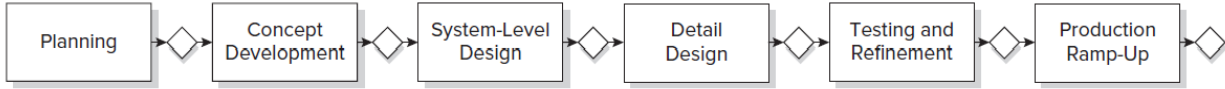


## Chapter 2: Product Development Process and Organization

1. Describe the product development process and how you have applied it on your project.

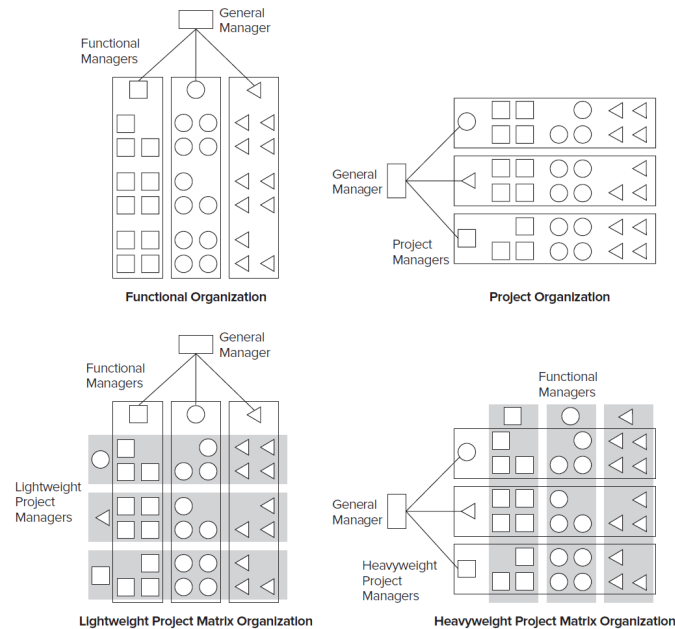


We pretty much followed this process, of course the weekly assignments were in-line with it as well. We started with planning which did take several weeks and then moved to concept development where we actually switched ideas and had to do the planning part again.

We then did the system level design and currently we are working on the design details.

2. Describe the strengths and weaknesses of an organizational structure and how you have structured your workflow in your project or how you would if it were an organization.

28 Chapter 2



Source: Adapted from Hayes, Robert H., Steven C. Wheelwright, and Kim B. Clark, *Dynamic Manufacturing: Creating the Learning Organization*, The Free Press, New York, 1988

**EXHIBIT 2-8** Various product development organizations. For simplicity, three functions and three projects are shown.

	Matrix Organization			
	Functional Organization	Lightweight Project Organization	Heavyweight Project Organization	Project Organization
<b>Strengths</b>	Fosters development of deep specialization and expertise.	Coordination and administration of projects is explicitly assigned to a single project manager. Maintains development of specialization and expertise.	Provides integration and speed benefits of the project organization. Some of the specialization of a functional organization is retained.	Resources can be optimally allocated within the project team. Technical and market trade-offs can be evaluated quickly.
<b>Weaknesses</b>	Coordination across different functional groups can be slow and bureaucratic.	Requires more managers and administrators than a nonmatrix organization.	Requires more managers and administrators than a nonmatrix organization.	Individuals may have difficulty maintaining cutting-edge functional capabilities.
<b>Typical Examples</b>	Customized products, where development involves slight variations to a standard design (e.g., motors, bearings, packaging).	Derivative products in many automobile, electronics, and aerospace companies.	New technology or platform projects in automobile, electronics, and aerospace companies.	Start-up companies. "Scrum teams" and "skunkworks" intended to achieve breakthroughs. Firms competing in highly dynamic markets.
<b>Major Issues</b>	How to integrate different functions (e.g., marketing and design) to achieve business goals.	How to balance functions and projects. How to simultaneously evaluate project and functional performance.		How to maintain functional expertise over time. How to share learning from one project to another.

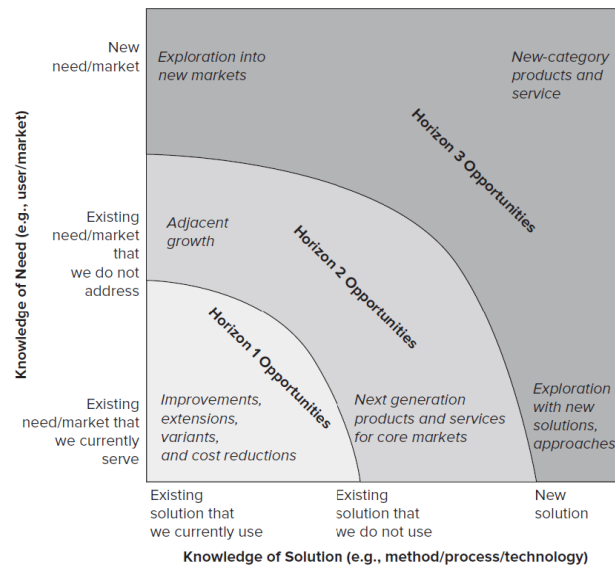
**EXHIBIT 2-9** Characteristics of different organizational structures.

Considering these strengths and weaknesses we decided on a project organization.

## Chapter 3: Opportunity Identification

1. Describe an opportunity and some different types. What opportunities did you seek in your project?

38 Chapter 3



**EXHIBIT 3-3** Types of opportunities. Horizons 1, 2, and 3 represent increasing levels of risk, reflecting different types of uncertainty.

Source: Terwiesch, Christian, and Karl T. Ulrich, "Innovation Tournaments: Creating and Identifying Exceptional Opportunities," *Harvard Business Press*, 2009.

Opportunities come in many forms but an example of an opportunity would be:  
If a country cuts tariffs, a car manufacturer can export its cars into a new market, increasing sales and market share.

There are many ways to generate opportunities, for example **study customers**, **imitate but better** and **consider the implications of trends**.

We used these methods to generate opportunities for our project and we decided to pursue:  
*Heatmap showing data on house prices in certain areas. It currently only exists in table and graph form.* Until we switched projects, then the opportunity was given and defined for one customer.

2. What are some ways of identifying opportunities? How did you apply this in your project?

There are many ways to generate opportunities, for example **study customers**, **Imitate but better** and **consider the implications of trends**.

## Opportunity Identification Process

We divide the opportunity identification process into six steps as follows:

1. Establish a charter.
2. Generate and sense many opportunities.
3. Screen opportunities.
4. Develop promising opportunities.
5. Select exceptional opportunities.
6. Reflect on the results and the process.

Each step is the focus of a section of this chapter.

bls 41

For example we used the study customers method, we interviewed potential customers and came up with a couple of opportunities from those.

Table 1: 10 opportunities and the method used to find it

Nr.	Method	Opportunity
1	Imitate but better	Heatmap showing data on house prices in certain areas. It currently only exists in table and graph form.
2	Consider implications of trends	Everything related to finance, like stocks, crypto, real estate, has been very trendy and talked about recently. That makes the heat map related to the real estate market a good opportunity.
3	Imitate but better	Making the site more accessible for everyone in an app.
4	Study Customer	Evaluate housing prices based on nearby shops, schools on more essential institutions.
5	Study customer	Have vital information concerning the housing market.
6	Study Customer	Get more insight into what kind of neighbourhood young families want to live in.

## Chapter 4: Product Planning

1. Summarize the 5 steps of the project planning process and how you applied this to your project.

1. Identify opportunities.
2. Evaluate and prioritize projects.
3. Allocate resources and plan timing.
4. Complete pre-project planning.
5. Reflect on the results and the process.

bls 59

1. We used multiple methods to identify opportunities including “study customer” and “intimate but better”.
2. We then evaluated one of the opportunities and explained how they are VRIN. We also evaluated the opportunity according to the Real-Win-Worth-it Framework.
3. We fortunately had a pretty good layout set out for us, we mostly had to follow the weekly assignments to have good timing.
4. We completed pre-project planning when we started the system design and design details.
5. We are currently working on design details but we pretty happy with our progress.

## Chapter 5: Identifying the Customer needs

1. Describe the 5 step process of identifying customer needs and how you applied this in your project.

1. *Gather raw data from customers.*
2. *Interpret the raw data in terms of customer needs.*
3. *Organize the needs into a hierarchy of primary, secondary, and (if necessary) tertiary needs.*
4. *Establish the relative importance of the needs.*
5. *Reflect on the results and the process.*

How we applied it:

1. Very easy, we use yahoo finance for reliable finance data. We can also use simplywall.st for sector information
2. We interpret the raw data by filtering it according to the customer's needs. For example we choose the volatility of the IPO's and a minimum expected rate of return.
3. The primary needs are the volatility, timeframe, and expected rate of return. Multiple other indicators are secondary such as Simple moving averages and exponential moving averages.
4. We establish the relative importance of the needs by choosing the primary and secondary needs. All of the primary needs are necessary for the project to function. Hence there is no relative importance between the primary needs.
5. We are currently well on our way with the design details and are pretty happy with our progress.

## Chapter 6: Product Specifications

1. Explain the 4 steps of establishing product specifications and how it applies to your project.

- 1. Prepare the list of metrics.*
- 2. Collect competitive benchmarking information.*
- 3. Set ideal and marginally acceptable target values.*
- 4. Reflect on the results and the process.*

*Bls.98-99*

How it applies to our project

- 1. FUUUCCKK**
2. RIP
3. We can set a maximum volatility and a minimum expected return to filter data.
4. Við erum toast með metrics

2. What are the 5 steps in setting the final specifications, how might you apply it to your project.

- 1. Develop technical models of the product.*
- 2. Develop a cost model of the product.*
- 3. Refine the specifications, making trade-offs where necessary.*
- 4. Flow down the specifications as appropriate.*
- 5. Reflect on the results and the process.*

*Bls 107-109*

How it applies to our project:

1. We created a figma product with core functionality, we also have an excel spreadsheet that we are currently working on with more defined calculations.
2. We developed a cost model of our product, estimated the manufacturing cost and arrived at a number around 3 million ISK for two months of product development.
3. We then refined the specifications and selected primary and secondary needs.
4. ...
5. We are currently well on our way into design details and are so far happy with our progress.

Number	Description	Expected Time	Unit cost	Total Cost
1	Salary	2 months	350.000 ISK/person/month	2.800.000 ISK
2	Energy	2 months	7.000 ISK/month	14.000 ISK
3	Rent	2 months	120.000 ISK/month	240.000 ISK

Table 1: Estimation of the manufacturing cost

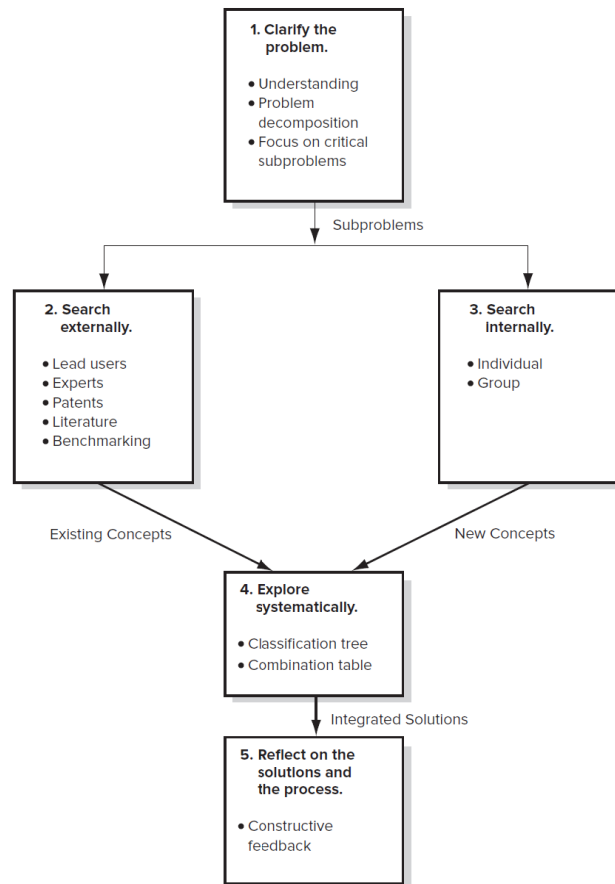
## Chapter 7: Concept Generation

1. Describe the 5 step concept generation method and how it could be applied to your project.

124 Chapter 7

### EXHIBIT 7-3

The five-step concept generation method.



bls 124

How it applies to our project:

1. We first had to clarify what our project / problem was, we wanted to see how the volatility of IPO's impact a portfolio / sector
2. For concept development we interviewed our customer and searched externally (on the web and emailing professors) for concepts that could help us with our problems and customer needs
3. We screened the concept and arrived at a final result, using CAPM and fama-french 3 at the time. (Although with new information we are currently reconsidering).
4. We are currently well on our way into design details and are happy with our progress so far.

## Chapter 8: Concept Selection

1. Explain the benefits of a structure method of concept selection. How may this apply to your project?

Example of benefits of a structure method of concept selection:

1. **A customer-focused product:** Because concepts are explicitly evaluated against customer oriented criteria, the selected concept is likely to be focused on the customer.
2. **A competitive design:** By benchmarking concepts with respect to existing designs, designers push the design to match or exceed their competitors' performance along key dimensions.
3. **Reduced time to product introduction:** A structured method becomes a common language among design engineers, manufacturing engineers, industrial designers, marketers, and project managers, resulting in decreased ambiguity, faster communication, and fewer false starts.
4. And more

Bls 154-155

2. Describe the process of concept scoring and how you applied it in your project.

Describe the process of concept scoring and how you applied it in your project.

160 Chapter 8

Concept									
		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%	<b>3</b>	0.15	3	0.15	4	0.2	4	0.2
Ease of use	15%	<b>3</b>	0.45	4	0.6	4	0.6	3	0.45
Readability of settings	10%	2	0.2	<b>3</b>	0.3	5	0.5	5	0.5
Dose metering accuracy	25%	<b>3</b>	0.75	3	0.75	2	0.5	3	0.75
Durability	15%	2	0.3	5	0.75	4	0.6	<b>3</b>	0.45
Ease of manufacture	20%	<b>3</b>	0.6	3	0.6	2	0.4	2	0.4
Portability	10%	<b>3</b>	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	

**EXHIBIT 8-7** The concept-scoring matrix. This method uses a weighted sum of the ratings to determine concept ranking. While concept A serves as the overall reference concept, the separate reference points for each criterion are signified by **bold** rating values.

bls 160

How we applied it:

We made a concept screening matrix and voted as a group on each point.



Table 1: Concept generation matrix for the financial models

Selection criteria	Concept				
	CAPM	Linear regression	Fama-French 3	Fama-French 5	AI
Easy to create	+	+	0	-	-
Result accuracy	0	-	+	+	+
Updatability	-	-	+	+	0
Maintainability	+	0	+	+	0
Model complexity (not complex)	+	+	-	-	-
Relevant factors	+	0	+	+	+
Score	3	0	3	2	0
Rank	1-2	4-5	1-2	3	4-5

We selected the winners for our concepts.

## Chapter 9: Concept Testing

1. Describe the 7 step process of concept testing. How did you test the concept of your project?

1. *Define the purpose of the concept test.*
2. *Choose a survey population.*
3. *Choose a survey format.*
4. *Communicate the concept.*
5. *Measure customer response.*
6. *Interpret the results.*
7. *Reflect on the results and the process.*

Bls173

How we applied it to our project:

Table 1: The questions and answers from the interview with Kvika

Nr.	Question	Answer
1	Are you in the process of investing?	Yes, but I can't disclose in what.
2	In which market are you mainly investing?	We mainly invest in biotech/pharmaceutical companies.
3	What investment methods are you studying for the fund?	NDA.
4	What do you think about using the CAPM model?	I think that it is very relevant for investment funds but it is a bit simple and limited.
5	What do you think about using the Fama-French 3 model?	It's a great model but it depends on how much time you have to study the method and the input factors. It's little bit more complicated than CAPM and it does not necessarily produce more accurate results.
6	Would you prefer either one?	I think I would prefer the Fama-French 3 model since I want to have more parameters.
7	How would you want to see the model presented?	Graphs are always nice but the most important thing is to get accurate results. For the graphs, I would like to be able to select from a few different types.
8	What would you like to see us add to the models?	I think this is a very good start. I would like to have the option to add more factors, so it's good to keep that in mind.

1. The main reason why we need to do a concept test is to make sure that the customers' needs are accurately fulfilled. Another reason is to give the customer a grasp on where the project is heading and how it is being developed.
2. Our survey population is our contact at Kvika Eignarstýring since we are developing this for them.
3. Our survey format for this project was the internet. For the reason that it is convenient for everyone.
4. We decided that we would communicate the concept with a verbal description and with sketches.
5. We collected the customer response
6. Based on the customer response we can assume that our customer would definitely buy our product.

## Chapter 10: Product Architecture

1. Describe the different types of product modularity and how it would apply in your project/how could you apply it to a software?

1. **Slot-modular architecture:** Each of the interfaces between chunks in a slot-modular architecture is of a different type from the others, so that the various chunks in the product cannot be interchanged.
  - a. Ports on a computer
2. **Bus-modular architecture:** In a bus-modular architecture, there is a common bus to which the other chunks connect via the same type of interface.
  - a. an usb port
3. **Sectional-modular architecture:** In a sectional-modular architecture, all interfaces are of the same type, but there is no single element to which all the other chunks attach.
  - a. lego cubes

BIs193-194

How we apply it:

1. Dafuq

2. What are the four steps of establishing product architecture, and how does it apply to your project?

1. *Create a schematic of the product.*
2. *Cluster the elements of the schematic.*
3. *Create a rough geometric layout.*
4. *Identify the fundamental and incidental interactions.*

Bls 197

How does it apply to our project?

We used this method to create a figma prototype for our project. See figma prototype for more information.

## Chapter 11: Industrial Design

1. Explain the importance of user experience needs and how it could be applied to your project.

User Experience Needs

Bls 219

2. Describe the 6 step industrial design project, and how it can be applied to your project

1. *Investigation of customer needs.*
2. *Conceptualization.*
3. *Preliminary refinement.*
4. *Further refinement and final concept selection.*
5. *Control drawings or models.*
6. *Coordination with engineering, manufacturing, and external vendors.*

Bls223

How it can be applied to our project:

.....

## Chapter 12: Design for Environment

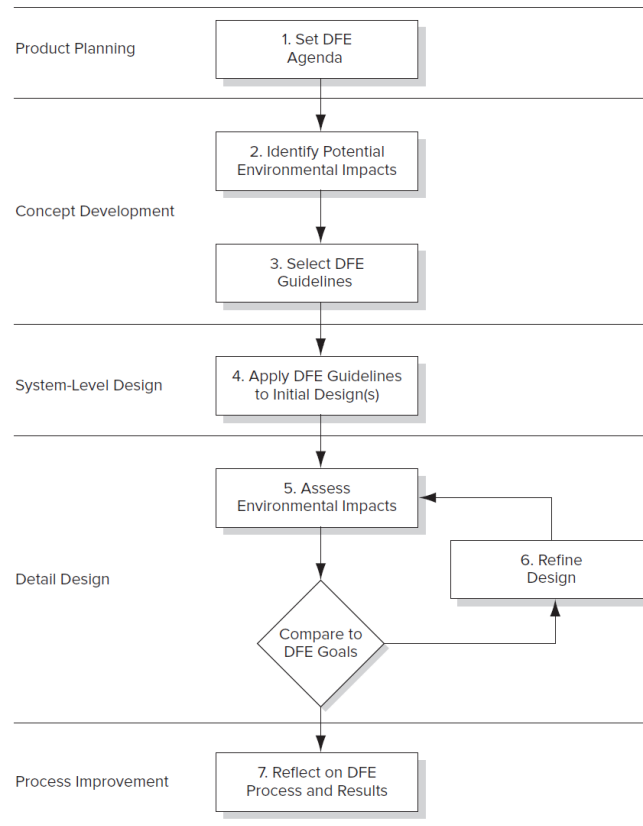
1. Describe shortly each of the 7 steps in the design for the environment process. What environmental considerations did you make for your project?

### The Design for Environment Process

Effective implementation of DFE includes activities throughout the product development process. The steps of the DFE process are shown in Exhibit 12-4. Despite the linear presentation of the steps, product development teams will likely repeat some steps several times, making DFE an iterative process. The following sections describe each step of the DFE process.

#### EXHIBIT 12-4

The DFE process involves activities throughout the product development process.



bls243

How it applies to our project:

Through this process we discovered that Iceland is exceptionally well suited for software based products. We used green-algorithms.com to calculate the environmental impact score of running a computer for 24 hours in Iceland. The result was that it was 0.5 g of CO2 equivalent which is very low. If we were in, for example Australia this would be almost a 1000 times larger.

2. Explain the two life cycle model and how it impacts the environment and how you used it in your project.

**Two Life Cycles**

**Bls 240**

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## Auka

### The innovation challenges

Are people: make it desirable, business: is it viable, technical: can it be done

### Development processes

**Rapid Iteration PD Process:** Much as the concept development process except there are multiple iterations in the design build and test part

**Staged Development Process:** A lot more complicated, it includes reviews between concepts design and system level design. It also has unplanned cross-phase iterations and within-phase iterations but those are planned.

**Spiral development process:** A lot more initiative process, multiple risk analysis and prototyping.

**System engineering V model:** A lot more defined process, for example it has multiple documentation and review segments.

### Design Structure Matrix:

Shows a breakdown of sequential , parallel and coupled processes.

Coupled tasks can be identified uniquely. • The display of the matrix can be manipulated to emphasize certain features of the process flow. • DSM analysis software implements partitioning algorithms.

## Scrum

A method for many kinds of development, the core is a sprint cycle which a scrum master oversees, it usually includes daily meetings but this process can be expanded on.

### Opportunity identification

Sjá ofar í skali

### Quality creation process

Basically there is only a small percentage of opportunities that are exceptional. It is expected that most fall inn a quality hurdle, aren't good enough. Fail to be Real win worth it and such.

## Real win worth it

Speak for itself, at all points in the process development we should ask ourselves, is this opportunity real, is it worth it financially, and can we win this opportunity ( can we establish a sustainable competitive advantage?

## Product planning

Using different sources of product opportunities.

## Product plan

Shark brand vacuums in six product categories, showing historical and future market release of each product platform and some of their derivative products

## Market segment map

Basically, the market is not eternal, there will be changes. In the market segment map we map the competing products, what we can price our product and different scenarios for it. Also our goals and anticipated competitors.

## Product-Technology Roadmap

It shows the evolution of sub-systems in the project and helps plan which technologies may be used in future products. Can be made for a couple of different versions and future versions.

*The product-technology roadmap shows the evolution of several subsystem technologies and helps to plan which technologies may be used in future products.*

## Platform vs derivatives

Basically from our product we may want to have different platforms, for example PC and Xbox if we had a computer game. And from that we can have different versions. For example The ultimate collection or the basic game.

## Product-Process Change matrix

It is a useful visual representation of how costly and impactful process changes are. The size of the circles indicates the relative cost of the development. The x axis is the size of the product change and the y axis is the extent of production process changes, which means how much we have to change our process

### Project portfolio planning

Not much to explain, we don't have infinite money, we have to estimate how much we need for each part. If we want to make derivative products those won't be free, also if we make product updates they can be costly if we have to make product changes.

### Aggregate resource planning

Much the same as product portfolio planning, we don't have infinite money and we have to plan ahead. What we are looking at is a pretty detailed breakdown into quarters of how much we have to spend on each section, and our targeted aim.

### Mission statement

Broken down into:

Table 5: A mission statement: Heatmap for housing prices	
Mission Statement: Heatmap for housing prices	
<b>Product description</b>	New website that shows a heat map of the housing market, how much the prices have increased or decreased.
<b>Benefit proposition</b>	Makes the housing market more accessible for new potential owners.  Simplifies the process to look where the prices of the houses might be increasing more than what the market should be.
<b>Key Business Goals</b>	Launch in summer 2023.  Consistent 5-star reviews from customers.
<b>Primary Market</b>	Housing owners or potential housing owners that live in Iceland.
<b>Assumptions and Constraints</b>	Customers can choose timeline for the map.  Customers can choose to see predictions.
<b>Stakeholders</b>	Real Estate agents  Loan institutions  Potential and existing housing owners.  New and existing customers.

Customer needs

See above

Classification of customer needs

Bottom: Latent: hard for customers to express *Style*

Middle: unfulfilled, easy for customer to express but known to be difficult to address e.g.  
compact folding of walking wheels

Explicit: easy for customers to express, known and understood and likely to be already fulfilled  
*stable seat*

Five guidelines for writing needs statements

What not how

specificity

positive not negative

an attribute of the product

avoid “must” and “should”

Quality function deployment

Not in the book, basically a convenient map of everything we know so far, not required but can be useful.

Includes mapping from customer needs to engineering metrics, benchmarking, technical corrections and such.

Concept generation, sjá ofar

Specify the problem

Search externally (web)

Search internally (team)

Explore systematically (refine and go through everything you know)

Reflect (go over what is working and what is not)

Concept funnel

Like in the name, just a concept, as you refine your concept from concept generation to the concept testing the number of concepts will go down until you have one exceptional.



### Concept screening matrix

A way to rank the concepts, we make a selection criteria and vote together as group on each one. In the end we choose those that have the highest rank. If we don't choose the highest rank then the selection criteria wasn't good enough.

### Types of modularity

see above

### Chunks

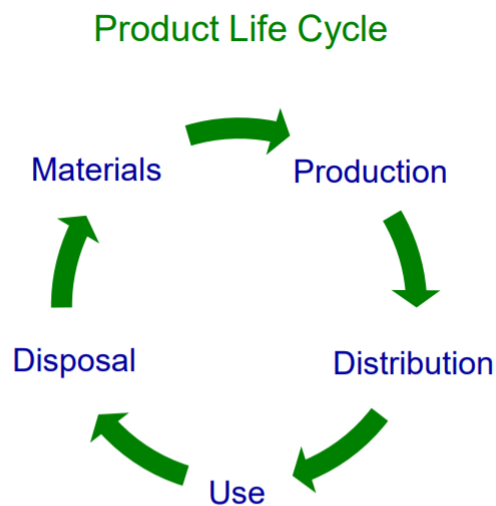
The whole lines represent flow of forces or energy,  
the thin lines represent flow of material  
the dotted lines represent flow of signals or data.

Then you cluster them into chunks, for example what is the enclosure, what is the chassis a and what is part of the user interface board

### Planning a modular product line : commonality table

The commonality plan explicitly represents the ways in which the different versions of the product are the same physically. The plan consists of a matrix with rows representing the chunks of the product

### Product life cycle



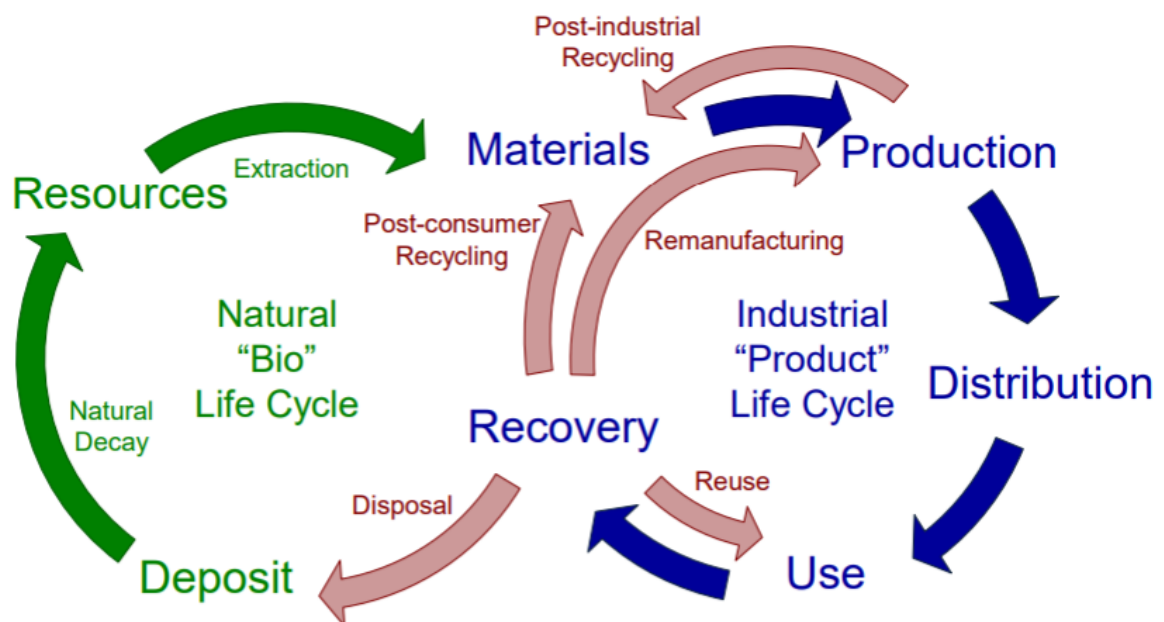
### Life cycle assessment

1.Prepare proposed design options

2. Identify life cycle, including recycling and disposal
3. Identify all materials and energy sources used
4. Identify outputs and waste streams
5. Quantify impacts of each material, energy, waste
6. Aggregate impact into categories for comparison

Two life cycles

Difference from one is that it also includes what happens after use or after disposal.



DFM method

It consists of seven steps plus iteration:

1. Consider the strategic sourcing decisions.
2. Estimate the manufacturing costs
3. Reduce the costs of components.
4. Reduce the costs of assembly.
5. Reduce the costs of supporting production.
6. Reduce the costs of logistics.
7. Consider the impact of DFM decisions on other factors

## Manufacturing and supply chain system

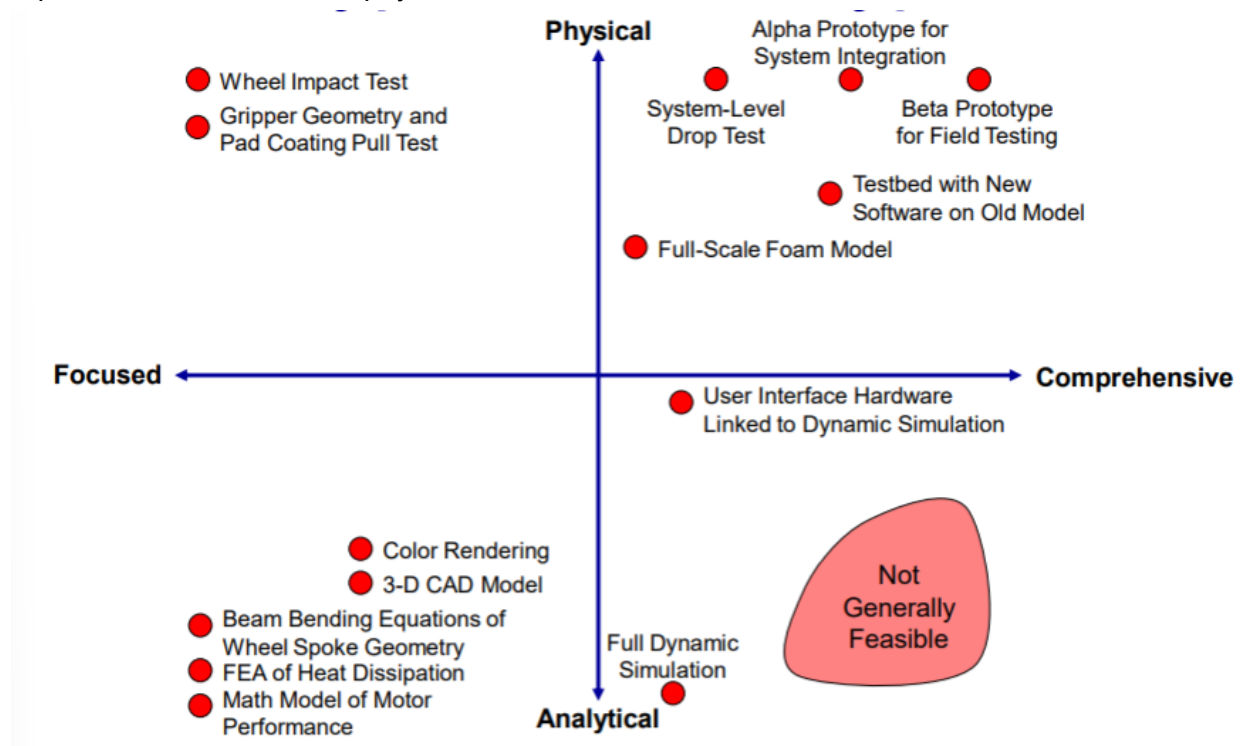
A simple–input-output model of the manufacturing and supply chain system. Takes in all of the factors such as labor and equipment and puts it in a general manufacturing system. The output is finished goods

## Types of prototypes

There are many different types of prototypes but the main separations are physical or analytical and then if they are focused or comprehensive.

Physical prototypes are a tangible approximation of the product and are often best for communication.

Analytical prototypes are for example a mathematical model of the product and often allow more experimental freedom than physical models.



Acceleration the critical path.

Accelerating a project with a better plan before it has begun is much easier than trying to expedite a project that is already under way.

For example building prototypes and testing right away to not waste time on dead ends and avoid having to start over.