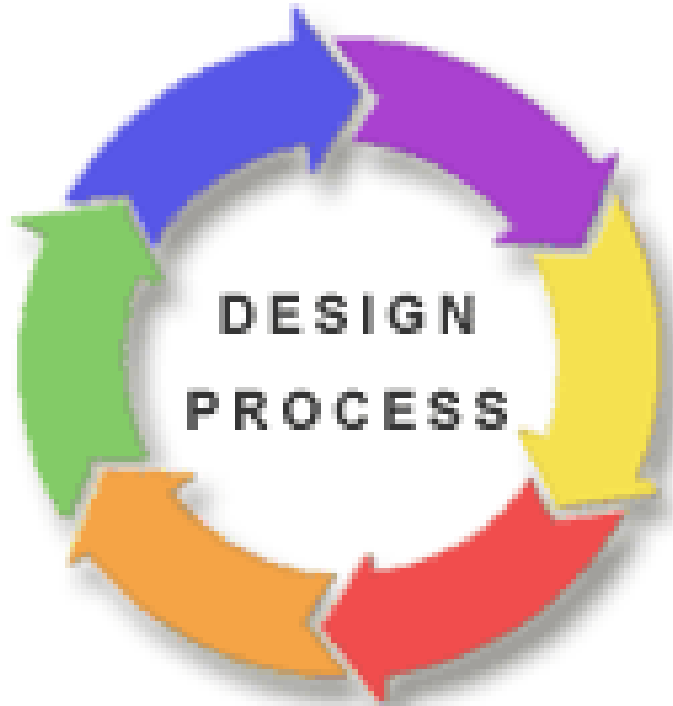
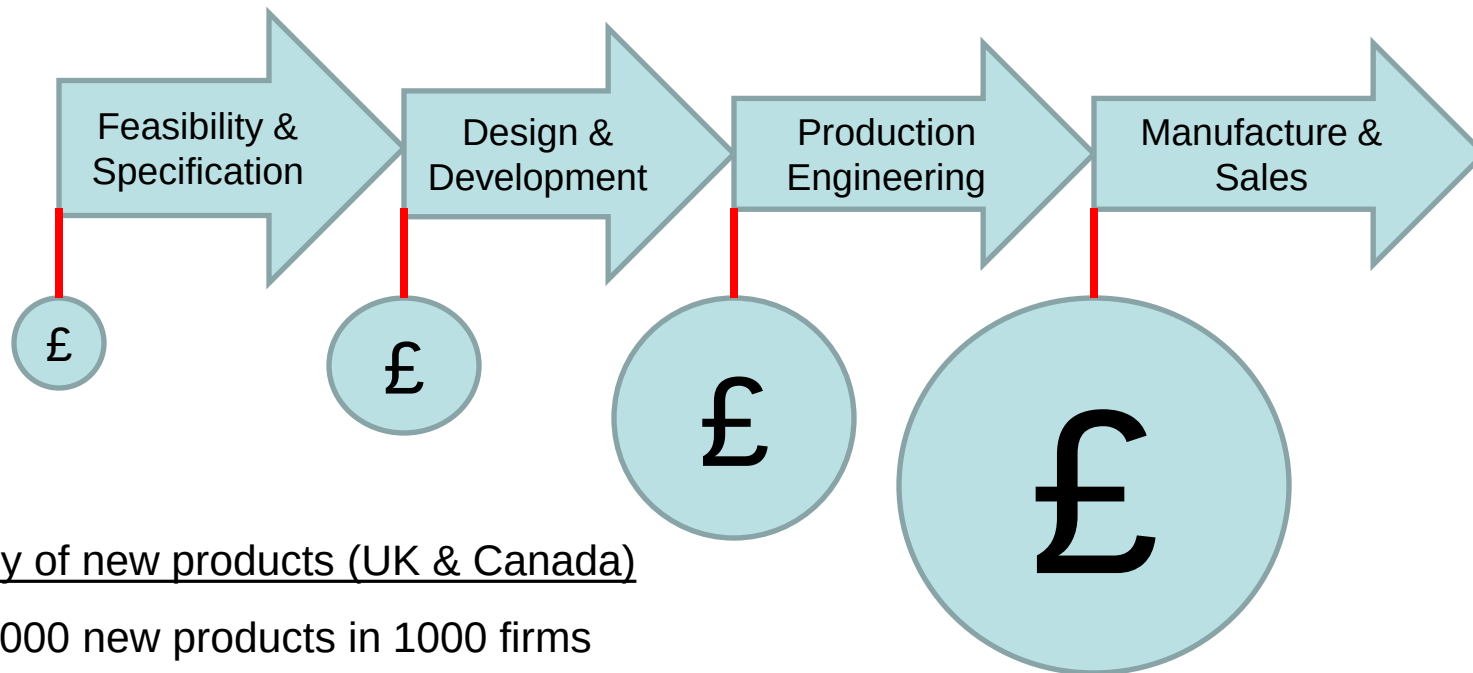


Design Process Fundamentals



Principles of New Product Development



Study of new products (UK & Canada)

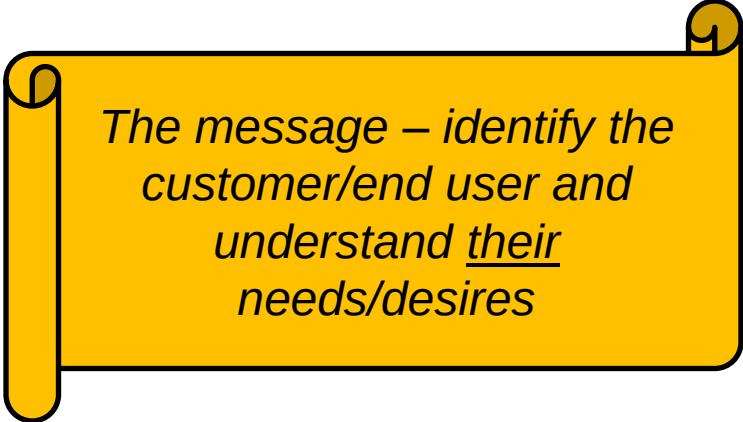
- 14,000 new products in 1000 firms
- Commercial failures and successes
- Question: What was done differently during the design process?

- Freeman C, 1998, The Economics of Industrial Innovation (2nd edition). Francis Pinter (Publishers), London.
- Cooper R.G. 1993, Winning at New Products, Addison Wesley Publishing Co. Boston
- Booz-Allen & Hamilton Inc. 1982, New Product Management for the 1980's. Booz-Allen & Hamilton Inc, New York

What differentiates failed products from successful ones?

1. Market orientation

Products which were seen as being:



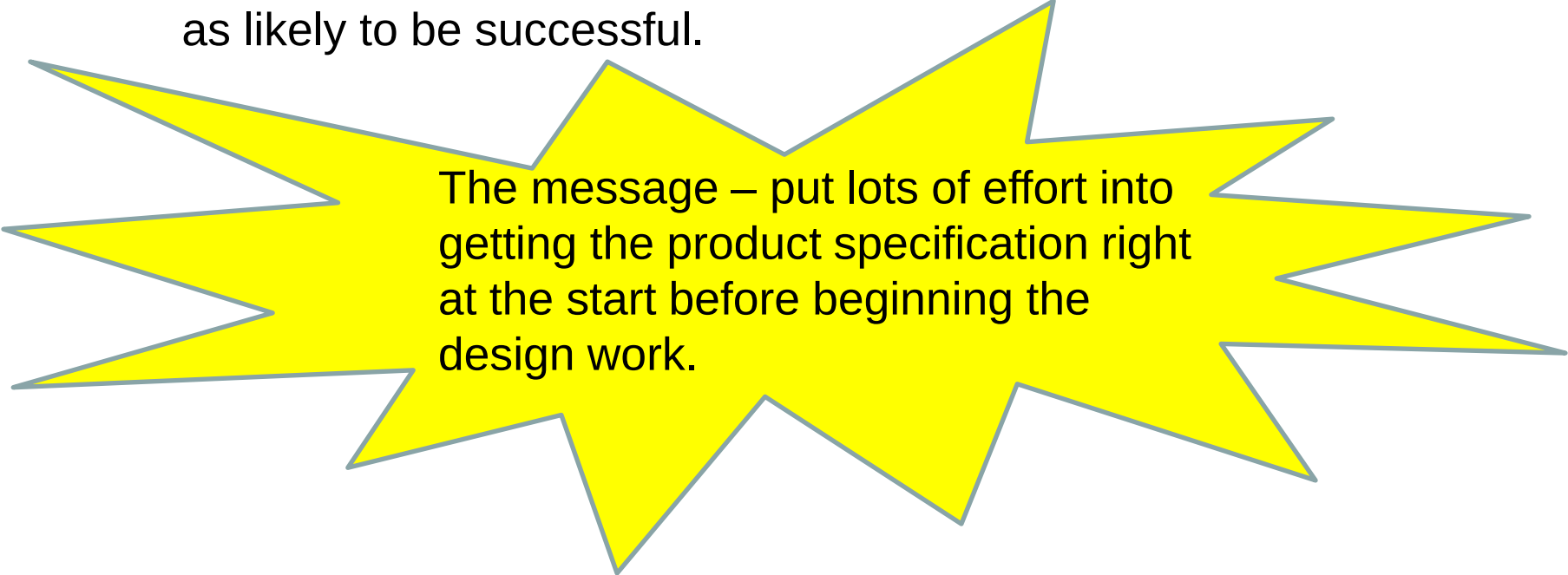
The message – identify the customer/end user and understand their needs/desires

- a) Substantially better than competing products
 - b) Better in ways which were highly valued
- had **5.3 times the success rate** of those which were marginally different

What differentiates failed products from successful ones?

2. Early feasibility assessment and Specification

- Products which underwent a thorough and stringent assessment prior to development were **2.4 times** as likely to succeed.
- Products which were sharply and well defined in a **DESIGN SPECIFICATION** prior to development were **3.3 times** as likely to be successful.

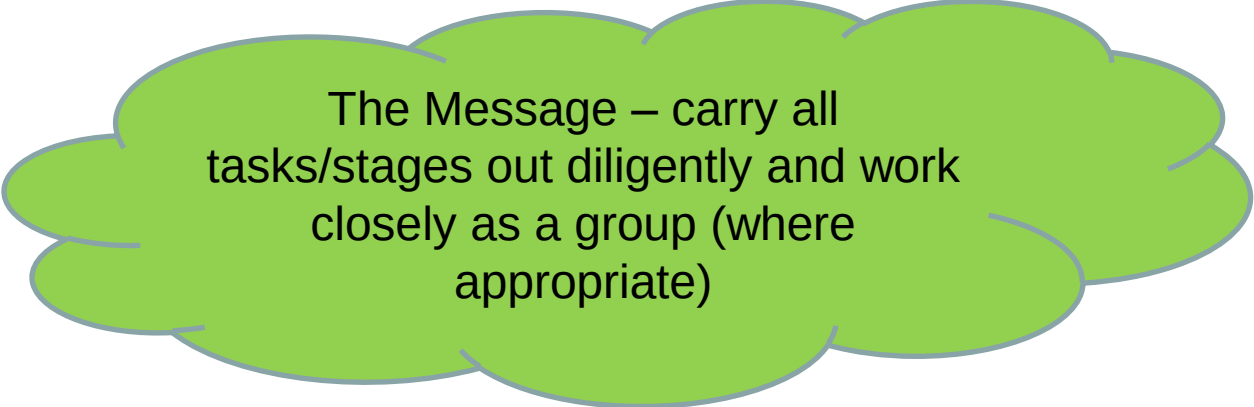


The message – put lots of effort into getting the product specification right at the start before beginning the design work.

What differentiates failed products from successful ones?

3. The quality of the product development process (and the people that do the work)

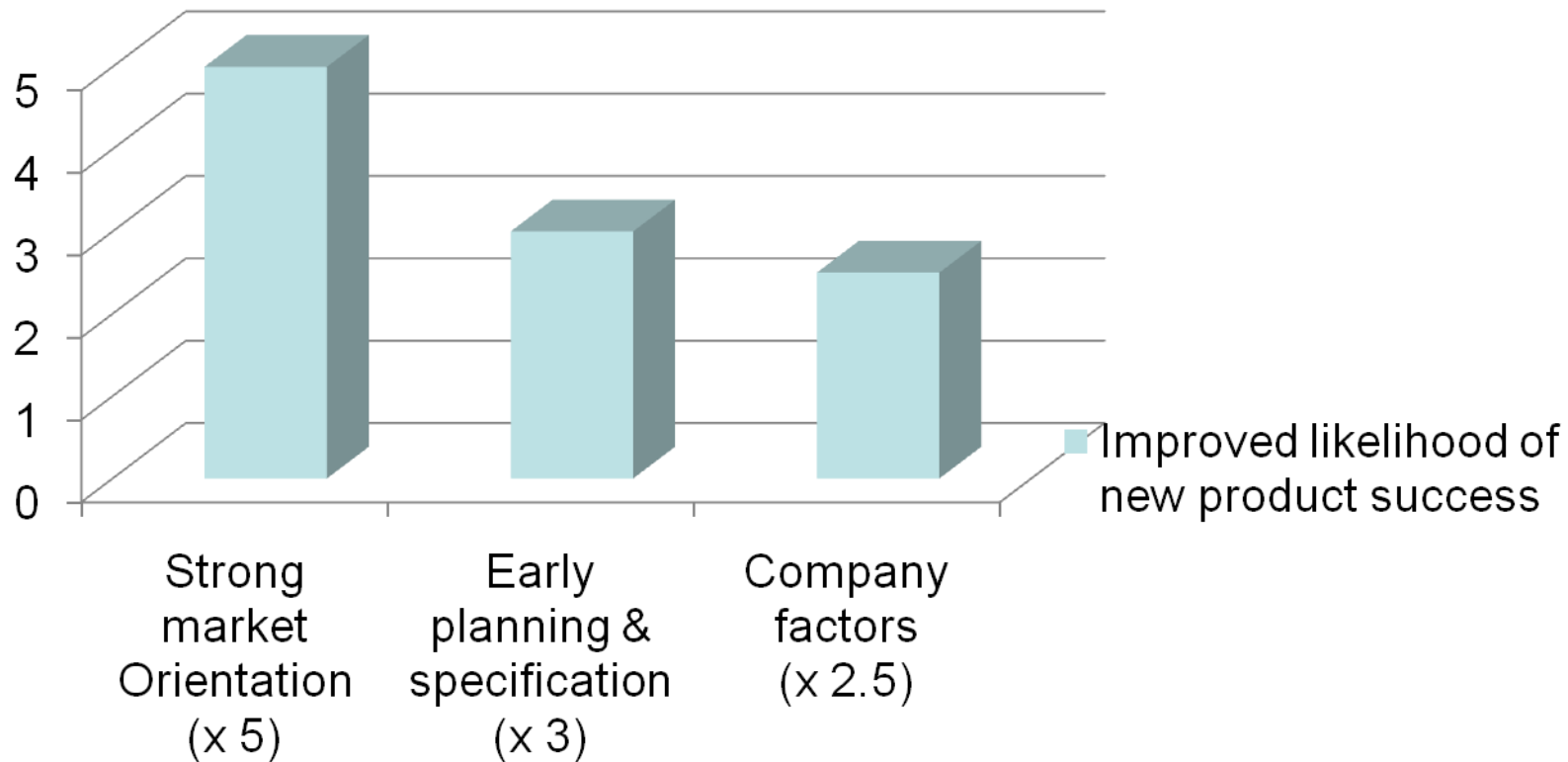
- Technical activities carried out to a high quality standard - **2.5 times** greater success rate
- Sales and marketing skills were well matched to a new product – **2.8 times** greater success rate
- High degree of ‘working harmony’ between the technical and marketing staff – **2.7 times** greater success rate



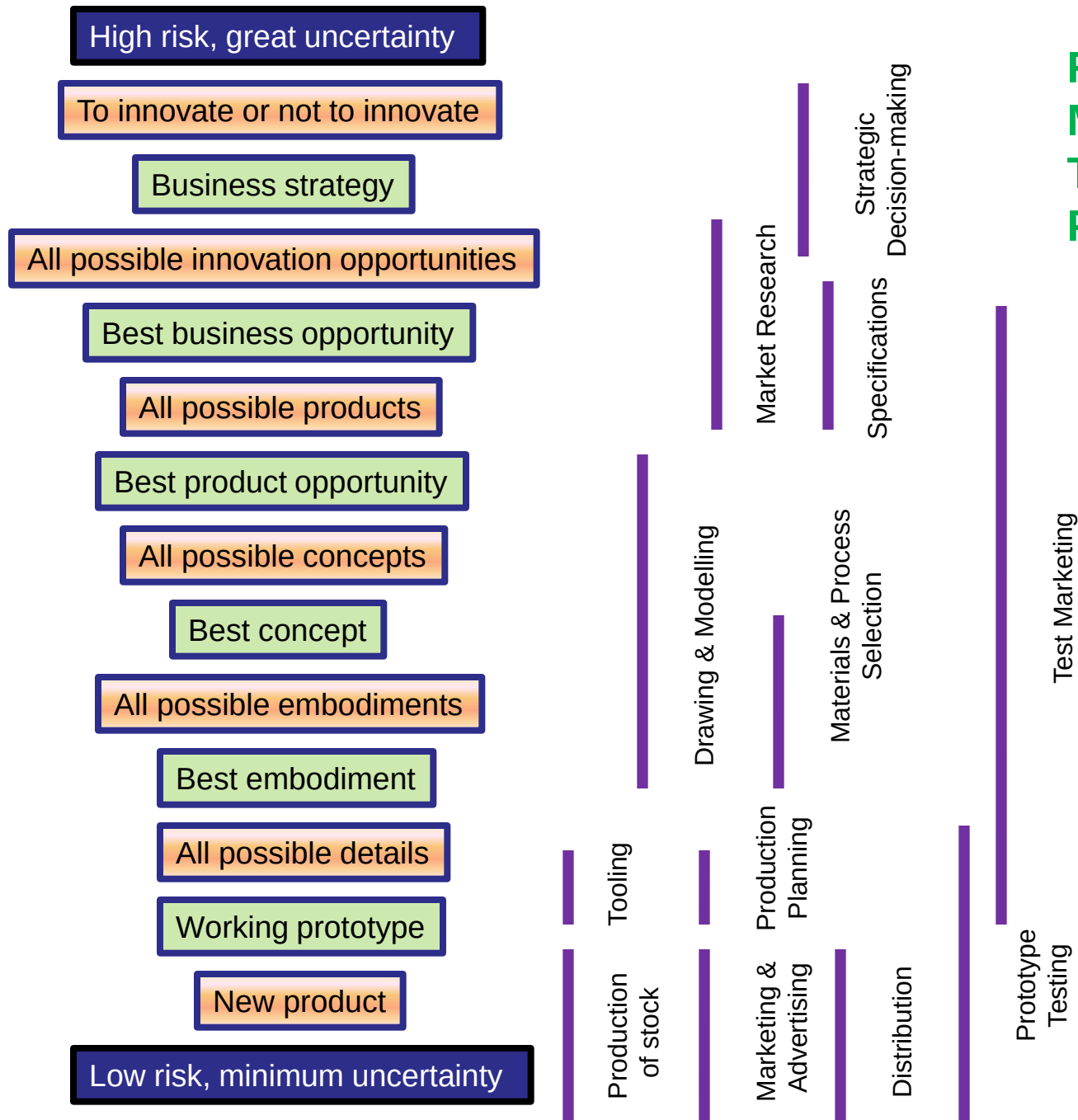
The Message – carry all tasks/stages out diligently and work closely as a group (where appropriate)

What differentiates failed products from successful ones?

Improved likelihood of new product success



Risk Management - Theory into Practice



Design Process Fundamentals

- *The Problem*
- *The Design Specification*
- *Research*
- *Developing Alternatives*
- *Choosing Alternatives*
- *Choosing a Solution*
- *Models & Prototypes*
- *Testing & Evaluating*
- *Manufacturing / Production*

The Problem

- *The Need*  *The Problem*
 - *The most important part of the process*
 - *Requires a thorough and detailed investigation*
 - *End-user orientated*
- *Redesign / modify an existing product*
 - *Carburettors*
 - *Fixed Choke*
 - *Variable Choke*
- *Design a new product*
 - *Electronic Fuel Injection*

The Design Specification

- *A design specification should describe simply and clearly the features, characteristics, functions, abilities etc. a solution would need to have, if it was to successfully solve the problem / meet the need*
- *Ask yourself:*
 - *What would the solution need to be/have to fully / successfully solve the problem / meet the need*
 - *E.g. would the solution need to:*
 - Be above / below a certain weight*
 - look a certain way*
 - Cost a certain amount*
 - Be easy to use*
 - Conform to certain legislation*
 - Be environmentally sympathetic*
- *If you are unable to compile a design specification due to lack of information. Research must be undertaken to obtain any relevant data*



Research

- *FUNCTION:*
 - *Physical*
 - *Psychological*
- *APPEARANCE:*
 - *Shape*
 - *Colour*
 - *Texture*
- *MATERIALS:*
 - *Availability*
 - *Cost*
 - *Physical Properties*
 - *Strength*
 - *Rigidity*
 - *Durability*
 - *Weight*
- *CONSTRUCTION:*
 - *Cut*
 - *Shape*
 - *Form*
 - *Join*
 - *Finish*
- *SAFETY:*
 - *Legislation*
 - *Professional bodies*
 - *Recognised standards*

Developing Alternative Solutions

- *Quantity of alternative solutions*
- *Record – brief description / sketch (every idea)*
- *‘Think inside & outside the box’*
- *Do not judge
/ evaluate*
- *Use idea
generation
tools*

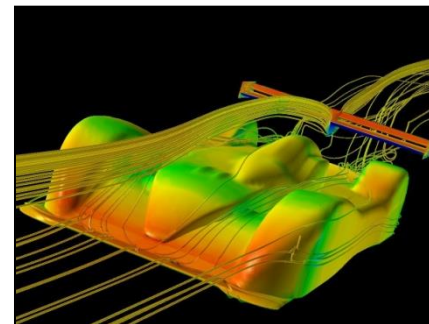
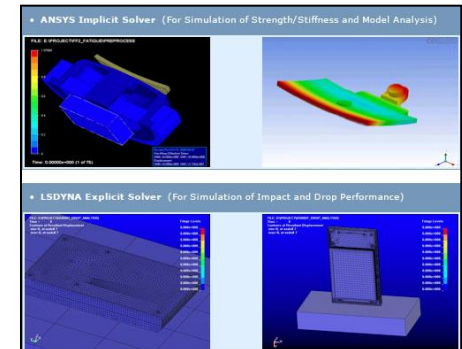


Choosing a Solution

- *Use a systematic approach*
- *Be able to account for your decisions (document the process)*
- *Examples of typical criteria for selection of a solution:*
 - *Your own or your groups level of skill & knowledge*
 - *The time needed for implementation*
 - *The cost of implementation*
 - *Ease of use*
 - *Weight*
 - *Aesthetics*
- *Use charts, graphs etc. to aid the decision making process*

Models & Prototypes

- *Models*
 - *Communicating design*
 - *Scaling*
 - *Reviewing aesthetics etc.*
 - *Physical*
 - *Virtual*
- *Prototypes*
 - *Working models*
 - *Function testing*
 - *Field trials / surveys*
 - *Physical*
 - *Virtual*



Testing & Evaluating

- *Measure the solution against the design specification*
- *How successfully does the solution solve the problem / meet the need?*
- *Ensure accurate results:*
 - *Objectivity*
 - *Environment*
 - *Target user trials*

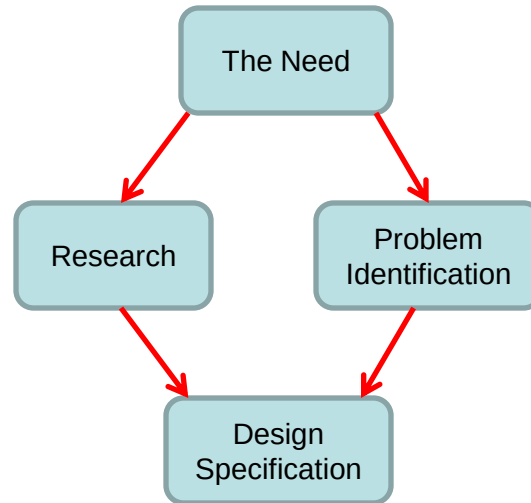


Manufacturing / Production & Commissioning

- *Batch quantities*
 - *Low*
 - *Medium*
 - *High*
- *Manufacturing processes*
- *Design / redesign for manufacture*
- *Joining processes*
- *Finishing processes*
- *Quality Control*
- *Servicing Arrangements*

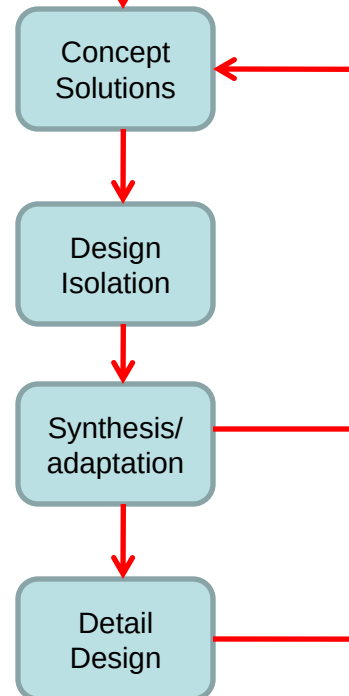


Problem Definition

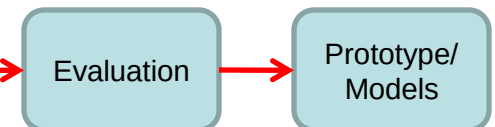


Design Methodology

Problem Solving



Solution Validation



Ground Rules for Systematic Design

- Establish targets for new product development. These should be clear, concise, specific and verifiable.
- Compare the emerging new product against these targets at several stages during development. Kill the product off as soon as it becomes clear that it will fail to meet essential targets.
- Be creative. Generate many ideas and select the best. Don't be afraid of producing ideas which may later prove non-viable