



Design Process Tools

Ideation & Brainstorming
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Contents - Objectives

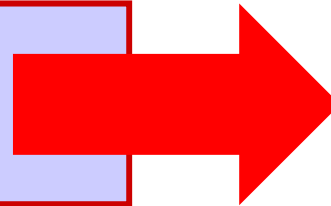
- **Ideation**
- **Brainstorming**
- **Ethics at Ideation State**

Review of Last Lecture

- **Why Design is important?**
- **Why Design is difficult?**
- **What are the Design Schools of thoughts?**

Systematic Design Process

- 1) Requirements
- 2) Specifications
- 3) Conceptual Design
- 4) Embodiment Design
- 5) Detailed Design



QFD

Prioritize requirements



Requirements

9	9	9	9	9															
7										9	9	9							
9									9	9	9	9							
6																			9
5	3								3					3					9
<i>Target Information</i>										LEFT VACANT									
<i>Absolute Importance</i>		96	81	81	129	81	96	81	81	81	96	81	81	54	45				
<i>Relative Importance</i>		6	5	5	9	5	6	5	5	5	6	5	5	2	1				

Ideation and Brainstorming

Conceptual Design Tools:

- **Ideation.**
- **Brainstorming.**
- **Morphological Analysis.**
- **Design Interpretation for Next Generation Products.**
- **Flexible Design for Families.**

Ideation

- **Ideation is the process of creating more ideas for a design solution by asking structured questions.**
- **Ideation relies on the fact that when there are several ideas the chances for it to have a good one is higher than the chances when the number of ideas are few.**

Ideation Questions

1. What is wrong with it?

- Make a list of all things that you feel are wrong with the present product, idea or task.
- (Coke can).

2. How can I improve it?

- Forgetting feasibility list all the ways you would improve the present product, idea or task.
- (Dyson Hoover).

3. Other uses: What other uses does it have in its present form? What other uses are there if the idea is modified? Can it perform a function that was not originally intended?

- Food processor and mill.

Ideation Questions

4. **Modify:** Change, trim, shape, description, weight, sound, form, contours etc.
 - (Toothpaste tubes).
5. **Magnify:** Make larger, higher, longer, wider, heavier, stronger.
 - Large aircraft as a solution to traffic congestion.
6. **Minify?:** Make smaller, shorter, narrower, lighter, subtract something, miniaturize.
 - E.g. Old electric motors were huge in size. Modern motors are relatively very small.

Ideation Questions

- 7. Adopt?** Is there something similar? What can be copied? Can it be associated with something else? Is there something in stock or surplus that can be used?
 - (E.g. Sausage, Aluminium).
- 8. Reverse?** Try a twist: opposites, upside down, turn around, rearrange, opposite pattern, opposite sequence.
 - E.g. Lifting wheel barrow and push down wheel barrow. Heat from outside to heat from inside kettles.
- 9. New Look?** Change, **colour**, form, or style, streamline, use new package or new cover.

Ideation Questions

- 10. Old Look?** Copy a period, antique, parallel a previous winner, look for prestige features, Trade on 'They don't build them like that any more.
 - E.g. Old models and new models of cars (Volkswagen Beetle).
- 11. Rearrange?** Try a different order, interchange components, piece together differently, change places.
 - Cars with engines at the rear. Cars with front wheel drive as opposed to rear wheel drive.
- 12. Substitute?** – What can take its place? Plastic for metal, metal for plastic, light instead of dark, round instead of square, what other process, principle, theory or method can be used?
 - Metal bumpers were replaced by plastic bumpers.

Ideation Questions

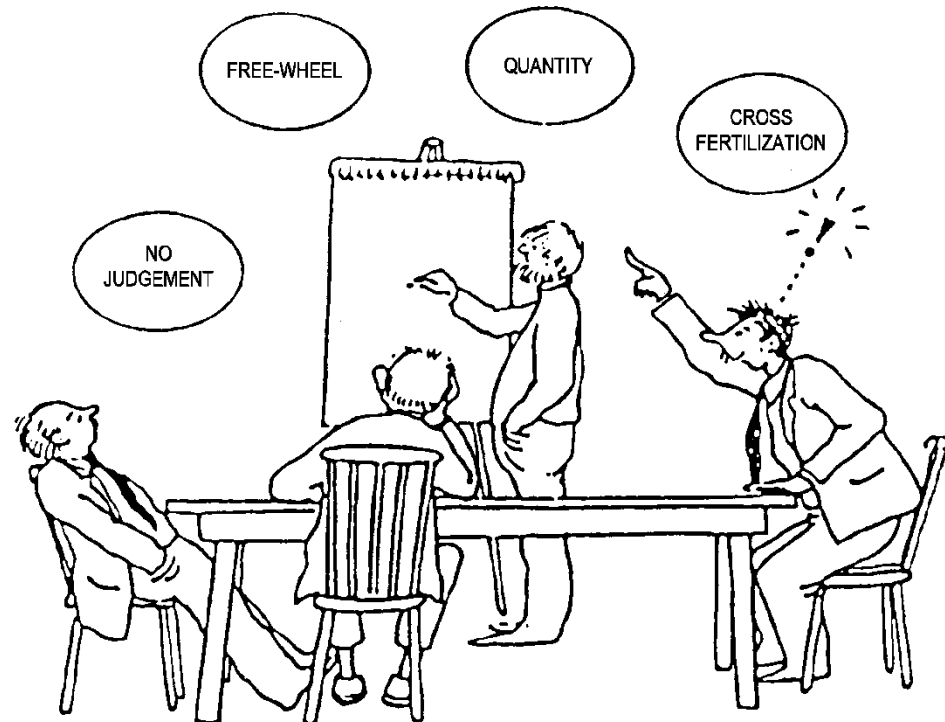
- 13. Combine?** Combine ideas, principles, methods, groups, components, hardware, issues.
 - Computerized control is an example for integrated control.
- 14. Simplify?** Make it easier, less work, easier to reach, disposable, simple to use, quicker.
 - Automatic drives instead of Gear Boxes.
- 15. Safety?** What devices, properties, controls, or sensors, can be added to prevent injury, accident, explosion?
 - Automatic braking system for trains.
 - Interlocking of doors of washing machine.

Brainstorming

- **Brainstorming is a powerful and widely known creative tool.**
- **It is used for generating a large number of ideas, most of which will subsequently be discarded, but with perhaps a few novel ideas being identified as worth following up.**

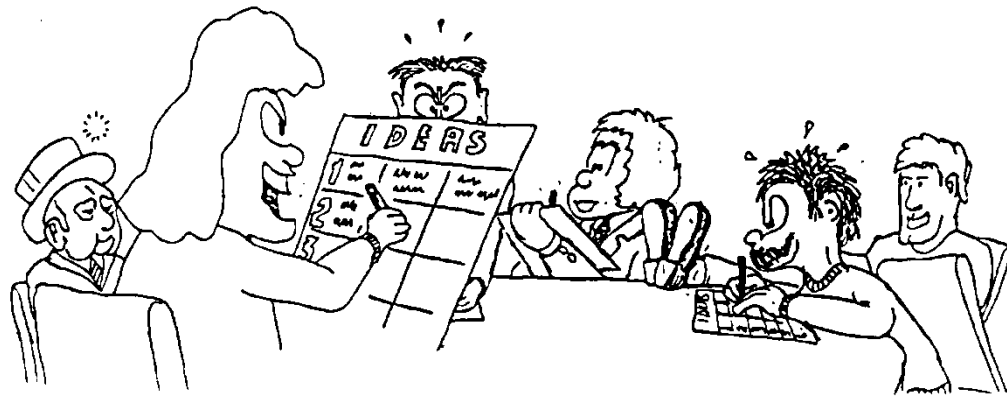
Pitfalls of Classical Brainstorming

- **Incompetent leaders**
- **Dominating individuals**
- **Passive individuals**
- **Inability to cooperate**
- **Fear of being foolish**
- **Disturbing interruptions.**



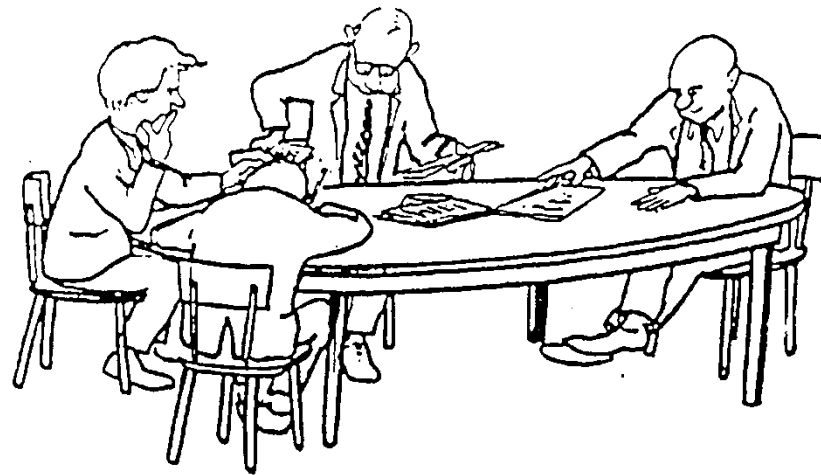
Brainwriting - Method 635

- **A form of written brainstorming.**
- **Participants write ideas on special forms or cards that circulate within the group.**
- **Gives more time to think than classical brainstorming where the ideas are expressed spontaneously.**
- **Consists of 6 members, each generates and writes down 3 ideas during a 5 minutes period.**
- **The forms are then passed to every participant.**
- **As in the earlier method the leader collates the ideas and submits them for analysis.**



Brain-writing Pool

- **Each participant starts by writing one or a few ideas on a sheet of paper which is placed in the middle of a table**
- **The writing of ideas is continued on another sheet.**
- **Whenever a participant runs out of ideas or wants to be stimulated by ideas of others, he or she exchanges the sheet with one from the pool.**



Ethics at the Conceptual Stage

- **In your groups discuss how ethical issues or moral theories could be relevant at the conceptual stage**
- **Make a list of your findings and try to think of some examples**
- **We shall discuss it after you complete your group discussion**

Further Reading and References

- <http://www.stanford.edu/group/biodesign/cgi-bin/ebiodesign/index.php/concept-generation/ideation-and-brainstorming-menu>
- <http://jcflowers1.iweb.bsu.edu/rlo/brainstorming2.htm>
- [http://en.wikipedia.org/wiki/Ideation_\(idea_generation\)](http://en.wikipedia.org/wiki/Ideation_(idea_generation))

Summary of the Lecture

- **Covered Design Methods for Conceptual Design**
 - Covered the design method **Ideation**
 - Covered the design method **Brainstorming**