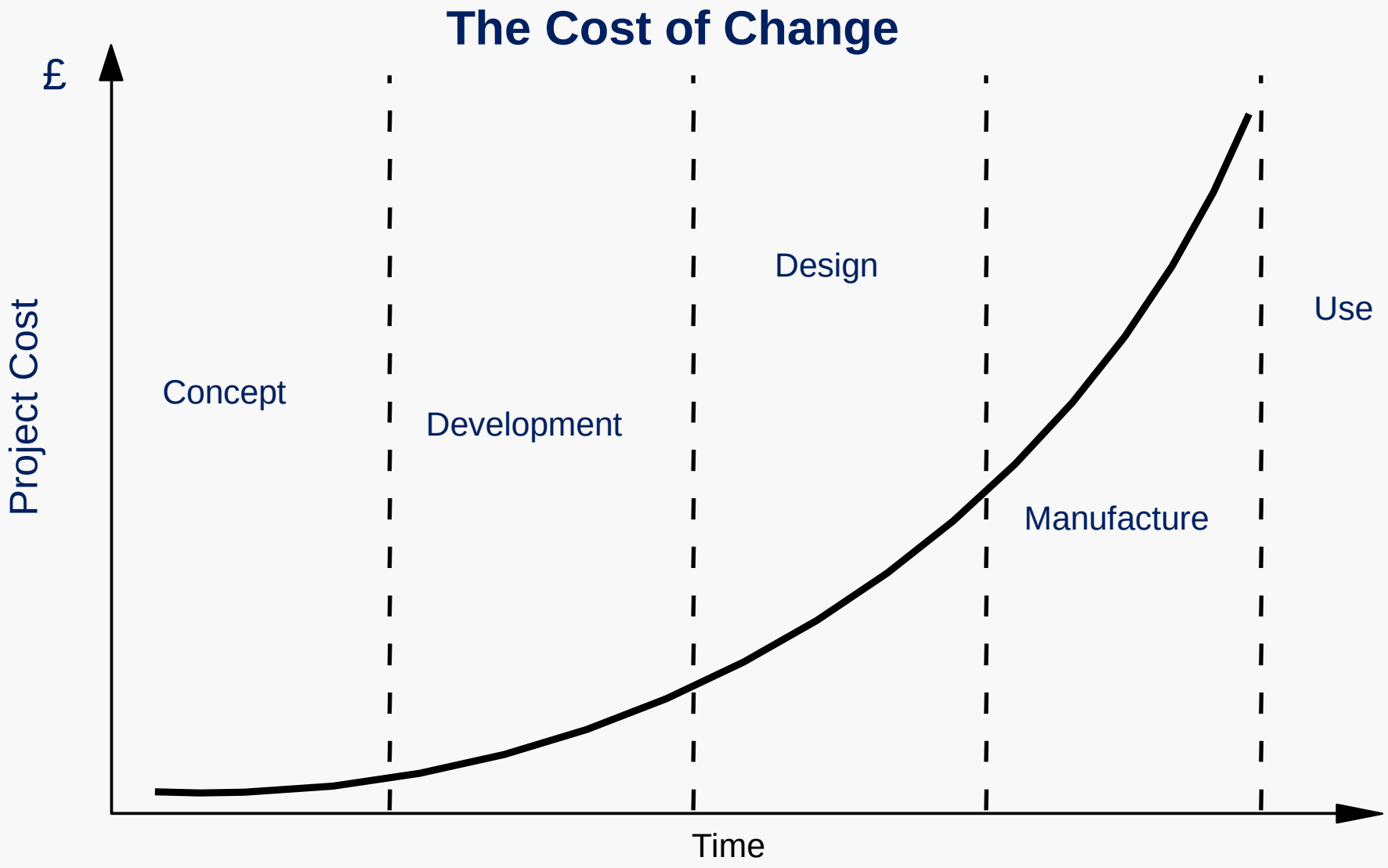
Time and cost issues in Projects

OVERRUNS OF COST AND TIME CAN ORIGINATE IN EACH PHASE OF A PROJECT

TIME

The cost of making changes rises dramatically, the later such changes are made during the life of a project.



SOURCES OF COST AND TIME OVER-RUNS IN PROJECTS

1. DURING THE PROJECT SPECIFICATION

a) Lack of previous experience.
b) Insufficient people with the necessary skills.
c) Inadequate time to prepare the specification.
d) Misunderstanding of the specification.
e) Agreement to terms and conditions that cannot be readily met.
f) Specification changes in the initial stages.

2. **DURING DESIGN**

a) Incorrect estimating for time and/or costs.
b) Lack of resources, especially in the initial phases.
c) Inadequate control of contract labour.
d) Lack of project control.
e) Poor communication between the specification writer and the designers.
f) Specification changes during design.
g) Over engineering ("Gold Plating")
h) Errors in design.

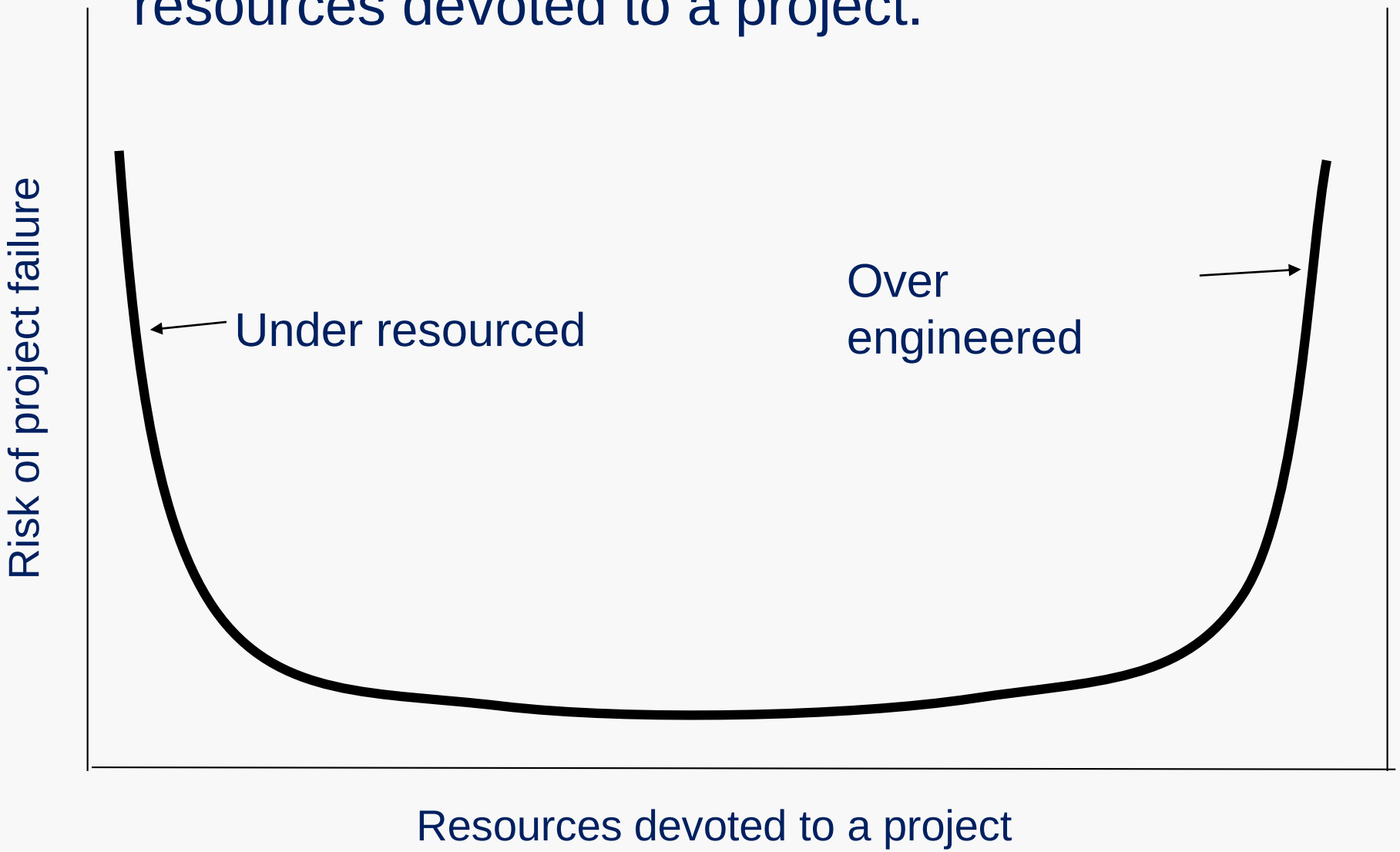
3. **DURING PROCUREMENT**

a) Placing orders late.
b) Lack of detailed or incorrect specification.
c) Failure to identify long lead times early enough.
d) Late delivery from supplies.
e) Incorrect supply.
f) Inability to supply equipment to original specification.
g) Goods lost, either in transit or at the Factory.

4. DURING MANUFACTURE or CONSTRUCTION or other PREPARATION

a) Shortage of suitable manpower.
b) Lack of documentation in drawings and procedures.
c) Failure or unsuitability of bought parts.
d) Late deliveries.
e) Design faults.
f) Shortage of equipment.
g) Lack of working space.
h) Strikes.

Risk of project failure can depend on the resources devoted to a project.



PLANNING THE PROJECT

Plans are management documents forming the backbone of the management information system requited for any project. The principal objectives of planning are;

- to identify the product and quantify the activities to be undertaken to produce the product;
- to provide a means whereby the progress of the activities may be monitored;
- to identify when control needs to be exercised.

Time must be allowed for planning a project properly.

PLANNING THE PROJECT

The purpose of planning is to ensure that the outputs from the project are likely to be delivered in sufficient time, within cost and at the required quality, such that the project’s benefits can be realized.

(BS 6079:2019 Section 13.1.1.1)

Responsibility Assignment Matrix (RAM)

RACI is a more commonly used acronym.

They describe the participation by various roles in completing tasks within a project.

RACI Charts

R ➞ Responsible
A ➞ Accountable
C ➞ Consulted
I ➞ Informed

Sometimes an additional category is also used;
S ➞ Supported
If so then it becomes a ‘RASCI’ chart or matrix.

General example of a RACI chart

	Role A	Role B	Role C	Role D
Function / task 1	R	A	C	I
Function / task 2	A	R	C	I
Function / task 3	C	R		A
Function / task 4	R	C	I	A
Function / task 5	I	A	R	

Function	Project Sponsor	Business Analyst	Project Manager	Software Developer
Initiate Project	C		AR	
Establish Project Plan	I	C	AR	C
Gather User Requirements	I	R	A	I
Develop Technical Requirements	I	R	A	I
Develop Software Tools	I	C	A	R
Test Software	I	R	A	C
Deploy Software	C	R	A	C

Responsible

The role or person or entity that is assigned the role type ‘Responsible’ is the one who performs the work. In other words he/she is the ‘doer’ of the task or activity. The person who is ‘Responsible’ need not be accountable for that task, even though in some cases the same person can be ‘Responsible’ and ‘Accountable’.

The degree of ‘Responsibility’ can vary and multiple roles can share the responsibility of a single task. Also the responsibility can be delegated by the role to another role. Using the RACI matrix we can see if a role has too many or too few responsibilities and try to adjust the work load.

Accountable

‘Accountable’ is the person or role who has the final authority and accountability to a given task. For any given task, there is only one role/person accountable. This accountability can’t be delegated to other roles or individuals or entities.

Consulted

‘Consulted’ are the people/roles who are consulted and taken advice from before and during performing the task. When there are many people who are assigned as ‘Consulted’ roles, the time take to accomplish the task increases.

On the other hand too few or no ‘Consulted’ roles assigned to a task means that task has the risk of being under performed.

Informed

Informed are the people/roles who are informed **after** the task is completed. You need to assigned the ‘Informed’ roles properly as otherwise it may lead to mis-communication and delays. You need to make sure the right people/roles are informed after a task is performed successfully. If too many roles are informed after a task, we need to see if it’s necessary to do so and minimize on that.

Supported

‘Supported’ are the roles/groups/departments that provide the resources and hence support that task.

This is an optional role type and if the matrix uses this category along with the other four RACI categories, then it’s called a **‘RASCI’** matrix.

When you fill the table, you should keep in mind following rules:

There should be only one A. Two or more As will create confusion.

More than two Rs in the same row means duplication of work. In that case try to split the task into smaller pieces.

No Rs in a row means a gap, because nobody will be responsible and work will not be done. This can also mean that task is not needed.

If possible, place most of Rs and As at the leftmost side of the matrix. This improves overall clarity of the table.

Every row must contain one A and one R. However, same participant can be both responsible and accountable at the same time.

If there is a role with no Rs or As, reconsider if role is needed.

RACI is a good communication tool.

Without RACI, processes will result in poor communication and improper process definition and poor hand-offs

RACI makes sure each and every task is owned by a role

People tend to think they are the ones who are responsible and/or accountable where as they might actually be in ‘Consulted’ or ‘Supported’ roles.

Assigning wrong roles results in duplication of effort and misunderstanding and fighting.

RACI allows the right people to be assigned to the role of consulted.

RACI Benefits and Advantages

By clarifying roles and responsibilities at the very initial stage of the process design, RACI helps setting up the proper expectations among team members and hence reduces future misunderstandings.

Eliminates duplication of effort

RACI helps improved communication by setting up the proper expectations among team members at the very initial process design stage.

RACI Benefits and Advantages (continued)

Identifies the owner of a task clearly and assigns accountability to that role.

By ensuring that the correct people are involved, RACI helps in avoiding wrong decisions.

RACI clarifies hand-offs and ask/role/responsibility boundaries.

Improves understanding of cross-functional view for employees across divisions or departments, and helps employees across various groups respect and appreciate the roles and duties of people from other groups.

A Step by Step guide for creating RACI Charts

Determine the functions, decisions, tasks and activities that will make up the process or project.

Identify who will be the project’s participants.

These will make up the rows and columns of the RACI chart.

Identifying how each participant is involved with each function, decision, task, activity.

Fill out the grid with the letters R(responsible), A (accountable), C (consulted), or I (informed)

RACI Matrix

Step	Tasks	Role1	Role2	Role3	Role4	Role5	Role6
1	Task1	C	C,I				R,A
2	Task2	A		C,I		R	
3	Task3			A	R		I
4	Task4	R	C			A	
5	Task5			R	A		
6	Task6	A	R			C	

R	Responsible
A	Accountable
C	Consulted
I	Informed

Discoveries/findings from RACI Chart

Each task/function/activity (row) should have ONE and only ONE Accountable (A).

Each task/function/activity (row) should have at least one Responsible. In some cases, a task can have more than one role responsible with shared responsibility.

If a task has more than one R then the task should be brainstormed further and see if it can be split into two tasks.

The number of Consults (C) should be minimized.

RASCI Matrix

Step	Tasks	Role1	Role2	Role3	Role4	Role5	Role6
1	Task1	C	C,I				R,A
2	Task2	A		C,I		R	
3	Task3			A	R	S	I
4	Task4	R	C		S	A	
5	Task5			R	A		C,S
6	Task6	A	R	S		C	

R	Responsible
A	Accountable
S	Supports
C	Consulted
I	Informed

Programme Breakdown

- is used to assess overall durations and gives broad approximations.

e.g.

i) The overall timescale.

ii) Major phases of developments.

iii) The scale of activity required.

iv) Numbers of prototypes and test specimens.

Work Breakdown

Programme breakdown is too broad for detailed planning.

Work breakdown provides a means of finer analysis.

Work breakdown is also used to check and if necessary, modify the programme breakdown.

The tasks are divided into their constituent activities.

The **Work Breakdown Structure** (WBS) defines the work required to produce the products (deliverables). The lowest level of detail normally shown in a WBS is a work package.

The **Product Breakdown Structure** (PBS) defines all the products (deliverables) that the project will produce. The lowest level of a PBS is a product (ie a deliverable).

The PBS and WBS are hierarchical structures.

In practice there is no universal agreement on the difference between PBS and WBS as they are very similar.

In general the PBS includes products (ie those delivered to the customer) and the WBS includes all work including that which is not always delivered to the customer (eg management products, such as the schedule, specification or plans).

WORK BREAKDOWN STRUCTURES

Developed in the US Defence Industry as -

A "Family Tree" division of hardware, software, services and other work tasks which organises, defines and displays graphically the product to be produced, as well as the work to be accomplished to achieve the specified product.

A work breakdown structure (WBS) is a hierarchical decomposition of the entire work that should be completed in order to achieve the project’s objectives.

BS 6079: 2019 (section 13.1.1.3)

It is difficult to determine the degree to which the breakdown should be carried.

- Too coarse and subsequent monitoring may be ineffective.
- Too fine and there will be elements which are not discrete and which cannot be recognised.
- Effort in monitoring becomes unmanageable.
- Detail contained in programme and progress report is too great.

FACTORS WHICH INFLUENCE THE NUMBER OF LEVELS OF WORK BREAKDOWN FOR A PROJECT

1. The stage to which a project has been defined
   - the better defined a project is then it becomes possible to break it down into more detail.

2. The size of the project.
   - for a larger project more levels are required.

3. The amount of uncertainty in a work element.
   - it is desirable to divide elements for which there is more risk into more detail than the others.

Work Breakdown Methods

Two approaches

1. Product Orientated.

2. Function Orientated.

1. <u>Product Orientated</u>

   Divisions are related to items of hardware.
   e.g. main equipment, sub-assemblies, major and minor components.
   CONCENTRATES ON PRODUCTS
   (PRINCE favours the Product Based Approach)

2. <u>Function Orientated</u>

   Divisions are related to organisational disciplines.
   e.g. design, manufacture, management, administration.
   CONCENTRATES ON ACTIVITIES

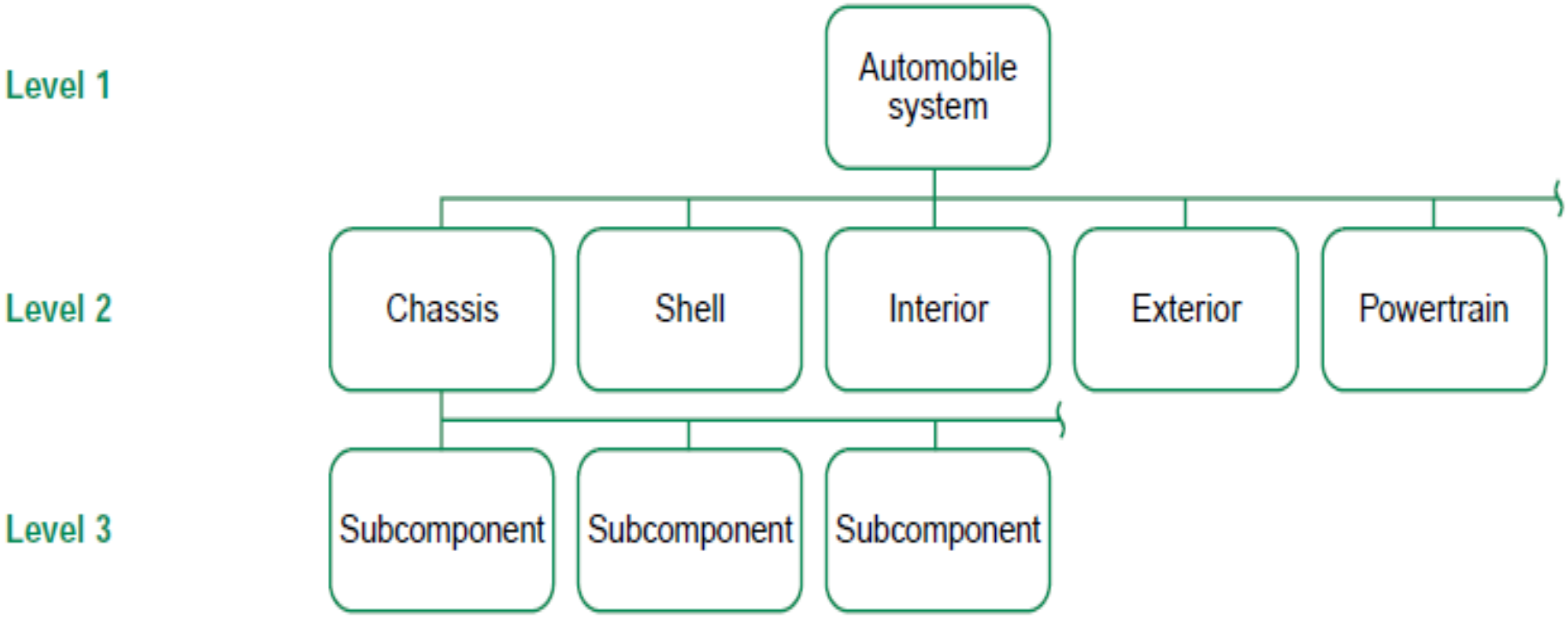
BREAKDOWN OF THE PRODUCTION OF A NEW CAR - BY PRODUCT.

	LEVEL	PRODUCTS
1	New Car	Body Styling Structural Analysis Powertrain development Aerodynamic development Suspension & Steering Production Planning
2	Powertrain	Engine development Gearbox development Rear axle development Powertrain optimization
3	Engine Development	Basic Engine Design Fuel Injection system Cylinder Head design etc

The previous slide illustrates the principle but this sort of layout becomes ungainly and unmanageable if all the elements are expanded and so a neater layout is needed.

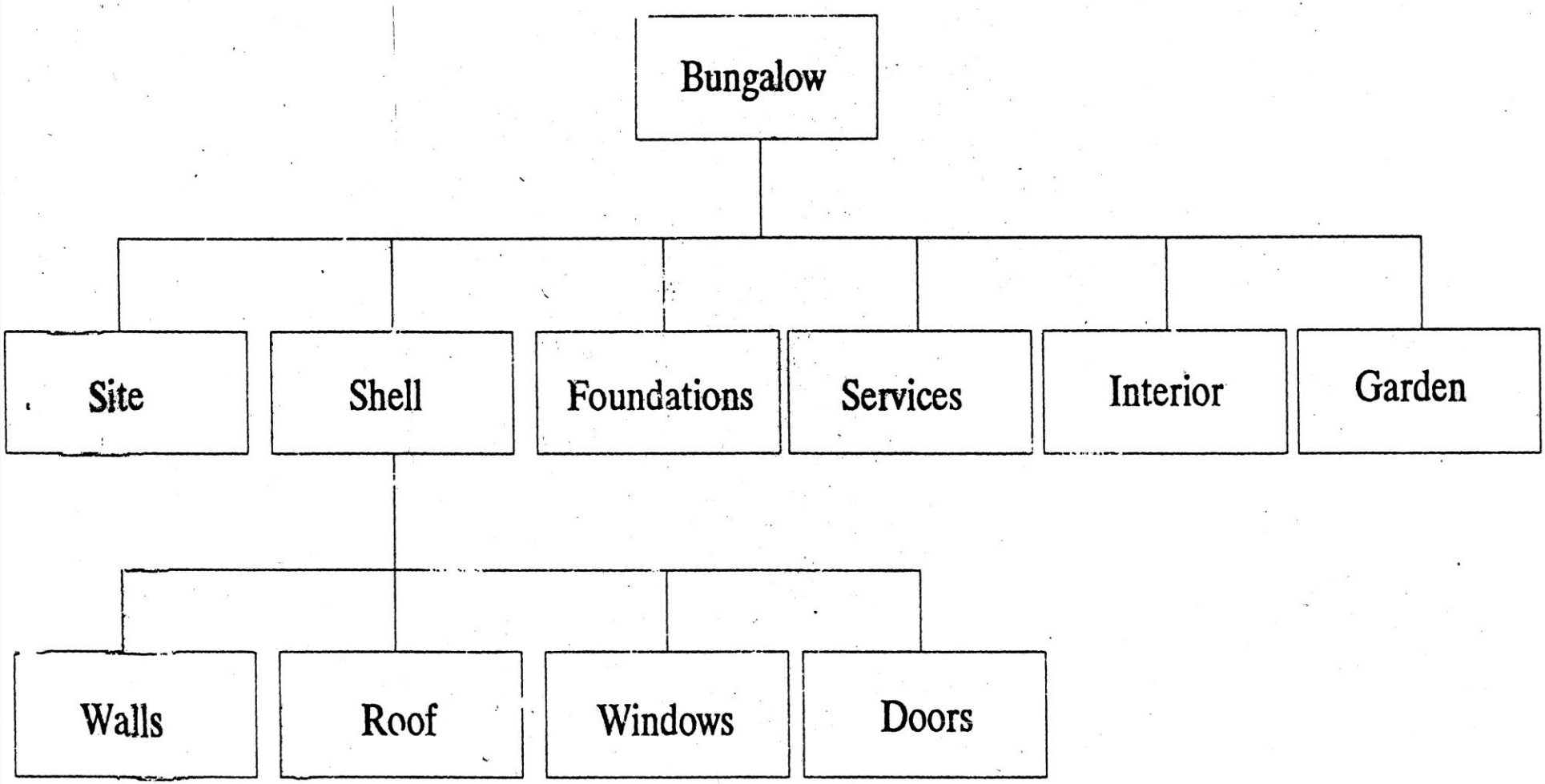
The following slide displays the “family tree” layout.

A product based work breakdown structure.

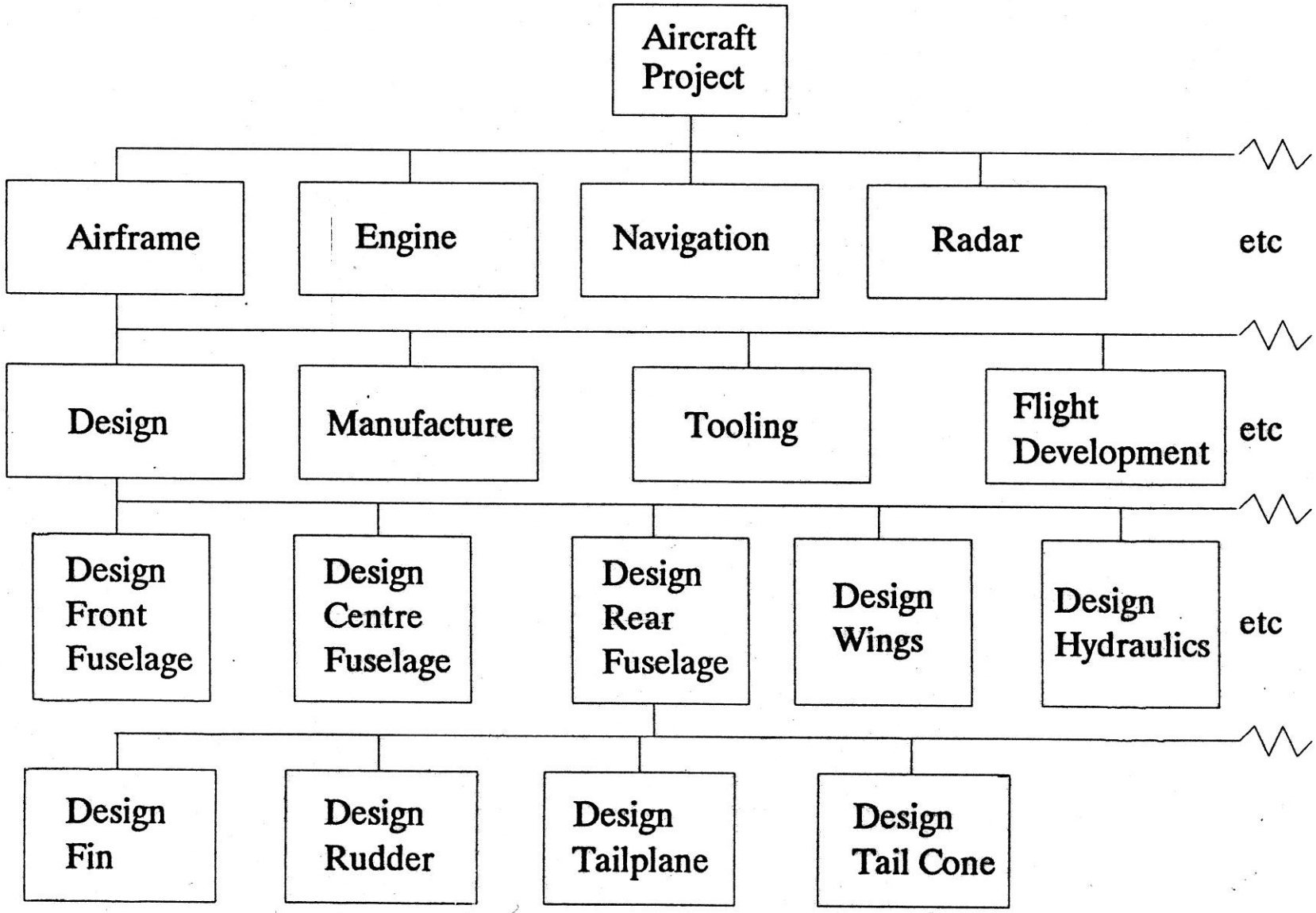


Source: © 2005 MCR, LLC, "Developing a Work Breakdown Structure."

Product Orientated Work Breakdown Structure



Function Orientated Work Breakdown Structure



In many cases a combination of the two breakdown methods is appropriate. - the higher elements divided by product - the lower by function.

PRINCE favours the Product Based Approach

The techniques associated with the product based approach to planning are;

- Product Breakdown Structures (PBS);
- Product Flow Diagrams;
- Product Descriptions;

The process is an iterative one; the number of iterations will depending on the complexity, size and risk associated with a project and the degree to which control is to be applied. The temptation to go into too much detail should be avoided.

The number of levels in the WBS will depend also on the degree to which the project has been defined.

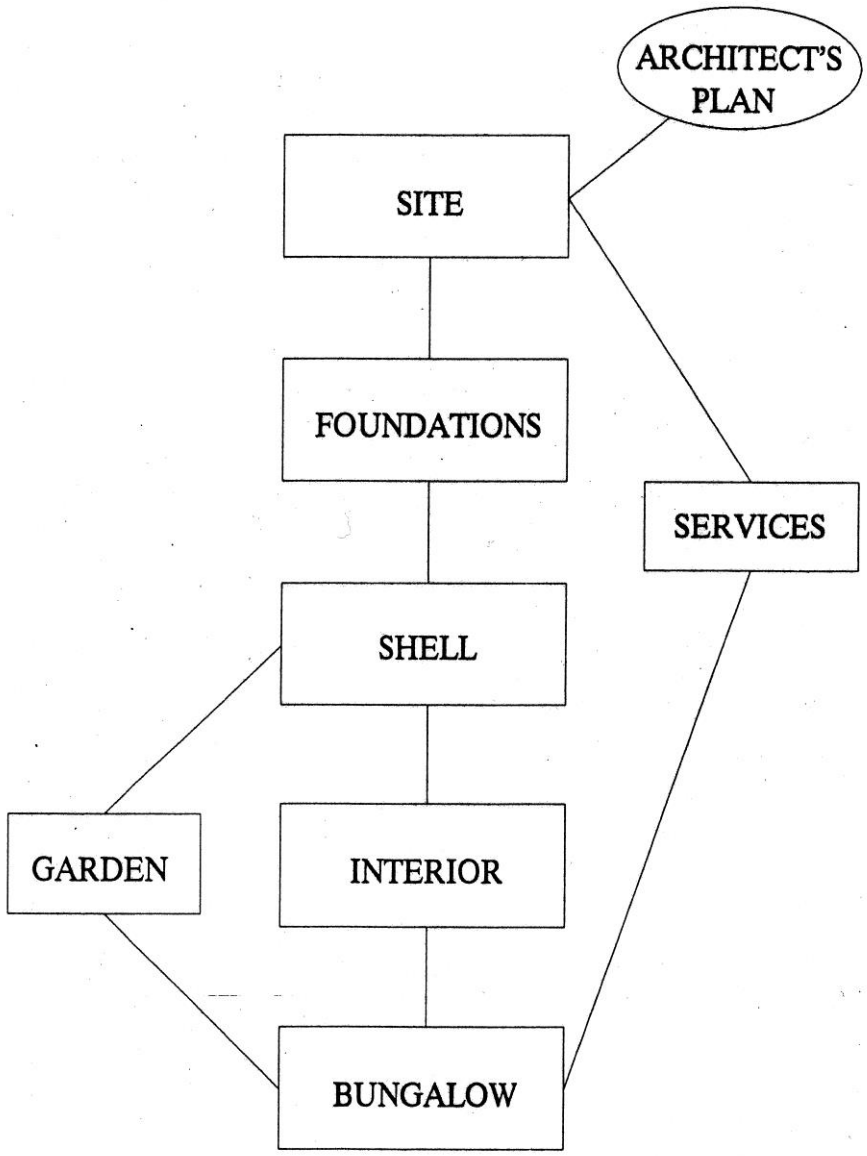
By concentrating on the goal rather than the means of getting there the PRODUCT ORIENTATED method identifies the products required by the project and describes these before development of the products commences.

This ensures that a common understanding exists between interested parties. The product based approach also ensures that the activities identified later are necessary and are to be carried out for the production of the ultimate product and not just because the development method says it should be done.

Other forms of breakdown structure can also be used as part of project planning to reflect the planning approach taken.

Examples include: product flow diagrams, cost breakdown structure, organization breakdown structure.

Product Flow Diagram



Work Packages

- are parcels of work which can be individually planned, resourced and costed.

- are the smallest entities to carry costs at total project level.

- they can be used to produce a project budget and then to monitor performance.

- may be a single activity in a critical path network.

DEFINED BY BS 4335; 1987 AS "A GROUP OF ACTIVITIES (NORMALLY RELATED IN SOME WAY OR WAYS) THAT ARE DEFINED AT A LEVEL WITHIN A WORK BREAKDOWN STRUCTURE."

BS 6079 (2019) says that a work package should include:

a) a breakdown structure reference code;
b) a summary description;
c) a description of the work content;
d) a list of key deliverables;
e) an assessment of risks;
f) performance measurement and completion criteria;
g) timescales for the deliverables;
h) a schedule of activity dependencies and subsidiary activities;
i) inputs needed from other work packages and other external sources;
j) a schedule of costs by cost element; and
k) reporting requirements.