THE 2016 INTERNATIONAL FORUM

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DFMA & Lean 3z Thinking

(Steps towards a failure-free innovation process)

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The failure of innovations causes huge costs, not only for the enterprises, but for the whole society

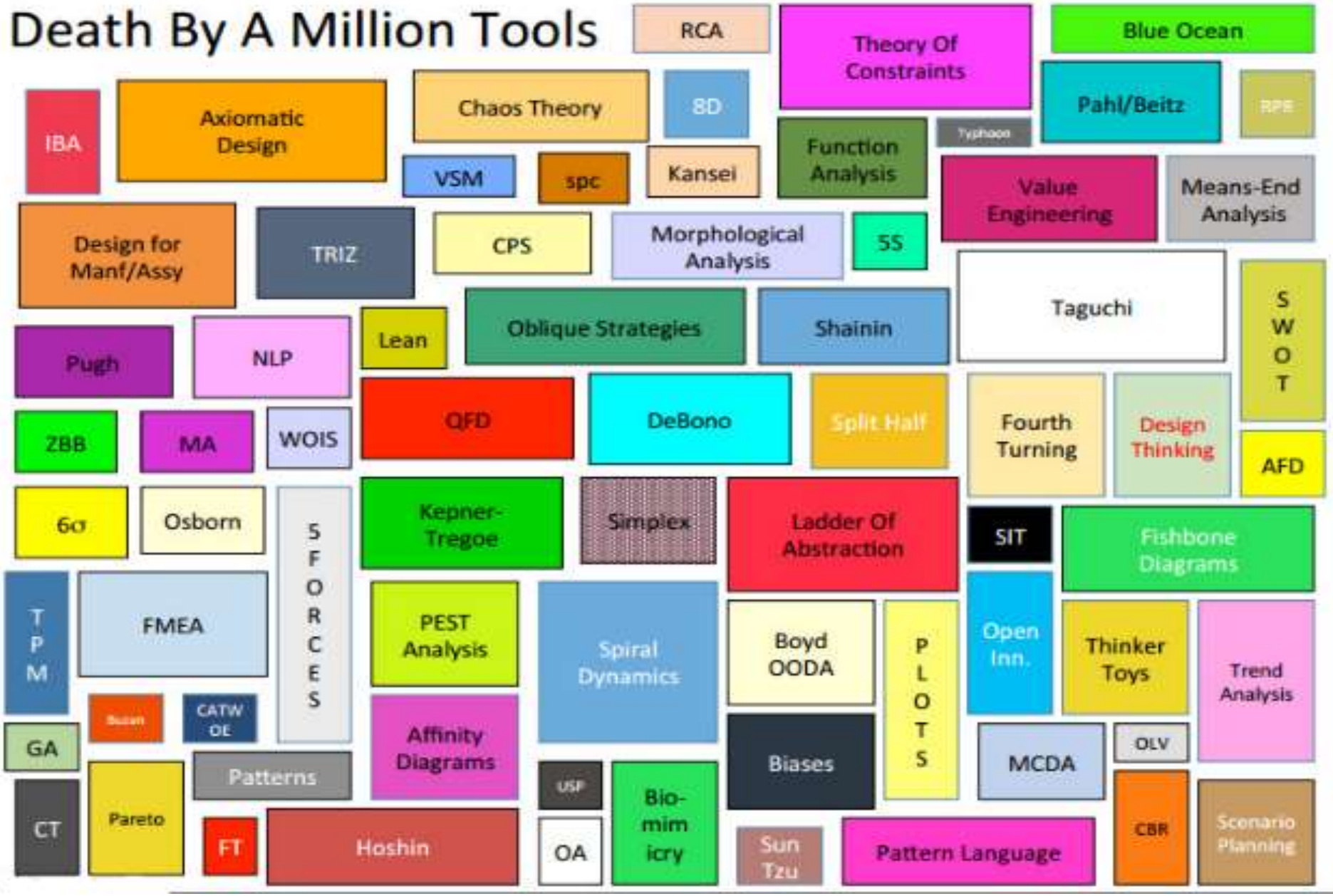
The Innovation Process

- But,…

has it always to be that way?

- Aren´t we able to develop methods that might turn this around?

Death by a Million Tools



The Innovation Process

- Our work is aimed at the integration of **tools and methods to increase effectiveness and reliability** of the innovation process.

The Innovation Process

- The first steps were focused on integrating QFD, Functional Analysis and TRIZ, and were followed by efforts toward the integration of TRIZ and CAD, devoted to contributing to a reduction in product development time and to an improvement in quality and performance and delivering a Computer Aided Innovation framework.

By following this way we realize that this might be the way to a **failure-free Innovation process**

Too good to be true?

Why not try?

A generic model

Difficult and complex problems require always at least one …

First step in the way of its solution:

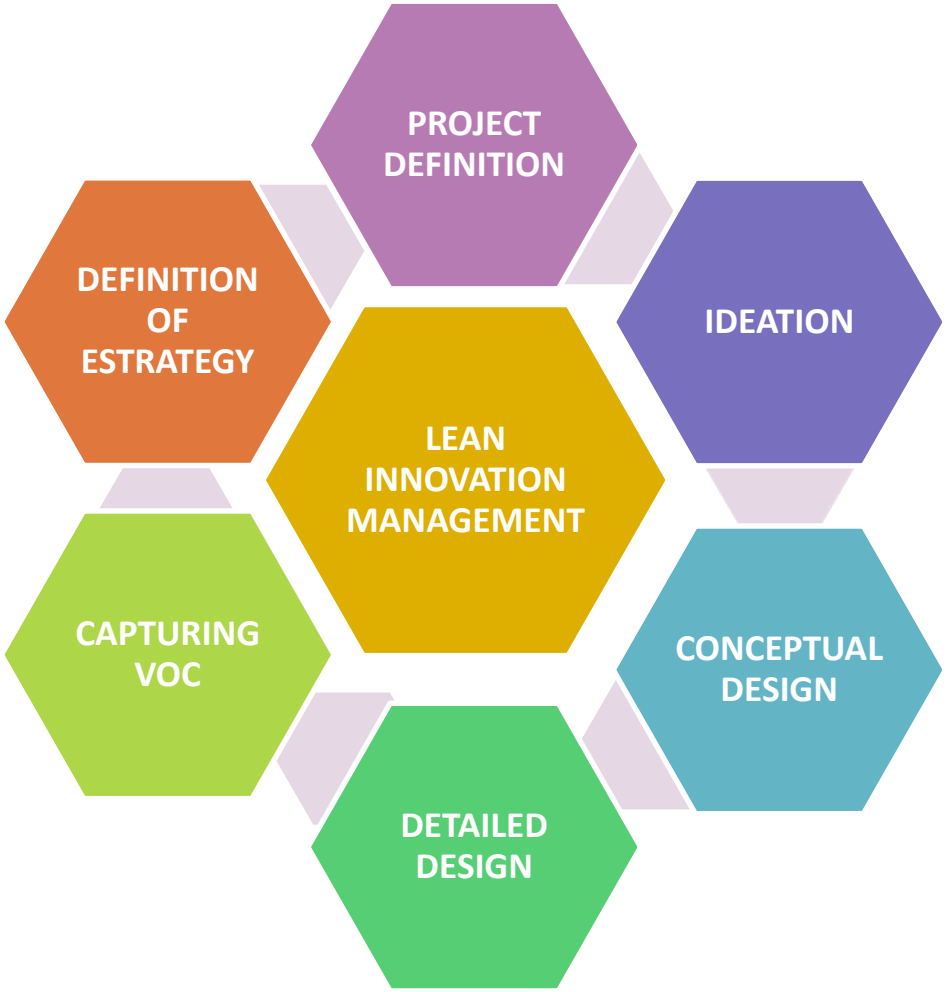
- To identify causes of innovation failures and…

has to be followed by the necessary further steps

- To Identify and develop a generic model of an innovation process in which it is possible to map the required methods for avoiding those failures…

A generic model

This generic innovation model represents common activities preformed by companies to increase their competitiveness, efficiency and progress.



A new framework

Then we locate the best innovation methods and tools according to their use in an integrated approach :

- **Design Thinking,**
- **Kansei engineering,**
- **QFD/VOC,**
- **Blue Ocean Strategy,**
- **Technology surveillance,**
- **Lean**
- **A3**
- **TRIZ**
- **Functional Analysis,**
- **Value Engineering,**
- **SBCE and**
- **DFMA**

A new framework

As these methodologies have the highest potential to improve the effectiveness and likelihood of success, while at the same time reducing risks and costs

Thus contributing to achieve robust, rapid innovation cycles by accelerating innovation and reducing **and probably eliminating failures.**

A new framework

However… integrating all those tools and methods into the innovation process as they are, might be an expensive and time consuming endeavor.

Let us look for the possibilities of a smooth integration…

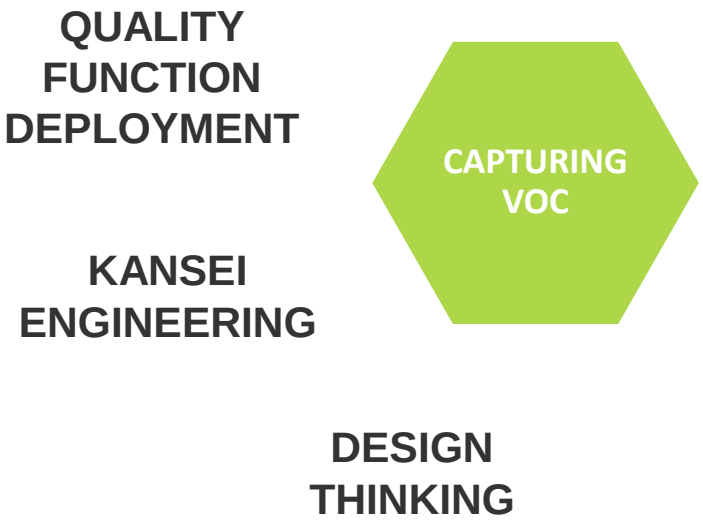
The Fuzzy Front End

CAPTURING VOC

- At the fuzzy front several approaches, such as QFD/VOC, blue ocean strategy, design thinking and Kansei engineering, are helpful in reducing uncertainty.

The Fuzzy Front End

- Each of them contains valuable useful guidelines with the potential for eliminating uncertainties and ensuring one straightforward path to success.



The Fuzzy Front End

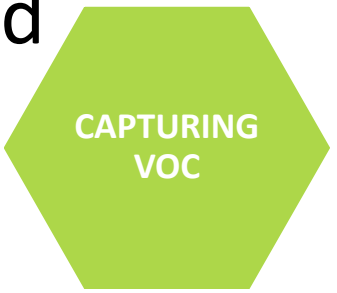
- However, …
- the long learning curve and implementation time discourages use of them and, consequently,
- most innovation initiatives are taken based more on inspiration and intuitive decisions that stand as the main source of the tremendous failure rates and enormous costs produced by those failures.

The Fuzzy Front End

- What if we could find ways of reducing the learning curve and accelerating their implementation?
- The following are the basic thoughts that might lead to a new way of implementing the fuzzy front end as part of a whole **“lean blue innovation”** process, which contains the best of all those methods and tools, making its implementation straightforward.

The Fuzzy Front End

- Of course, it is not an easy endeavor and will require the collaborative work of many persons and institutions.
- Our intention now is to highlight the benefits of the interfaces that are being recognized and that will make it possible to convert the Fuzzy Front End into a structured approach that minimizes failures and costs.



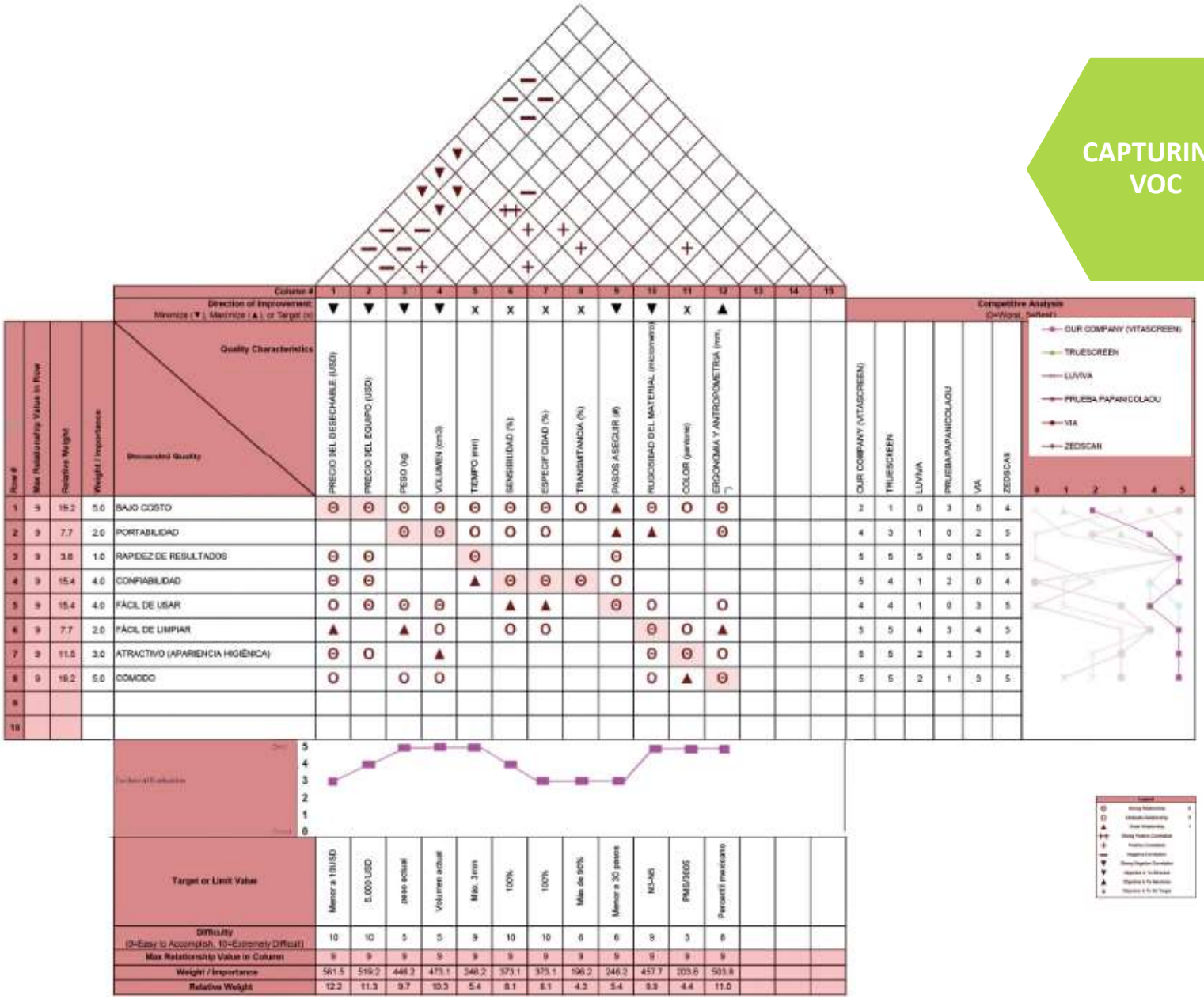
QFD/*VOC*

- QFD was developed by Yoji Akao building on Deming's work on statistical quality control.
- QFD/*VOC* serves as a decision support tool with the aim to ensure that the key quality aspects that are important for customers are taken into consideration for guiding the improvement of products.

CAPTURING VOC

The HoQ

CAPTURING VOC



The “buzz” of social networks

- New possibilities are being developed for capturing VOC through the “buzz” of social networks
- Furthermore, computational simulations are being developed that produce insights providing the researcher with another tool to reason about challenging problems.

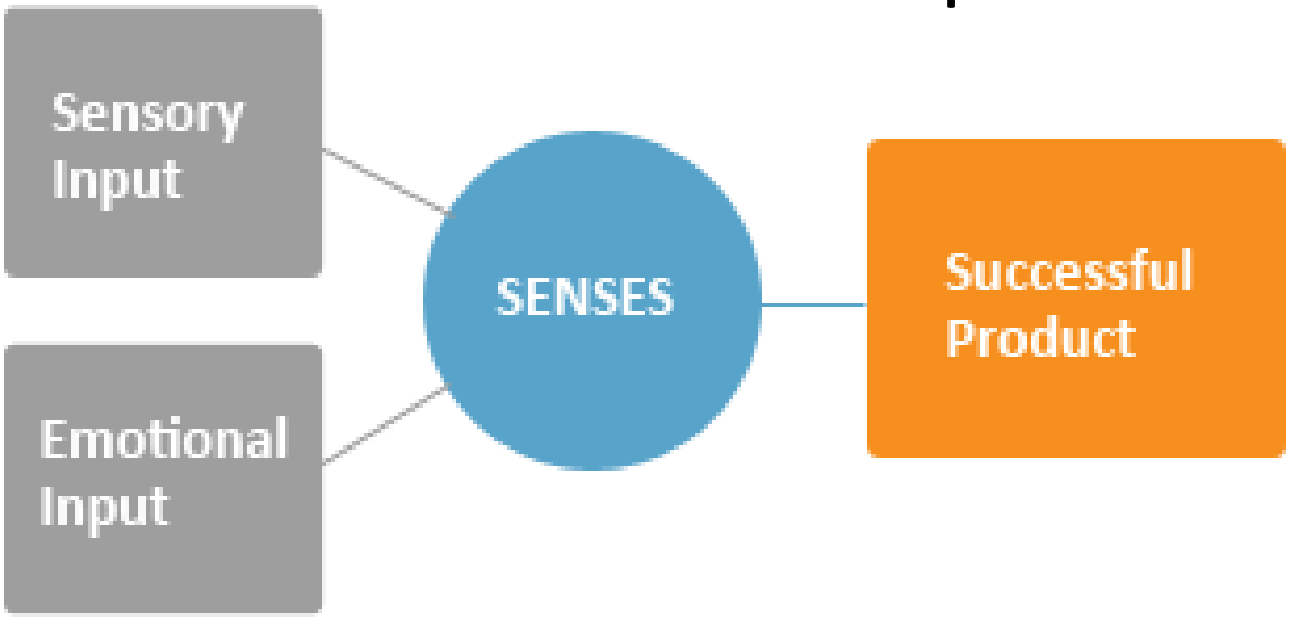
Design thinking and Kansei engineering

- Design thinking is a recognized method for the practical, creative resolution of problems
- It is a form of solution-based thinking, beginning with an objective (a better future situation) as an alternative for solving a specific problem
- It emphasizes observation and collaboration and it contains opportunities of synergies with the concept of “going to the Gemba” of QFD/VOC.

CAPTURING VOC

- Kansei engineering is useful for translating the customer's psychological feelings and implicit needs, such as emotional experience, into the features of the new product.

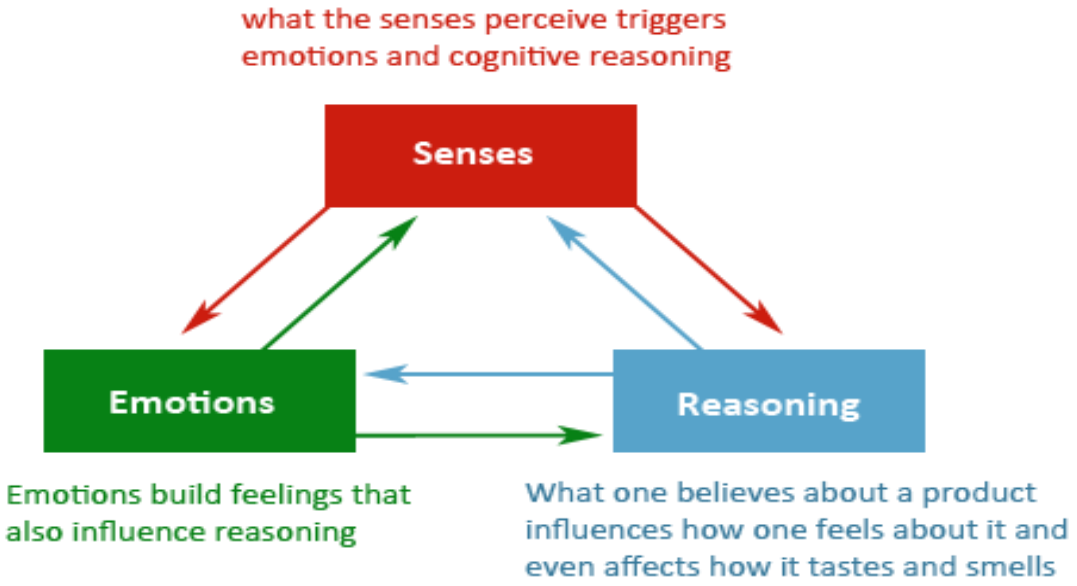
CAPTURING VOC



Customer acquaintance with diverse viable options, is forcing producers to change from conservative 'product-out' thinking to a 'market-in' approach

CAPTURING VOC

How to help engineers address the emotional design needs of new classes of clients?



How can your product and brand connect emotionally with them?

Design thinking and Kansei engineering

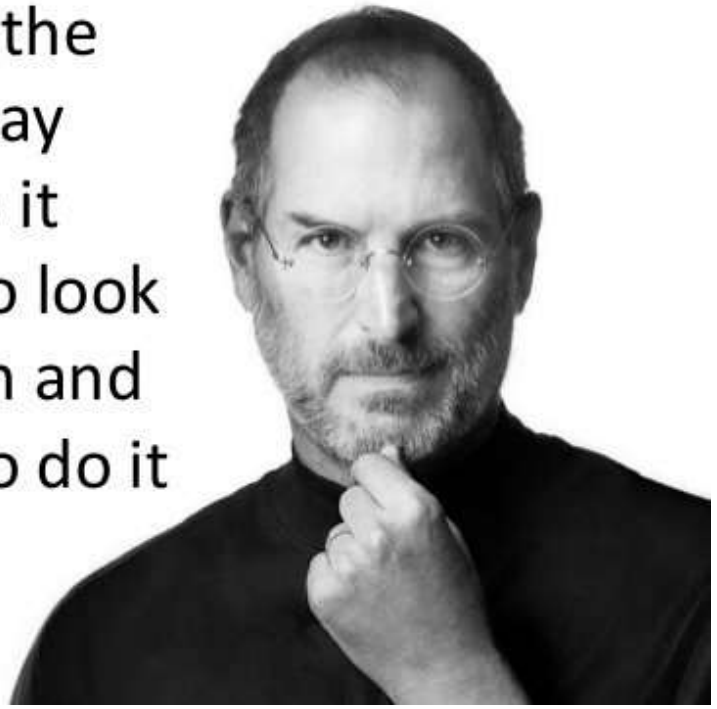
- Workshops that link Kansei engineering and QFD are already offered claiming “easily available Kansei engineering tools and software to apply QFD to the fuzzy emotional sides of product development
- An enhanced value may be added by also integrating design thinking and Kansei engineering.

Definition of Estrategy

- From capturing the voice of the customer to the strategy of development

DEFINITION OF ESTRATEGY

"You can't look at the competition and say you're going to do it better. You have to look at the competition and say you're going to do it differently."
- *Steve Jobs*



Blue ocean strategy

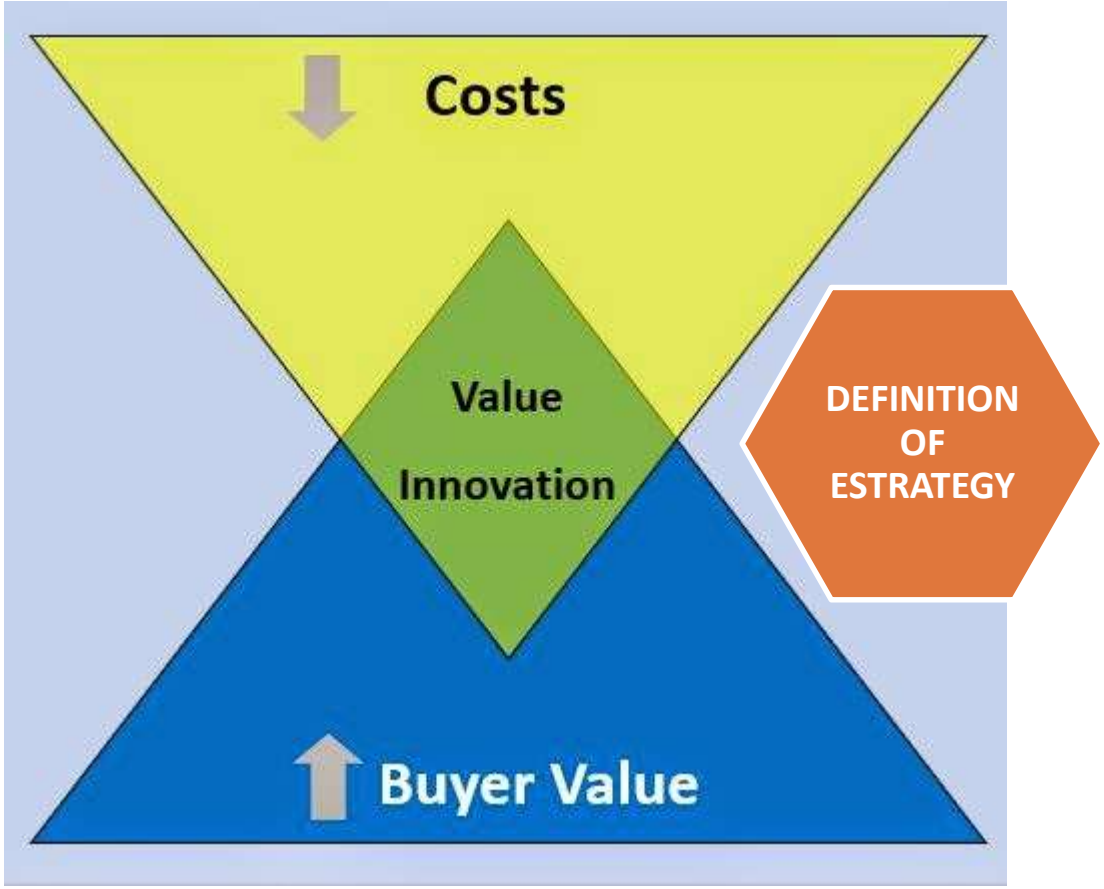
BOS challenges companies to break out of the red ocean of bloody competition by creating uncontested market space that makes the competition irrelevant".

DEFINITION OF ESTRATEGY

Blue ocean strategy (BOS) is a business methodology focused on creating uncontested market space by increasing the buyer´s value while reducing costs.

Blue ocean strategy

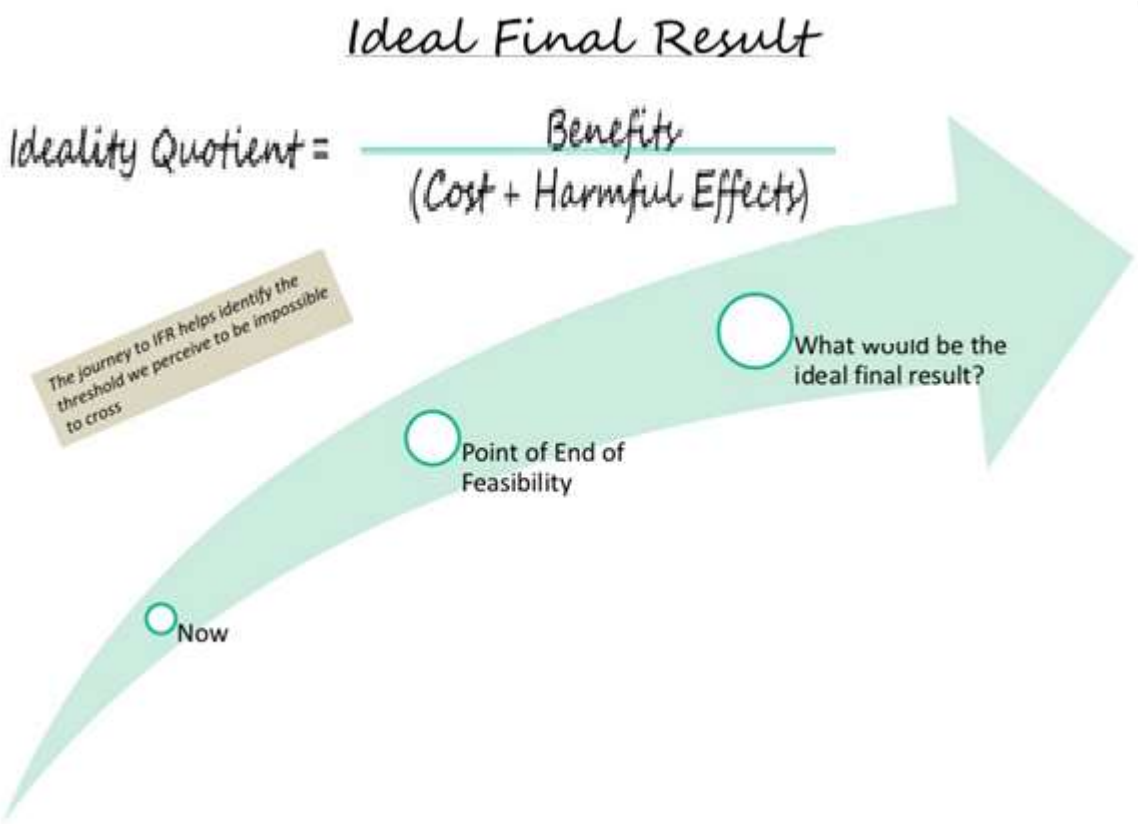
BOS tools include: strategic canvas, cost-value relationship, four actions framework, six basic paths, cycle of experiences of buyer, and services map to the purchaser.



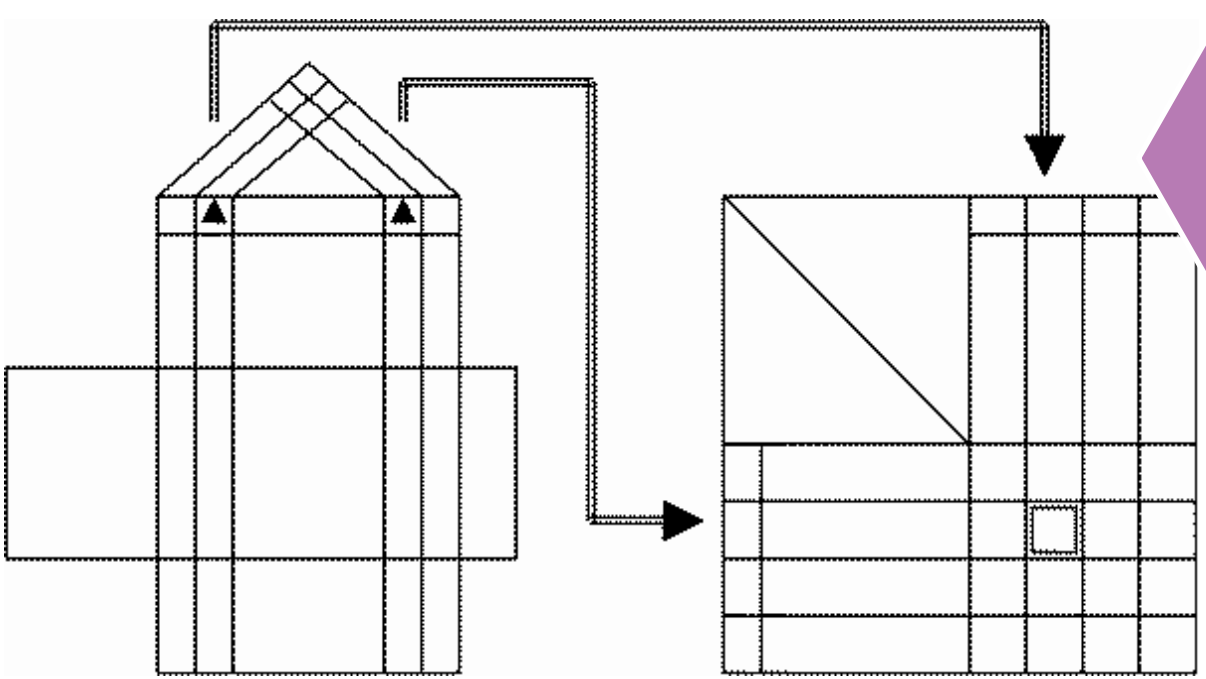
Of course, if that were easy to do, each company would be implementing this strategy for maximizing its competitiveness.

IFR removes mental constraints and gets people to think “out of the box”

DT and IFR have in common acting as tools to imagine future states.



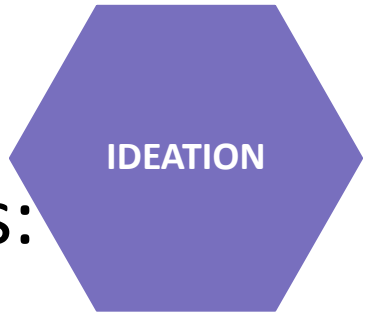
For solving contradictions, the TRIZ contradiction matrix is a helpful alternative to brain storming, where inventive principles screened from the patent analysis help in overcoming the current contradiction with innovative solutions.



PROJECT DEFINITION

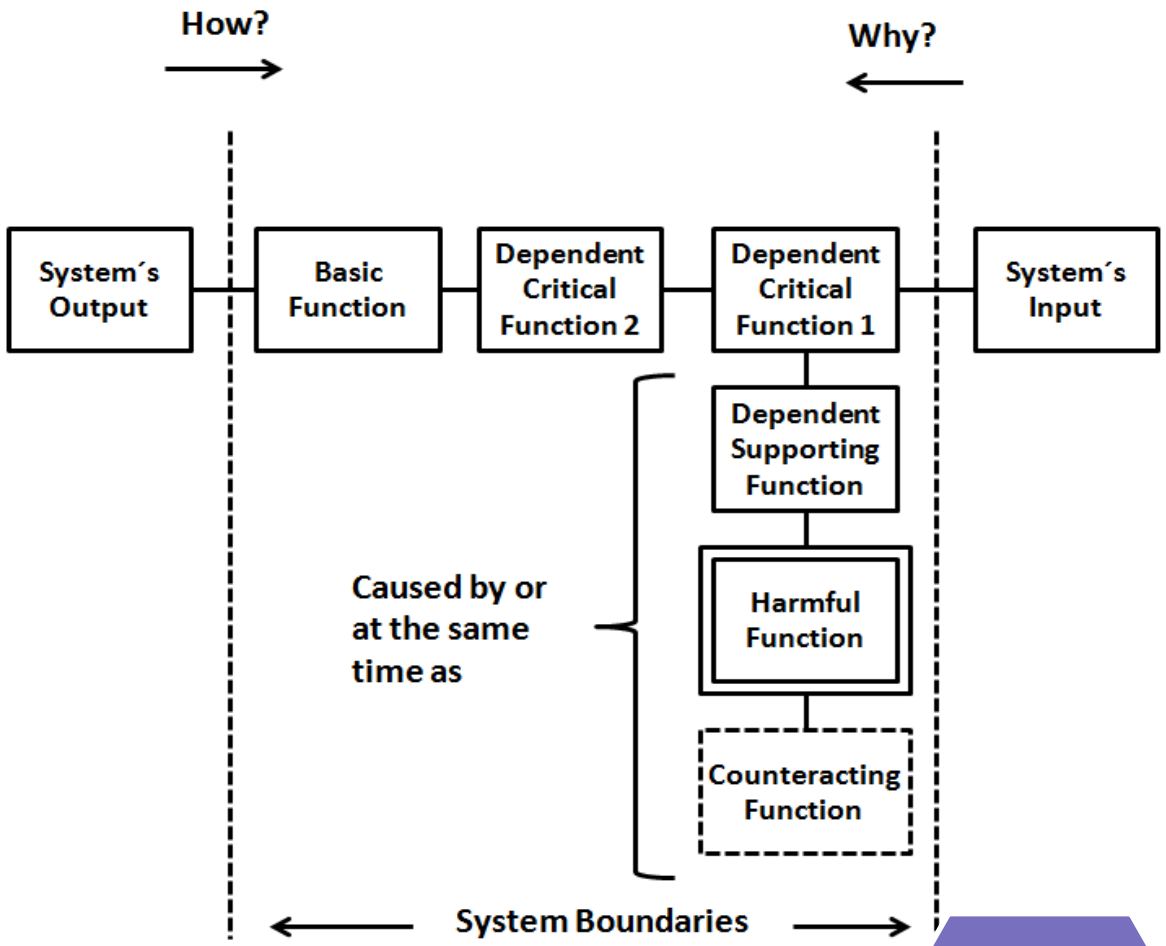
Functional Analysis

- The primary or global useful function of a system is decomposed in sub-functions at different hierarchical levels.
- The term function is defined as the input/output relation in one technical system that has to fulfill a task.
- Functions are actions fulfilled on objects:
- “to increase torque” “to transfer load” “to decrease rotational speed” “to cut metal”, etc.



Functional Analysis

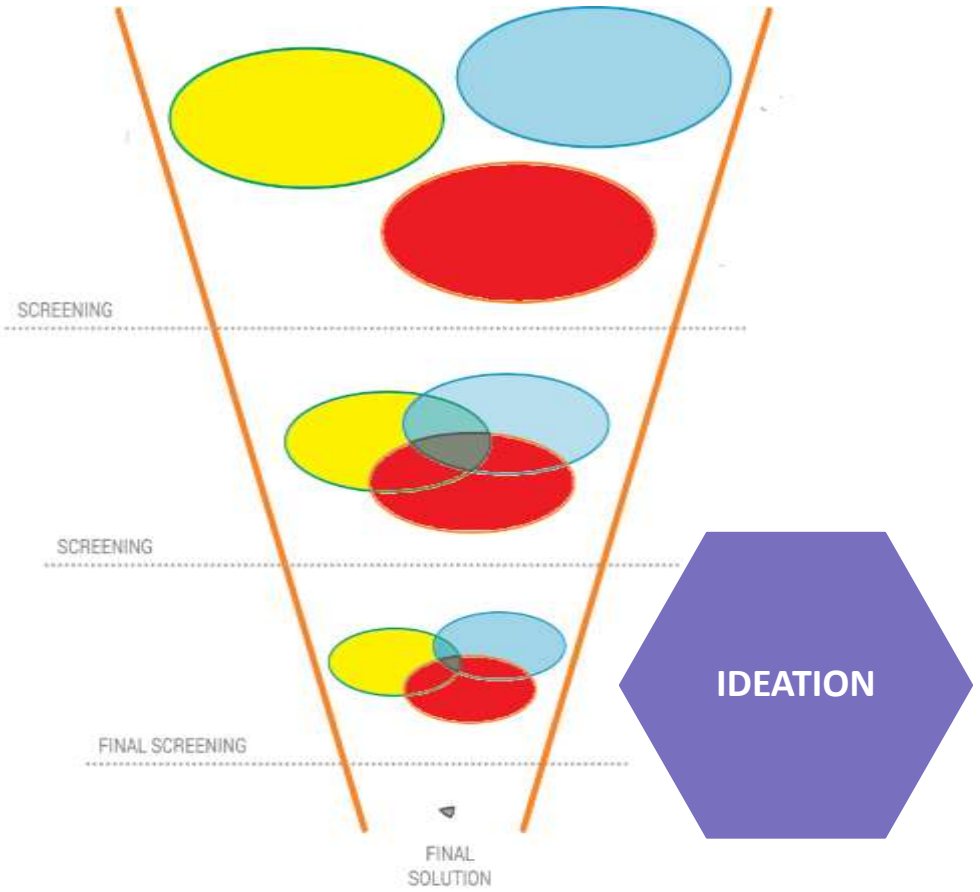
Building on the concept of function analysis, value engineering was developed by Miller and later, Charles W. Bytheway, developed the methodology called function analysis systems technique, or FAST.



IDEATION

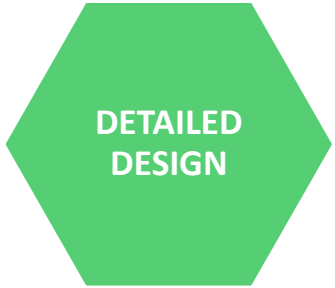
Set-based Design

- Set-based design is a concurrent methodology, in which a fixed design space is defined and a set of design requirements has to be met.
- SBD methodology generates numerous potential alternatives and these multiple alternatives involve various technical challenges.



CAI and DFMA

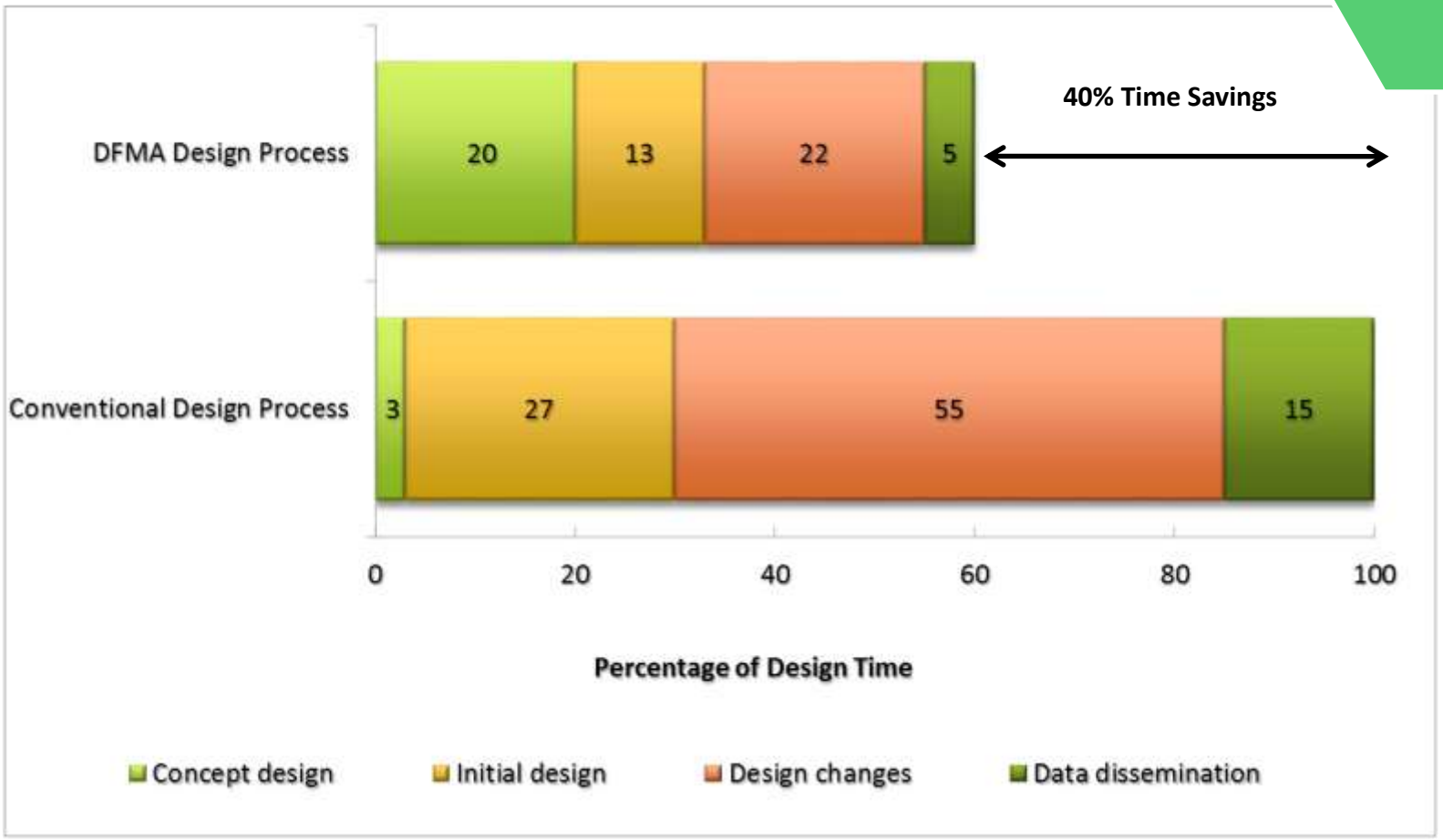
- A comprehensive vision conceives Computer Aided Innovation as tools for providing help up to the introduction of successful innovations in the market.
- DFMA methods and the corresponding software can be considered in the stage of optimization systems.
- DFMA supports that manufacturing engineers and product designers can be involved at the early stages of a product's design.



CAI and DFMA

- DFMA significantly contributes to the reduction in development time and product costs

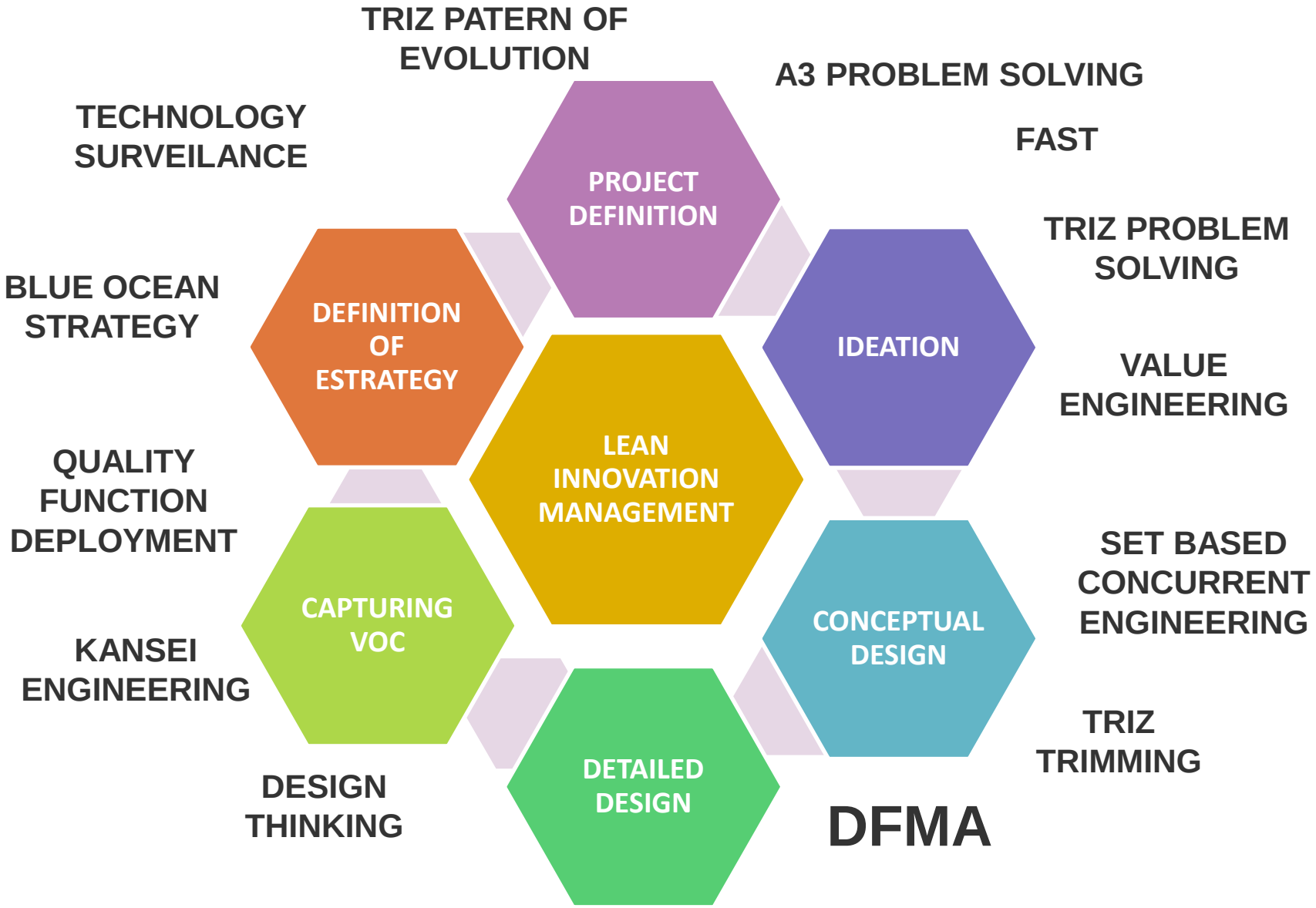
DETAILED DESIGN



Lean Blue Innovation

- “Lean 3z thinking” as integration focuses on a new way of customer-centered innovative thinking
- Functional analysis, set-based design and especially DFMA provide help to the design team for simplifying the product structure to reduce manufacturing and assembly costs.
- The integration of the TRIZ concept of trimming and the concept of minimum part criteria, provides the possibility of using DFA as a computer innovation tool

Lean Blue Innovation



Lean Blue Innovation

This new integrated process may be coined **“lean blue innovation”,** as that integration creates a structured way for finding the blue oceans that drive the growth and development of the products that will succeed in the market due to minimized costs and maximized performance.

Perhaps new steps might lead us to make certain a

FAILURE-FREE-INNOVATION?

Is that target only on the realm of Ideal Final Results?, or…

Will we be able to approach that target step by step?

Let us continue working on that…

Only the results will say…

Questions:

Thanks to:

- **Boothroyd Dewhurst, Inc., Design for Manufacture and Assembly (DFMA®) for Sponsoring & allowing me to present**
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- **Altshuller Institute for TRIZ Studies, Worcester, MA**
- **AMETRIZ: Mexican TRIZ Association**

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