INST0031
Systems Management

Lecture 2

Project Management
Planning and Analysis Tools

What we will cover today

Project management

What is it

What does it involve

Methodology

Planning and Analysis tools

Especially Network Analysis

Practical session - Network Analysis!

What is a project?

- The UK Association of Project Management definition:
  - ‘A project is a unique, transient endeavour, undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes or benefits’.
- Therefore a project:
  - Has a specified result
  - Has a specified duration
  - Needs a specified set of resources

Project Management

- The UK Association of Project Management definition:
  - 'Project management is the application of processes, methods, knowledge, skills and experience to achieve the project objectives'.

What is Project Management?

- A way of exercising control
- A way of preventing mistakes
- A way of maximizing efficiency

- Why is it important?
  - Project success and failure...

What is project management

- The core components of project management are:
  - defining the reason why a project is necessary, justify the investment, securing funding;
  - capturing project requirements, specifying quality of the deliverables, estimating resources and timescales;
  - developing and implementing a management plan for the project;
  - leading and motivating the project delivery team;
  - managing the risks, issues and changes on the project;
  - monitoring progress against plan, managing the project budget;
  - maintaining communications with stakeholders and the project organisation;
  - provider management;
  - closing the project in a controlled fashion when appropriate.

Types of project

"Practical" projects

Classic "industrial" subjects e.g. construction

Projects with tangible "production" outcomes

"Management" projects

Organisational projects e.g. Relocations

May not have such a tangible outcome

"Research" projects

More difficult to fit in the mould

Outcomes may be undefined!

Project Stakeholders

- Stakeholders are individuals or organizations that can be favourably or unfavourably impacted by the project.
  - Internal stakeholders
    - Executive officers
    - Line managers
    - Employees
    - Volunteers
  - Connected stakeholders
    - Shareholders
    - Creditors
    - Customers
    - Suppliers
  - External stakeholders
    - Local committees
    - Governments (local, state, and federal)
    - General public
    - Competitors!

Types of management

- Cost
- Time
- Performance
- Quality
- The relationship between cost, time and performance
  - Balance of objectives
- The importance of good communication

PRINCE2

- Projects in Controlled Environments
- Complete project management philosophy
- Useful framework regardless of scale
- Not suggesting direct use (in most cases) but approach can remind us of important considerations

- https://youtu.be/61RnrsWQE7A

Project definition

- Need for clear scope
- User specification
  - User needs analysis
- Feasibility studies
- Operational requirements
- Whats and Hows

- How project Really work….
  https://youtu.be/0YBMfTorE6A

Project Specifications

- The following are often included in project specifications:
  - Introduction - description of project
  - Project Objectives
  - Site User Roles - what types of roles will site users have (guest, editor, admin, etc)
  - Functional Requirements Per User Role
  - Design Specifications - how things should look and feel visually
  - Success Criteria - how to know if your website is doing its job
  - Project Timeline - desired timeline for completion (may be in phases for large projects)
  - Budget - how much your organization has set aside for the project

Project Scope

- After identifying and accepting the project specifications, the scope needs to be agreed:
  - is the set of boundaries that define the extent of a project
  - what falls inside or outside the boundaries of the project.
  - Activities that are “in scope”, are accounted for in the schedule and budget

Project life-cycle

- Conceptual
- Planning
- Testing
- Implementation
- Closure

Three primary objectives

- Golden Triangle

Project Success

- Within the allocated time period
- Within the budgeted cost
- At the proper performance or specification level
- With acceptance by the customer/user
- With minimum or mutually agreed upon scope changes
- Without disturbing the main work flow of the organization
- Without changing the corporate culture

Cost estimation

- to predict the quantity and price of the resources required by the project scope
- the accuracy of the estimate depends heavily on the level of project scope definition
- used to set up the budget during the front end of projects.
- used as a baseline to assess the performance of a project.
- is done by breaking down the total scope of a project in manageable parts.

Contracting

- Contracting out
  - Buying turnkey systems
  - Work packaging
- Making things clear
  - Contract terms and conditions
- Keep everything
  - Explicit
  - In writing

Planning & scheduling

What's the difference?

Planning - 'Whenever any job has to be accomplished according to a time or date deadline, it is advisable to have at least some idea of the relationship between the time and the time needed.' (Dennis Lock)

Comes first

Estimating, sequencing, time analysis

Importance of network analysis

Scheduling

Follows on, and extends, the plan

Allocates resources

The working details to implement the plan

Approaches to planning

Free planning

- Planning with minimum constraint
- A certain solution?
- Idealistic?

Target planning

- Practically focused
- Unduly constrained?
- Dangers of undue compromise

Whichever, must be realistic and honest

Monitoring the plan

- The key questions:
  - Where should we be?
  - Where are we?
- And thus
  - What do we need to do?
- What can go wrong?
  - Estimating errors
  - Execution errors
  - Importance of honesty (again)
  - Key danger - the “knock-on”effect

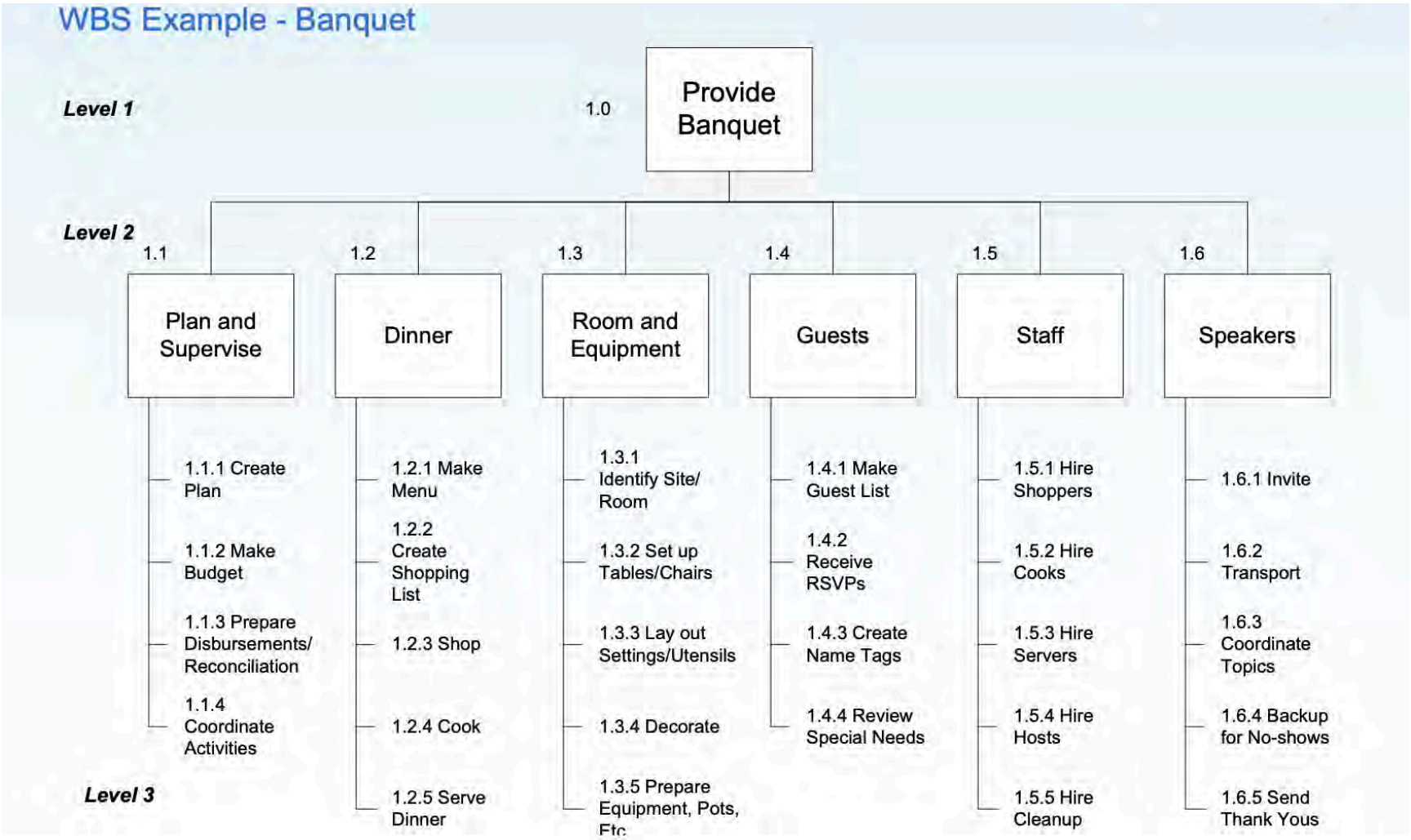
Attributes of an ideal plan

- Clear and thorough presentation of the planned intentions
- List all significant tasks
- Show the complete project time scale from start to finish and highlights project key events or major milestones.
- Practical sequence of tasks, including all priorities, dependencies or constraints.
  - If possible to quantify the impact on progress and resource allocation.
- Any external waiting periods (subcontractors or suppliers) must be identified and included
- Detailed completion criteria for each milestone to make the monitoring process as efficient as possible.

The work breakdown structure (WBS)

- It is a project family tree
- A WBS is a logical, hierarchical tree of all the tasks needed to complete a project
- Project starts at the top of the tree
- The main work packages are the first level.
- Each level will include more details and number of tasks .
- The lowest level will be day-to-day tasks

Example


WBS Example - Banquet
Level 1
1.0
Provide Banquet
Level 2
1.1
Plan and Supervise
1.2
Dinner
1.3
Room and Equipment
1.4
Guests
1.5
Staff
1.6
Speakers
1.1.1 Create Plan
1.1.2 Make Budget
1.1.3 Prepare Disbursements/ Reconciliation
1.1.4 Coordinate Activities
1.2.1 Make Menu
1.2.2 Create Shopping List
1.2.3 Shop
1.2.4 Cook
1.2.5 Serve Dinner
1.3.1 Identify Site/ Room
1.3.2 Set up Tables/Chairs
1.3.3 Lay out Settings/Utensils
1.3.4 Decorate
1.3.5 Prepare Equipment, Pots, Etc
1.4.1 Make Guest List
1.4.2 Receive RSVPs
1.4.3 Create Name Tags
1.4.4 Review Special Needs
1.5.1 Hire Shoppers
1.5.2 Hire Cooks
1.5.3 Hire Servers
1.5.4 Hire Hosts
1.5.5 Hire Cleanup
1.6.1 Invite
1.6.2 Transport
1.6.3 Coordinate Topics
1.6.4 Backup for No-shows
1.6.5 Send Thank Yous
Level 3

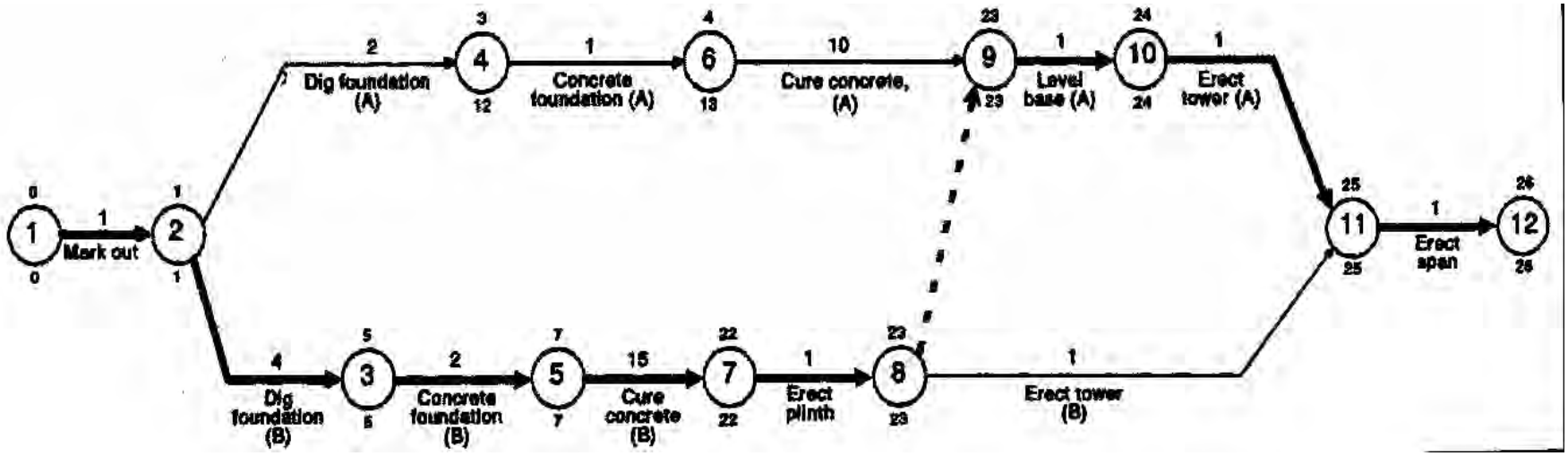
Network analysis

- Not as intuitive …
- Inappropriate for resource scheduling BUT
- Much more powerful notation
- Prevent constraints being missed
- Allow prioritisation
  - Criticality quantified by task duration and interdependence

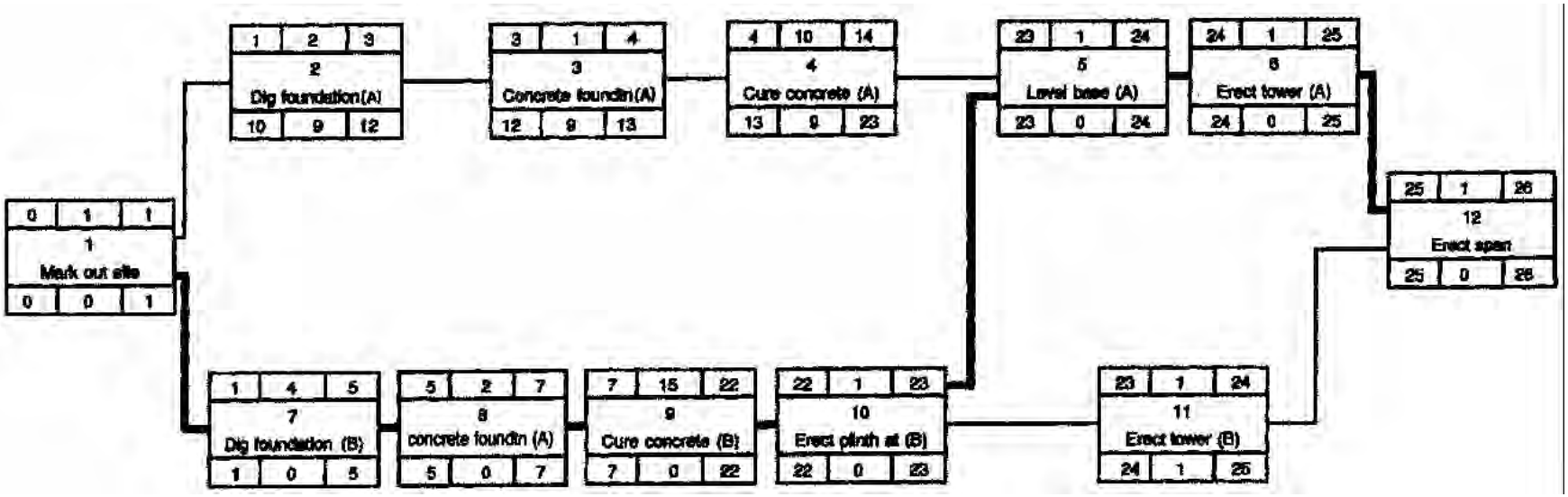
Critical Path Networks

- Critical Path = The critical path is that sequence of activities and events whose accomplishment will require the greatest time.
- logical interdependencies between different tasks.
- NOT appropriate for resource planning
- Arrow diagrams (activity on arrow)
- Precedence diagrams (activity on node)

Example of ADM

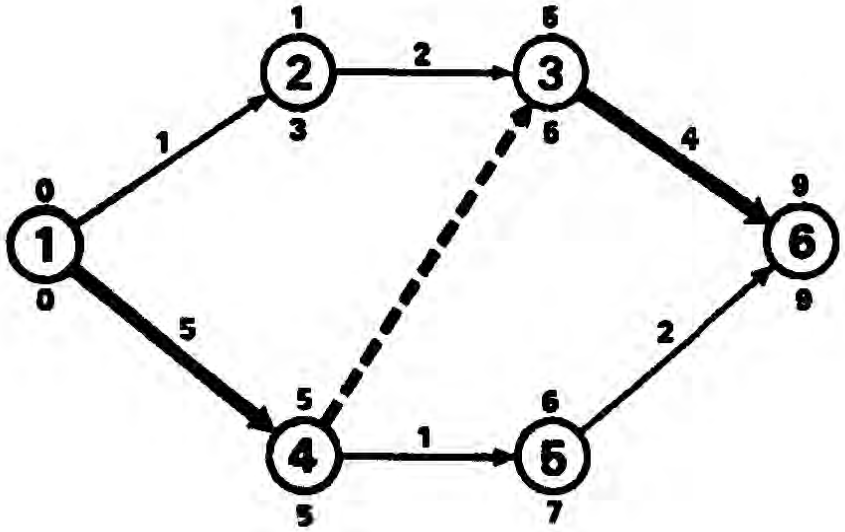


Example of PDM



ADM

- Logic diagram – not to "scale"
- Activities (arrows)
- Events (nodes)
- ID numbers
- Dependencies
- Durations
- Dummy activities

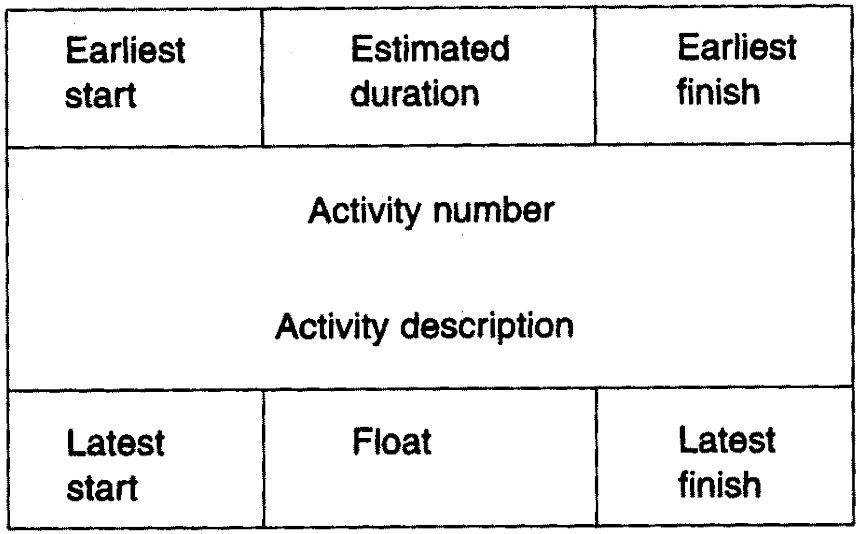


Arrow Diagrams

- **Forward Path:** Earliest completion time = Preceding activities earliest completion + activity duration
- **Backward Path:** Latest completion = Succeeding activity latest completion – activity duration
- Float (Slack) = Latest completion – Earliest completion
- Forward pass, where activities converge, the HIGHEST total is entered as earliest completion time.
- In the backward pass, where activities converge, the LOWEST total is entered as latest completion time.

PDM

- Again, logic diagram
- Activities are nodes
- Other data in boxes within the node
- Extra data explicit
- Concepts otherwise as for ADM



Precedence diagrams

Forward Path:

- Earliest start = Preceding activity earliest finish
- Earliest finish = Earliest start + estimated duration

Backward Path:

- Latest finish = Succeeding activity latest finish
- Latest start = Latest finish – activity duration

- Float (Slack) = Latest finish – Earliest finish

Total Float and Free Float

- Total Float = Total float is the amount of time an activity can be delayed **without delaying the project completion date. On a critical path, the total float is zero.**
- Total Float = Late Finish date – Early Finish date
- Free Float = Free float is the amount of time an activity can be delayed **without delaying the Early Start of its successor activity.**
- Free Float = ES of next Activity – EF of current Activity
- **Smallest ES of next Activity in case there are more than one successor activities**

Resource scheduling

- Views of resource scheduling
  - Utilisation of actual resource
    - Identifying what's available
    - How to deploy it as efficiently as possible
    - Identifying what's needed and what's surplus?
  - Establishment of requirement for bought-in resource
    - Subcontracting
    - Purchasing

Resource scheduling in practice

- What can be scheduled?
  - People
  - Equipment
  - Materials
  - Money
- Gannt charting

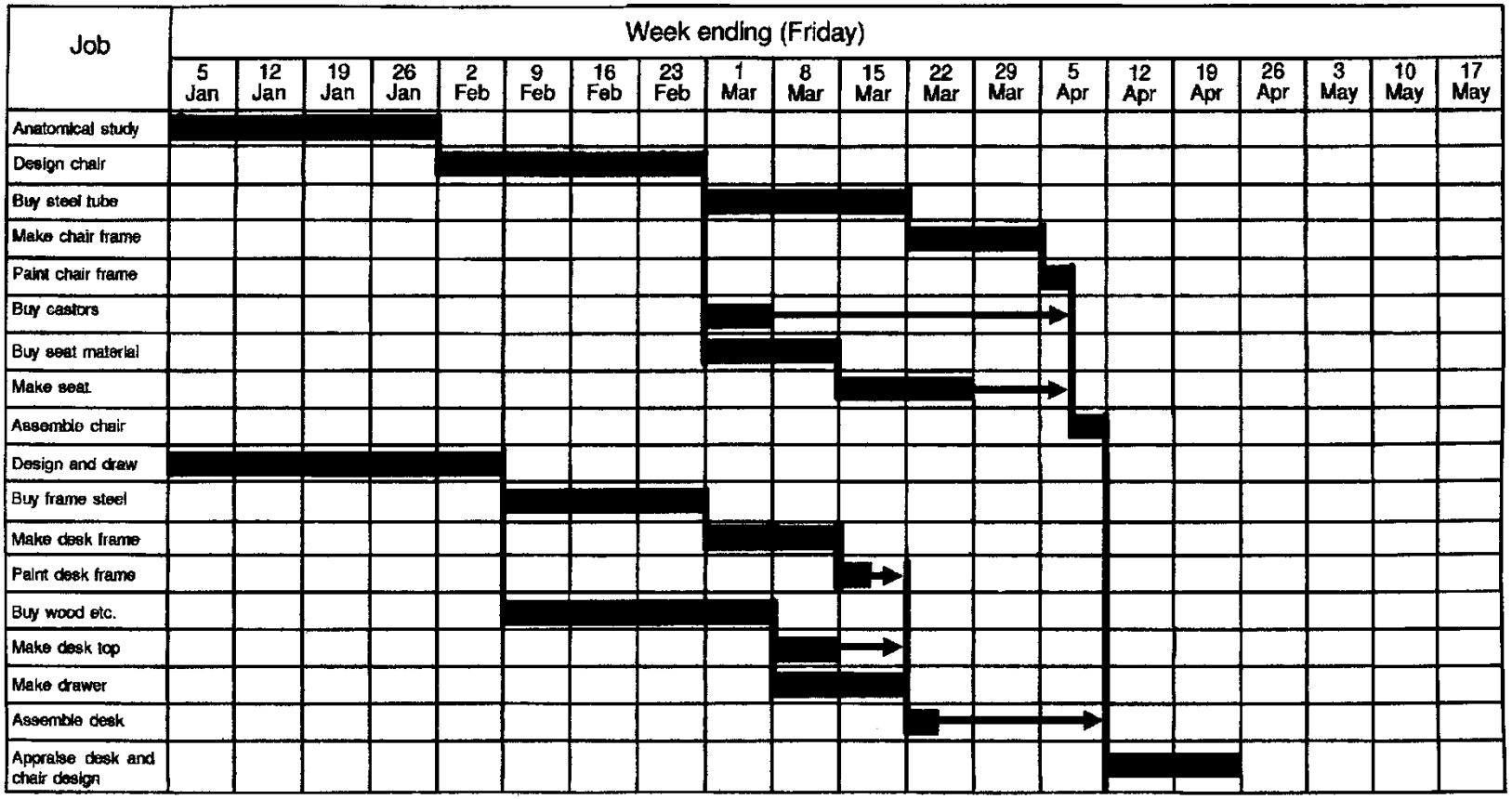
Gantt chart

- Very easy and intuitive no formal training required
- Always drawn to a linear timescale.
- Excellent visual aids
- Can be enhanced by colour coding.

However:

- Can get cluttered
- May not be able to show all the inter-task dependencies

Gannt (linked bar) chart example



Managing progress

- The need for review and updating
- Collecting data
- Role of good communications
- Dealing with real-world crises
  - The importance of accuracy and honesty
  - Corrective actions
- What-ifs and risk analysis

Managing costs

- Cost reporting vs cost control
- Cost management factors
  - …many and varied!
- The Total Cost approach
  - Holistic, cooperative…
  - …Difficult?
- Budget milestone monitoring
- Achievement analysis
  - Requires quantification of work done
- Importance of work breakdown in cost management

Managing quality

What is quality?

On time on budget?
Fitness for purpose?
Customer satisfaction?

Contractual quality definitions

Quality systems

Quality plans

The importance of commitment

Closure

When does a project end?

"The end of a continuous process"

Lifecycles

Handover

Signoff

Records

Archives

Retrievability

Post mortem?

Questions?