# The FlexLink New Product Conceptualizing Handbook™

Last Modified on 05/11/2024 3:27 pm CET

This handbook provides guidance on generating and selecting design concepts for new products. It begins by emphasizing the importance of understanding customer needs and using tools like the Kano Model and SWOT analysis to gain insights. Next, it focuses on establishing product specifications, emphasizing the importance of distinguishing between essential requirements and desirable features. The handbook then explores various concept generation techniques, such as brainstorming, TRIZ, and mind mapping, and emphasizes the value of systematic exploration and external research. Finally, it presents different concept evaluation methods, including the Elimination matrix, Pugh matrix, and the Kesselring evaluation matrix which help teams narrow down options and make informed decisions about the most promising concepts.
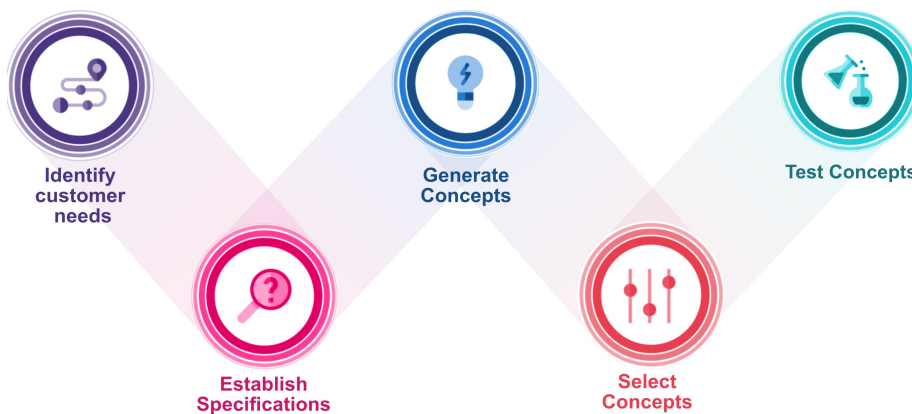
Below, you'll find brief explanations for various topics covered in our Conceptualizing Handbook. These summaries provide a quick overview, but if you're looking for more in-depth understanding or detailed guidance, we encourage you to download the full handbook. Simply click the link to access it and explore the comprehensive strategies and tools for effective concept generation and evaluation.

1. Analyze needs
Understand the customer's needs so you don't solve problems that nobody asked for.

Tools
SWOT-analysis

Analyze strengths, weaknesses, opportunities & threats to gain information about products/teams to ensure appropriate milestones.

Example:

Strengths

New procurement process speeds up output.
Team dynamic makes collaboration easy.
Diverse strengths allows many areas of expertise.

Example

Weaknesses

Many people with similar or overlapping responsibilities.
Many different team goals.
Difficult to get market research.

Example

Opportunities

Platform's real-time analysis allows for fast strategy changes.
Audience interested in video content.
Market trends show certain platforms more popular than others.

Example

Threats

Main competitor has better brand awareness.
Other, similar products being introduced to the market.
Audience attention span increasingly short.

Example

2. Establish specifications

Plot the criteria in a preliminary product design specification sheet. The template can be found here: 67-XXXX.

Example:

Document type:	Initial Requirement specification					
Project/title:	Sensor support bracket, Quickguide				FLEXLINK	
Created by:	Martin Bredberg	Date: 2022-12-15			a coesia company	
Modified by:	Max Bensryd	Date: 2023-07-10				
N:O	Criterion/ Description	D/W	Imp.	Reason	Verification method	Reference
1	**Design**					
1.1	Able to fit into the QuickGuide bracket system	D		QuickGuide assortment	Assessment using CAD and prototyping	Design engineer
1.2	Enable free orientation of the sensor	D		For quick adjustment	Assessment using CAD and prototyping	Design engineer
1.3	Minimal usage of tools	W	4	For quick installation	Assessment using CAD and prototyping	Design engineer
1.4	Surface finish to comply with other FlexLink parts	D		Coherent design language	Initial samples	Quality department
2	**Function**					
2.1	Use as few parts as possible	W	4	Decrease manufacturing lead time and cost	DFMA	Supplier
2.2	Easy to operate	W	3	Market competition	Prototypes/ initial samples	Test engineer
3	**Economics**					
3.1	High volume parts suitable for plastic injection moulding	W	4			Design engineer/tool make
4	**Environment**					
4.1	Suitable for food and beverage	W	4	Market prerequisite	No dirt traps. Easy to clean	Refer standards
4.2	Suitable for dry/clean room	W	4	Market prerequisite	No dirt traps. Easy to clean	Refer standards
5	**Legal & Safety**					
5.1	Fulfilment of European safety standards	D		Market prerequisite	2006/42 EC (machinery)	Refer standards
5.2	No interference with existing/valid patents	D		Fine cost/license	Patent search, inhouse or third party	

Tools

Needs-Metrics Matrix:

Create a simple needs-metrics matrix that represents the relationship between needs and metrics

Example:

	Need	Metric						
		Attenuation from dropout to handlebar at 10 Hz	Spring preload	Damping coefficient adjustment range	Time to assemble to frame	Special tools required for maintenance	JIS test	Bending strength
		1	2	3	4	5	6	7
1	Reduces vibration to the hands	●						
2	Allows traversal of difficult terrain		●					
3	Remains rigid during cornering		●					
4	Allows sensitivity adjustment			●				
5	Works with current fenders				●			
6	Allows easy replacement of worn parts					●		
7	Is safe in a crash						●	●

- Collect benchmarking information
    Example:

No.	Need	Imp.	ST Tritrack	Maniray 2	Rox Tahx Quadra	Rox Tahx Ti 21	Tonka Pro	Gunhill Head Shox
1	Reduces vibration to the hands	3	•	••••	••	•••••	••	•••
2	Allows easy traversal of slow, difficult terrain	2	••	••••	•••	•••••	•••	•••••
3	Enables high-speed descents on bumpy trails	5	•	•••••	••	•••••	••	•••
4	Allows sensitivity adjustment	3	•	••••	••	•••••	••	•••
5	Preserves the steering characteristics of the bike	4	••••	••	•	••	•••••	•••••
6	Remains rigid during hard cornering	4	•	•••	•	•••••	•	•••••
7	Is lightweight	4	•	•••	•	•••	••••	•••••
8	Provides stiff mounting points for the brakes	2	•	••••	•••	•••	•••••	••
9	Fits a wide variety of bikes, wheels, and tires	5	••••	•••••	•••	•••••	•••	•
10	Is easy to install	1	••••	•••••	••••	••••	•••••	•
11	Works with fenders	1	•••	•	•	•	•	•••••
12	Instills pride	5	•	••••	•••	•••••	•••	•••••
13	Is affordable for an amateur enthusiast	5	•••••	•	•••	•	•••	••
14	Is not contaminated by water	5	•	•••	••••	••••	••	•••••
15	Is not contaminated by grunge	5	•	•••	•	••••	••	•••••
16	Can be easily accessed for maintenance	3	••••	•••••	••••	••••	•••••	•
17	Allows easy replacement of worn parts	1	••••	•••••	••••	••••	•••••	•
18	Can be maintained with readily available tools	3	•••••	•••••	•••••	•••••	••	•
19	Lasts a long time	5	•••••	•••••	•••••	•••	•••••	•
20	Is safe in a crash	5	•••••	•••••	•••••	•••••	•••••	•••••

EXHIBIT 6-7 Competitive benchmarking chart based on perceived satisfaction of needs. (Scoring more "dots" corresponds to greater perceived satisfaction of the need.)

- **Set ideal and marginally acceptable target values for each metric**

  Example

Metric No.	Need Nos.	Metric	Imp.	Units	Marginal Value	Ideal Value
1	1, 3	Attenuation from dropout to handlebar at 10 Hz	3	dB	>10	>15
2	2, 6	Spring preload	3	N	480–800	650–700
3	1, 3	Maximum value from the Monster	5	g	<3.5	<3.2
4	1, 3	Minimum descent time on test track	5	s	<13.0	<11.0
5	4	Damping coefficient adjustment range	3	N-s/m	0	>200
6	5	Maximum travel (26-in. wheel)	3	mm	33–50	45
7	5	Rake offset	3	mm	37–45	38
8	6	Lateral stiffness at the tip	3	kN/m	>65	>130
9	7	Total mass	4	kg	<1.4	<1.1
10	8	Lateral stiffness at brake pivots	2	kN/m	>325	>650
11	9	Headset sizes	5	in.	1.000 1.125	1.000 1.125 1.250
12	9	Steertube length	5	mm	150 170 190 210	150 170 190 210 230
13	9	Wheel sizes	5	List	26 in.	26 in. 700C
14	9	Maximum tire width	5	in.	>1.5	>1.75
15	10	Time to assemble to frame	1	s	<60	<35
16	11	Fender compatibility	1	List	None	All
17	12	Instills pride	5	Subj.	>3	>5
18	13	Unit manufacturing cost	5	US$	<85	<65
19	14	Time in spray chamber without water entry	5	s	>2300	>3600
20	15	Cycles in mud chamber without contamination	5	k-cycles	>15	>35
21	16, 17	Time to disassemble/assemble for maintenance	3	s	<300	<160
22	17, 18	Special tools required for maintenance	3	List	Hex	Hex
23	19	UV test duration to degrade rubber parts	5	hr	>250	>450
24	19	Monster cycles to failure	5	Cycles	>300k	>500k
25	20	Japan Industrial Standards test	5	Binary	Pass	Pass
26	20	Bending strength (frontal loading)	5	kN	>7.0	>10.0

EXHIBIT 6-8   The target specifications. Like the other information systems, this one is easily encoded with a spreadsheet as a simple extension to the list of specifications.

- **Reflect on result and process**

3. Generate concepts
Use different techniques to generate a solid base of concepts.

1. Clarify the problem TO BE FINISHED
2. Understand the problem and decompose it into simpler sub-problems if possible/needed
3. Search externally TO BE FINISHED
4. Consult Experts
5. Search Patents
6. Search Published Literature
   - Existing solutions (don't waste time reinventing the wheel)

- **Benchmark Related Products**

- Search internally TO BE FINISHED

- **Brainstorming**

- **Working alone**

- **Does FlexLink already have a similar product/solution?**

- **Have FlexLink investigated this kind of problem before? Conclusions?**

- Explore systematically TO BE FINISHED

- Reflect on the solutions and the process TO BE FINISHED

Tools

TRIZ

Russian theory of inventive problem solving to help you systematically generate solutions.

The 40 principles can be viewed **here**.
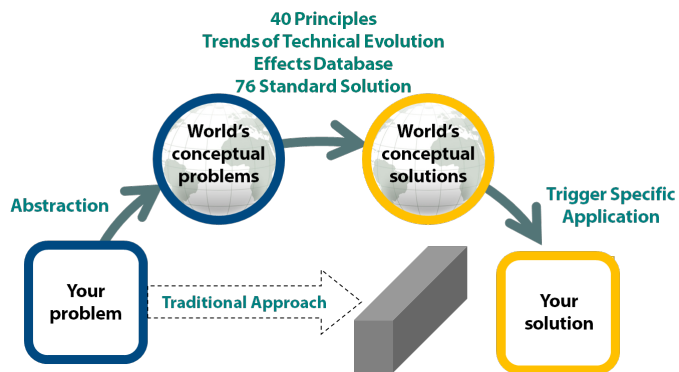
Example:

You own a furniture store in a small building. The store wants to attract customers, so it needs to have its goods on display. But it also needs to have enough storage space to keep a range of products ready for sale.

The furniture needs to be large (to be useful and attractive), but also small (to be stored in as little space as possible).

Using TRIZ, you can generalize this contradiction into a general problem and apply one of the 40 Principles of Problem Solving – a key TRIZ technique – to it. Something like general solution "Principle 1 – Segmentation".

This solution advocates dividing the product and making it easy to assemble/disassemble. And you develop ready-to-assemble versions of all your furniture, so that display models can take up the room that they need while inventory occupies much less space per unit.

bild för exemplet

Mechanical? principles

Consider the typical solutions that already is tried and tested. TO BE FINISHED
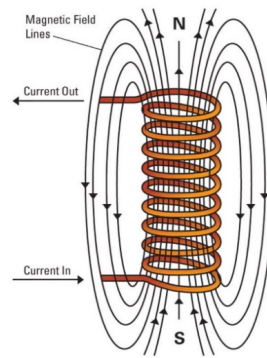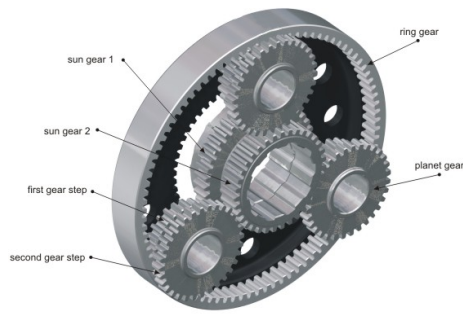
Brainstorming

Involve several people, i.e put together a Team TO BE FINISHED

Morphological Matrix

A chart or design matrix (table) that aims to provide a framework within which new or different ideas can be produced or considered.
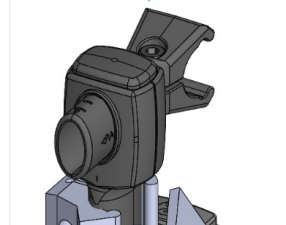

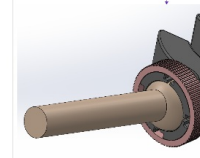This image is only for reference. Not to be considered while generating ideas.

Concept 1
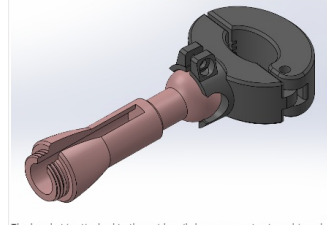
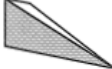The bracket is attached to the guide rail clamp support using a hinged
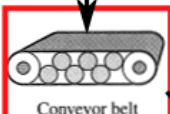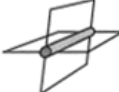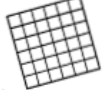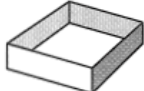
Concept 2

Concept 3

The bracket is attached to the guide rail c snap clip and a screw fastener to lock it ir holds the bracket firmly in place.

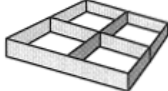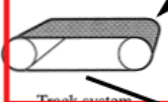|	Option 1	Option 2	Option 3	Option 4
Vegetable picking device	(Option 1 selected)	Triangular plow	Tubular grabber	Mechanical picker
Vegetable placing device	Conveyor belt	Rake	Rotating mover	Force from vegetable accumulation
Dirt sifting device	Square mesh	Water from well	Slits in plow or carrier	
Packaging device			(bowl - selected)	
Method of transportation		Track system	Sled	
Power source	Hand pushed	Horse drawn	Wind blown	Pedal driven

Concept 1

Starbursting

Challenge in the middle and on each of the points write: Who, what, where, when, why & how. Generate questions from these keywords. TO BE FINISHED

Five whys

Ask whys to reach the ultimate cause of the problem. Childish but surprisingly effective. Investigate the link between cause and effect!

Brainstorming

Set it up as a team exercise, describe the problem and use a time limit. No judging for now. TO BE FINISHED

Reverse brainstorming

Gives a different perspective. Focus on the problems and encourage thinking backwards. We have a natural tendency to see problems over solutions.

Example:

When creating a new sports car design:

- **How do we make this sports car engine less reliable?**
- **Can we make the interior more dangerous?**
- **Where can we make the seat more uncomfortable?**
- **How do we remove this paddle shifter functionality?**

Reverse thinking

Expand your thinking by asking yourself what someone else would do in your situation. What would the opposite approach be? Reflect on the ramifications.

Mind mapping

Tool for visualizing different concepts. Group, organize and draw connections like branches from a tree. TO BE FINISHED

Gap filling

State where you currently are and where you'd like to be. Fill the gap with a variety of solutions.

The 6-3-5-method

6 people | 3 ideas | 5 min Then rotate the worksheet and either add 3 ideas or develop previous ideas.

(At most 108 ideas in 30 minutes)

Slip-writing

Write ideas on cards and submit anonymously. Ideas are then shared and modified. Submit anonymous concerns, suggestions and thoughts for each idea. Good for transparency.

Preselection

Gather data to validate or invalidate concepts early.

4. Select concepts
Rank the concepts to arrive at the best solutions.

Tools
Kesselring matrix

It is nice b/c TO BE FINISHED

Example:

Table 4: Kesselring matrix.

Chalmers			Kesselring matrix											
			Created: 120416 Modified: 120502								Page 1			
Criteria			**Solution alternative**											
			Ideal		A		B		D		E		F	
Name	w		v	t	v	t	v	t	v	t	v	t	v	t
Ergonomics	5		5	25	4	20	5	25	5	25	5	25	4	20
Cost	3		5	15	5	15	3	9	1	3	3	9	2	6
Productivity	3		5	15	4	12	4	12	3	9	3	9	5	15
Feasibility	4		5	20	5	20	3	12	2	8	2	8	3	12
Safety	4		5	20	3	12	4	16	5	20	4	16	3	12
Applicability	4		5	20	4	16	4	16	1	4	2	8	1	4
Total			30	115	25	95	23	90	17	69	19	75	18	69
Rank						1		2		4		3		4
Decision			Propose both alternative A and B											

CONCEPT SCORING - KESSELRING MATRIX

No	Criteria ↓	w	XLRX18X (Reference) r	ws	Concept 1 r	ws	Concept 2 r	ws	Concept 3 r	ws	Concept 4 r	ws	Concept 5 r	ws	Concept 6 r	ws
1	**Functionality**															
1,1	Holds securely in place	5	3	15		0	5	25	3	15	4	20	3	15	5	25
1,2	Fits older clamps/rods	1	3	3		0	2	2	2	2	2	2	2	2	2	2
1,3	Does not damage the surface in contact under normal use	4	3	12		0	3	12	3	12	3	12	3	12	3	12
1,4	Tamper proofing	4	3	12		0	5	20	4	16	4	16	3	12	5	20
2	**Ease of use**															
2,1	Quick to mount	5	3	15		0	4	20	4	20	5	25	4	20	5	25
2,2	Mountable by one person	5	3	15		0	5	25	5	25	5	25	5	25	5	25
2,3	Implement mistake proofing	4	3	12		0	1	4	2	8	2	8	2	8	2	8
2,4	Easy to adjust	5	3	15		0	5	25	4	20	4	20	4	20	4	20
2,5	No tools required	4	3	12		0	5	20	5	20	5	20	5	20	5	20
3	**Ease of manufacture**															
3,1	Low component cost	3	3	9		0	2	6	3	9	1	3	5	15	4	12
3,2	Low complexity of parts	3	3	9		0	1	3	2	6	1	3	4	12	2	6
3,3	Time-to-market	4	3	12		0	1	4	1	4	3	12	4	16	3	12
4	**Design & Aesthetics**															
4,1	Does not accumulate dirt particles	2	3	6		0	4	8	4	8	2	4	3	6	2	4
4,2	Resistant to UV and other destructive elements	5	3	15		0	3	15	3	15	3	15	3	15	3	15
4,3	Flexlink/ QuickGuide design language	3	3	9		0	3	9	3	9	1	3	2	6	4	12
4,4	Aesthetic appeal when mounted	3	3	9		0	5	15	5	15	1	3	3	9	4	12
5	**Environment**															
5,1	Recyclable	2	3	6		0	5	10	5	10	3	6	5	10	3	6
	Total score		186		0		223		214		197		223		236	
	Ranking						2		3		4		2		1	

Date:

Pugh matrix

Decision matrix that encourages self-reflection with minimal bias. Criteria is weighted and rated on each solution as (+) or (-) compared to baseline. Click this link for a template: TO BE FINISHED

Example:

5. Test concepts
TO BE FINISHED

- **Define the purpose of the concept test.**
- **Choose a survey population.**

- **Choose a survey format.**
- **Communicate the concept.**
- **Measure customer response.**
- **Interpret the results.**
- **Reflect on the results and the process.**