Management & Planning Tools
(Helps Teamwork)

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Gantt Chart

Affinity Diagram

Interrelationship Digraph

Tree Diagram

Prioritization Matrices

Matrix Diagram
## Gantt Chart

Timeline of Required Tasks

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<tr>
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Add Detail by Using Sub-Tasks
**Tree Diagram**
*(Not Function Tree)*

- **Purpose:**
  - Show paths and tasks to accomplish primary goal and its related sub-goals

- **First:**
  - List main what (goal)

- **Then:**
  - List “Hows” (means)
  - These become goals (“Whats”) for next level

- **Continue until you get to assignable tasks**
Tree Diagram

- Aerial Lift

- Understand Problem
  - Create House of Quality
  - Develop Function Tree
  - Develop Specification List
  - Study Codes and Laws

- Study Existing Lifts
  - Catalog Competitor Products
  - Conduct Patent Search
  - Assess Strengths/Weaknesses
  - Test Best Competitor Products

- Develop Concepts
  - Create Morph Chart
  - Develop Many Alternatives
  - Evaluate Alternatives
  - Select Best Concept

- Produce Prototype
  - Make Detailed Part Drawings
  - Build Lifting Mechanism
  - Test Lifting Mechanism
  - Create Several User Interfaces
  - Performance Test Interfaces

- Finalize Design
  - Modify Prototype
  - Create Construction Drawings
  - Specify Production Methods
Affinity Diagram

- **Purpose:**
  - Creative process (generate & organize ideas)
- **Start with:**
  - What is issue under discussion?
- **Then:**
  - Brainstorm ideas
- **Then:**
  - Gather ideas under affinity headings
Affinity Diagram Example

- Reduce Data Entry Complexity (Selling, Leasing, Tracking Products)

**Improved Training**
- Error Prevention
- Problem Solving

**Improved Hardware**
- Optical Scanning System
- On-Line System at Customer Site
- Voice Activated System
- Automated Entry

**Friendly Software**
- Inlet
  - Menu Driven
  - Improve Prompts
- Outlet
  - Display Only Critical Info. On Screen

**Improve Paperwork**
- Standardize completion Format
- Increase Size to Increase Legibility
- Train Clerical Sales and Customer Service Personnel
- Shorten 11-Digit Product Code
- Color Code Forms by Product Group
- Forms Contain Only Non-Standard Customer information
Interrelationship Digraph

- **Purpose:**
  - To show causality between items
  - To identify drivers and bottlenecks
  - Can be used to fill in roof of house of quality

- **First:**
  - Write down items to be discussed

- **Then:**
  - Draw arrows between items
  - From $\rightarrow$ to indicates causality

- **Arrows**
  - Most out arrows $\rightarrow$ driver
  - Most in arrows $\rightarrow$ bottleneck
Interrelationship Digraph Example

- Repeated service calls on a machine
Interrelationship Digraph Example

- Repeated service calls on a machine

Diagram:

- Wrong Person Sent
- Repeat Service Calls
- Problematic Customer
- Wrong Tools
- Lack of Info. on Job
- Lack of Knowledge of Job by Subcontractor Interviewer
- Lack of Good People
- Poor Matching of People
- Lack of Trades Experience in Management
- Lack of Formal Record of What Final Job is
- Lack of Knowledge of Matching People to Job Requirements
- Unclear Customer Expectations
- Advertising Promises
Prioritization Matrix

- **Purpose:**
  - To prioritize items:
    - Prioritization against themselves
    - Prioritization against criteria
  - This allows you to focus limited resources
## Prioritization Matrix (Math Analysis)

<table>
<thead>
<tr>
<th>Task</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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Matrix Diagram

- **Purpose:**
  - To show relations between two sets
  - To show strength of relations

- **Basic types**
  - QFD
  - Job responsibilities
## Matrix Diagram (Aerial Lift)

### Job Responsibilities

<table>
<thead>
<tr>
<th>Job Description</th>
<th>Supervisor</th>
<th>Project Engineer</th>
<th>CAD Engineer</th>
<th>Purchasing Agent</th>
<th>Machinist</th>
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<tbody>
<tr>
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X = Primary Responsibility,  O = Secondary Responsibility,  N = Needs to Know
Relationship of MP Tools to QFD

(1) Affinity Diagram

(2) Interrelationship’s Digraph

(3) Tree Diagram

(4) Prioritization Matrices

(5) Matrix Diagram Relationships

Characteristics

(How) Product Characteristics

Competitive Assessment

Prioritization

Requirements

(What) Customer Requirements

Importance

Target Values

Importance Ratings

How Much

How Much

Importance

Importance Ratings

Interrelationships

Customer Requirements

Product Characteristics

Interrelationships

Prioritization

Requirements Flow

Prioritization Matrices

Affinity Diagram

Interrelationship’s Digraph

Product Characteristics

Customer Requirements

How Much

Importance

Target Values

Importance Ratings

Competitive Assessment

Characteristics

(How) Product Characteristics

Matrix Diagram Relationships

Prioritization

Requirements Flow

Prioritization Matrices

Affinity Diagram

Interrelationship’s Digraph
Use of M&P Tools for ME2110 Design Project

- Gant Chart to Create Project Timeline
- Affinity Diagram to Organize Ideas for Each Problem
  (Improve Machine Repeatability, …)
- Interrelationship Digraphs to Debug Machine
  (Loss of Power, Premature Triggering, …)
- Tree Diagrams to Assign Tasks
  (Buy wood, Build frame, Program controller, …)
- Prioritization Matrix to Identify Critical Tasks
- Matrix Diagram to Ensure You are Addressing All Needs
- Etc.
Summary

- Management and planning tools allow you to:
  - Plan more formally
  - Organize information
  - Deal with qualitative information
  - Show relations between items and issues
  - Resolve team disputes

Use Them!!!