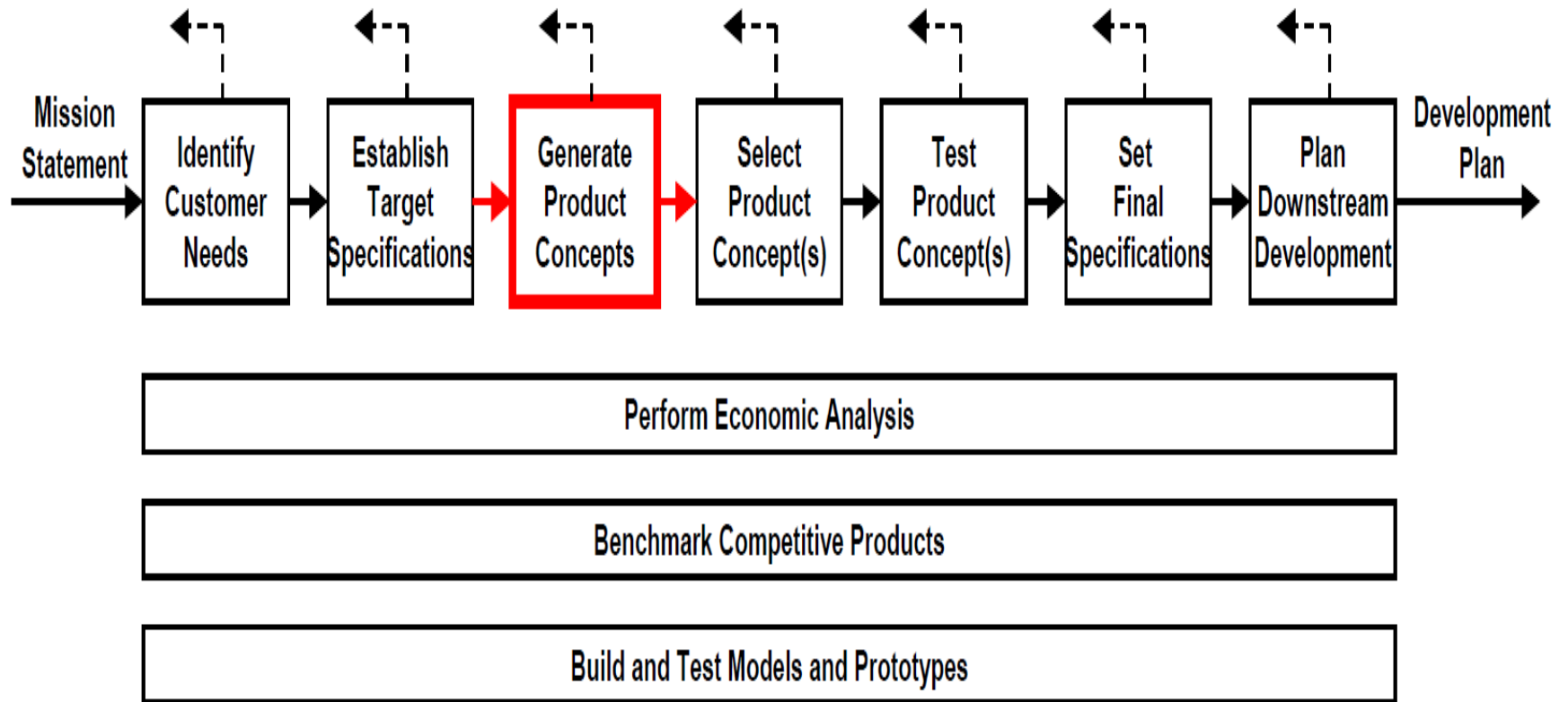


Concept Generation

Concept Development Process



Concept Generation Example: Power Nailer



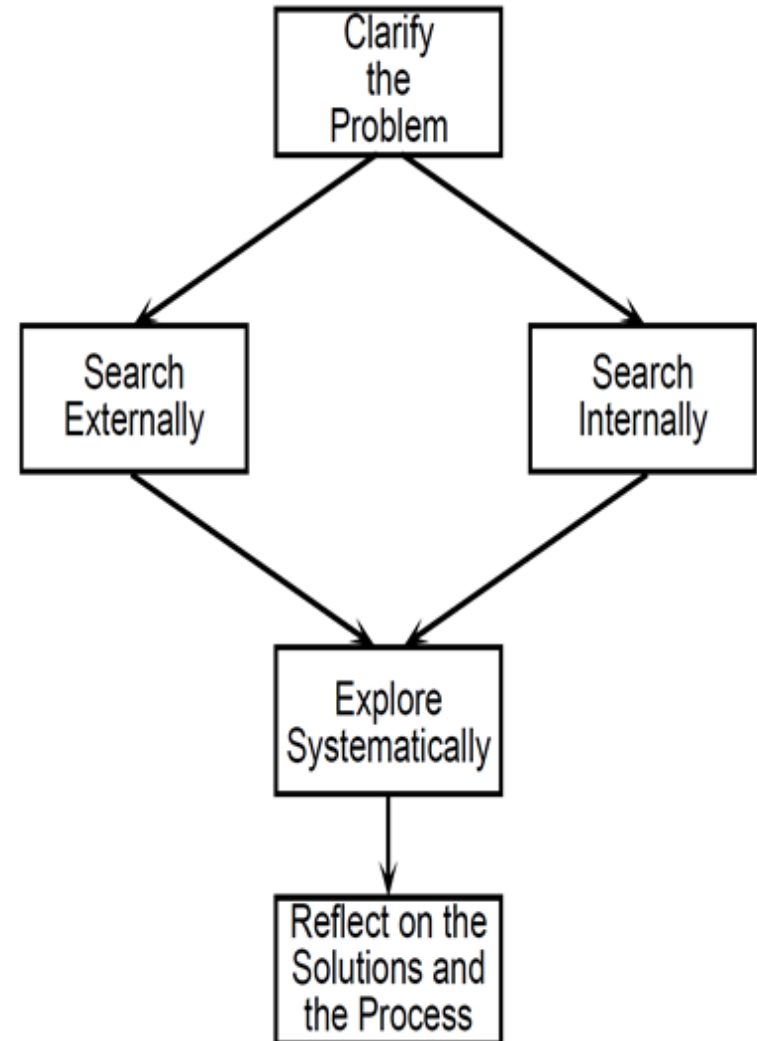
- A product concept is an approximate description of the technology, working principle, and form of a product. It is a concise description of how the product will satisfy the customer needs.
- A good product concept can be made into a bad product but the reverse is not true.

Why structure approach is needed?

- Consideration of a few alternatives, often suggested by the most assertive members.
- Failure to consider carefully the usefulness of concepts employed by other firms in related and un related products.
- Ineffective integration of promising partial solutions
- Failure to consider entire categories of solutions

Concept Generation Process

- **Clarify the Problem**
 - Problem Decomposition
- **External Search**
 - Lead Users, Experts & Patents
 - Literature & Benchmarking
- **Internal Search**
 - Individual Methods
 - Group Methods
- **Systematic Exploration**
 - Classification Tree
 - Combination Table
- **Reflect on the Process**
 - Continuous Improvement Clarify the Problem Reflect

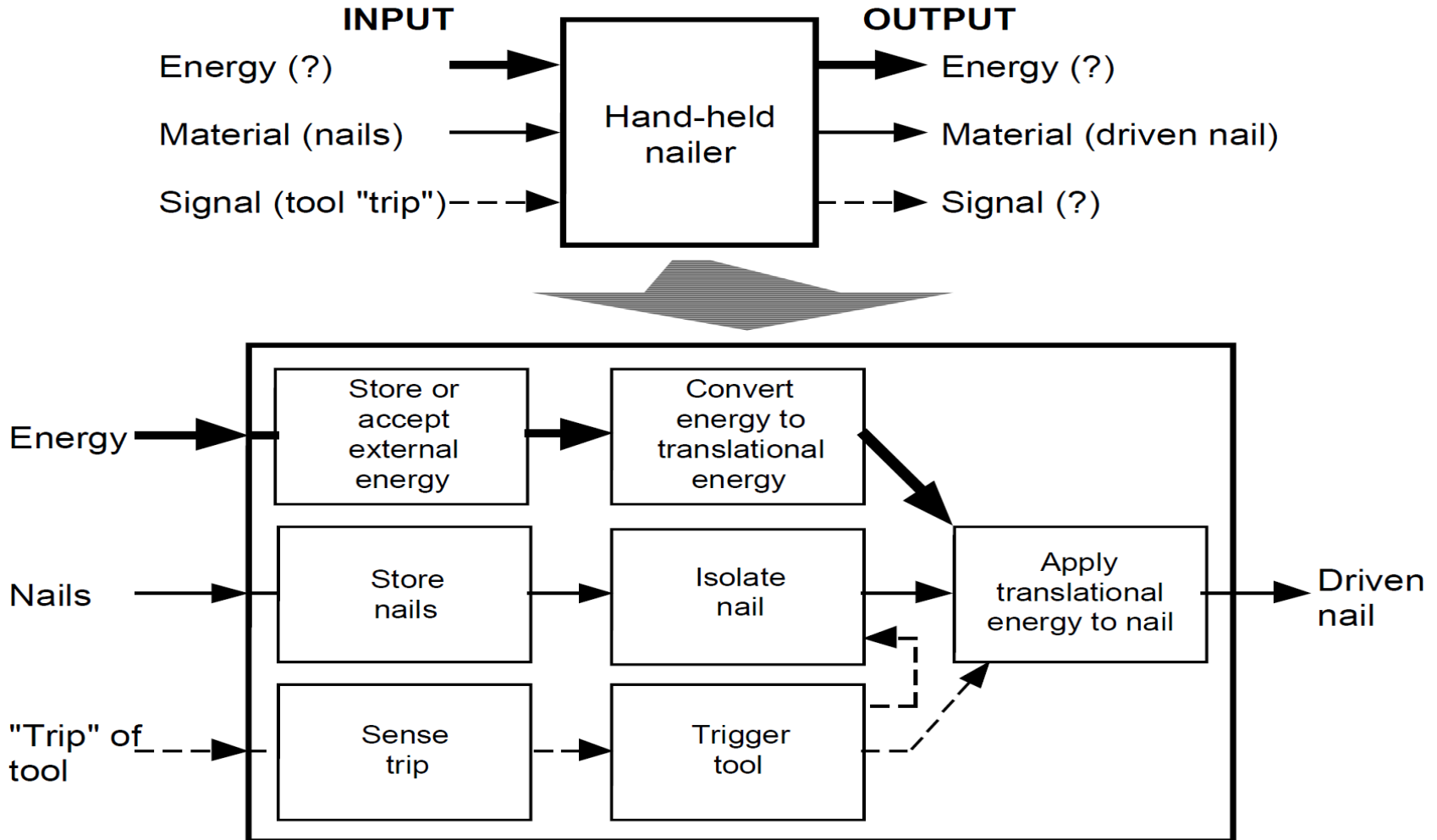


Clarify the problem

- Problem decomposition by dividing it into simpler sub problems
 - Represent a problem functionally as a black box.
 - Divide the single black box into sub functions to create a more specific description of what the elements of the product do in order to implement the overall function of the product. Convention is to have 3-10 sub functions in the diagram.

- Some useful techniques to do this are:
 - Create a function diagram of an existing product
 - Create a function diagram based on an arbitrary product concept already generated by the team or based on a known sub function technology
 - Follow one of the flows (for ex. Material) and determine what operations are required.
 - Decomposition by the sequence of user action(ex. Moving the tool to the gross nailing position, positioning the tool, triggering the tool)
 - Decomposition by the key customer needs (ex. Fires nails in rapid succession, is light weight, and has a large nail capacity). Useful for products in which form, and not working principle or technology is primary problem (Toothbrush, storage container etc.)

Problem Decomposition: Function Diagram



Focus on critical sub problem-External Search:

- **Lead Users**
 - Benefit from improvement
 - Innovation Source
- **Benchmarking**
 - Competitive products. Can also reveal existing concepts that have been implemented to solve a particular problem
- **Experts**
 - Technical Experts
 - Experienced customers
- **Patents**
 - Search Related Inventions (explain royalty)
- **Literature**
 - Technical Journals
 - Trade Literature

Internal Search:

Hints for Generating Many Concepts

- Suspend judgment
- Generate a lot of ideas
- Infeasible ideas are welcome
- Use graphical and physical media
- Make analogies
- Wish and wonder
- Solve the conflict
- Use related stimuli & unrelated stimuli
- Set quantitative goals
- Use the gallery method
- Trade ideas in a group

Systematic Exploration

- Concept Classification tree
 - Pruning of less promising branches
 - Identification of independent approach to the problem
 - Exposure of inappropriate emphasis on a certain branch
 - Refinement of the problem decomposition for a particular branch.

Systematic Exploration

- Concept combination table
 - It provides a way to consider combinations of solutions fragments
 - It a way to make forced association among fragments in order to stimulate further creative thinking systematically.
- Two guidelines:
 - Fragments considered to be infeasible should be removed at the beginning
 - Should concentrate on the sub problem that are coupled.

Systematic Exploration: Concept Combination Table

