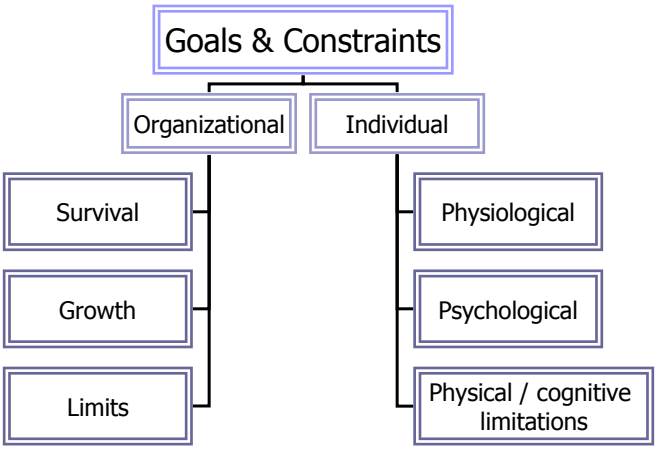
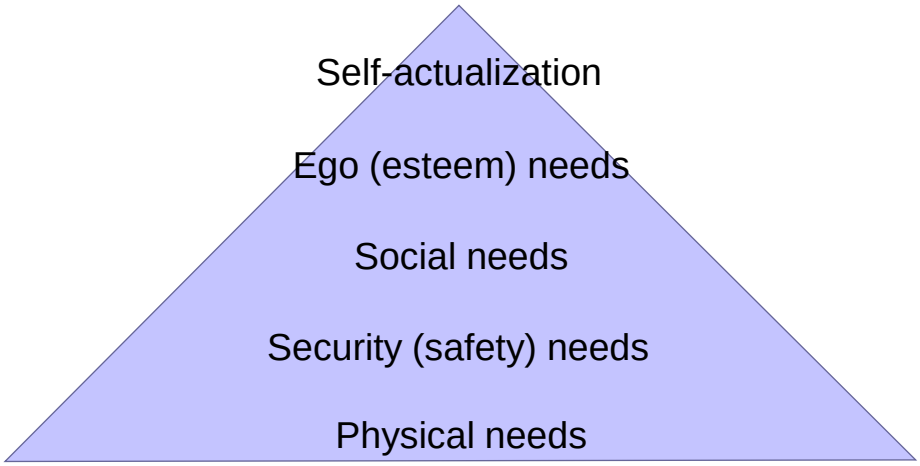
Criteria



Maslow's Hierarchy of Needs



Americans with Disabilities Act

- Title 1 covers access to employment and prohibits discrimination in employment against “qualified individuals with disabilities.”
- Individual with a disability
  - Any individual with a physical or mental impairment that substantially limits one or more major life activities.
- Qualified Individual with a disability
  - The individual must satisfy the skill, experience, education, and other job-related requirements.
  - The person must be able to perform the “essential functions” of the job, with or without reasonable accommodations.
  - The ADA does not specifically define essential functions.

Reasonable Accommodation

- “Any modification to a job, an employment practice, or the work environment that makes it possible for an individual with a disability to enjoy an equal opportunity.”
- Examples:
  - Restructuring a job
  - Modifying work schedules
  - Modifying equipment
  - Providing readers or interpreters
  - Allowing the employee to provide devices

8 Foundations of job design

1. People vary.
2. People are more educated.
3. People want a say.
4. The world is becoming smaller.
5. Machines are becoming more capable.
6. Safety and health are more important.
7. Job specialization is changing.
8. Jobs are more interrelated.

6 Criteria of job design

1. Safety is first.
2. Make the machine user-friendly.
3. Reduce the percent excluded by the machine.
4. Design jobs to be cognitive and social.
5. Emphasize communication.
6. Use machines to extend human performance.

Engineering design

- Based on the scientific method
- *But* there is more than one solution!
- You must choose a solution.
- Cost is an important criterion.

Engineering design

D	Define the problem	■ Number of replications ■ Multiple criteria ■ Schedule
A	Analyze	■ Who is affected? ■ What are the users' needs? ■ What should the design achieve? ■ What are the characteristics of the user population?
M	Make search	■ Design a number of alternatives. ■ Get ideas from many sources. ■ See the optimum solution. ■ Do not stop too soon!
E	Evaluate alternatives	■ Use mockups, pilots, simulations, etc. ■ Trade off multiple criteria. ■ Rank alternatives. ■ Use "Disagree and Commit."
S	Specify and sell solution	■ Translate concept into nuts and bolts. ■ Gain decision makers' acceptance. ■ "Sell" early, not late. ■ Document the results.

Design & Decision Making

- Benchmarking - learning from others' experience and applying this knowledge to your own process or product.
- Cost Allocation
- Return on Investment

Justifying Ergonomics

- Use success stories (case studies).
- Show ROI on your own projects.
- Consider ergonomics, productivity, quality, and "yield."
- Determining ergonomic benefit
  - Score alternatives (low, medium, high) on:
    - Ergonomic improvement
    - Ergonomic risk
  - Calculate:
    - Number of people affected
    - Development time
    - Estimated implementation cost
  - Assign numerical values to scores.
  - Add up scores and rank alternatives.

Benefit / Cost Analysis

- Life of the application and costs
  - May be limited by life of the equipment or life of the product.
  - Consider volume/year and labor cost/hour carefully.
  - Record information for:
  - Existing solution
  - Best manual proposal
  - Best mechanized proposal
- Annual Savings
  - Savings/unit × annual volume
  - Calculate subcategories individually, then add
  - Include all relevant costs

Benefit / Cost Analysis

- One-Time Costs
  - Equipment costs
  - Jigs and fixtures
  - Installation costs
  - Operator retraining
  - Engineering costs
- Benefit/Cost Calculations (simple)
  - Total benefit = gross savings per year * number of years
  - Total cost = one-time expenses + (yearly cost * number of years)
  - $B/C = \frac{\text{total benefits}}{\text{total costs}}$
- Note: more accurate B/C analysis includes time value of money

Benefit / Cost Analysis Example

- A hospital is considering the purchase of 65 patient lift devices to be installed over patient beds. The devices will serve to assist health care workers in lifting patients in and out of bed, as well as repositioning patients within the bed. The devices cost $2000 each, including installation and training, and annual maintenance costs are expected to be $250 per year per machine. A 3-year study period will be used in the analysis.
- A benchmarking study was conducted using a similar hospital in a different city, but with similarities in patient demographics and other critical factors. The benchmark hospital installed the devices several years ago and has seen a decrease in lifting injury costs from $83,000 to $27,000 per year and a decrease in repositioning injury costs from $113,000 to $65,000.

Benefit / Cost Analysis

- Total yearly benefit = _____
- Purchase, installation, & training = _____
- Yearly cost = _____
- B / C = _____