

Australian Cost Engineering Society

# Work Breakdown Structures

*Getting the fundamentals right*

Melbourne

February 2011

Malcolm Sawle



# AGENDA

- Introduction
- Definitions
- Uses of a WBS
- WBS Development Process
  - Purpose
  - Context
  - Content
  - Preparation
  - Hierarchy
  - Coding
- Pitfalls
- Recommendations



# Introduction

- Benefits of attending ACES meetings:
  - Techniques are explained by practitioners who have been there and done that.
  - We meet with our peers and are able to share our frustrations.
  - It causes us to question our perceptions, and leads to a deeper understanding, of project controls.
- This seminar falls into the latter category.



# Introduction

- This seminar is about Work Breakdown Structures (WBS).
- A WBS is normally a given requirement on projects.
- What information is available on how to prepare one is usually very context specific.
- This session is an attempt to look for some universal themes and develop a common process for developing a WBS.
- Whilst the focus is on engineering and construction projects, concepts discussed are generally applicable to other types of projects.



# WBS Definition 1

Ref: [Wikipedia](#)

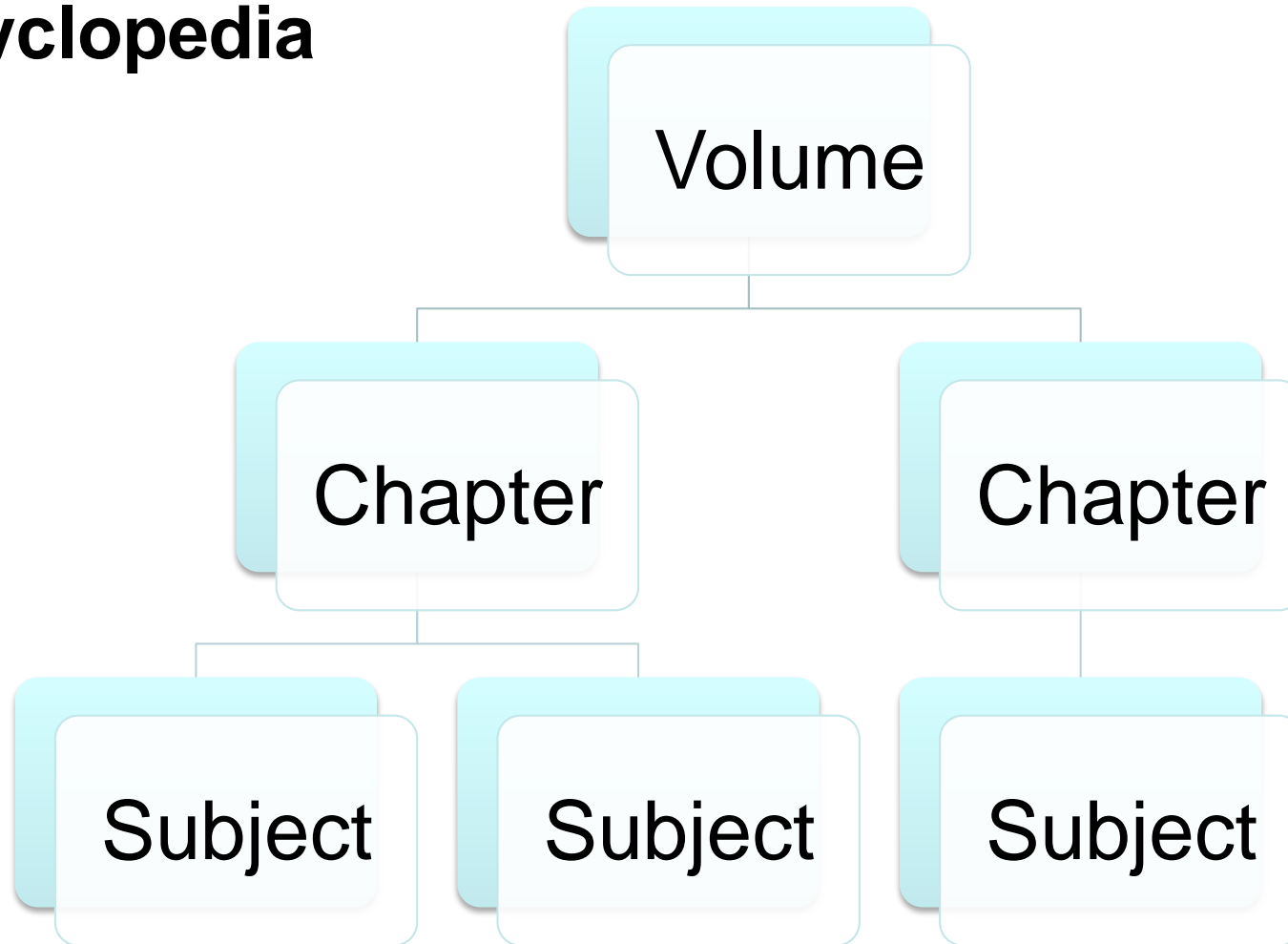
A work breakdown structure ..... is a tool used to define and group a project's discrete work elements in a way that helps organize and define the total work scope of the project.





# Does this fit the definition?

## Encyclopedia



# Is this a good WBS?

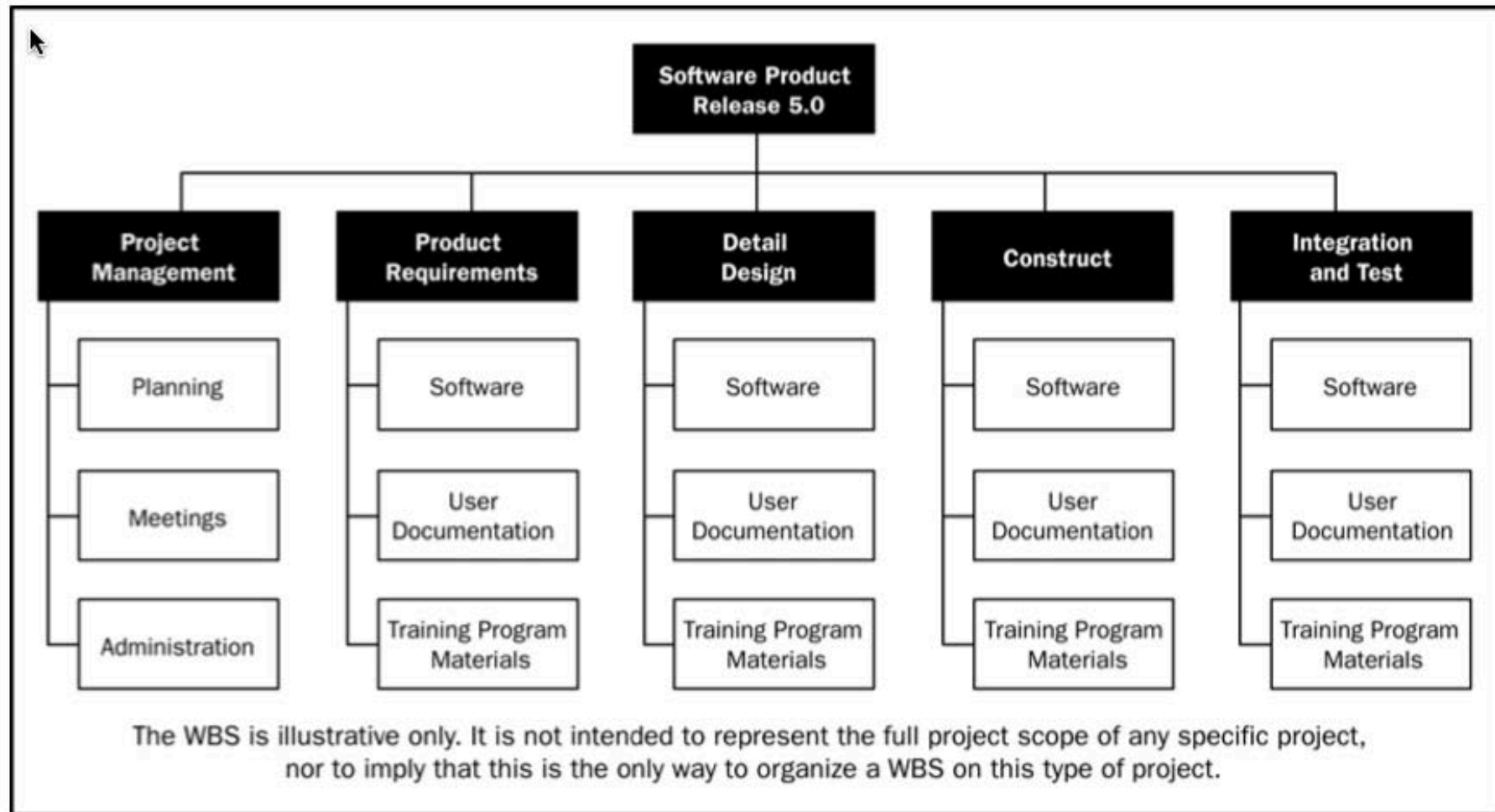


# WBS Definition 2

- **Ref: Project Management Institute Body of Knowledge**
- A deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work. The WBS is decomposed into work packages. The deliverable orientation of the hierarchy includes both internal and external deliverables.



# PMI Example – by Deliverable?



**Figure 5-7. Sample Work Breakdown Structure Organized by Phase**

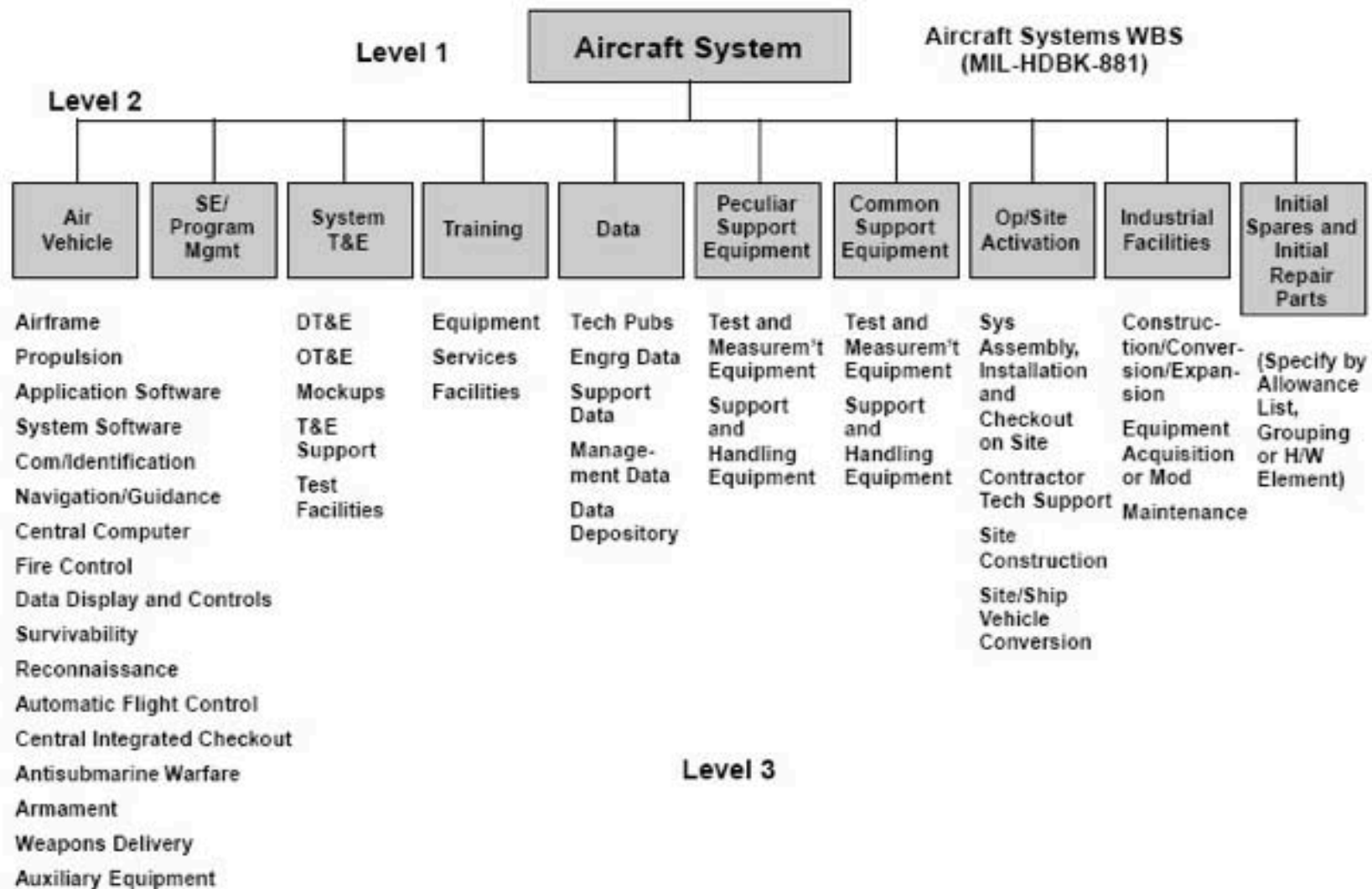


# Definitions 3

**Ref: USA DOD MIL-HDBK-881A Work Breakdown  
Structures for Defense Materiel Items**

.....provides a framework for specifying program objectives. It defines the program in terms of hierarchically related, product-oriented elements.....Each element provides logical summary levels for assessing technical accomplishments... and for measuring cost and schedule performance.





# Definitions 4

**Ref: AACEI Project Code of Accounts 20R-98**

.....a WBS can be described as a hierarchical division of work scope into manageable parts that correspond to key deliverables, phases, or milestones. Work breakdown structures can be product-oriented,.... organization-oriented,...or combined product/process/organizational hierarchies.....several organizations refer to their code of accounts as a WBS because the project breakdown is incorporated into the cost coding.



# Definitions 5

Ref: ACES Melbourne February 2011

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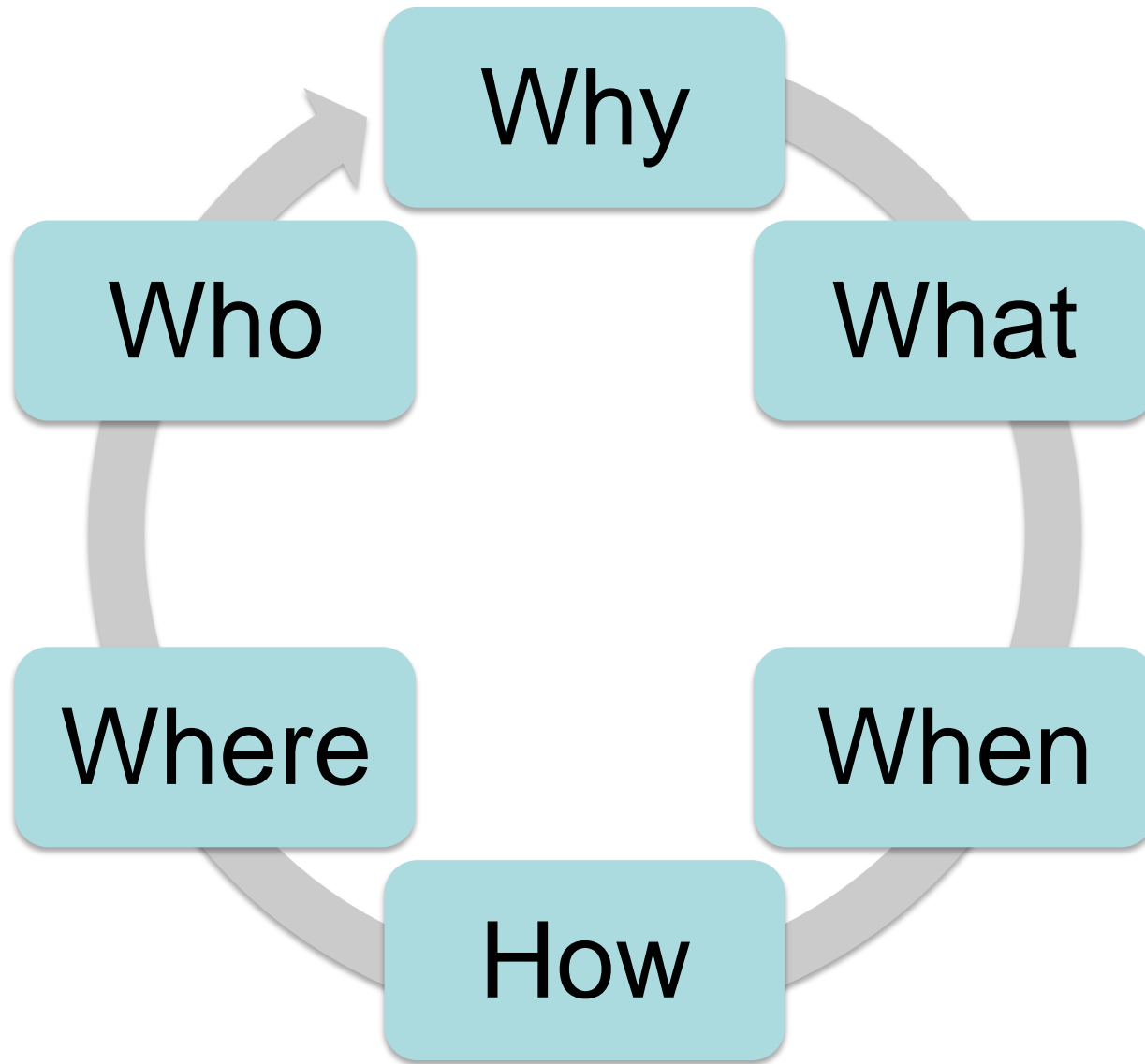
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We are starting to know what a WBS is but  
how do we get there!

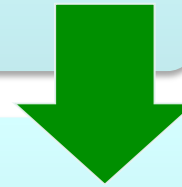


# The Universal Questions



# Basic WBS Development

Content



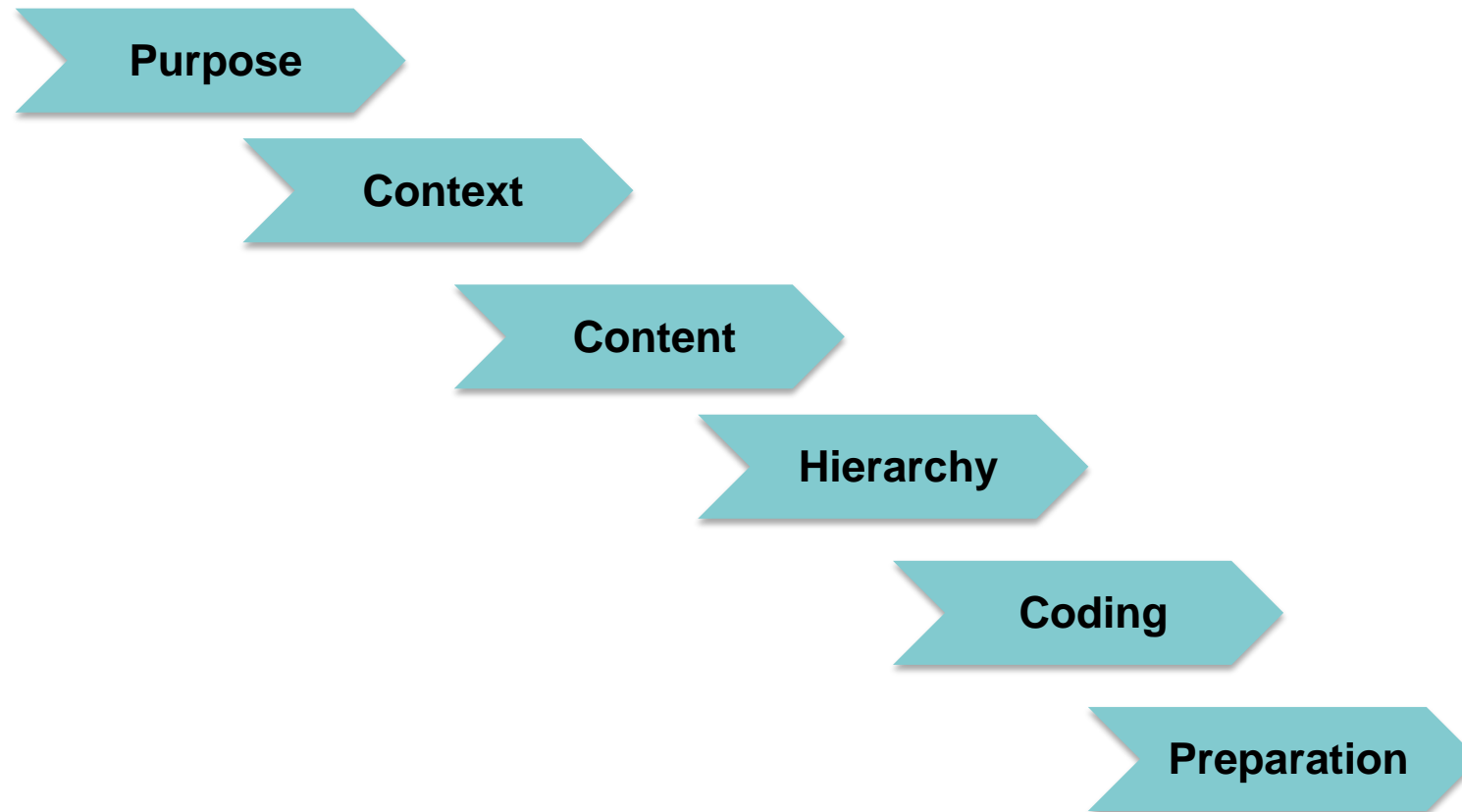
Structure



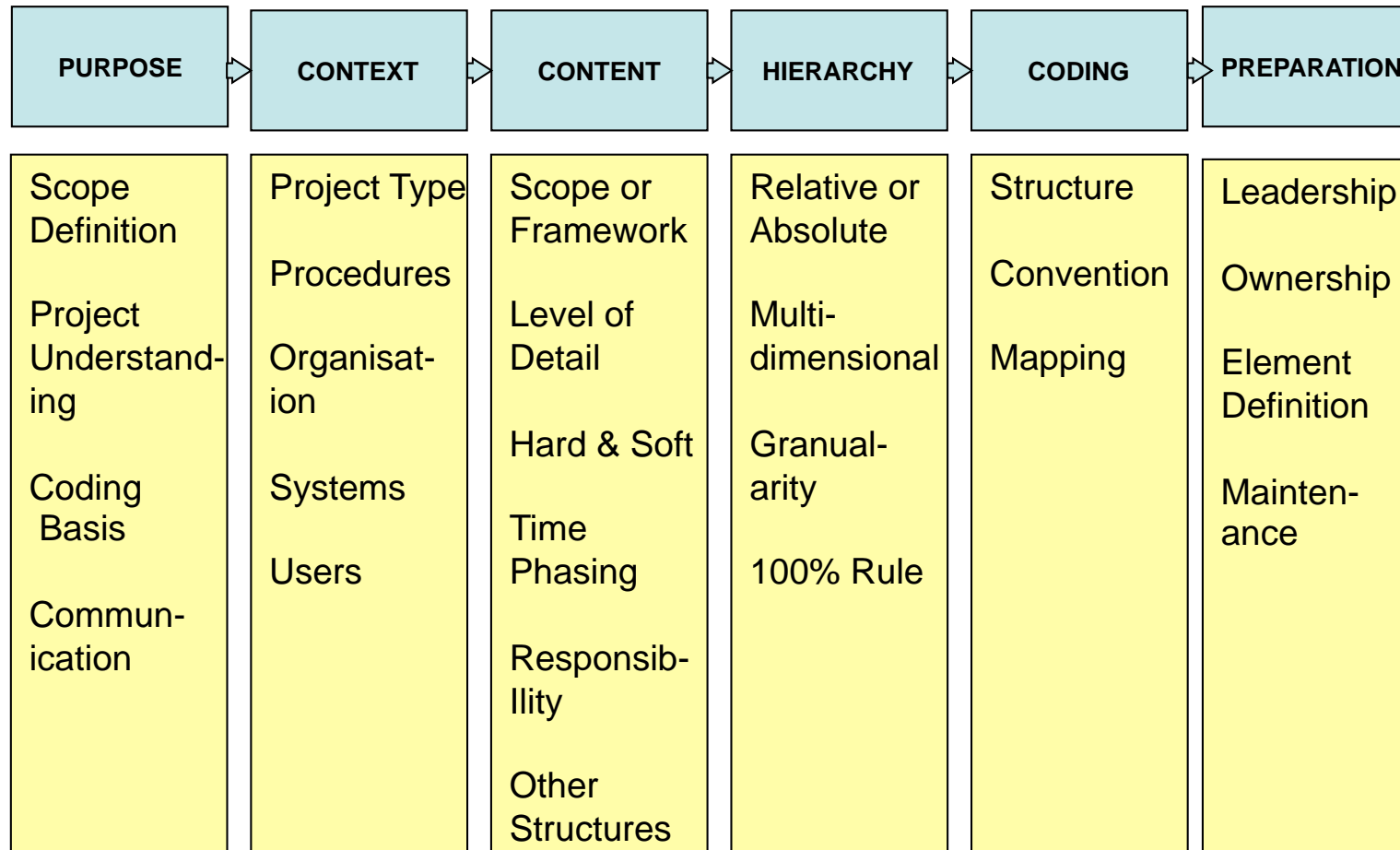
Codification



# Further WBS Development



# WBS Development Process



# Purpose

- Why does the project need a WBS?
- What value does the WBS add?
- Who benefits from the WBS?

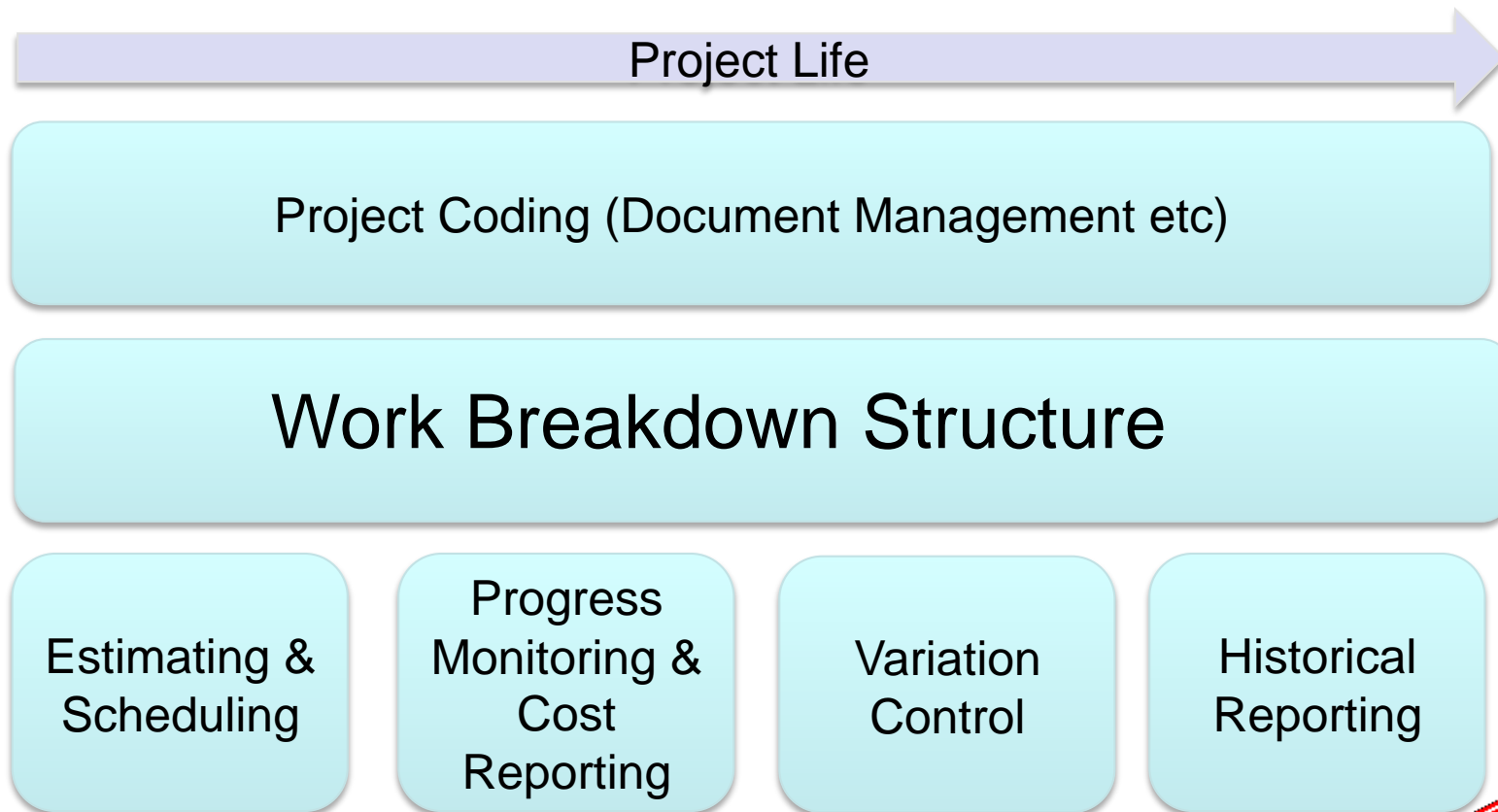


# Purpose of a WBS

## The Great Communicator



# Purpose of a WBS



# Context

- How does a WBS vary with the type of project?
- What procedures have been established?
- What interface is required with the organisational structure of the project?
- What systems are used on the project?
- Who are the users of the WBS?

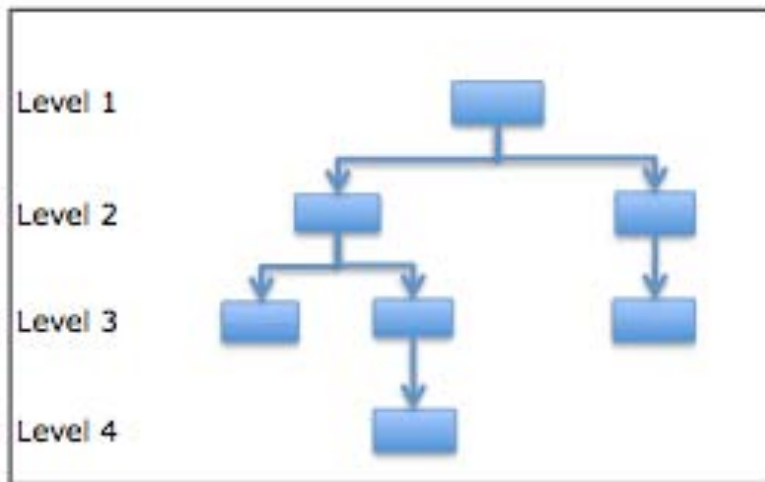


# Content

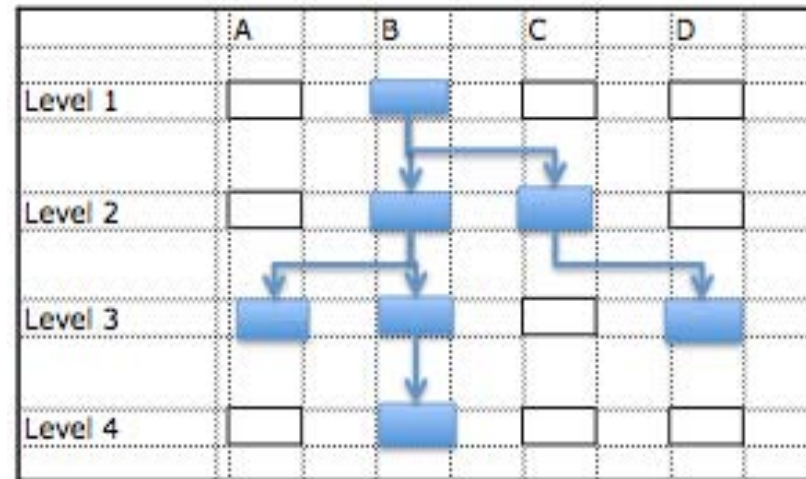
- Should the WBS reflect known scope or provide a Framework?
- How detailed the content of the WBS?
- Difference between tangible scope and intangible scope.?
- Variation of content over time?
- Responsibility for the definition of the WBS?
- WBS compared to:
  - Code of Accounts (COA)?
  - Organisational Breakdown Structure (OBS)?
  - Cost Breakdown Structure (CBS)?



# Known Scope or Framework?



Right Hand Brain



Left Hand Brain

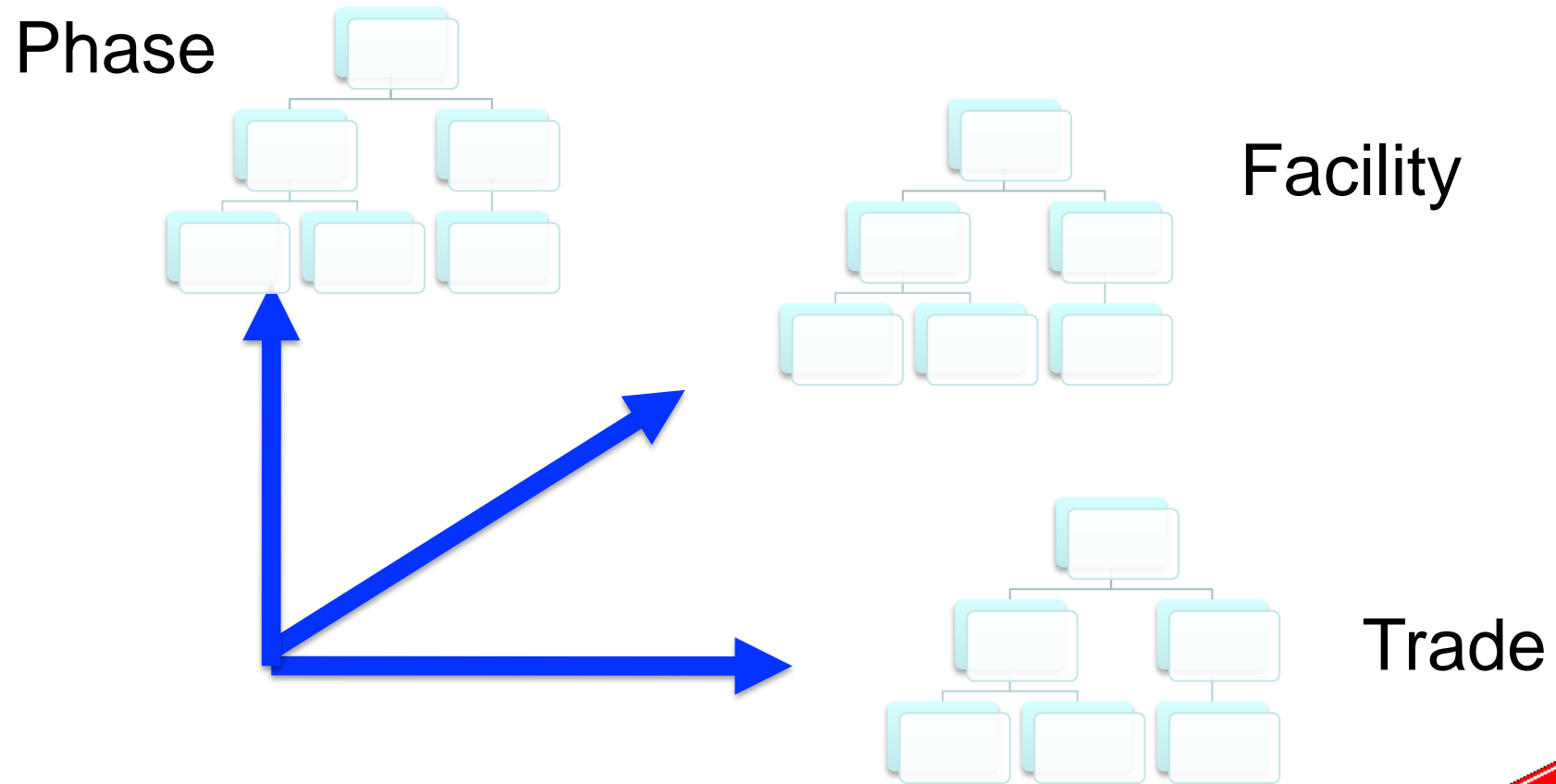


# Hierarchy

- Should the levels of the WBS hierarchy be relative or absolute?
- Should the WBS hierarchy have multiple dimensions?
- What factors need to be taken into account in deciding the granularity of the WBS?
- The 100% Rule



# Multi-dimensional Hierarchy



# Some Rules

- The next level decomposition of a WBS element (child level) must represent 100 percent of the work applicable to the next higher (parent) element (“the 100% rule”);
- No overlapping of scope between WBS elements;
- No mixing of products/deliverables with activities or phases at the same level;
- No mixing dimensions when using a multi-dimensional structure.

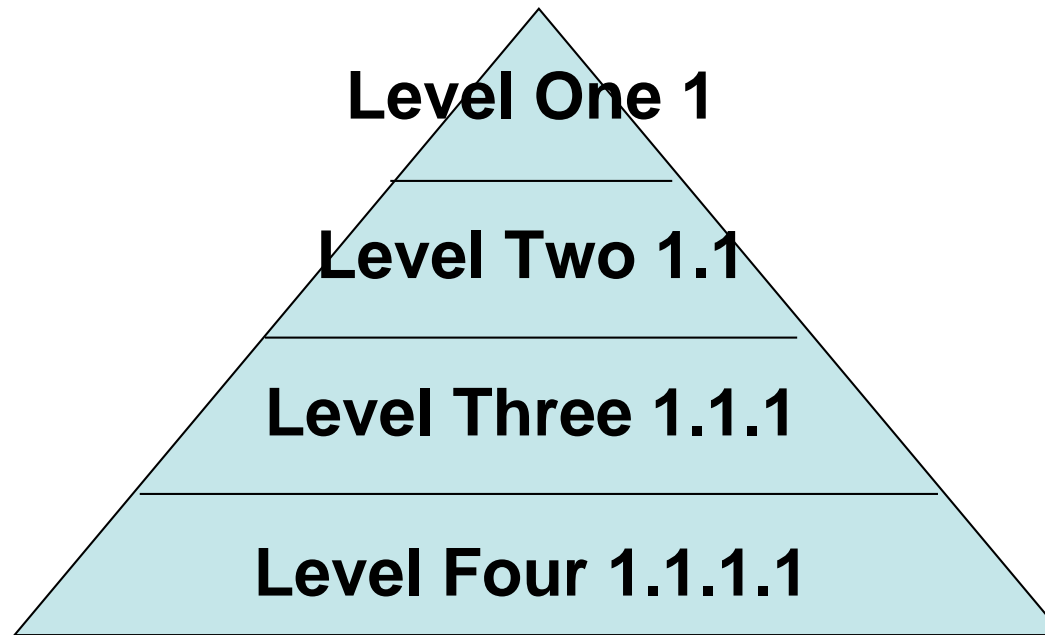


# Coding

- What are the advantages in applying a coding structure to the WBS?
- What conventions should be used when coding a WBS?
- How much consideration be given to mapping across to other project systems?
- What compromises may result from having to map across to other systems?



# One Dimensional Coding Convention



- Other Coding Conventions?



# Preparation

- Does the project leadership promote the development and use of the WBS?
- Does the project team accept ownership of the WBS?
- Can each element be defined in terms of scope/timing/budget/responsibility?
- Is the maintenance of the WBA being controlled?



# WBS Selection Chart

Criteria for hierarchy and content of WBS for particular projects types:

Level	Type	Construction Project	Design Project	Defence Project	Software Project
Primary	Area	??	??	??	??
Secondary	Facility	??	??	??	??
Tertiary	Commodity	??	??	??	??
Detail	Task	??	??	??	??



# What a WBS is Not

- A WBS is not an exhaustive scope statement or to-do list;
- A WBS is not a chronological listing;
- A WBS is not an organisational hierarchy;
- A WBS is not a prescriptive list of methods;
- A WBS is not a schedule activity list.



# Pitfalls

- Not understanding fully the purpose of the WBS;
- Not keeping elements mutually exclusive;
- Not maintaining a consistent definition for each level;
- Not controlling development of the WBS.



# Pitfall Example

- A WBS was decomposed with the first level of the WBS having the following elements:
  - 1. Building/Area
  - 2. Systems
  - 3. Project Management
  - 4. Programs
  - 5. Indirects
  - 6. Permanent Plant Staffing
  - 7. Corporate Support
  - 8. Life Cycle Ops
  - 9. Site Master Plan/Facilities.
- This was so confusing to those working the project, it led to many questions of "Where is my budget?", "How much and when?", and "What do I charge to if I am doing this?"
- As a communication tool it clearly failed.



# Recommendations

- Go through a structured process to define the WBS;
- Prepare the WBS early in project;
- Get team buy-in on content and structure;
- Ensure change control in place;
- Acknowledge limitations but minimise compromise.



# work breakdown structure example

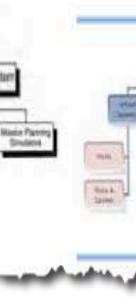
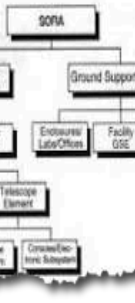
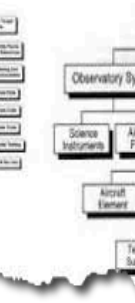
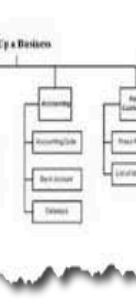
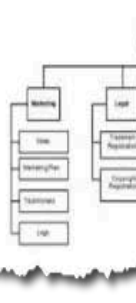
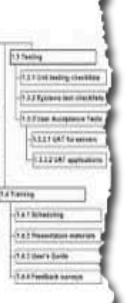
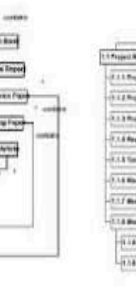
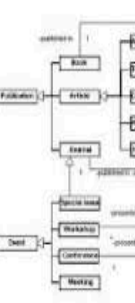
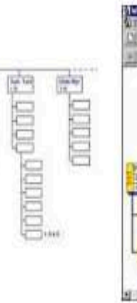
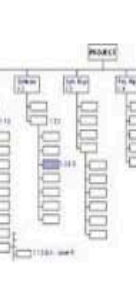
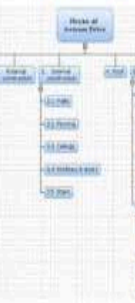
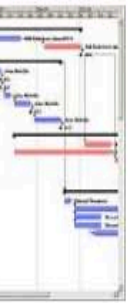
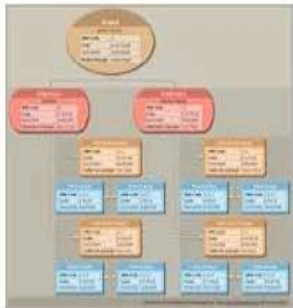
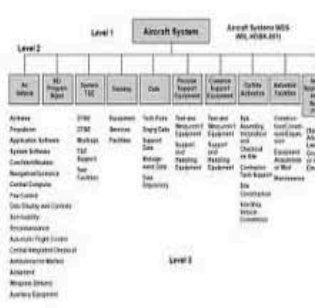
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# Work Breakdown Structures

Thank You

