all aspects the consumer expects to get when they purchase a product
- **AUGMENTED PRODUCT =** all additional factors which sets the product apart from that of the competition
- **POTENTIAL PRODUCT =** about augmentations and transformations that the product may undergo in the future

Pricing

- PRICE influences in a strong way:
  - The business profitability
  - The brand image and positioning compared with competitors

- PRICE is one of the first things that customers notice and is one of the benchmarking elements with cuncurrents brands.

Pricing

- Firms have to think very carefully about the price to charge for their products. There are a number of FACTORS to take into account when reaching a pricing decision:

  - **Customers:** Price affects sales. Lowering the price of a product increases customer demand. However, too low a price may lead customers to think you are selling a low quality 'budget product'.
  - **Competitors:** A business takes into account the price charged by rival organisations, particularly in competitive markets. Setting a price above that charged by the market leader can only work if your product has better features and appearance. When a business matches the price of competitors this is called the market price.
  - **Costs:** A business can make a profit only if the price charged eventually covers the costs of making an item

Pricing

- **Penetration pricing:** Useful in network markets for:
  - rapidly imposing a standard
  - rapid development of necessary complementary assets
  - exploiting economies of scale and learning economies

- **Skimming prices:** for minimizing current performance by rapidlu recouping R&D expenses

Pricing

- When a business is already involved in the market, it can choose between three additional short term pricing strategies:
  - **Promotional pricing:** is used to increase flagging sales. It is a short time reduction in price for a specific time period. A common example is the January sales after Christmas. Companies have leftover stock, which is using up valuable and expensive storage space, so they decide on a clear out.
  - **Demand-orientated pricing:** is used when the demand for a product or service can fluctuate. This means that you may pay different prices for the same product or service at different times of the year.
  - **Destroyer pricing:** is an illegal practice where firms lower their prices to such a damaging level that they run at a loss. They do this in order to put their competitors out of the market.

Pricing

- How to determine the «PRICE» of a new product? The MARKETING MIX: THE PRICE
  - 1. DEFINE OBJECTIVES
  - 2. DETERMINE THE DEMAND
  - 3. ESTIMATE COSTS
  - 4. ANALYZE COMPETITORS
  - 5. SELECT A PRICING METHOD (Ceiling, competitors, costs)
  - 6. SELECT THE FINAL PRICE

Distribution

- PLACE is the point where products are made available to customers. A business has to decide on the most cost-effective way to make their products easily available to customers. This involves selecting the best channel of distribution

Distribution

- The choice is manly between:
  - direct selling (traditional and/or on line)
  - intermediaries, such as:
    - Manufacturers' representatives
    - Wholesalers
    - Retailers
    - OEM

Distribution

- INTENSIVE DISTRIBUTION
- SELECTIVE DISTRIBUTION
- EXCLUSIVE DISTRIBUTION

Distribution

- Distribution choices should consider:
  - Fit with existing distribution configuration
  - The need to modify / customize the technology
  - Localization, typology and dispersion of clients
  - Need for training and specialised competencies
  - Competitors' distribution configuration
  - Substiututes' distribution configuration

- In order to accelerate the diffusion of a new technology it is possible to set (up):

  - Alliances with intermediaries and/or (exclusive) agreements
  - Bundling agreements
  - Contracts and sponsorship
  - guarantees

Communication and promotion

- Communication and promotion of innovation should be tailored in coherence with:
  - The type of technology
    - B2B vs B2C;
    - Need for training;
    - Relevance and complexity of technical functionality;
    - brand
  - the specific intended adopters
    - innovators
    - Early adopters
    - Early majority
    - Late majority
    - laggards

Communication and promotion

- PROMOTION refers to the methods used by a business to make customers aware of its product. Advertising is just one of the means a business can use to create publicity. Businesses create an overall promotional mix by putting together a combination of the following strategies:
  - **Advertising:** where a business pays for messages about itself in mass media such as television or newspapers
  - **Sales promotions:** which encourage customers to buy now rather than later
  - **Personal selling:** using face-to-face communication, eg employing a sales person or agent to make direct contact with customers.
  - **Direct marketing:** takes place when firms make contact with individual consumers using tactics such as 'junk' mail shots and weekly 'special offer' emails

Launch timing

- Development timing may be different from launch timing;

- Launch timing could be delayed in order to exploit:
  - Macro-economic cycles;
  - Seasonal effects;
  - Positioning with respect to previous generations of related technologies

- .. and in order to adapt to the availability of:
  - Production capacity
  - Complementary assets

Timing and cannibalization

- Launch Timing should consider the risk of cannibalization of profits from existing technologies
  - companies tend to (hope to!) maximize returns from R&D investments

- Delay in launch timing may prevent companies from achieving the advantages of the first mover

Licensing

- Licensing proprietary technologies may foster its diffusion
- Licensing implies for some risks:
  - Lowering of pricing, as licenees do not need to recoup R&D expenses;
  - Fragmentation of the technology platform as different producers alter it to their needs

Licensing and compatibility

- Compatibility of the technology with competitors' ones may foster the definition of a standard, by rapidly enlarging the installed base
- Incompatibility with competitors' technologies locks customers to a specific technology and to the related complementary accessories and services
- Backward compatibility allows customers accessories and services of previous generations of the technology