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Project management

Part 2

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Riga Technical University

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“IMPROVEMENT OF MASTER-LEVEL EDUCATION IN THE FIELD OF PHYSICAL SCIENCES IN BELARUSIAN UNIVERSITIES” ERASMUS+ PROJECT “PHYSICS” 561525-EPP-1-2015-1-LV-EPPKA2-CBHE-JP – ERASMUS+ CBHE

Student’s mobility and training event

25.09.2017 - 06.10.17., RIGA, LATVIA

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The human mind is the source of all works of art and inventions

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Riga city

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- ✓ Riga, the capital of Latvia http://www.riga.lv was founded in 1201
- ✓ It has a population of around 706 400 (1/3 of Latvia population) and its area is around 307 square kilometers
- ✓ Riga has always been a city at the cross roads of the large markets of Western Europe and the East
- ✓ The historic center of Riga exemplifies all architectural styles characteristic for the Northern Europe from Gothic to Modernism including unique ensemble of Art Nouveau buildings
- ✓ In 1997 the historic center of Riga due to this valued architecture was inscribed into the UNESCO World Heritage List.
- ✓ See more at tourism information portal : http://www.liveriga.com

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Price for Energy efficient building in Riga 2014

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Story about RTU

https://www.youtube.com/watch?v=i8gvSFuRHNs

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Program

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- **1st**: Introduction to the project management
- **2nd**: Idea generation
- **3rd** : New product development
- **4th**: PM methods. Projects selection and evaluation. Launch of product

Introduction

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- Riga Technical University (RTU) is placed in the group of universities ranked 201–250 in one of the world's leading university rankings – Times Higher Education (THE) BRICS & Emerging Economies University Rankings 2017 TOP 300. Development of structured education courts in innovation up-taking by university students is a challenge for nearest future.

Introduction

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- RTU is a research institution, with high rate of applied researches, but now the students and in particular students from electrical engineering are involved in the innovation based education only on master and PhD stages, there is no reliable system for undergraduates, and more actually for engineers to realize of his idea in the University.

Introduction

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- Scientific institutes at the Riga Technical University are the basis for the development of both financial and human resources. And it is very important to ensure the sustainability of the educational process and the scientific environment precisely in institutions and, in particular, in the Institute of Industrial Electronics and Electrical Engineering.

Introduction

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- Education for Sustainable Development (ESD) is about enabling us to constructively and creatively address present and future global challenges and create more sustainable and resilient societies.
- UNESCO has been recognized globally as the lead agency for ESD. It coordinates the implementation of the Global Action Programme (GAP) on ESD, as official follow-up to the United Nations Decade of ESD (2005-2014).

Introduction

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- For example, it is concluded in, that the proportion of theoretical and practical training for master level students is recommended from 1/3 to 2/3 – the number of hours for laboratory/practical training must exceed the number of lectures at least by 30 %. Measures will require systematic changes in the approach to the teaching process of master students. It is required to go from the “lectures” way of training to a more balanced approach involving both practical and theoretical training of master students.

Training approach

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- The study of the problem of positive motivation in educational activity is carried out in indissoluble connection with their formation. Pedagogical practice shows that in this case it is advisable to adhere to a certain algorithm, which includes several relatively independent, but mandatory organizational and pedagogical actions.

Training approach

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- The use of Project Based Learning (PBL) method is one of the most important methodological issues for acquisition of transferable skills by the students of electrical engineering branch. The PBL approach in RTU is extremely important, for developing innovations and technical progress in Latvia.

Training approach

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- PBL in general provides complex tasks derived from challenging questions or problems that involve the students in problem solving, decision making, investigative activities, and reflection that include teacher facilitation, but not direction.
- PBL is focused on the questions that drive students to encounter the central concepts and principles of a subject hands-on.

Training approach

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- Cognitive skills via PBL is associated with increased capability on the part of students for applying those learning's in novel, problem-solving contexts. PBL approach supports students learning and practicing skills in problem solving, communication, self-management, it encourages the development of habits of mind associated with lifelong learning, civic responsibility, and personal or career success.

Training approach

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- Application of PBL in RTU encouraged creation positive communication and collaborative relationships among diverse groups of students, because it met the needs of learners with varying skill levels and learning styles. However the main problem of introducing PBL in RTU is changing the thinking way of academic staff and students.

Training approach

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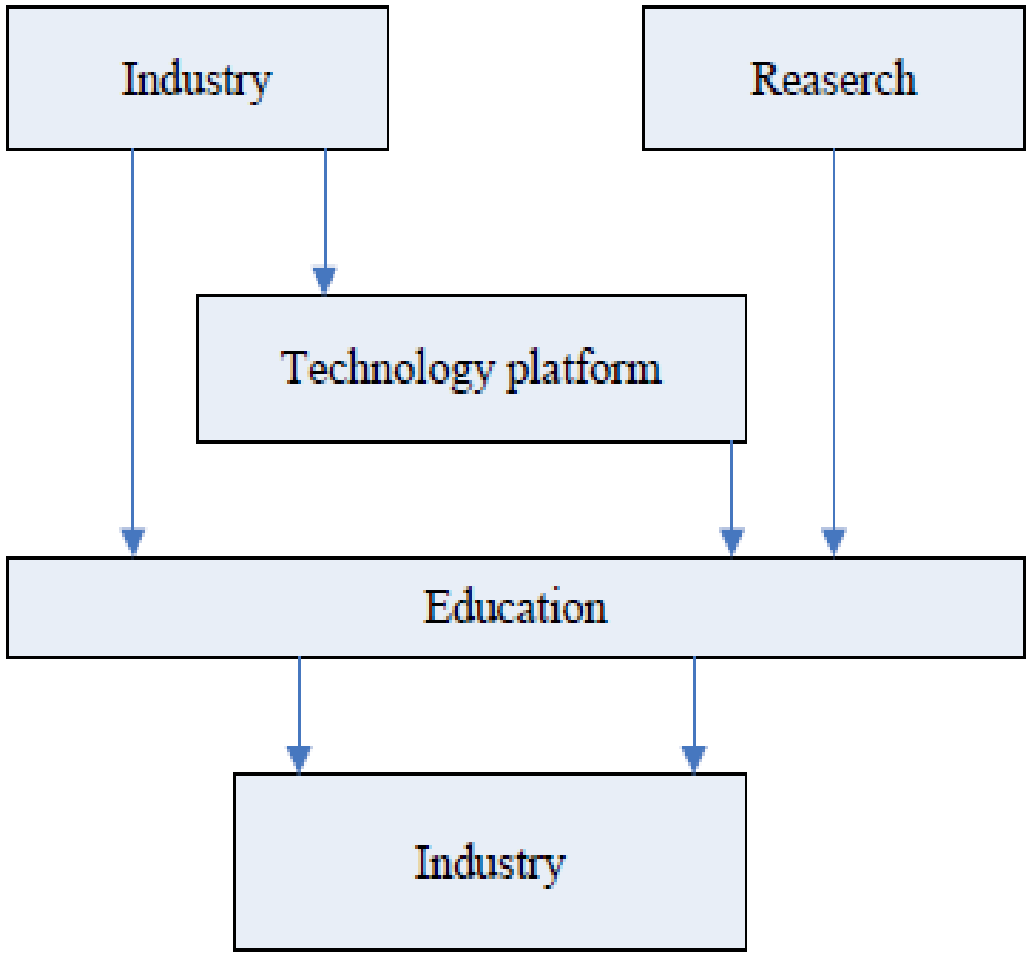
- The most advanced students could be authorized to independently manage a project team. Therefore student step by step moves forward starting from the projects to commercialisation of own developments



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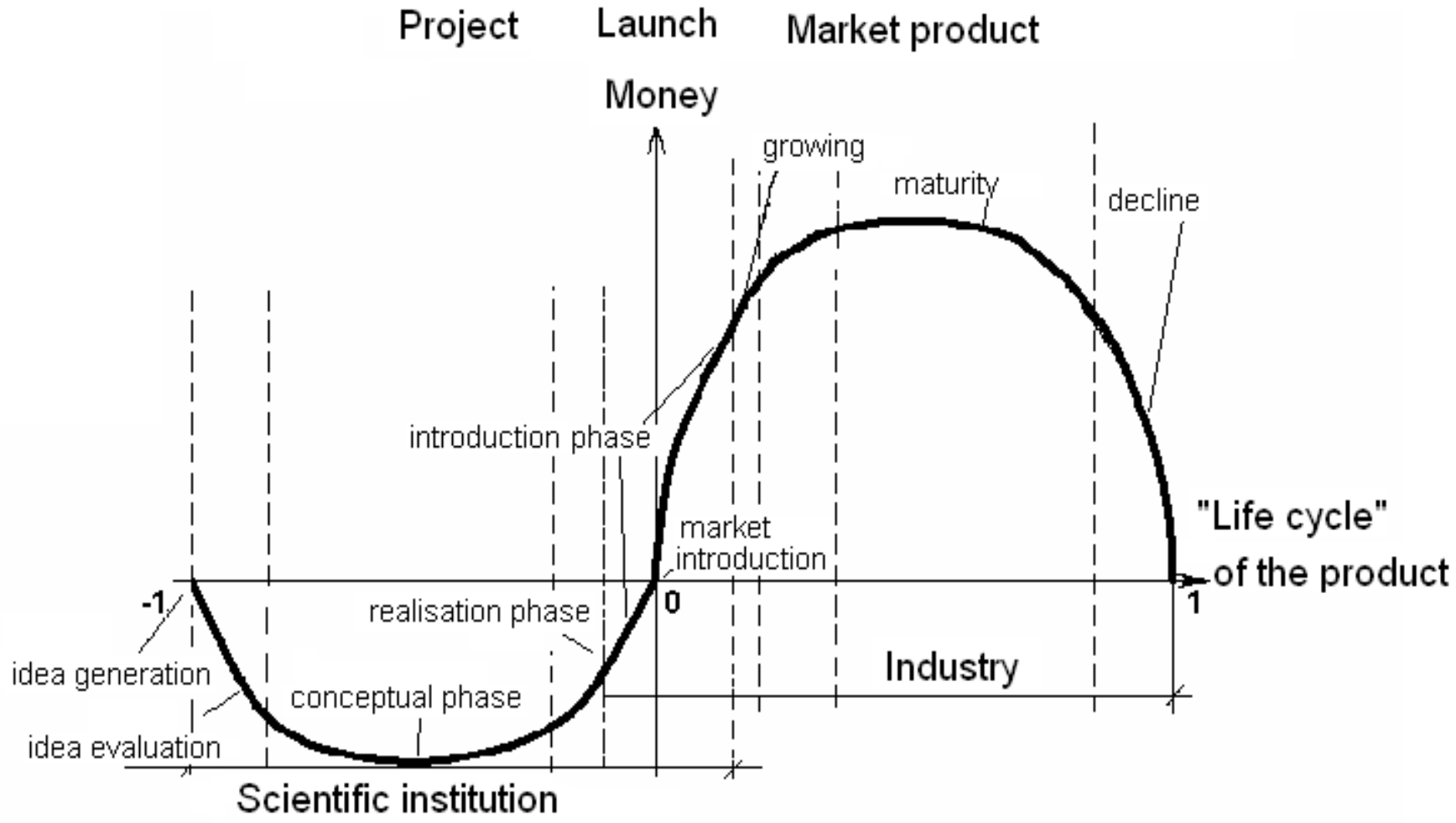

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Dr. Elīna Gaile-Sarkane,

Professor and Vice Dean for Research at Faculty of Engineering Economics and Management (FEEM) of Riga Technical University (RTU), has been working with RTU since 2001.

Elina has got her Doctor degree in 2003. Since 2005 within Latvian-Norwegian executive MBA programme “Innovations and Entrepreneurship” she has delivered study course “Product Design and Development” which is extremely popular and valuable for engineers at RTU today. On 2011 Elina became a Head of Department of Management and Director of Bachelor and First level higher professional education Programmes in Human Resource Management.

Home reading

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Product Design and Development

Irwin McGraw-Hill

Product Design and Development

Irwin McGraw-Hill

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1. Introduction
2. Development processes and organizations
3. Product Planning
4. Identification of customer needs
5. Product specification
6. Creating a Concept
7. Concept selection
8. Concept development
9. Product architecture
10. Industrial design
11. Production plan
12. Sample design
13. Goods development economics
14. Project management

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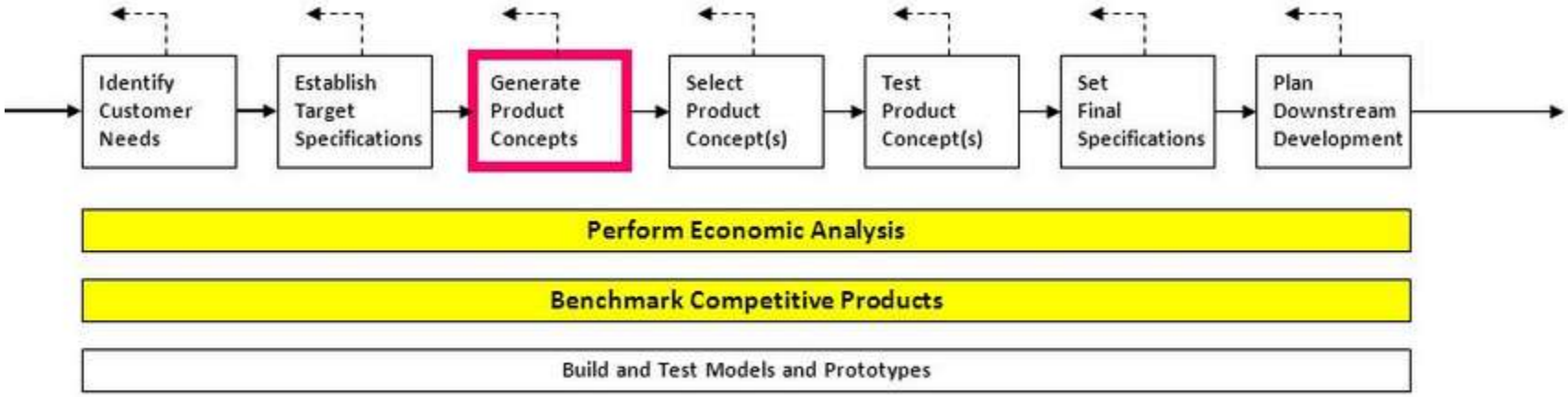
The concept development process



Need finding

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- The most important thing about need finding in design thinking is that we look without knowing what we are looking for. We trust that our ability to define the problem will emerge during the need finding process.

MAIN PRINCIPLES

- Human Centered Design (Look to users for design inspiration.)

KANO MODEL

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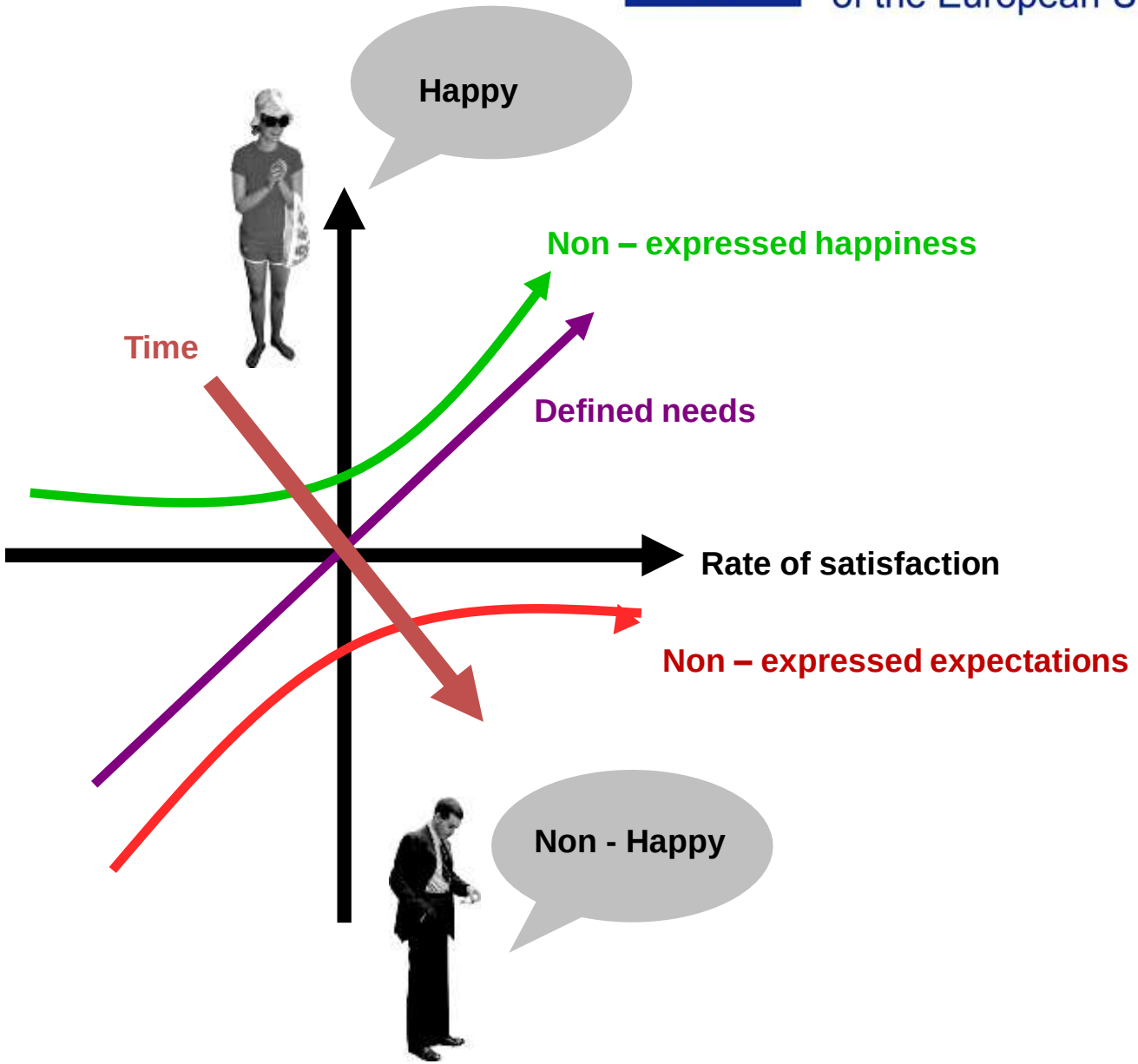

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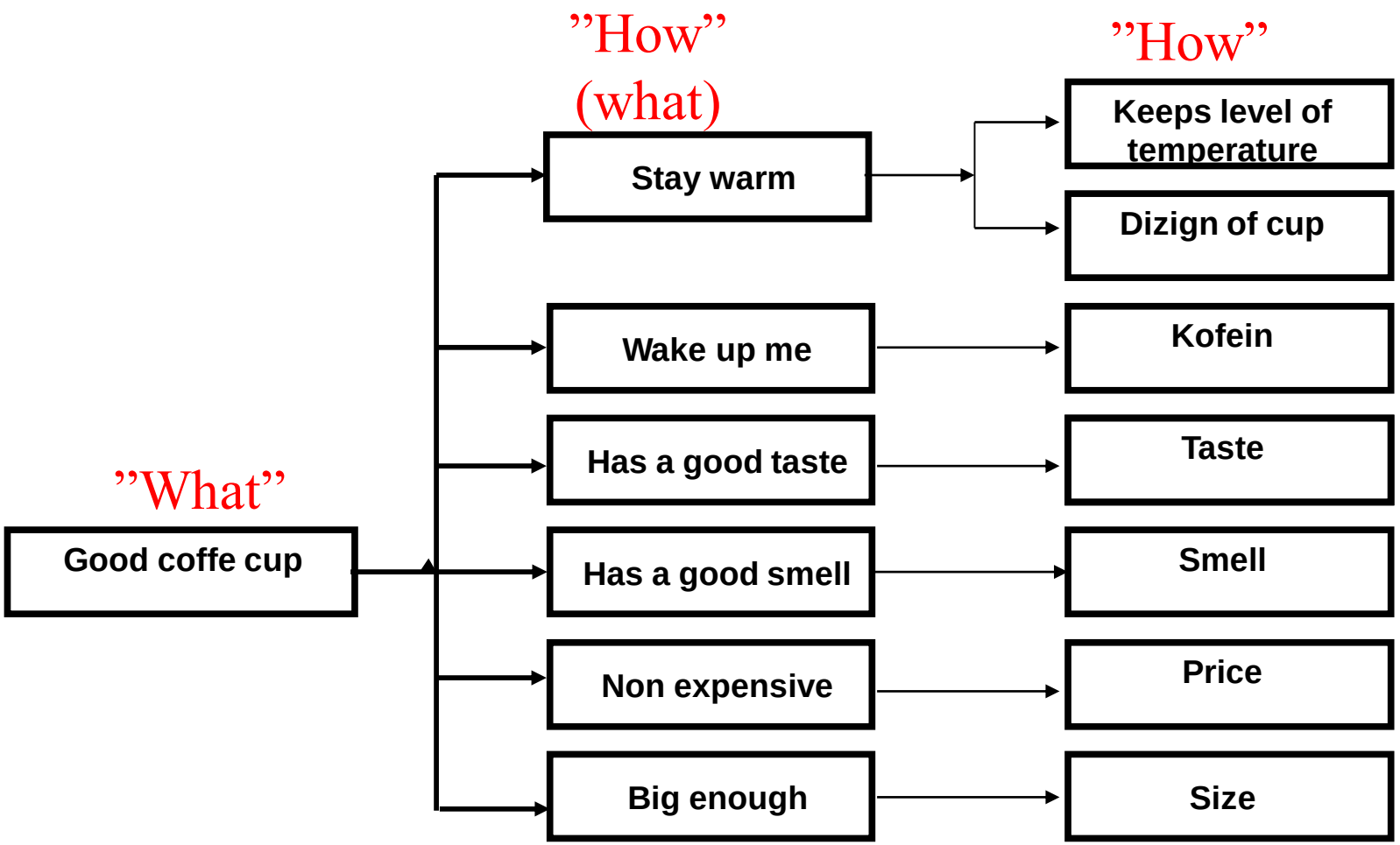

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Product development specification

- Develop planned specifications
  Based on customer needs and competing products
  For each need to develop a metric
  Identify the ideal and acceptable values of values
- Improve specifications
  Based on the chosen concept and feasibility study
  Technical modeling
  Going out is critical
- Consider the results and process
  Critical for continuous improvement

Expansion of Quality Function (Quality House)

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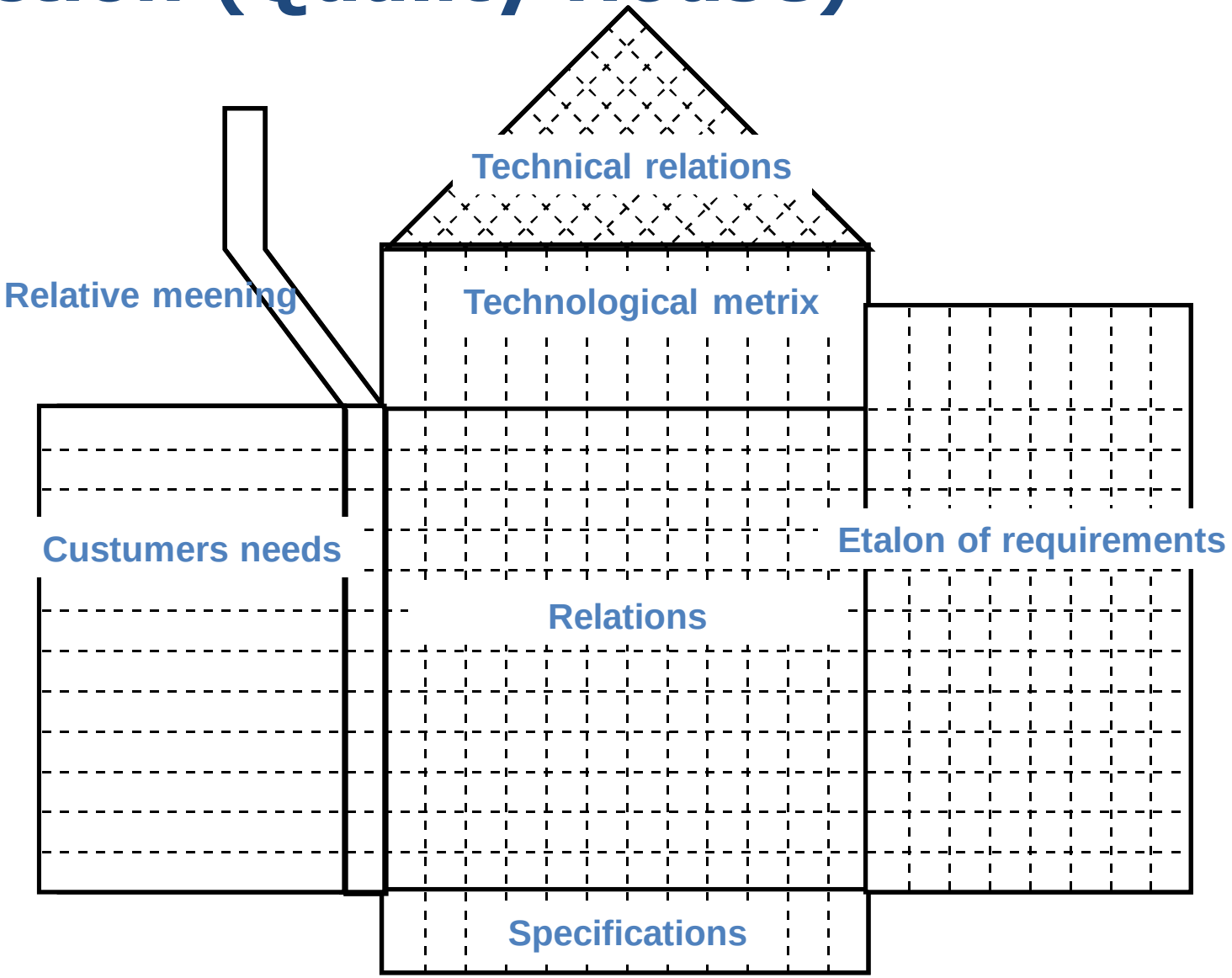

«World-class concept» development

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- World-class products have winning concepts and robust design
- A mistake that is corrected when a product is on the market costs 10,000 times more than the concept development phase.
- Engineers (product creators) often make mistakes because they have made too many conclusions

Concept phase

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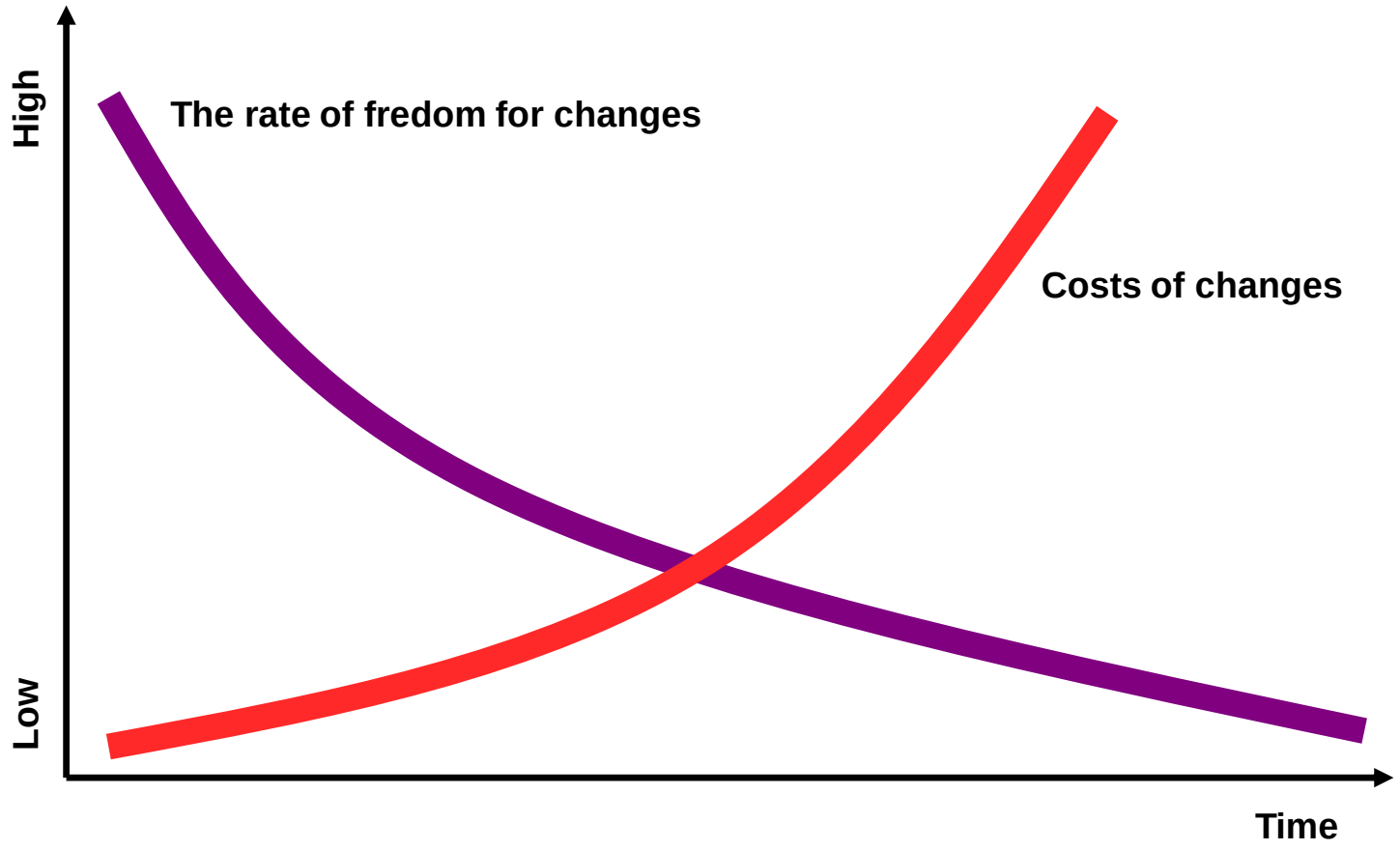

Concept phase

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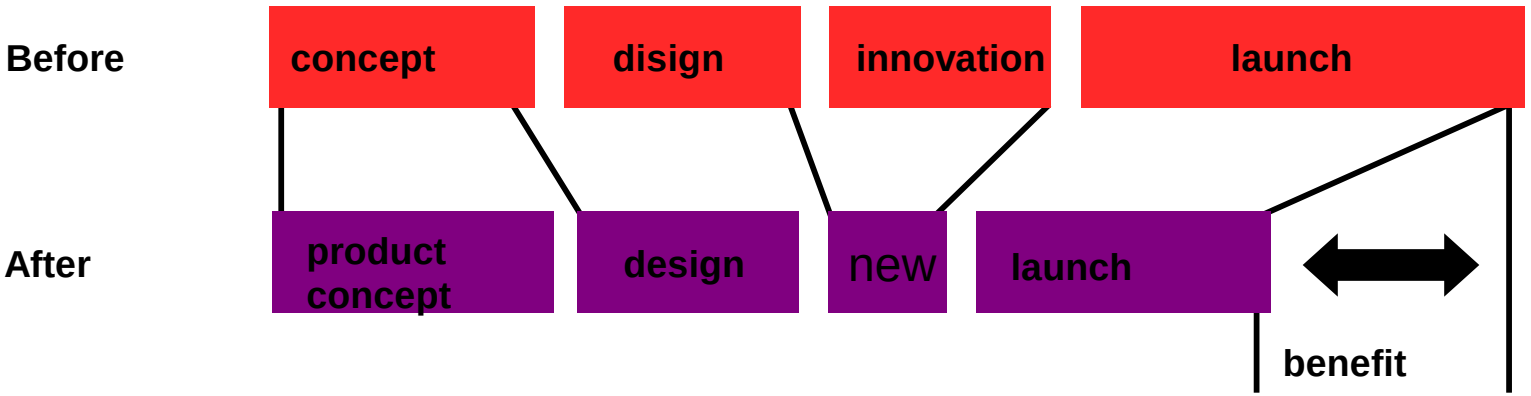

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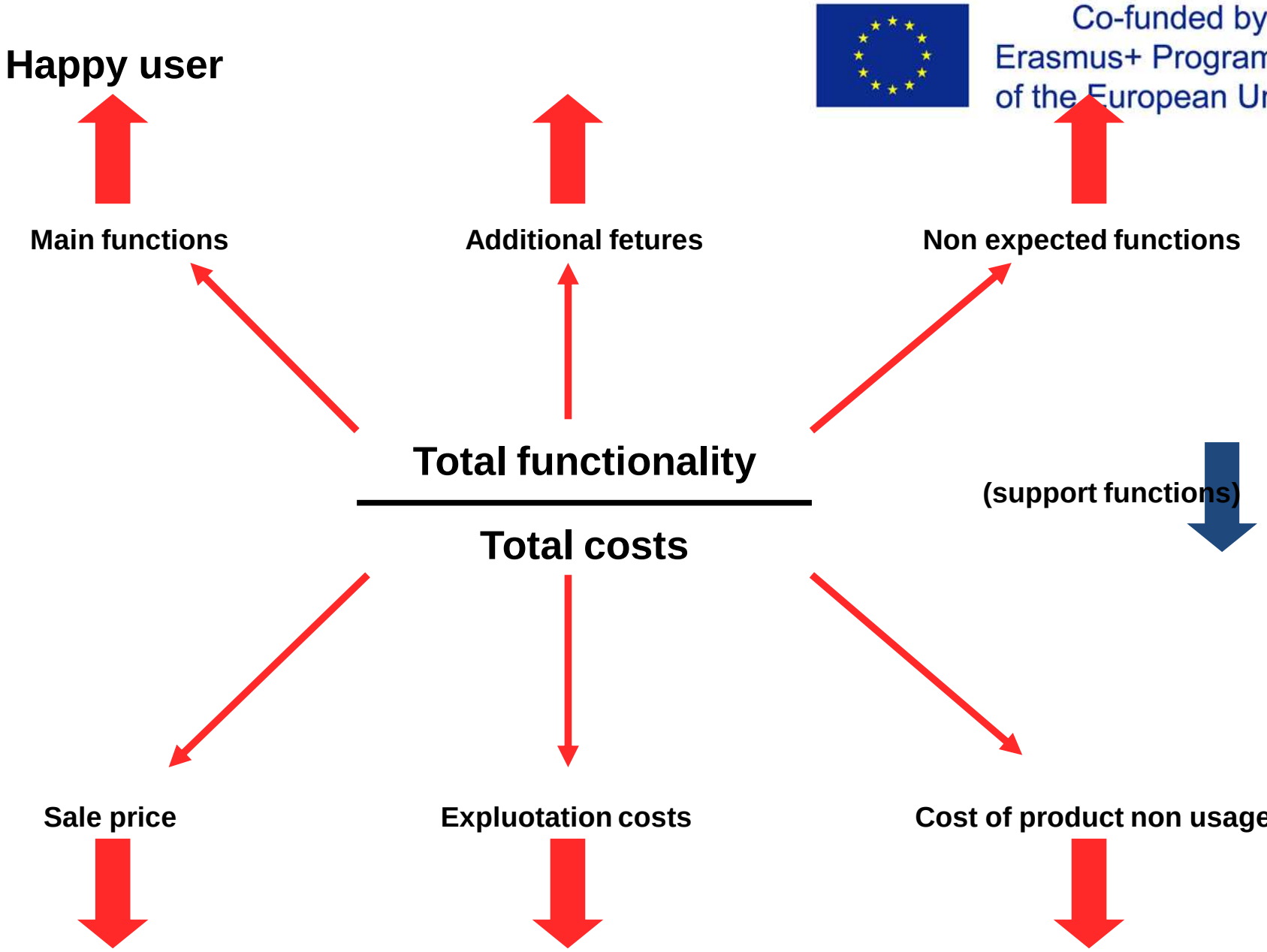

Conception creation process

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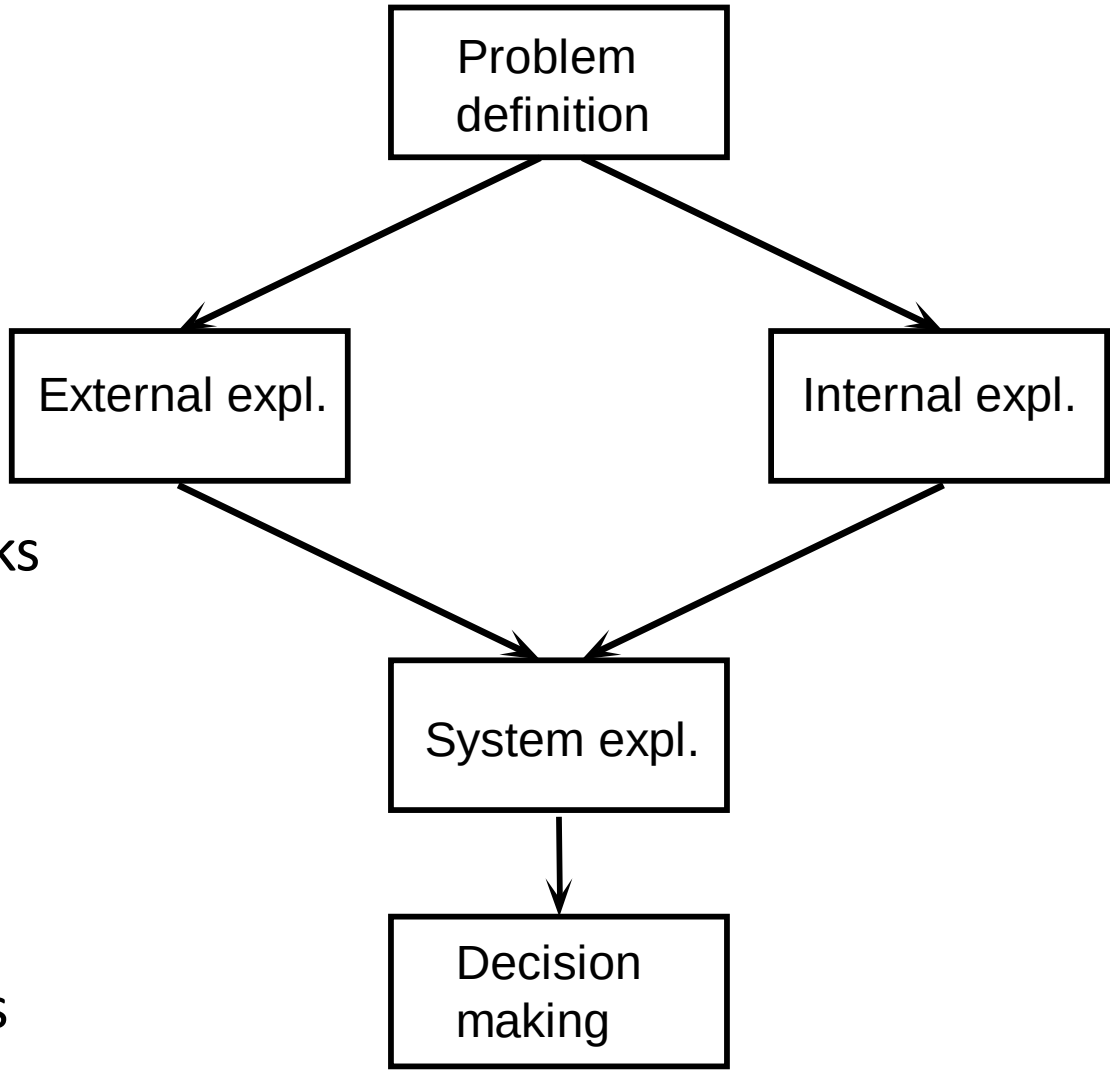
Find out the problem
Task decomposition
External study
The main users
Experts
Patent
Literature
Comparison with benchmarks
Internal study
Individual methods
Group methods
Systematic research
Classification tree
Combination table
Consideration of the process
Continuous refinement



5 STEPS CONCEPT DEVELOPING PROCESS

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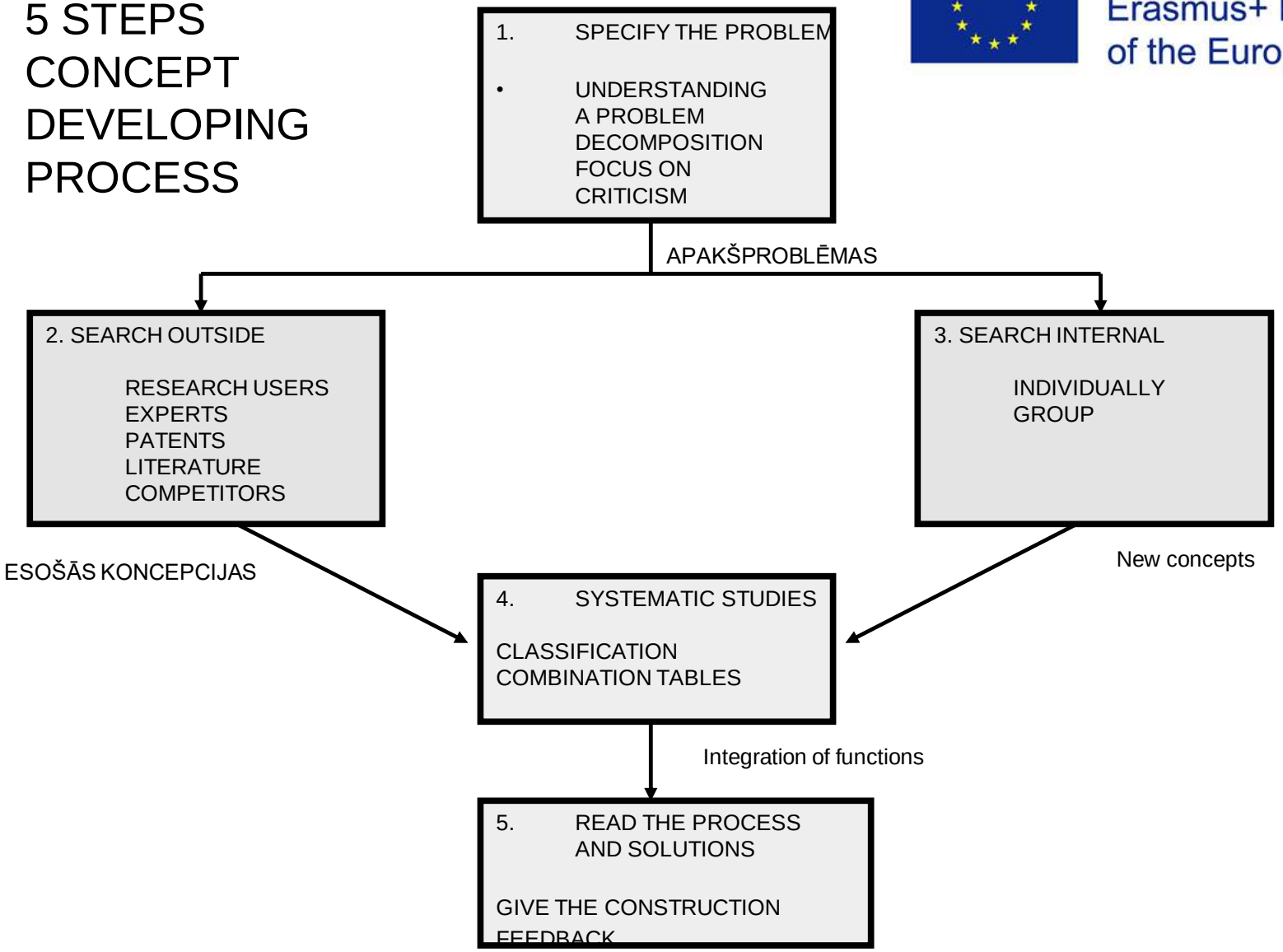

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State of the art – SWOT analysis

	Strengths	Weaknesses
Opportunities	(SO)	(WO)
Threats	(ST)	(WT)

Strengths: characteristics of the business, or project team that give it an advantage over others
Weaknesses (or Limitations): are characteristics that place the team at a disadvantage relative to others
Opportunities: external chances to improve performance (e.g. make greater profits) in the environment
Threats: external elements in the environment that could cause trouble for the business or project

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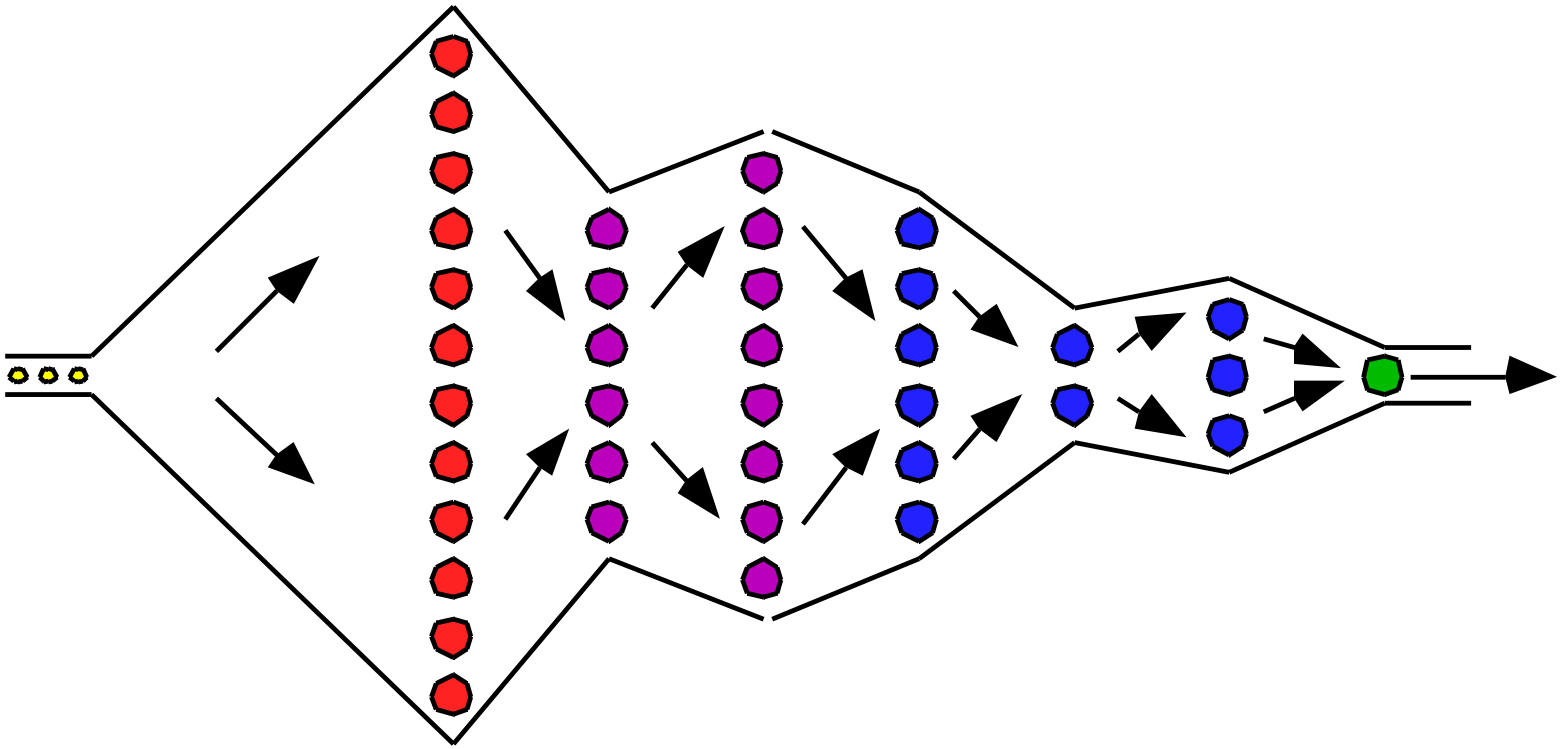
Scope of the project
State of the art
Steps beyond state of the art

- Scope of the project limits the area of research;
- State of the are show, that project team is familiar with existing research results as well as with priorities in research topic;
- Steps beyond state of the art shows, that project team knows hove to achieve foreseen results within defined quality;

Conception evaluation process



Definnition of concept

Reviewing the concept

Evaluation of concept

Testing of the concept

TRIZ - ALTSHULLERS CONTRADICTION TABLE

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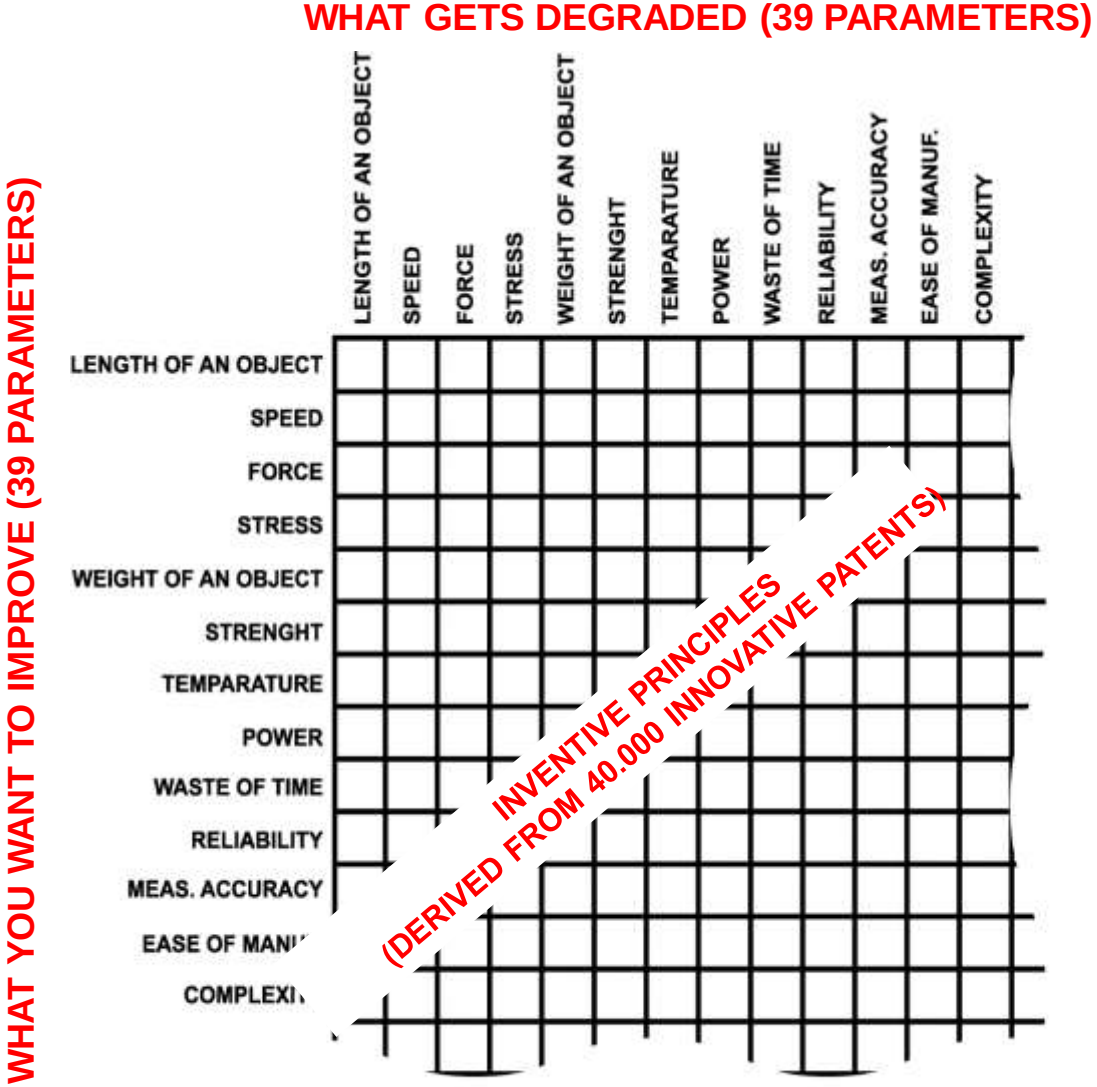

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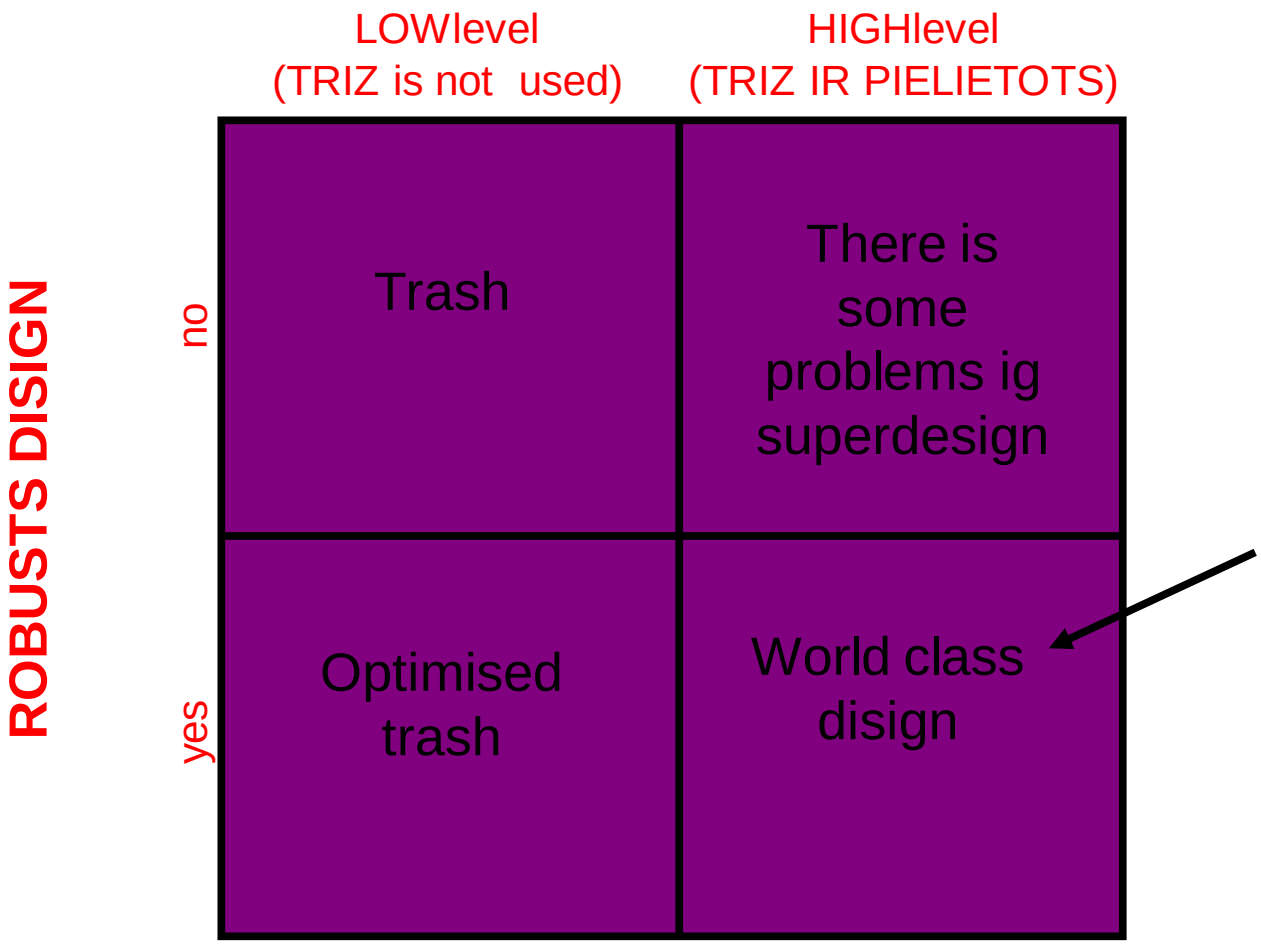
SCRECH OF CONCEPT



- Fast,
- Low costs,
- Very reliable complete product development
- Low cost

Example: Conceptual evaluation

		Concepts							
		A (reference) Master Cylinder		**DF Lever Stop**		**E Swash Ring**		**G+ Dial Screw+**	
Selection Criteria	Weight	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score
Ease of Handling	5%	**3**	0.15	3	0.15	4	0.2	4	0.2
Ease of Use	15%	**3**	0.45	4	0.6	4	0.6	3	0.45
Readability of Settings	10%	2	0.2	**3**	0.3	5	0.5	5	0.5
Dose Metering Accuracy	25%	**3**	0.75	3	0.75	2	0.5	3	0.75
Durability	15%	2	0.3	5	0.75	4	0.6	**3**	0.45
Ease of Manufacture	20%	**3**	0.6	3	0.6	2	0.4	2	0.4
Portability	10%	**3**	0.3	3	0.3	3	0.3	3	0.3
	Total Score	2.75		3.45		3.10		3.05	
	Rank	4		1		2		3	
	Continue?	No		Develop		No		No	

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Remember…

The purpose of the concept is not
Choose the best concept.

The purpose of the concept is to
Develop the best concept.

Therefore, remember to combine and improve
these concepts in order to develop better!

Alerts

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Find out the best "average" products.

- Choose a concept for each different customer group and compare the results.
- Compare the degree of choice with significance ratings and grades.
- At the final stage of the selection, you may want to use all the detailed requirements.
- Mark the qualities that can be applied to other concepts.

The purpose of the experiments developed

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- Modeling
  Understanding the relationship between design parameters and product performance
  Understanding the effects of disturbing factors
- Optimization
  Reduce product or process variations
  Optimization of nominal efficiency

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Approximate development

- A roughly developed product or process works correctly even under the influence of disturbance factors.

- Disturbing factors can be as follows:`

- parameter variations
- environmental changes
- operating conditions
- manufacturing process variations

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Imperical development procedure Step 1: Parameter Chart

- Step 1: Choose the appropriate control mechanism, response, and experimentally investigate disturbing factors.
  - Control factors (input parameters)
  - Delusional factors (uncontrollable)
  - Performance Measurement (Response)

“P” diagramm

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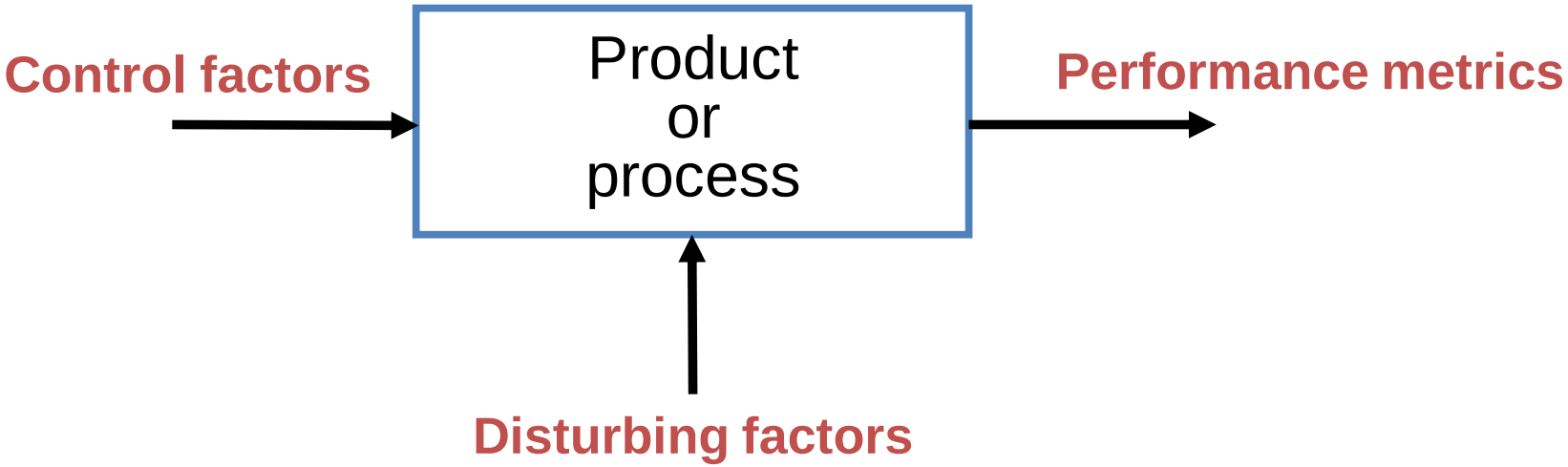
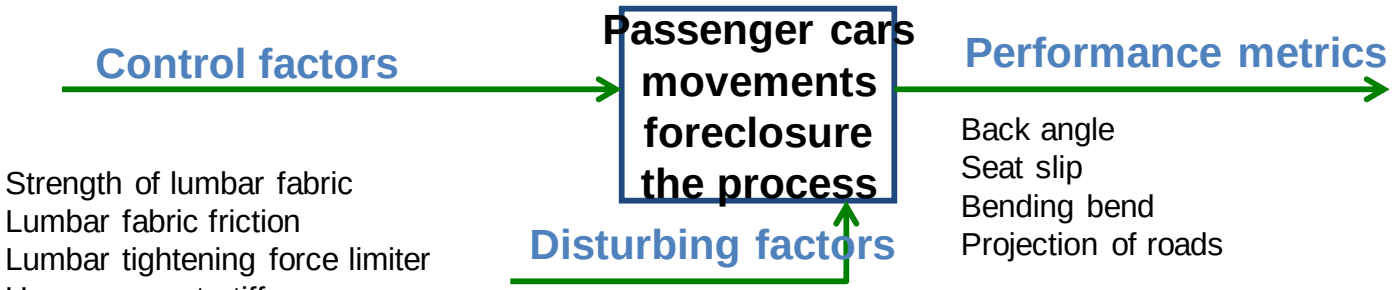


Example of parametrs diagramm



Strength of lumbar fabric
Lumbar fabric friction
Lumbar tightening force limiter
Upper support stiffness
Strength of the buckle
Front seat backrests under the head
Litter Friction
Attachment geometry

Back angle
Seat slip
Bending bend
Projection of roads

Rear seat shape
Seat cloth type
Collision shock degree
Component wear
Position of the passenger
Belt spacing
Passenger body parameters
Kind of cloth
Changes in the development of lumbar spine
Lock manufacturing variations

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Imperical development procedure Step 2: Target function

Step 2: Define the target function (response) to optimize it.

increase the efficiency of the desired activity

reduce variations

target value

signal / interference ratio

Imperical development procedure Step 3: Planning of experiment

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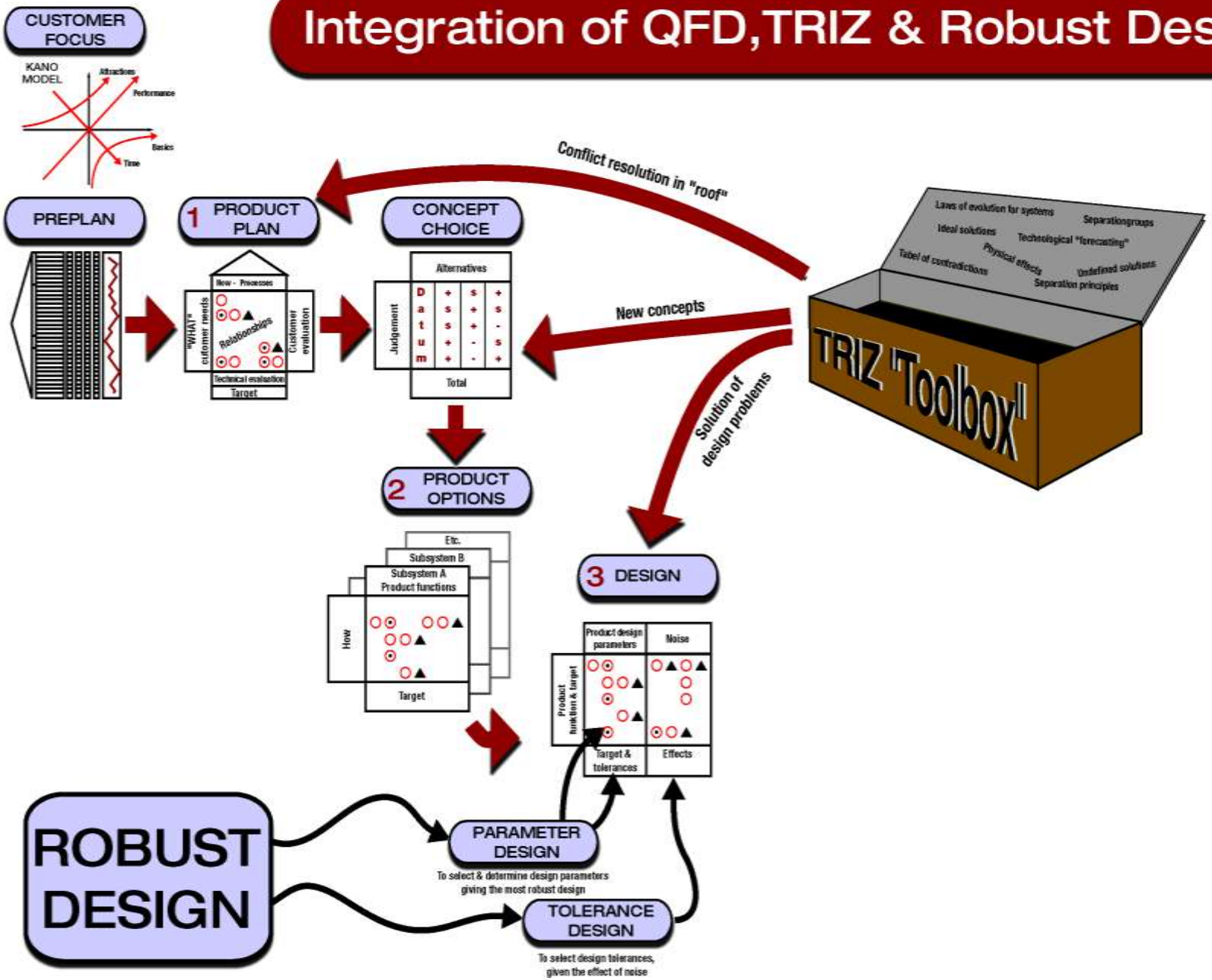
Step 3: Schedule experimental sessions to find out the desired effects.

- Use whole or partial factory design projects for interconnection.
- Use rectangular layouts to identify key effects with minimal number of trials.
- Use internal and external layout to view the effects of disturbing factors.

Integration of QFD,TRIZ & Robust Design



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Thank you for your attention!

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