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Design and Professional Practice 2

Creativity Tools and Morphological Analysis

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Aims and Objectives

This sessions aims to introduce you to some examples of Creativity Tools which are currently used in Concept Development

Its objective is for you to:

- Acquire understanding of how to implement Creativity Tools
- Appreciate how Creativity Tools may be utilized in your own projects
- Be able to implement an evaluation of several designs

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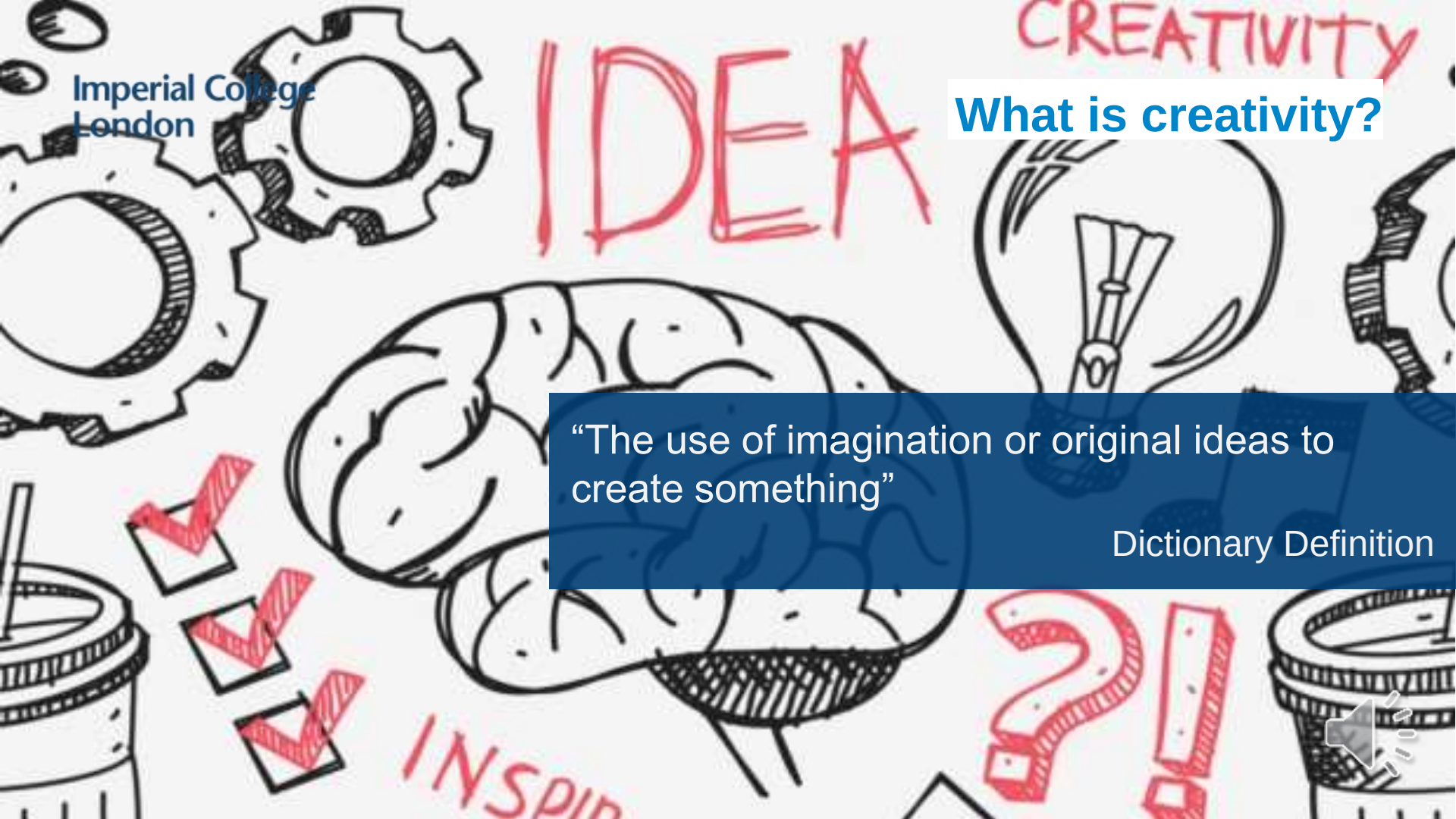
What is creativity?



"The use of imagination or original ideas to create something"

Dictionary Definition

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Why do we need creativity tools?

The purpose of creativity tools is to trigger the thought process and stimulate the user to partner up ideas which they may not have come up with by staring at a blank wall

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Which are you familiar with?

Abstraction
Analogy
Attribute Listing
Biomimicry
Brainstorming
Brain-writing 6-3-5
Cause and Effect Matrix
Challenge Assumptions
Creative Challenge
Divide and Conquer
Excursion Technique
Function Analysis
Functional Requirements
Harvey Cards
Heuristic Ideation Technique (HIT)
Heuristic Redefinition
Hypothesis Testing
Idea Sorting and Refinement
Imaginary Brainstorming
Job to be done
Lateral Thinking
Lotus Blossom Technique
Means-Ends Analysis
Method of Focal Objects
More Inspiration
Morphological Analysis
Nine Windows
Opportunity Prioritization
Osborn Checklist
Outcome Expectations
Performance Perception Expectations
Personal Analogy
Proof
Provocation and Movement
Random Input
Redefinition
Reduction
Reverse Brainstorming
Root Cause Analysis
SCAMPER
SIPROC
Systematic Inventive Thinking
Structured Abstraction
SWOT Analysis
TILMAG
TRIZ
Trial-and-Error
Wishing

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Brainstorming

A general type of concept generation

Group of 4-8 people (1 facilitator)

Well defined problem (that everyone understands)

Flip board / whiteboard / post-it notes

Ground rules:

- Avoid criticism
- Generate a lot of varied ideas
- Don’t censor ideas
- Listen and develop
- Avoid excessive discussion

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Brainwriting 6-3-5

Aims to stimulate even participation

Well defined problem (always good)

Group of 6 people (no facilitator necessary)

- Each with a sheet with a matrix on it
- Each captures 3 ideas each
- Pass the concepts around the table
- Next person contributes to the idea
  - Or adds an alternative idea
- Repeat 5 times

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Brainwriting 6-3-5

Problem Statement:

	Idea #1	Idea #2	Idea #3
Person A	Person A writes an idea here...	...and another idea here	...and another here.
Person B	Person B writes their idea here, perhaps a new idea...	...or one which builds from an earlier idea	...or a combination of both ideas
Person C	Person C contributes here, adding their ideas in this row...	...which build on any ideas on this page...	...or may be entirely new

Final outcomes looks something like this

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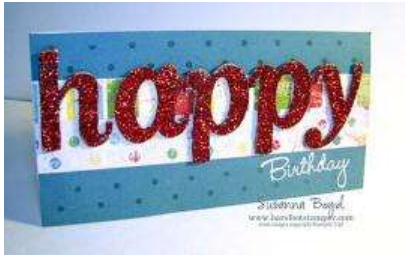
Heuristic Ideation Technique (HIT)



Efficient idea generation technique

Choose 2 existing unconnected items

Make a list of the aspects or components of the designs

Transfer list into a matrix

- Rows contain the list of one product
- Column contains the list of the other

Cross out cells which describe existing products

Identify cells with market potential

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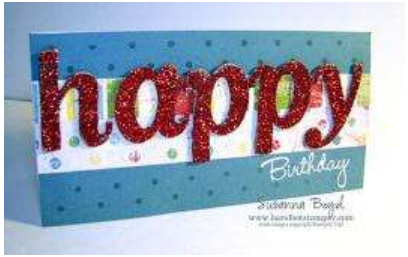
Heuristic Ideation Technique (HIT)



	Card	Glitter decoration	Poetic message	Sent by post
Mug	Mug, card	Mug, glitter decoration	Mug, poetic message	Mug, sent by post
Floral design	Floral design, card	Floral design, glitter decoration	Floral design, poetic message	Floral design, sent by post
Coloured design	Coloured design, card	Coloured design, glitter decoration	Coloured design, poetic message	Coloured design, sent by post
Coffee sized	Coffee sized, card	Coffee sized, glitter decoration	Coffee sized, poetic message	Coffee sized, sent by post
Round shape	Round shape, card	Round shape, glitter decoration	Round shape, poetic message	Round shape, sent by post

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SCAMPER

A checklist creativity technique

Substitute
Combine
Adapt
Modify, Maximise or Minimise
Put to other uses
Eliminate
Reverse or Re-arrange

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SCAMPER

A checklist creativity technique

Substitute
Combine
Adapt
Modify, Maximise or Minimise
Put to other uses
Eliminate
Reverse or Re-arrange

Substitute chocolate for fruit

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SCAMPER

A checklist creativity technique

Substitute

Combine

Adapt

Modify, Maximise or Minimise

Put to other uses

Eliminate

Reverse or Re-arrange

Combine with ice cream

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SCAMPER

A checklist creativity technique

Substitute
Combine
Adapt
Modify, Maximise or Minimise
Put to other uses
Eliminate
Reverse or Re-arrange

Adapt the shape

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SCAMPER

A checklist creativity technique

Substitute
Combine
Adapt
Modify, Maximise or Minimise
Put to other uses
Eliminate
Reverse or Re-arrange

Minimise

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SCAMPER

A checklist creativity technique

Substitute
Combine
Adapt
Modify, Maximise or Minimise
Put to other uses
Eliminate
Reverse or Re-arrange

Put to other use – cake decoration

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SCAMPER

A checklist creativity technique

Substitute
Combine
Adapt
Modify, Maximise or Minimise
Put to other uses
Eliminate
Reverse or Re-arrange

Eliminate the colour

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SCAMPER

A checklist creativity technique

Substitute
Combine
Adapt
Modify, Maximise or Minimise
Put to other uses
Eliminate
Reverse or Re-arrange

Reverse the structure

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Morphological Analysis

- Method for exploring potential solutions
- Break the system down into key parts / functions
- List a variety of different methods of achieving these functions
- Insert into a grid
  - Functions in first column
  - Methods along the rows
- Select a different means from each function to produce different combinations for an overall solution

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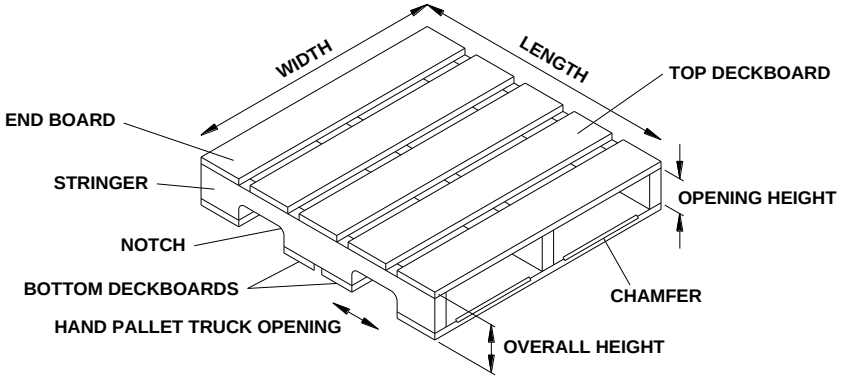
Morphological Analysis

Example:

Following some initial market assessments the Board of a plant machinery company has decided to proceed with the design of a new product for transporting pallets around factories.



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Morphological Analysis

Feature	Means				
Support					
Propulsion					
Power					
Transmission					
Steering					
Stopping					
Lifting					
Operator					

Starting with a blank form and the key features we are interested in.

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Morphological Analysis

Feature	Means				
Support	Track	Wheels	Air Cushion	Slides	Legs
Propulsion	Driven Wheels	Air Thrust	Moving Cable	Linear Induction	
Power	Electric	Diesel	Petrol	Gas	Steam
Transmission	Belts	Chains	Gears / Shafts	Hydraulics	Flexible Cable
Steering	Turning Wheels	Air Thrust	Rails	Magnetism	Brake
Stopping	Brakes	Reverse Thrust	Ratchet	Magnetism	Anchor
Lifting	Hydraulic Ram	Rack & Pinion	Screw	Chain / Rope Hoist	Linkage
Operator	Standing	Walking	Front Seat	Back Seat	Remote

We then populate the table with different methods of achieving those features.

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Morphological Analysis

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Support	Track	Wheels	Air Cushion	Slides	Legs
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Operator	Standing	Walking	Front Seat	Back Seat	Remote

One set of combinations will produce …

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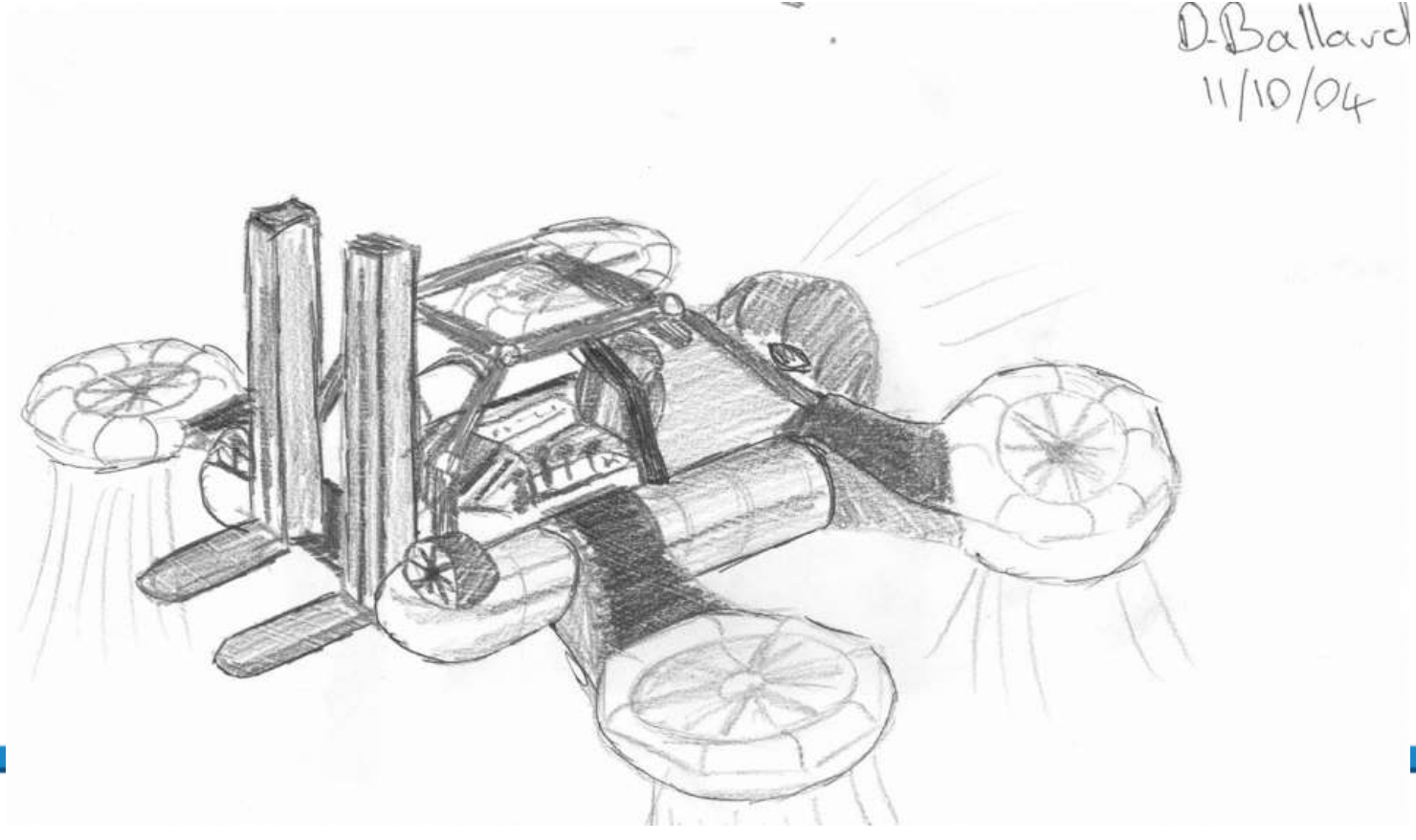
Morphological Analysis



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Another set of combinations will produce …

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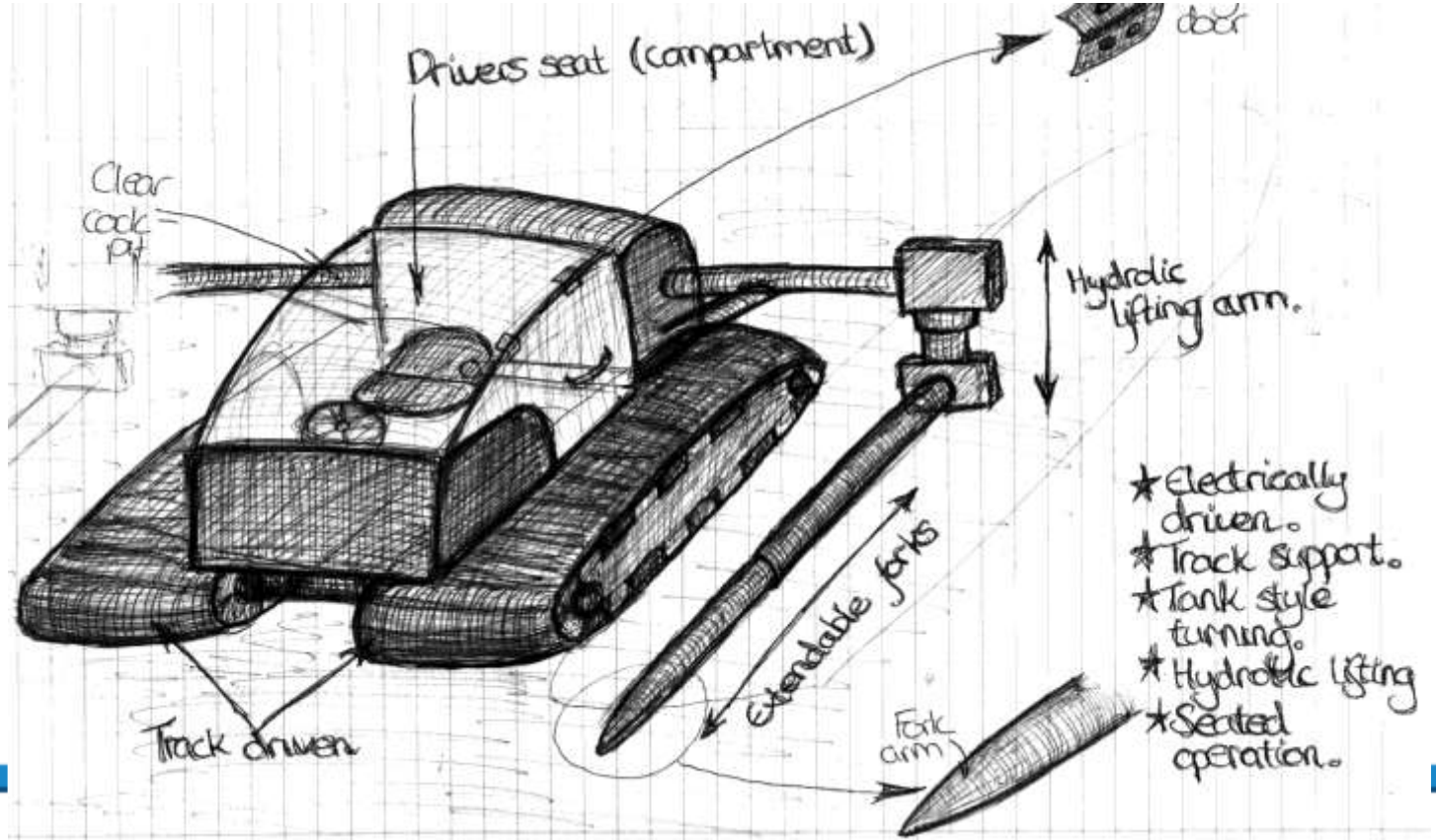
Morphological Analysis



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Morphological Analysis

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Another set of combinations will produce …

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Morphological Analysis

Feature		
Support		gs
Propulsion		
Power		eam
Transmissio		xible ble
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Stopping		chor
Lifting		kage
Operator		mote

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Morphological Analysis

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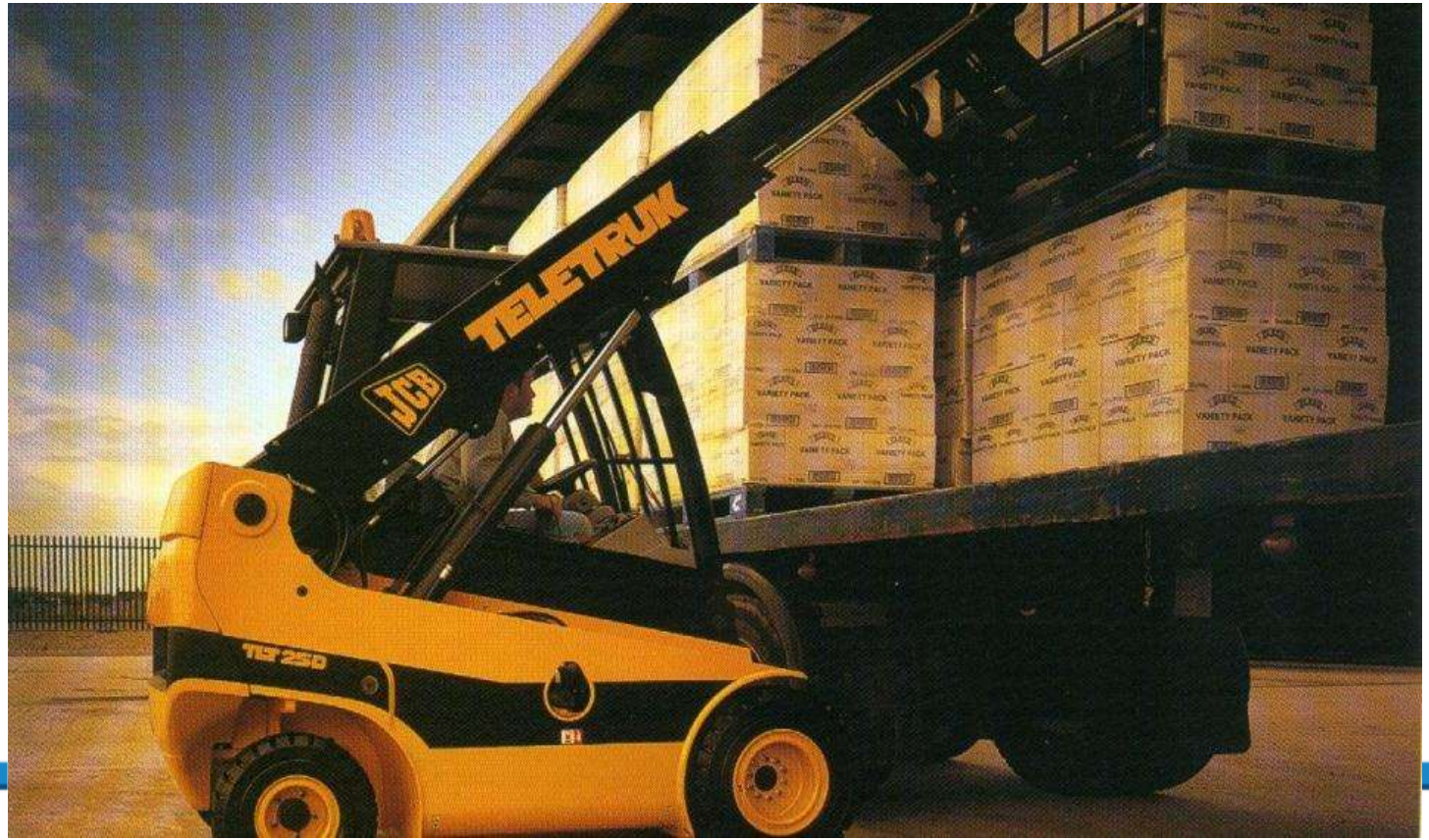

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Concept Evaluation

Having developed a number of concepts, which one are you going to develop?

A number of methods have been developed for this:

- COCD Box
- Force-Field Analysis
- Enhancement Checklist
- Hundred Euro Test
- Idea Advocate
- Negative Selection
- New Useful Feasible Test
- PINC Filter
- Pugh Matrix
- Six Thinking Hats
- Weighted Selection

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Concept Evaluation

The simplest system is to score each concept against key User Requirements.

Requirement	Weighting	Concept 1		Concept 2		Concept 3	
Robust							
Lightweight							
Low Cost							
Manufacture							
Total							

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Concept Evaluation

The User Requirements can be “weighted” according to their importance.

Requirement	Weighting	Concept 1		Concept 2		Concept 3	
Robust	5						
Lightweight	3						
Low Cost	5						
Manufacture	3						
Total							

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Concept Evaluation

Each concept is then scored as to how well we perceive it achieves the User Requirement.

Requirement	Weighting	Concept 1		Concept 2		Concept 3	
Robust	5	3		4		5	
Lightweight	3	4		4		4	
Low Cost	5	4		3		4	
Manufacture	3	5		3		3	
Total							

Important – remain impartial

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Concept Evaluation

The score is then multiplied by the weighting and the totals compared to find which concept ranks the highest.

Requirement	Weighting	Concept 1		Concept 2		Concept 3	
Robust	5	3	15	4	20	5	25
Lightweight	3	4	12	4	12	4	12
Low Cost	5	4	20	3	15	4	20
Manufacture	3	5	15	3	9	3	9
Total			62		56		66

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Summary

- Creativity tools help generate ideas when faced with a blank wall
- Think broadly about the range of potential solutions
  - There's no bad ideas
- Concepts are evaluated against the requirements
  - Evaluation needs to be unemotional