Overcoming Innovation Barriers

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Innovation is......

• About Satisfaction and Value and NOT New Gadgetry

• A Way of doing things better than it was done earlier

• “Innovation is not invention. It is a term of economics rather than technology”

  Peter Drucker
START
BUT
WHY
INNOVATE?
Organizations know that “what’s next” is all about...

- Thinking differently;
- How to create compelling customer value;
- How to flow that value through streamlined processes; and
- Embedding a real discipline around pursuit of perfection.
Conventional Approach is Inefficient

The Innovation Challenge

3,000 Raw Ideas (Unwritten)
300 Ideas Submitted
125 Small Projects
9 Early Stage Development
4 Major Development
1.7 Launches
1 Success

Number of Ideas

Stage of New Product Development Process

Source: G. Stave & J. Bury, “3,000 Raw Ideas = 1 Commercial Success”
Improving Existing Systems
(99% of problems)

- Eliminate Disadvantage of System
- Increase Main Useful Function of System
- Reduce Weight, Dimension and Resource Consumption
- Add New Useful Function

Synthesis of New Systems
(1% of problems)
Innovation Killers

- Project Constraints
- Psychological Inertia
- Limited Breadth of Knowledge and Information Overload
- Giving Up and/or Compromising Too Easily
- Not Invented Here Syndrome
- Unable to Forecast the Future
- Solving the Wrong Problem
Different Perspective

six

nine
This is where the TRIZ thinking can be useful.
BUT, what is TRIZ?

• Theory of Inventive Problem Solving

• Devised by Soviet engineer who worked as a clerk in the patent office

• Embarked on finding some generic rules that would explain creation of new, inventive ideas
TRIZ Roadmap

- **Component Analysis**: Identifies components of the system.
- **Function Modeling**: Identifies and evaluates the functions performed by the components.
- **Interaction Analysis**: Identifies interaction between the components.
- **Functional Analysis**: Identifies interaction between the components.
Component Analysis

Top Level

2nd Level

3rd Level

4th Level

Electrolyte  Electrodes  Battery casing  Battery terminals
Interaction Analysis

• Identify all the interactions between the components and whether it is positive or negative or neutral
Function Modeling

• This is a stage which describes the functions, their usefulness and performance level, i.e. an action performed by one component on another.
Conditions for existence of function

1. Both, “function carrier” and “object of the function” are components

2. Function carrier “interacts” with the object of the function

3. Parameters of object of function either “affected or maintained”
Element – Parameter – Value (EPV) Concept
The EPV Model

• Good innovators are adept in identifying difference characteristics of any given object

• They view the object from multiple dimensions

• Element – Parameter – (Opposing) Values of that parameter
ELEMENT of the EPV Model

- Element is the WHOLE or PART of the object
- Boy, Sausage, Fire, BBQ grill, Fork, etc.
- Eyes, Hair, Cap, Shoes, T-shirt
- Shoe lace, Sole
PARAMETER of the EPV Model

- Parameter is the characteristic defining the object
- It can be changed
- Consider
  - Length
  - Weight
  - Diameter
  - Color
  - Temperature
VALUES of the EPV Model

• Opposing values for each parameter
• Consider
  • Height: Low-High
  • Numerical: 0-Infinity
  • Weight: Heavy-Light
  • Temperature: Hot-Cold
  • Hardness: Hard-Soft
Writing the EPV

Element → Parameter → Value 1

Parameter → Opposite Value 2
Exercise: Write the EPV

- Fire
- Temperature
  - 125° C
  - 30° C
Exercise: The EPV Model

- **Element**
- **Parameter**
  - **Value 1**
    - +ve Result 1
    - -ve Result 1
  - **Opposite Value 2**
    - +ve Result 2
    - -ve Result 2
Exercise: The EPV Model

- Fire
- Temperature
  - 125°C: Chef will feel hot
  - Chef will not feel hot
  - Burger will get heated
  - 30°C: Burger will not get heated
Write the EPV for... (consider 1 parameter)
Think of the following

- To protect the head
- To save the soldier
- Not allow the bullet to penetrate

- HELMET DEFLECTS/STOPS THE BULLET

Main Useful Function
Define MUF for the following
Rules for defining a MUF

1. The ACTION **MUST** CHANGE a Parameter of the object

2. The SUBJECT/ACTION/OBJECT **MUST BE** PRESENT

3. Avoid AMBIGUOUS ACTIONS, for e.g. Protects, Cleans
MUF of an air bag

• To DECREASE the **level of impact** of Driver from HIGH to LOW
MUF Definition

- Keep
- Change
- Increase
- Decrease

Which parameter from to
Redefine MUFs
Innovations thrive on resolving contradictions
Exercise: Write the EPV

Plane

Wings

Large

Plane will fly

Occupy large parking area

Small

Plane will occupy small parking area

Plane will not be able to fly
Representing the contradiction

- The written form for a Contradiction is

  IF <event OR action>
  THEN <positive result OR outcome>
  BUT <negative result or outcome>
Representing the contradiction

• The written form for a Contradiction is

   IF   <the wings of the plane are large>
   THEN <the plane can fly>
   BUT  <will occupy more parking space>

   IF   <the wings of the plane are small>
   THEN <will occupy less parking space>
   BUT  <the plane cannot fly>

The plane should have large wings such that it can have a stable flight, but also not take much parking space when on ground.
2 Types of Contradictions – Technical Contradiction

• Contradictions occur when improving one characteristics leads to deterioration of another. For e.g.
  • Improved crash-worthiness $\rightarrow$ Increased weight of car
  • Increased audit samples $\rightarrow$ Increased time for completing assignment
  • More experienced audit team $\rightarrow$ Increased cost of engagement

• Innovative solutions RESOLVE contradictions and NOT compromise/trade-offs
For resolving Technical Contradictions

- We use Altschuller’s Matrix

![Altschuller's Matrix Diagram]
Physical Contradictions

- Physical Contradictions exists when two justified opposite requirements are placed upon a single physical parameter of an object.
- These cause conflicting requirements.

Hammer should be LIGHT and HEAVY.
Resolving Physical Contradictions

1. Separating contradictory demands
   • Separation in Space, Time, Relation, System Level

2. Satisfying contradictory demands

3. Bypassing contradictory demands

4. Apply Inventive Principles
You will never stand out if you try to look like everyone else. Innovation is not imitation.
THINK DIFFERENT.
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