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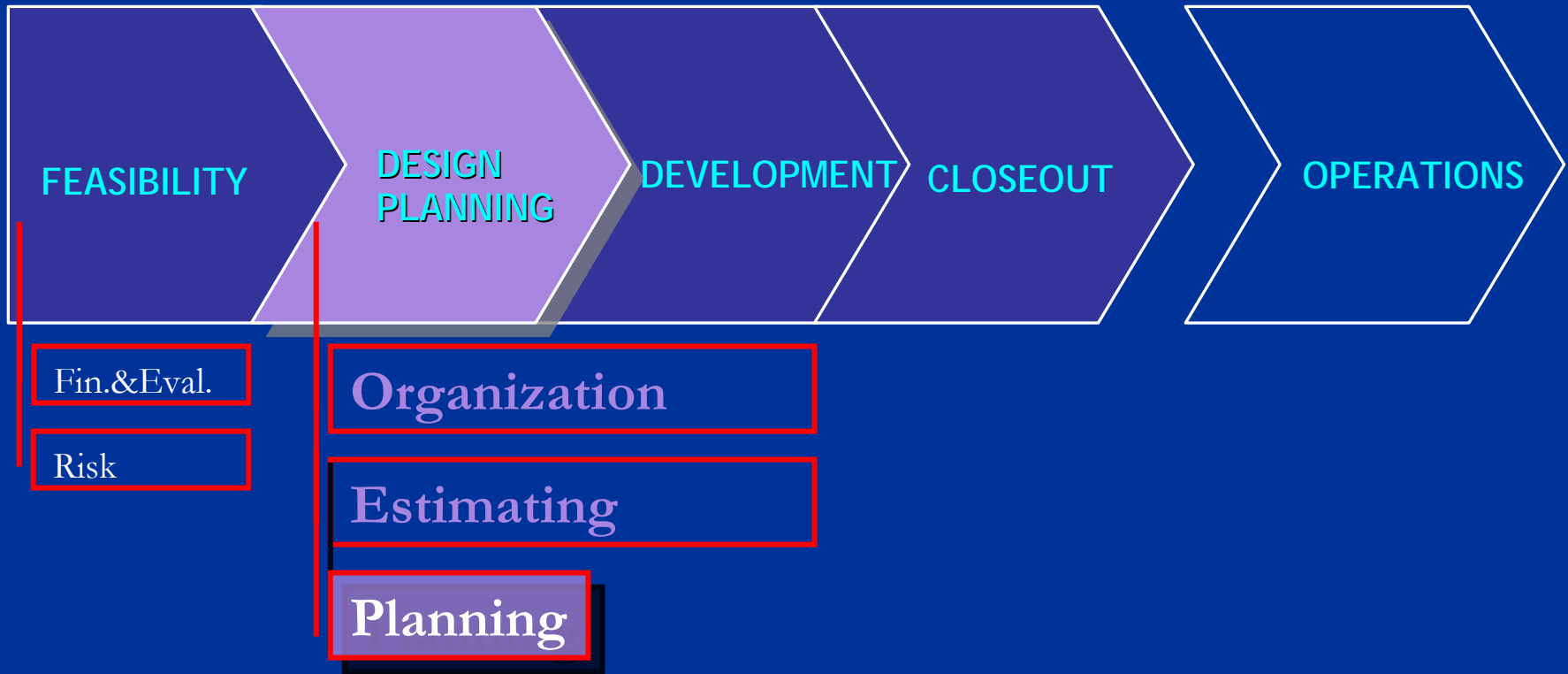
# Project Management

## Spring 2007

### Planning

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# Project Management Phase



# Outline

- Planning – Hierarchical Project Structures
  - Work Breakdown Structure
  - Organization Breakdown Structure
  - Cost Breakdown Structure

# Planning Components

- What: Work Breakdown Structure
- How: Plans and Specifications
- Who: Organization Breakdown Structure
- How much: Cost Breakdown Structure (via estimate)
- When: Schedule

# Outline

- Planning – Hierarchical Project Structures
  - *Work Breakdown Structure*
    - Organization Breakdown Structure
    - Cost Breakdown Structure

# Work Breakdown Structure

- A WBS is a deliverable-oriented grouping of project components that organizes and defines the total scope of the project
  - Work not in the WBS is outside the scope of the project
  - WBS is usually an operative tool used by contractors
- First step towards constructing a schedule
- Central role in project monitoring and control

# WBS: Example

different  
summary level

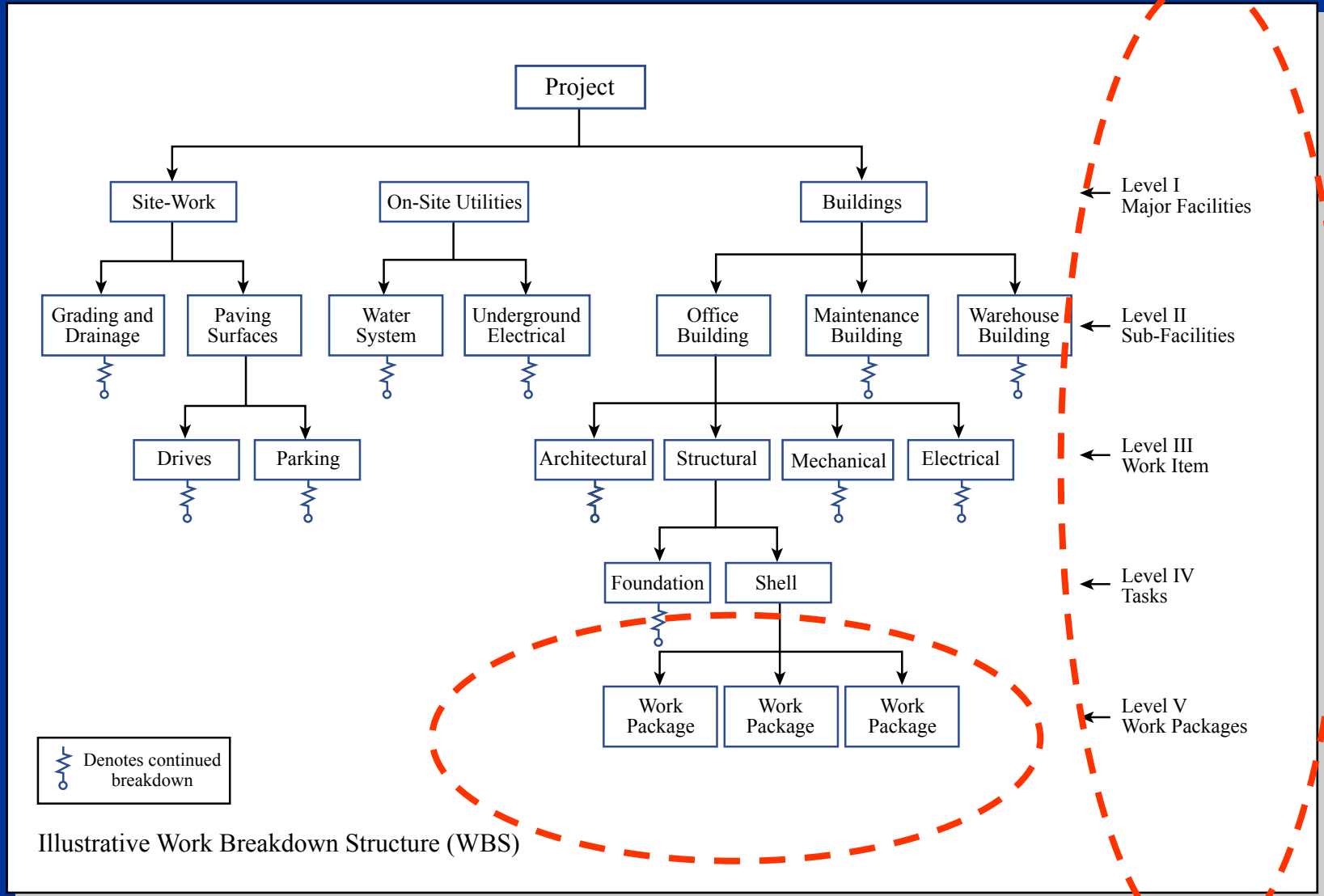


Figure by MIT OCW.

Source: Shtub et al., 1994

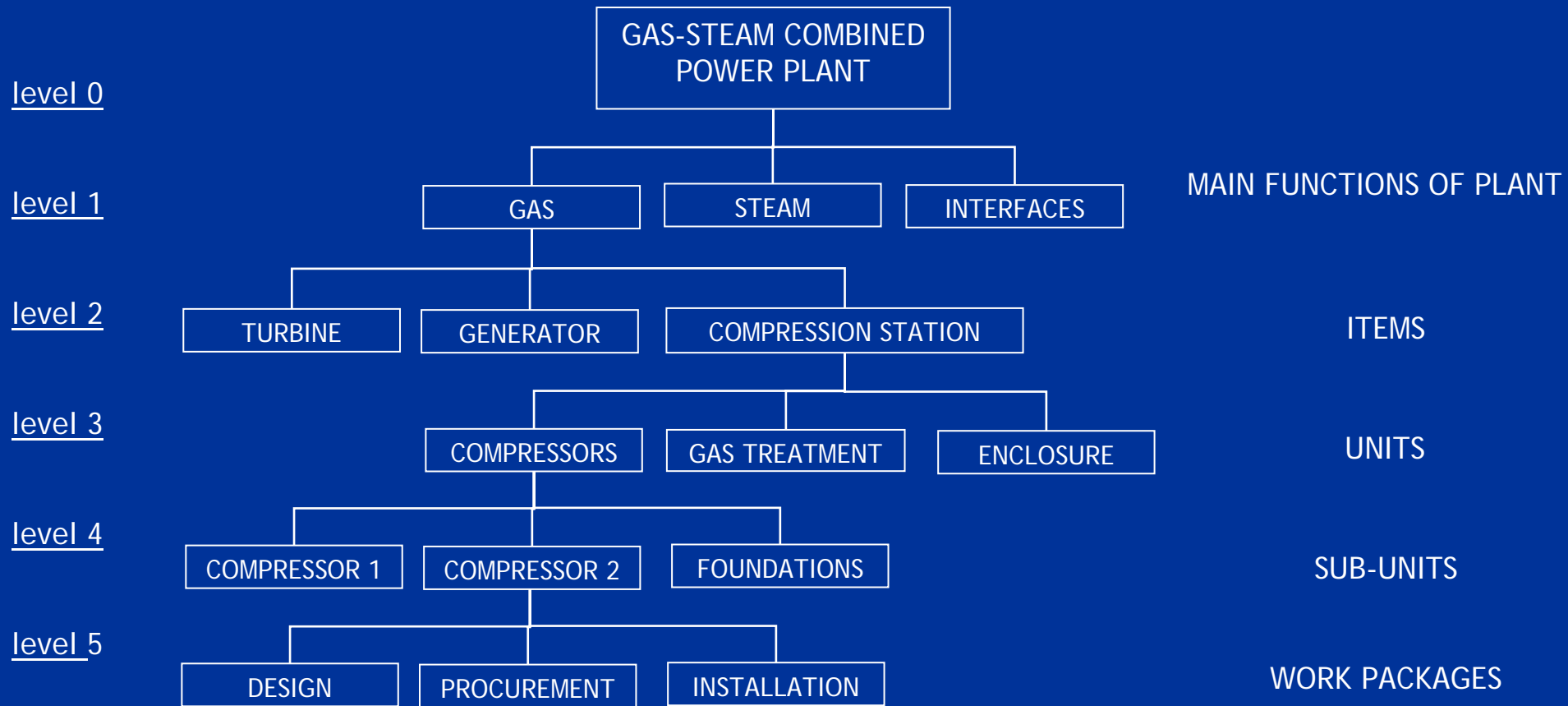
# Work Package

- Lowest level
- Distinguish from Others
- Single Responsible Organization
- Assigned Start and Finish
- Assigned Budget
- Limited Duration

# Types of WBS

- Project WBS
  - Operative tool for monitoring and control contractor work
- Contractual WBS
  - Defines the level of reporting that the seller will provide the buyer
  - May include less detail than Project WBS
  - Agreed between owner and contractor

# Functional Approach



# Physical Space Approach

- Project
  - Main building
    - 1st floor
      - Structures
      - Plumbings
      - Electrical
      - HVAC
    - 2nd floor
  - Service building
    - Structures
    - Plumbings
    - Electrical
    - HVAC

# Procedure Approach

- Project
  - Feasibility
  - Design
    - Basic
    - Detail
    - Bid documents
    - Shop drawings
  - Bid
  - Construction
    - Foundations subcontract
      - Main building
        - Piles
        - Concrete foundations
      - Service building
        - Piles
        - Concrete foundations
    - Steel erection
    - Finishings
  - Commissioning

# WBS: CSI Master Format - Example

*NORTHWEST CONSTRUCTION COMPANY*  
 1242 First Avenue, Cascade, Washington 98202  
 (206) 239-1422

**Work Breakdown Structure**  
 Huna Office Building  
 7/15/2000

<b>CSI Division</b>	<b>Description</b>	<b>CSI Division</b>	<b>Description</b>
1	Job Site General conditions	9	Finishes:
2	Site work:		Drywall
	Earthwork & Utilities		Painting
	Paving		Acoustical Ceilings
	Walks & Miscellaneous Sitework		Floor Covering: Carpet
3	Concrete:		Floor Covering: Ceramic, Vinyl, Base
	Purchase Reinforcement Steel	10	Specialties
	Foundations	11, 12, 13	Equipment, Furnishings, & Special Construction
	Walls & Slabs	14	Conveying Systems (Elevator)
4	Masonry	15	Mechanical Systems:
5	Structural and Miscellaneous Metals		Plumbing
6	Wood & Plastic		Fire Protection
	Rough Carpentry		HVAC
	Finish Carpentry / Wood Floors		Controls
7	Thermal & Moisture Protection	16	Electrical Systems
	Insulation		
	Roof & Accessories		
	Gutters & Downspouts		
8	Doors, Windows, Glass		
	Doors		
	Windows & Storefront		
	Door Hardware		

**Sample**

# Outline

- Planning – Hierarchical Project Structures
  - ✓ Work Breakdown Structure
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  - Cost Breakdown Structure

# Organization Breakdown Structure

- Decomposition of necessary resources to perform job
- Identification & organization of the resources responsible with carrying out activities associated with the project
- Used to keep track of specific work assignments & resource allocations

# Organization Breakdown Structure

- Project resources
  - Project management team
    - Project manager
    - Construction superintendent
    - Field superintendent
    - Office manager
    - Scheduler
    - Accounter/controller
    - Field engineer
  - Construction force
    - Worker
    - Subcontractor
      - Electrical
      - Plumbing
      - Insulation
      - Tankage
      - Roads

# OBS/WBS Linkages

Linking the WBS and OBS.

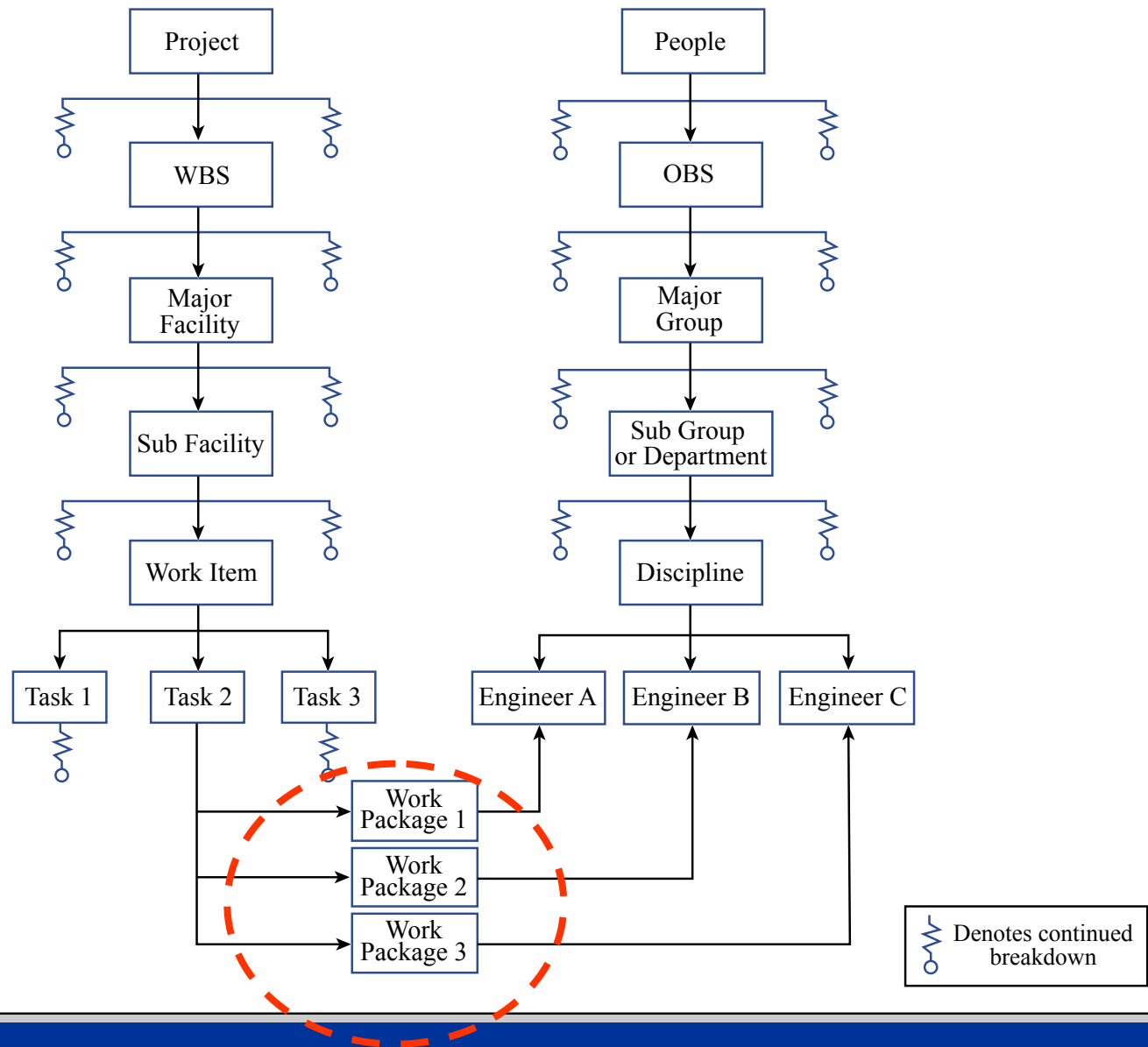


Figure by MIT OCW.

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# Cost Breakdown Structure (CBS)

- Breakdown of the costs of the various components of the structure including all work done by the subcontractors
- Serves as a basis for subsequent monthly pay requests by the contractor
- Used to continuously compare costs as they actually occur with the budget

# Cost Breakdown Structure (CBS)

MASTER LIST OF PROJECT COST ACCOUNTS			
Subaccounts of General Ledger Account 80.000			
PROJECT EXPENSE			
Project Work Accounts .100 - .699			
100	Clearing & Grubbing	245	Precast Concrete
101	Demolition	260	Concrete forms
102	Underpinning	.01	footings
103	Earth Excavation	.05	grade beams
104	Rock Excavation	.07	slab on grade
105	Backfill	.08	beams
115	Wood structural piles	.10	slab
116	Steel structural piles	.11	columns
117	Concrete structural piles	.12	walls
121	Steel sheet piling	280	Structural Steel
240	Concrete poured	350	Masonry
.01	footings	.01	8 in. block
.05	grade beams	.02	12 in. block
.07	slab on grade	.06	common brick
.08	bcarns	.20	face brick
.10	slab on forms	.60	glazed tile
.11	columns	400	Carpentry
.12	walls	440	Millwork
.16	stairs	500	Miscellaneous Metals
.20	expansion joints	.01	metal door frames
.40	screeds	.20	window sash
.50	float finish	.50	toilet partitions
.51	trowel finish	560	Finish Hardware
.60	rubbing	620	Paving
.90	curing	680	Allowance
		685	Fencing

# Two Main Approaches

- CBS = WBS
  - CBS is the project cost control structure
- CBS  $\neq$  WBS
  - CBS is the corporate multi-project cost control structure
  - Usually the case of a firm that has an integrated cost control system

# Diverse Combinations

- WBS + OBS: Task assignments
- CBS + OBS: Budget monitoring of crews, etc.
- OBS + Schedule: Time-specific crew assignments
- CBS + Schedule: Cost monitoring