Many people get stuck in the problem-solving process by analyzing things to death.

- Define the Problem
- Generate Solutions
- Decide the Course of Action
- Implement the Solution
- Evaluate the Solution

There are a number of techniques that will facilitate the implementation process.

- Evaluate the Solution
- Implement the Solution
- Decide the Course of Action
- Generate Solutions
- Define the Problem

The first step in the implementation process is to get approval from your organization.

- Sell your ideas
- Prepare a document to sell your project

Your report should describe:
- What you want to do
- Why you want to do it
- How you are going to do it
- How your project will benefit the organization

- Avoid technical jargon
- Keep presentation clear and to the point
- Make presentation in logical and orderly manner
- Be concise
- Anticipate questions
- Be enthusiastic about your ideas
Planning

Planning is the most important step in the implementation process.

Consider the following items:
- Allocate your time, time, and resources
- Anticipate bottleneck
- Identify milestone
- Identity and sketch the pathway to the solution.

A modified KT situation analysis can be useful.

Planning

Many people use a personal organizer to keep track of activities and commitments.

We will discuss four types of organization methods:
- Gantt Chart
- Coordination and development
- Critical path
- Necessary resources

Planning

Gantt Chart - a common way to allocate time to specific tasks.

“If you don’t know where you’re going you’ll probably end up somewhere else.”

Planning

Coordinate and Development

Coordination among various team members is imperative to achieving an efficient solution in the time allotted.

The use of a Development Chart can help guide the team by assigning various responsibilities to different team members.
Planning Example

Thanksgiving Dinner - my extended family consists of 25 people

Main Course: Roasted turkey with dressing clean (0.5 hr), stuff (0.5 hr),
cook 7 hr @ 350°F, cool and slice (1 hr)

Vegetable: Green beans with mushroom sauce
prep. time (30 min)

Potato: Sweet potato casserole
prep. time (30 min),
cook (3 hr @ 350°F)

Sauce: Jellied cranberry sauce
open can, slice, serve

Dessert: Pumpkin pie
prep. time (45 min),
cook (1 hr @ 425°F)

Beverages: Coffee, tea, milk, water, wine

Critical Path Example

Critical Path - Organizing critical tasks along a time line

- Develop an understanding of how one task effects other tasks in the project
- Use extensively in the construction industry
- Constructing a critical path is a dynamic process

Critical Path for Thanksgiving Dinner

- Turkey
- Housework
- Sweet Potato
- Pumpkin Pie
- Green Beans

Critical Path Example

Critical Path for Thanksgiving Dinner

- Bake sweet potatoes 350°F for 1 hr
- Prepare casserole with potatoes, spices, butter and milk
- Bake casserole 350°F for 2.5 hrs
- Remove turkey and casserole from oven
- Bake pie @ 425°F
- Serve meal

Group Problem

Critical Path Group Problem Page 148
Planning

Necessary Resources

Typically resource are divided into five categories:

- Personnel
- Equipment
- Travel
- Supplies
- Overhead

Planning

I. Salaries and Wages
   A. Principal Investigator, C.V. Camp
      Summer, 2 month @ 66.67% 14,925 $
      Extra Compensation (1 month academic year @11.11%) 7,462 $
   B. Shahram Pezeshk
      Summer, 2 month @ 66.67% 14,925 $
      Extra Compensation (1 month academic year @11.11%) 7,462 $
   C. Undergraduate Research Assistant
      2 @ $6/hr (1280 hours) 15,360 $
   Subtotal I  60,134$

II. Fringe Benefits
    @ 17.65% of IA+IB  7,903 $

III. Travel
     2,000$

IV. Operating Expenses
    15,000$

V. Subcontract - Dr. Russell Deaton - The University of Arkansas
   37,597$

Total Direct Costs
   122,634$

VI. Facilities & Administration Costs @ 15% MTDC
    18,395$

Total Project Costs
   141,029$

Planning

Carry Through - all the planning in the world will not save a poor job of carrying through the chosen solution

Carry Through Checklist:

- Find the limits of your solution - overestimate or underestimate your assumptions
- Anticipate your solution
- Construction of a model our your solution to see if it will work under simple conditions
- Continue to collect information and research your solution
- Make sure no physical law are violated
- Plan you simulations carefully

Planning

Revealing the Solution - "It's like peeling an onion"

- Evaluation - qualitative and quantitative judgements about how material and methods satisfy problem criteria
- Synthesis - formulation of problem statement and testing procedures from "fuzzy" situations
- Analysis - break the problem into parts, identify missing, redundant, and and contradictory information
- Knowledge - remembering previously learned material
Planning

Follow Up
- Flexibility is an essential trait of problem solvers
- Periodically check your progress

“Inspect what you expect”

Planning

Follow Up
- Follow the solution plan
- Proceed on schedule
- Stay within budget

Planning

Problems That Change With Time
- Where did the goals come from and why?
- Are the goals still appropriate to the problem?
- Are you trying to hit a moving target?

Planning

Experimental Projects
- Examine the Need for the Experiment
- Define Objectives for the Experiment
- Choose Responses You Want to Measure
- Identify the Important Variables
- Design Experiment
- Perform Experiment
- Analysis Results

Planning

Experimental Projects
- Examine the Need for the Experiment
- Define Objectives for the Experiment
- Choose Responses You Want to Measure
- Identify the Important Variables
- Design Experiment
- Perform Experiment
- Analysis Results
- Act on Results
- Report and Present
Examine the Need for the Experiment

- Do you really need the experiment?
- Why perform the experiment?
- Do you have enough time and money?
- Is the information already available?

Define Objectives for the Experiment

- Prepare a list of objectives you wish to accomplish
- What question would you most like to answer?
  - "Can’t see the forest for the trees"

Choose Responses You Want to Measure

- What are the dependent and independent variables?
- Do you have the appropriate equipment?
- Are your measures and accurate and precise
Identify the Important Variables

- What are the really important measurements?
- What is the range of each variable?
- Look for dimensionless ratios or groups of variables

What are the types of errors to avoid?
- What is the minimum number of experiments that must be performed?
- Should we repeat the experiment?

How many times?
- Is one enough?
- Is three too many?
Planning

Experimental Projects

- Examine the Need for the Experiment
- Define Objectives for the Experiment
- Choose Responses You Want to Measure
- Identify the Important Variables

Design Experiment

Perform Experiment

Analysis Results

Act on Results

Report and Present

Planning

Experimental Projects

- Analyze the Results

- Have all experimental objectives been satisfied?

Planning

Experimental Projects

- Report Format
  1. Abstract
  2. Introduction
  3. Material and Methods
  4. Results
  5. Discussion of Results
  6. Conclusions
  7. References

Planning

Top Ten List of Effective Reports

1. Perfect grammar
2. Logically organized
3. Logical flow of ideas
4. Concisely written
5. Interestingly written
6. Ideas supported by data
7. Appropriate use of figures
8. Passive voice
9. Clear purpose
10. Professionally bound document

Planning

Top Ten List of Effective Presentations

1. Well organized
2. Logical flow of ideas
3. Ideas presented concisely
4. Ideas supported by data
5. Clear explanations
6. Good visual aids
7. Speak clearly
8. Well prepare and practiced
9. Dress appropriately
10. Conclusions supported by evidence
End of Chapter 6