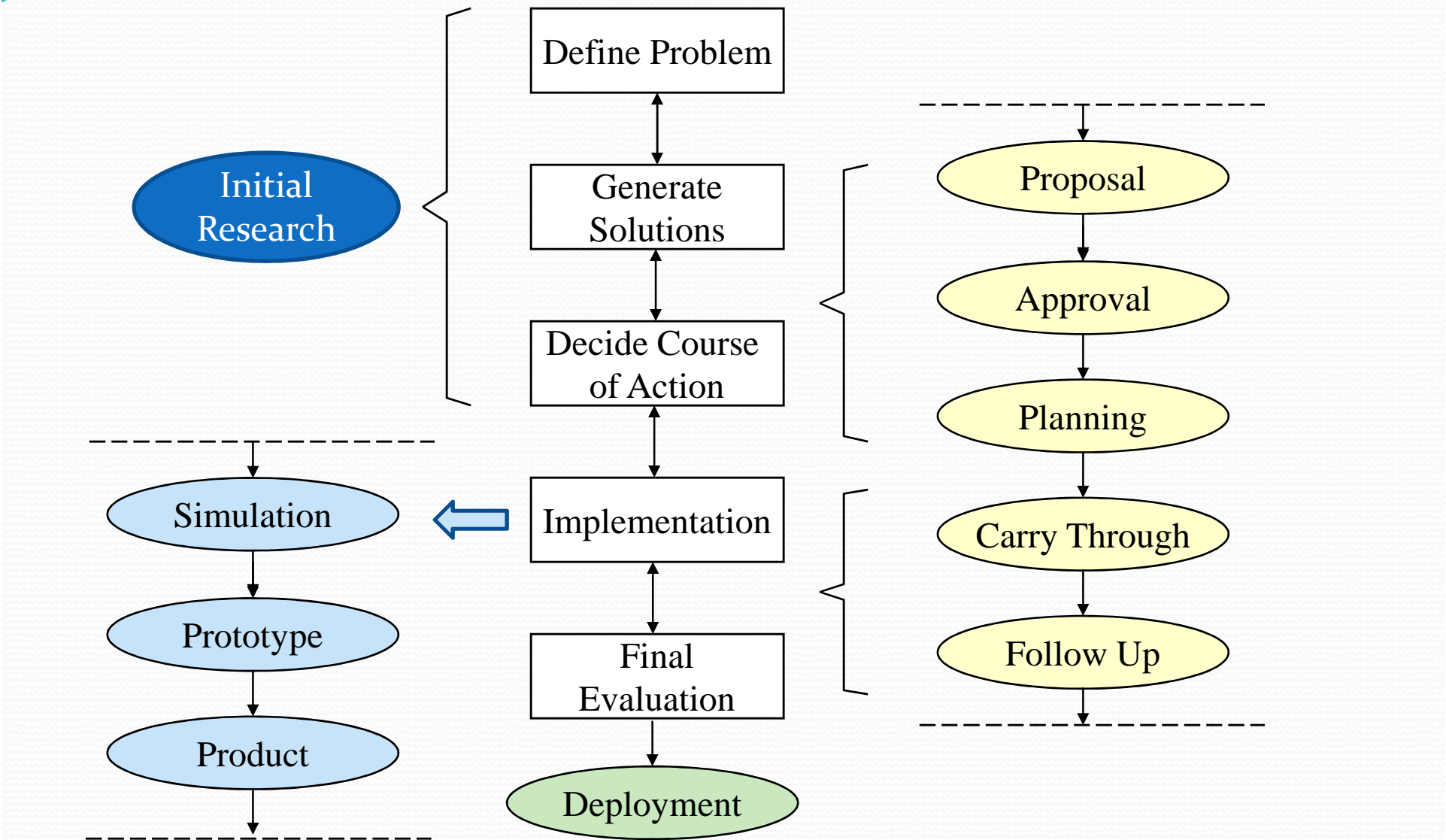# Proposal and Planning

Prepared for CSE Capstone Course

Dr. Yinong Chen

# Overview

# Proposal and Approval

- A highly competitive proposal
  - Motivation/Rationale/ Goals and Objectives: **Why**
  - Problem description: What
  - Approaches/Methodology to solve the problems: **How**
  - Schedule
  - Budget
  - Qualification of the proposers (bios / CV)
- Proposal review and evaluation
  - Short listing
  - Site visiting and presentation
- Approval/Disapproval

# Heilmeier's Criteria of Proposal Writing

- What are you trying to do? Articulate your objectives using absolutely no jargon.

- How is it done today, and what are the limits of current practice?

- What's new in your approach and why do you think it will be successful?

- Who cares? If you're successful, what difference will it make?

- What are the risks and the payoffs?

- How much will it cost? How long will it take?

- What are the midterm and final "exams" to check for success?

# A Simple Budget Example



**Proposed Budget**

**BUDGET**

| Personnel | Months/Rate | Cost | % of Total |
|---|---|---|---|
| Tom Smith, Project Director | 6 mos @ $5000/mo | $30,000 | |
| Bill Wade, Engineer | 12 mos @ $3500/mo | 42,000 | |
| Secretary | 2 mos @ $2250/mo | 4,500 | |
| Subtotal - Salaries | | 76,500 | 44% |
| Fringe Benefits 24% of Salaries | | 18,360 | 10% |
| Total Salary and Benefits | | $94,860 | |
| **Equipment** | | | |
| Fabrication in machine shop Parts and Labor | | $10,000 | 6% |
| **Travel** | | | |
| Attend Professional Meeting | | $1,140 | 0.7% |
| **Supplies** | | | |
| Chemicals, etc. | | $4,000 | 2.3% |
| Subtotal | | $110,000 | |
| Overhead 58% | | $63,800 | 37% |
| **TOTAL BUDGET** | | $173,800 | 100% |
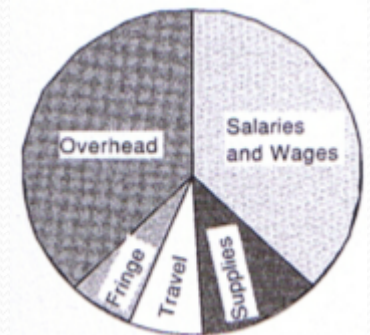
# ASU Budget Example

Page 1

Page 2

Page 3

| PROPOSAL BUDGET | | Date: 1-Nov-07 | | Sponsor: NSF | | Institution: ARIZONA STATE UNIVERSITY | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year 1 Total = | $472,770 | Budget #: | | Robotics Playground | | | | | |
| Summary Budget = | $907,477 | Duration: 1/1/08 - 12/31/09 | | | | Year 1 | Year 2 | Year 2 | Summary |
| Total Years = | 3.00 | PI Name: John Doe | | PI Phone: | | | Info | | 24 mos |
| **1. DIRECT COSTS** | | PI e-mail: | | PI Fax: | | 1.04 | Salary Escalation | 1.04 | |
| **1.A. SALARIES, WAGES, BENEFITS & INS** | | | | | | 1/1/08-12/31/08 | | 1/1/09-12/31/09 | |
| | | | $/mos | # mos | % effort | | | | |
| **Faculty Salaries** | | | | | | | # mos | % effort | |
| PI: Jenny Smith | | AY Salary: $112,000 | $12,942 | 0.00 | 0.000% | $0 | 0.00 | 0.00% | $0 | $0 |
| AY LOE Yr 1 = | 0.00 person months | | $13,459 | 0.00 | 0.000% | $0 | 0.00 | 0.00% | $0 | $0 |
| Sum LOE Yr 1 = | 1.00 person months | | $12,942 | 1.00 | 100.000% | $12,942 | 1.00 | 100.00% | $13,459 | $26,401 |
| Total LOE Yr 1 = | 1.00 | | $13,459 | 0.00 | 100.000% | $0 | 0.00 | 100.00% | $0 | $0 |
| Count = | 1 | | | SUB-TOTAL Salary= | | $12,942 | AY LOE = 0.00 | | $13,459 | $26,401 |
| | | | | | | | Sum LOE = 1.00 | | | |
| | | | | | | | LOE = 1.00 | | | |
| Co-PI: John Doe | | AY Salary: $82,000 | $9,475 | 0.00 | 0.000% | $0 | 0.00 | 0.00% | $0 | $0 |
| AY LOE Yr 1 = | 0.00 person months | | $9,854 | 0.00 | 0.000% | $0 | 0.00 | 0.00% | $0 | $0 |
| Sum LOE Yr 1 = | 1.00 person months | | $9,475 | 1.00 | 100.000% | $9,475 | 1.00 | 100.00% | $9,854 | $19,329 |
| Total LOE Yr 1 = | 1.00 | | $9,854 | 0.00 | 100.000% | $0 | 0.00 | 100.00% | $0 | $0 |
| Count = | 1 | | | SUB-TOTAL Salary= | | $9,475 | AY LOE = 0.00 | | $9,854 | $19,329 |
| | | | | | | | Sum LOE = 1.00 | | | |
| | | | | | | | LOE = 1.00 | | | |
| **Sub-Total Faculty Salaries** | | 3 = # of senior personnel | | | | $22,417 | | | $23,313 | $45,730 |
| **Staff Salaries** | | | | | | | | | | |
| Staff - Name | | FY Salary: $20,000 | $1,733 | 12.00 | 50.000% | $10,398 | # mos = 12.00 | | $10,814 | $21,212 |
| LOE Yr 1 = | 6.00 person months | | $1,802 | 0.00 | 50.000% | $0 | 0.00 | | $0 | $0 |
| # of staff = | 1.0 | | | SUB-TOTAL Salary= | | $10,398 | % effort = 50.00% | | $10,814 | $21,212 |
| | | | | | | | 50.00% | | | |
| | | | | | | | LOE = 6.00 | | | |
| | | | | | | | # of staff = 1.0 | | | |
| Staff - Programmer | | FY Salary: $80,000 | $6,933 | 12.00 | 100.000% | $83,196 | # mos = 12.00 | | $86,524 | $169,720 |
| LOE Yr 1 = | 12.00 person months | | $7,210 | 0.00 | 100.000% | $0 | 0.00 | | $0 | $0 |
| # of staff = | 1.0 | | | SUB-TOTAL Salary= | | $83,196 | % effort = 100.00% | | $86,524 | $169,720 |
| | | | | | | | 100.00% | | | |
| | | | | | | | LOE = 12.00 | | | |
| | | | | | | | # of staff = 1.0 | | | |
| **Sub-Total Staff Salaries** | | | | | | $93,594 | | | $97,338 | $190,932 |

| Grad Students - PhD | | AY Salary: | $31,000 | $3,444 | 9.00 | 50.000% | $46,494 | | 9.00 | 50.00% | $48,354 | $94,848 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AY LOE Yr 1 = | 13.50 person months | | | $3,582 | 0.00 | 50.000% | $0 | | 0.00 | 50.00% | $0 | $0 |
| Sum LOE Yr 1 = | 4.50 person months | | | $3,444 | 3.00 | 50.000% | $15,498 | | 3.00 | 50.00% | $16,118 | $31,616 |
| Total LOE Yr 1 = | 18.00 | | | $3,582 | 0.00 | 50.000% | $0 | | 0.00 | 50.00% | $0 | $0 |
| # of students = | 3.0 | | | | SUB-TOTAL Salary= | | $61,992 | AY LOE = | 13.50 | | $64,472 | $126,464 |
| | | | | | | | | Sum LOE = | 4.50 | | | |
| | | | | | | | | LOE = | 18.00 | | | |
| | | | | | | | | # of stdts = | 3.0 | | | |
| **Sub-Total Student Salaries** | | | | | | | **$61,992** | | | | **$64,472** | **$126,464** |
| **TOTAL SALARIES & WAGES** | | | | | | | **$178,003** | | | | **$185,123** | **$363,126** |
| Faculty Benefits | | 25% | | | | | $5,604 | | | | $5,828 | $11,432 |
| Staff Benefits - 50% or more | | 32% | | | | | $29,950 | | | | $31,148 | $61,098 |
| Post Doctoral Associate | | 25% | | | | | $0 | | | | $0 | $0 |
| Graduate Student Benefits | | 8.0% | | tuition remission | 35.0% | | $26,657 | | | | $27,723 | $54,380 |
| Undergraduate Student Benefits | | 4% | | | | | $0 | | | | $0 | $0 |
| **Sub-Total Benefits** | | | | | | | **$62,211** | | | | **$64,699** | **$126,910** |
| **TOTAL SALARIES & BENEFITS** | | | | | | | **$240,214** | | | | **$249,822** | **$490,036** |
| **1.B. TRAVEL** | | | | | | | | | | | | |
| Travel - In State | Per diem | | # days> 0 | | $/day> $0.00 | | $0 | | | | $0 | $0 |
| | Lodging | | # nights> 0 | | $/night> $0.00 | | $0 | | | | $0 | $0 |
| | Transportation | | plane fare> $0.00 | | rental car> $0.00 | | $0 | | | | $0 | $0 |
| | Registration | | $0.00 | | other> $0.00 | | $0 | | | | $0 | $0 |
| | TOTAL In-State | | | | | | $0 | | | | $0 | $0 |
| Travel - Out State | Per diem | | # days> 0 | | $/day> $0.00 | | $0 | | | | $0 | $0 |
| | Lodging | | # nights> 0 | | $/night> $0.00 | | $0 | | | | $0 | $0 |
| | Transportation | | plane fare> $0.00 | | rental car> $0.00 | | $4,500 | | | | $4,500 | $9,000 |
| | Registration | | $0.00 | | other> $4,500.00 | | $0 | | | | $0 | $0 |
| | TOTAL Out-State | | | | | | $4,500 | | | | $4,500 | $9,000 |
| Travel - Foreign | Per diem | | # days> 0 | | $/day> $0.00 | | $0 | | | | $0 | $0 |
| | Lodging | | # nights> 0 | | $/night> $0.00 | | $0 | | | | $0 | $0 |
| | Transportation | | plane fare> $0.00 | | rental car> $0.00 | | $0 | | | | $0 | $0 |
| | Registration | | $0.00 | | other> $0.00 | | $0 | | | | $0 | $0 |
| | TOTAL Foreign | | | | | | $0 | | | | $0 | $0 |
| **TOTAL TRAVEL** | | | | | | | **$4,500** | | | | **$4,500** | **$9,000** |

| 1.C.  OTHER DIRECT COSTS | | Federal Daily Rate | # days | | | | |
|---|---|---|---|---|---|---|---|
| 7310-01 | Consultants      External Reviewer | $0 | 0 | $10,000 | | $10,000 | $20,000 |
| | Consultant travel | | | $1,500 | | $1,500 | $3,000 |
| 7310-22 | Publication/Page Charges | | | $0 | | $0 | $0 |
| 7310-28 | Photocopy Charges | | | $0 | | $0 | $0 |
| 7320-01 | Office Supplies | | | $0 | | $0 | $0 |
| 7320-05 | Materials & Lab Supplies | | | $5,000 | | $5,000 | $10,000 |
| 7320-48 | Computer Software | | | $0 | | $0 | $0 |
| 7325-22 | Lab Equipment under $5,000   Robotics | | | $38,400 | | $12,000 | $50,400 |
| | Rental/Equipment Use Fees | | | $0 | | $0 | $0 |
| | Other | | | $0 | | $0 | $0 |
| TOTAL OTHER DIRECT COSTS | | | | $54,900 | | $28,500 | $83,400 |
| 1.D.  MODIFIED TOTAL DIRECT COSTS | | | | $277,917 | | $260,257 | $538,174 |
| CAPITAL EQUIPMENT | | 2 Servers | | $12,000 | | $0 | $12,000 |
| Computer Use Fees | | | | $0 | | $0 | $0 |
| Sub-Recipient(s) | | Subcontract to BGCEV | | $10,000 | | $10,000 | $20,000 |
| | | Insert Name> | | $0 | | $0 | $0 |
| | | Insert Name> | | $0 | | $0 | $0 |
| | | Insert Name> | | $0 | | $0 | $0 |
| | TOTAL Sub-Recipients | | | $10,000 | | $10,000 | $20,000 |
| Participant Support | Stipends      dicate total number of participants here>    0 | | | $0 | | $0 | $0 |
| Costs | Travel | | | $0 | | $0 | $0 |
| | Subsistence | | | $0 | | $0 | $0 |
| | Other | | | $0 | | $0 | $0 |
| | TOTAL | | | $0 | | $0 | $0 |
| Scholarship | | Insert # students >    0    Insert $ >    $0 | | $0 | | $0 | $0 |
| 1.E.  TOTAL DIRECT COSTS | | | | $321,614 | | $292,822 | $614,436 |
| FACILITIES & ADMINISTRATIVE COSTS (F&A) | | 52.5% MTDC  Year 1 | | $145,906 | | $136,635 | $282,541 |
| | | 52.5% MTDC  Year 2 | | | | | |
| | | 52.5% MTDC  Year 3 | | | | | |
| for Subs = | see note | 52.5% of first $25,000 | | $5,250 | | $5,250 | $10,500 |
| 2.  TOTAL FACILITIES & ADMINISTRATIVE COSTS (F&A) | | | | $151,156 | | $141,885 | $293,041 |
| 3.  TOTAL PROJECT COSTS | | | | $472,770 | | $434,707 | $907,477 |

## BUDGET SUMMARY IN PROPOSAL

| | | | | | | | | Year 1 | Year 2 | Summary |
|---|---|---|---|---|---|---|---|---|---|---|
| A. | Senior Personnel | | | | | | | | | |
| | 1. PI: Jenny Smith | | Yr 1 | | | 1.00 | P-Mos per year | $12,942 | $13,459 | $26,401 |
| | 2. Co-PI: John Doe | | Yr 1 | | | 1.00 | P-Mos per year | $9,475 | $9,854 | $19,329 |
| | | | | | | | Total Senior Personnel | $22,417 | $23,313 | $45,730 |
| B. | Other Personnel* | | | | | | | | | |
| | 2. Staff – Name | Yr 1 | 1 | @ | | 6.00 | P-Mos per year | $10,398 | $10,814 | $21,212 |
| | 3. Staff – Programmer | Yr 1 | 1 | @ | | 12.00 | P-Mos per year | $83,196 | $86,524 | $169,720 |
| | 5. Grad Students – PhD | Yr 1 | 3 | @ | | 18.00 | P-Mos per year | $61,992 | $64,472 | $126,464 |
| | | | | | | | Total Other Personnel | $155,586 | $161,810 | $317,396 |
| | | | | | | | Total Salaries and Wages | $178,003 | $185,123 | $363,126 |
| C. | Fringe Benefits | | | | | | | | | |
| | 1. Faculty and Academic Professionals | | | | | 25% | | $5,604 | $5,828 | $11,432 |
| | 2. Staff (50% LOE or more) | | | | | 32% | | $29,950 | $31,148 | $61,098 |
| | 3. Post Doc | | | | | 25% | | $0 | $0 | $0 |
| | 4. Students | | | | 43% | 4% | | $26,657 | $27,723 | $54,380 |
| | | | | | | | Total Fringe Benefits | $62,211 | $64,699 | $126,910 |
| | | | | | | | Total Salaries, Wages, & Fringe Benefits | $240,214 | $249,822 | $490,036 |
| D. | Permanent Equipment | | | | | | | | | |
| | | | | | | | Total Permanent Equipment | $12,000 | $0 | $12,000 |
| E. | Travel | | | | | | | | | |
| | 1. Domestic Travel | | | | | | | $4,500 | $4,500 | $9,000 |
| | | | | | | | Total Travel | $4,500 | $4,500 | $9,000 |
| F. | Other Direct Costs – Included in MTDC | | | | | | | | | |
| | 2. Consultant Travel | | | | | | | $1,500 | $1,500 | $3,000 |
| | 5. Materials & Lab Supplies | | | | | | | $5,000 | $5,000 | $10,000 |
| | 9. Lab Equipment under $5,000 | | | | | | | $38,400 | $12,000 | $50,400 |
| | | | | | | | Total Other Direct Costs – *Included in MTDC* | $54,900 | $28,500 | $83,400 |
| G. | Other Direct Costs – Not included in MTDC | | | | | | | | | |
| | 1. Sub-Recipient(s) | | | (See attached) | | | | | | |
| | | 0 | | | | | | $10,000 | $10,000 | $20,000 |
| | | | | | | | Total Other Direct Costs – *Not Included in MTDC* | $10,000 | $10,000 | $20,000 |
| H. | Modified Total Direct Costs (MTDC) | | | | | | | $287,917 | $270,257 | $558,174 |
| I. | Total Direct Costs | | | | | | | $321,614 | $292,822 | $614,436 |
| J. | Facilities & Administrative Costs (F&A) | | | | | | | | | |
| | Rate negotiated with the DHHS | | | | | 52.5% | MTDC | $151,156 | $141,885 | $293,041 |
| K. | Total Project Costs | | | | | | | $472,770 | $434,707 | $907,477 |

# Other Cost Consideration:
# Cost of Design Changes

Cost to
implement a
change
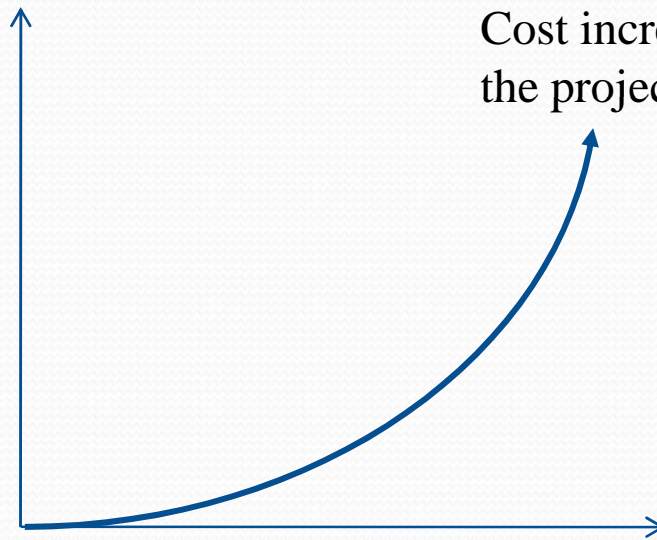
Cost increases exponentially as
the project lifetime increases

Project lifetime

# Ownership Costs of a Product

# Planning

Approval → Planning → Carry Through → Follow Up

Time and resource allocation

Resources within budget

Follow the budget

Critical path management

Bottlenecks Time consuming items

Gantt Chart

Refine the schedule in the proposal
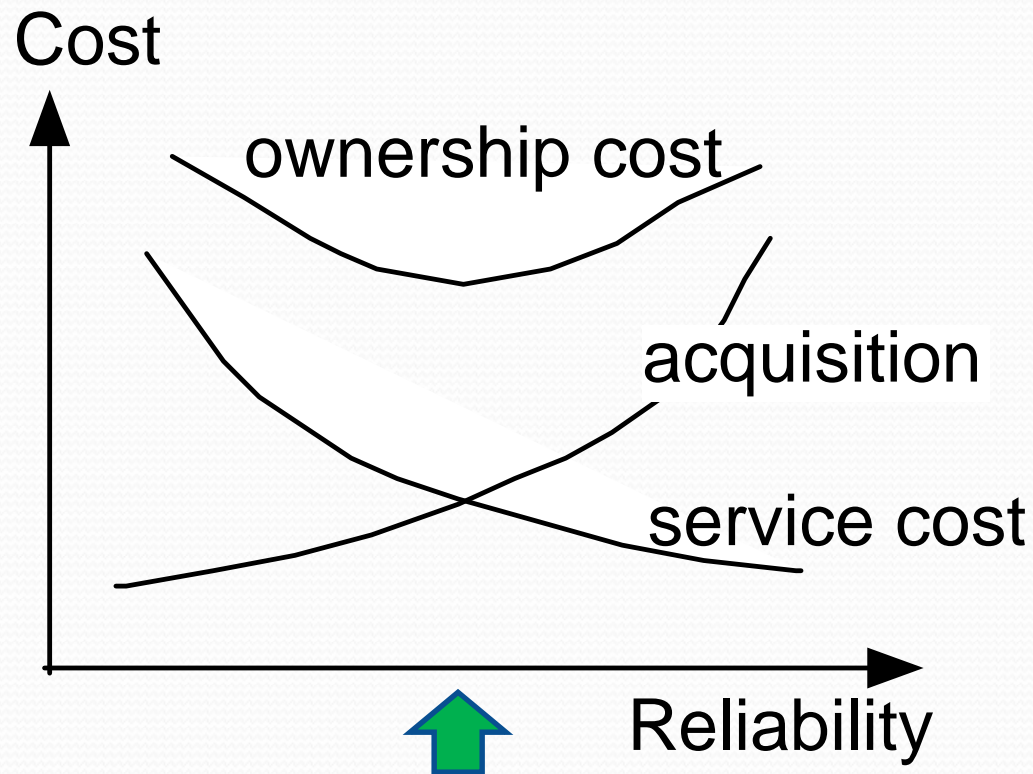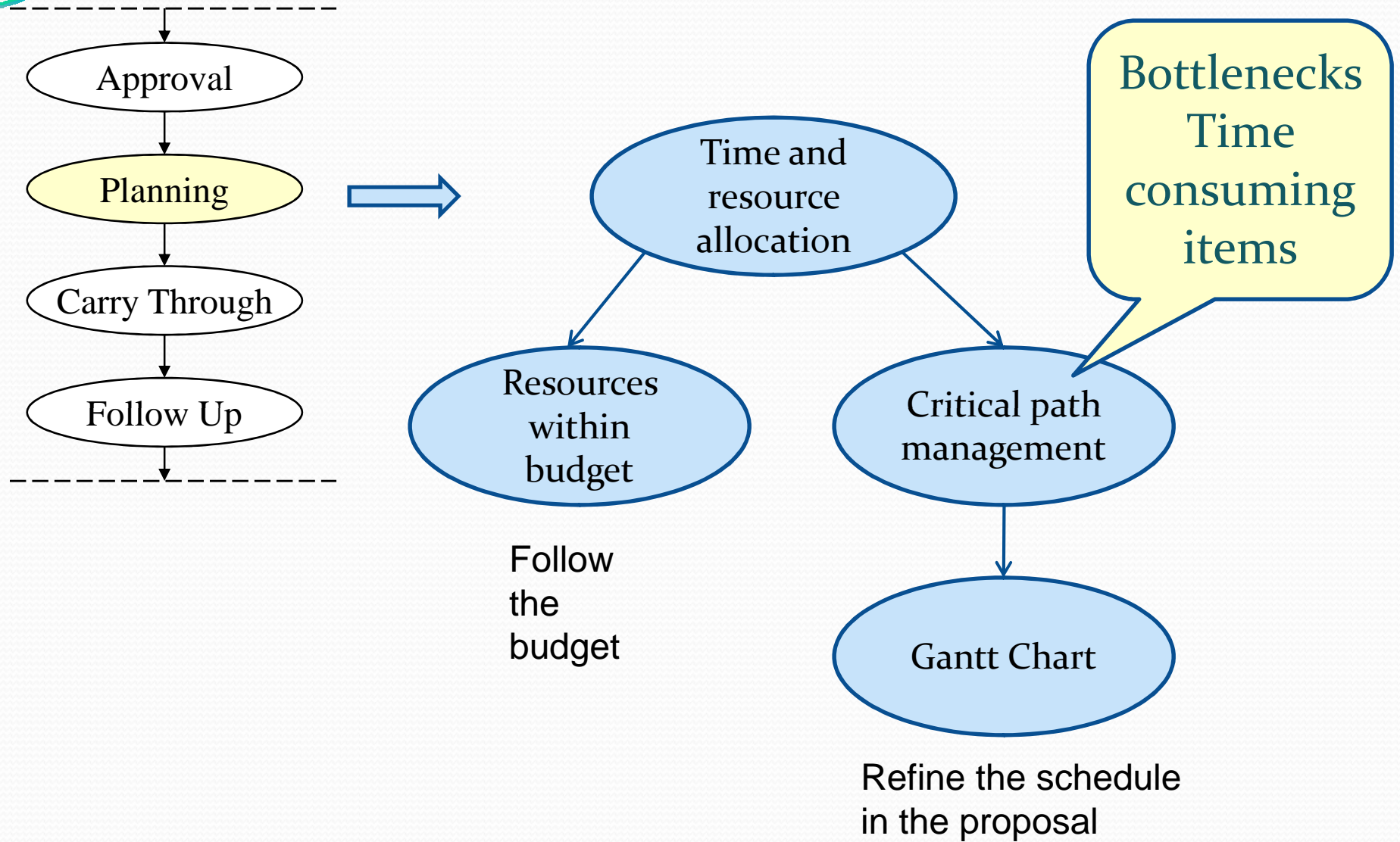
# Project Planning: Gantt Charts

- Gantt charts are used to plan stages of the design process

- Usually stages run vertically and time (e.g. calendar days) horizontally

- Indicates work in progress, as well as future and past work, in relation to time

# Gantt Chart

- A detailed list of all tasks that will be required through the project with corresponding target dates of completion;

- Critical path management must be embedded to the chart

- A Gantt chart is required for this project and should be placed in mid-term and final report

- Convenient tools of creating a Gantt chart includes Excel, table feature of Word, project software

# Gantt Chart Example

| Task | Week of | | | | | |
|---|---|---|---|---|---|---|
| | 1-Feb | 8-Feb | 15-Feb | 22-Feb | 29-Feb | 7-Mar |
| 1. Gather information, do research | ███ | | | | | |
| 2. Brainstorm with team | ███ | | | | | |
| 3. Draft proposal | ██ | | | | | |
| 4. Edit proposal and turn in | | ██ | | | | |
| 5. Develop final two designs | | ███ | ███ | ███ | | |
| 6. Draft report | | | | | ███ | |
| 7. Develop presentation | | | | | ██ | |
| 8. Give presentation | | | | | | ███ |
| 9. Turn in report | | | | | | ██ |

# Gantt Chart Example

| Task | 1999 | | | | | | | 2000 | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May |
| 1. Find a sponsor | ██ | ██ | | | | | | | | | | |
| 2. Analyze the collected data | | | ██ | ██ | ██ | ██ | | | | | | |
| 3. Summer report | | | | ██ | | | | | | | | |
| 4. Database design | | | | ██ | ██ | | | | | | | |
| 5. ER model | | | | | ██ | | | | | | | |
| 6. Coding of applications | | | | | | ██ | ██ | ██ | ██ | | | |
| 7. Progress report | | | | | | | ██ | | | | | |
| 8. Implementation of the database | | | | | | | | ██ | ██ | | | |
| 9. Testing and evaluation | | | | | | | | ██ | ██ | ██ | | |
| 10. Final report | | | | | | | | | | ██ | ██ | |
| 11. Poster | | | | | | | | | | | ██ | |
| 12. Oral presentation | | | | | | | | | | | ██ | |
| 13. Project demonstration | | | | | | | | | | | | ██ |
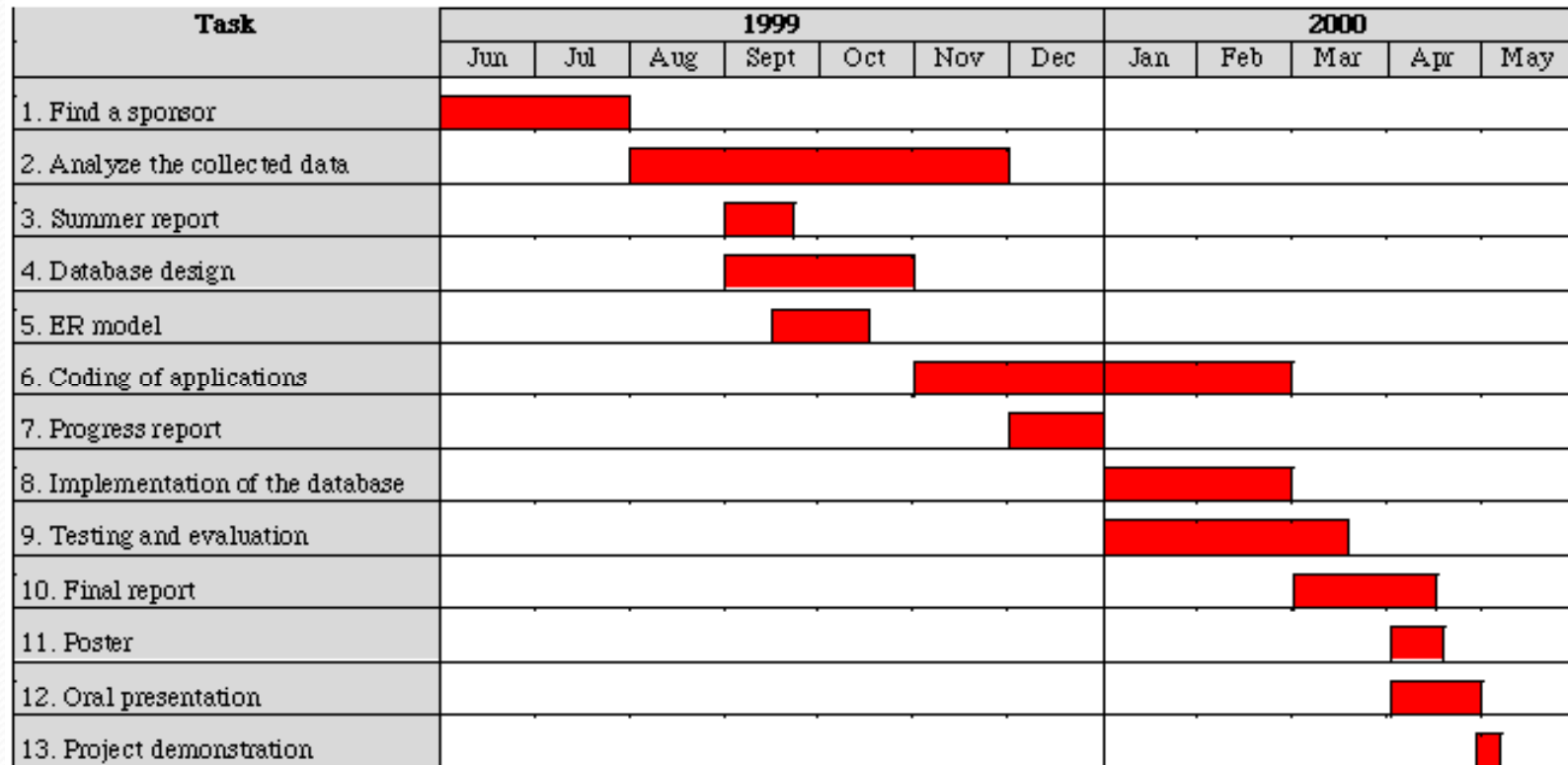
# Gantt Chart Example
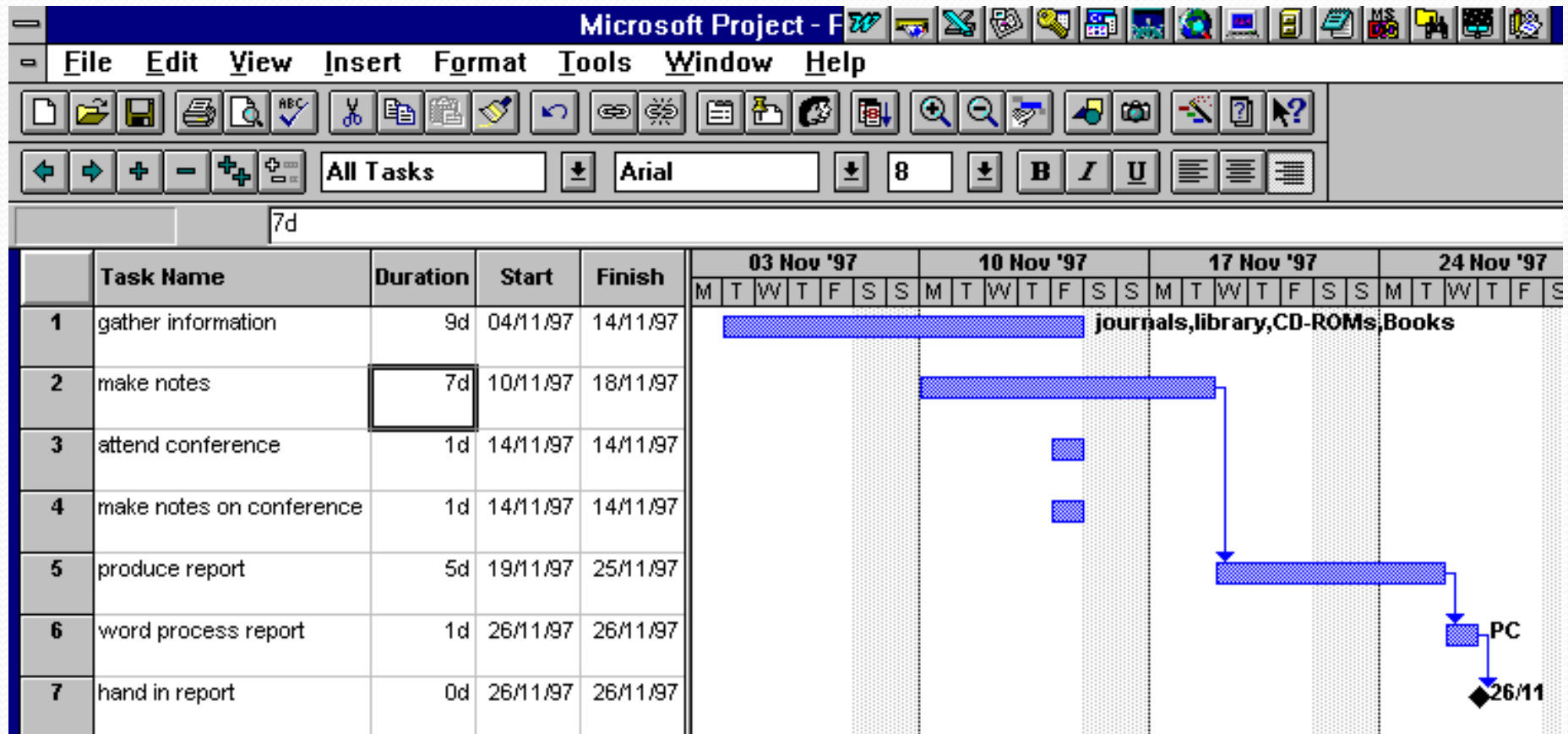
# Tasks that should be in your Gantt chart

- Problem definition and brainstorming
- Research of existing and related work
- Development of alternative designs
- Preliminary testing of designs and decide the course of action
- Design Improvements
- Implementation plan of the current phase deliverable
- Evaluation plan
- Drafting and final revisions of documents
- Due dates for documents and presentation

# Sample Gantt Chart Outline

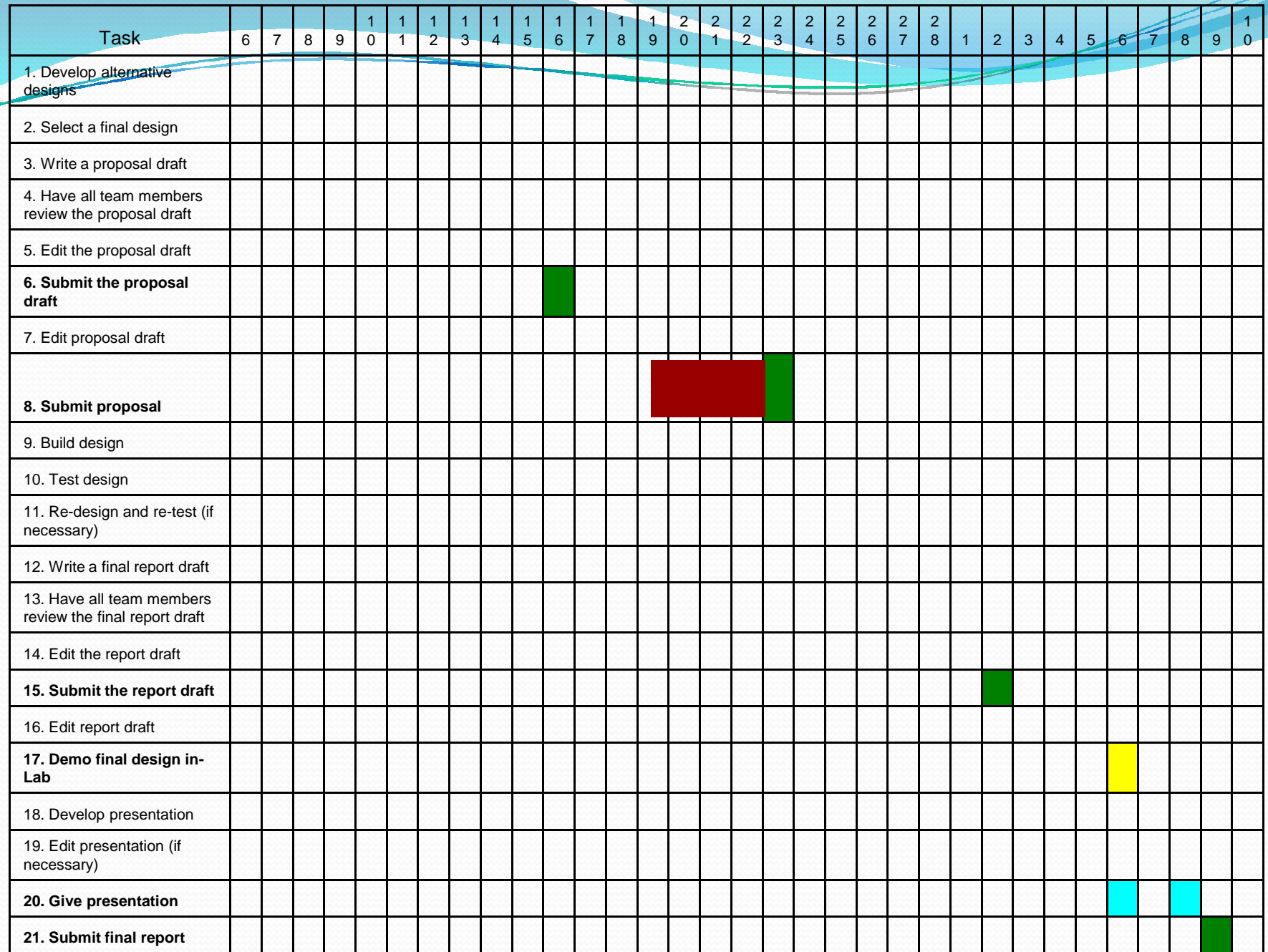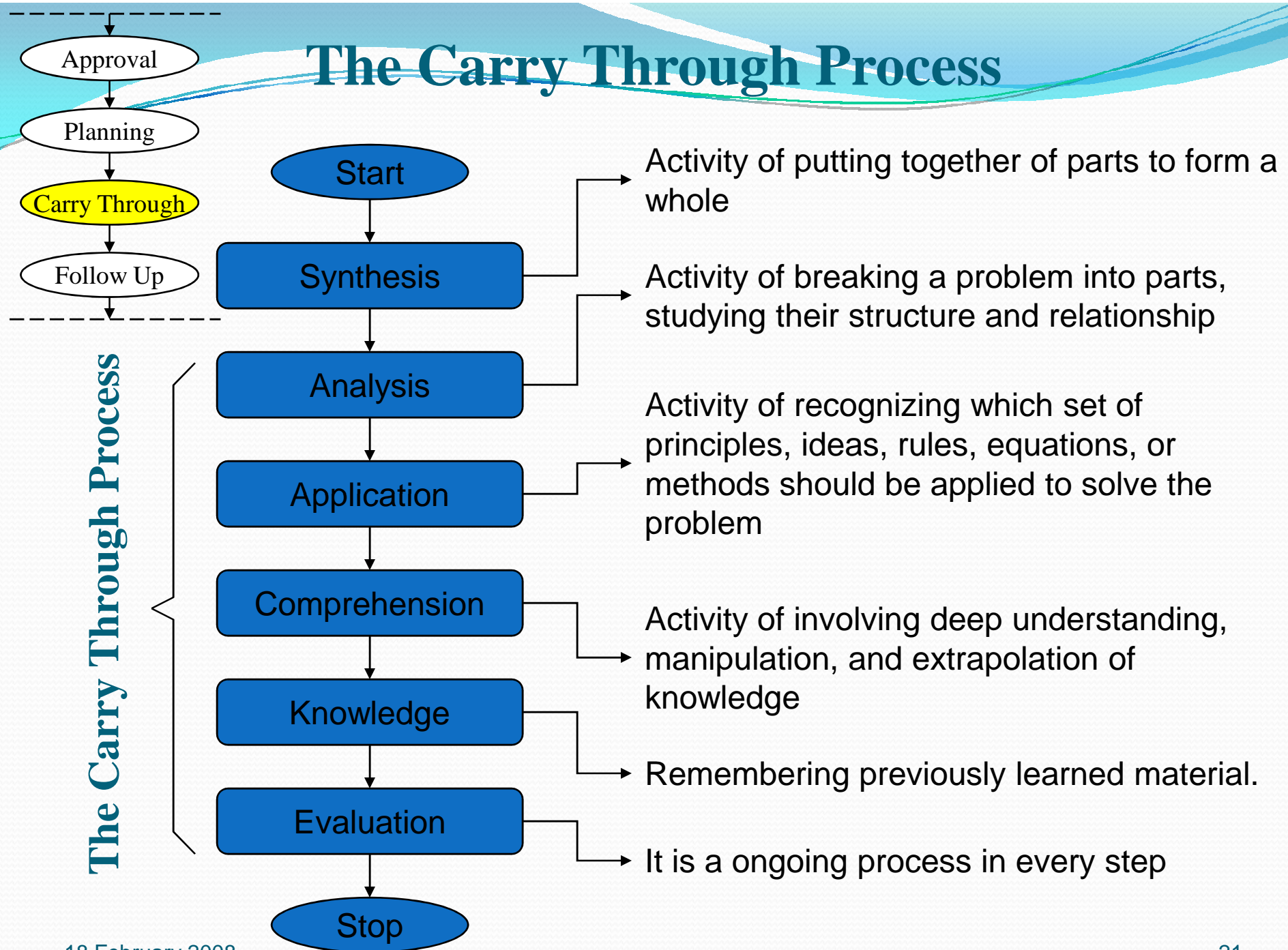| Task | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Develop alternative designs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Select a final design | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Write a proposal draft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Have all team members review the proposal draft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Edit the proposal draft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **6. Submit the proposal draft** | | | | | | | | | | ■(green) | | | | | | | | | | | | | | | | | | | | | | | |
| 7. Edit proposal draft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **8. Submit proposal** | | | | | | | | | | | | | | ■(red) | ■(red) | ■(red) | ■(red) | ■(green) | | | | | | | | | | | | | | | |
| 9. Build design | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. Test design | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11. Re-design and re-test (if necessary) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12. Write a final report draft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13. Have all team members review the final report draft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14. Edit the report draft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **15. Submit the report draft** | | | | | | | | | | | | | | | | | | | | | | | | | ■(green) | | | | | | | | |
| 16. Edit report draft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **17. Demo final design in-Lab** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ■(yellow) | | | | |
| 18. Develop presentation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19. Edit presentation (if necessary) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **20. Give presentation** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ■(cyan) | | ■(cyan) | | |
| **21. Submit final report** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ■(green) | |

# The Carry Through Process

Approval

Planning

**Carry Through**

Follow Up

**The Carry Through Process**

Start

Synthesis

Analysis

Application

Comprehension

Knowledge

Evaluation

Stop

Activity of putting together of parts to form a whole

Activity of breaking a problem into parts, studying their structure and relationship

Activity of recognizing which set of principles, ideas, rules, equations, or methods should be applied to solve the problem

Activity of involving deep understanding, manipulation, and extrapolation of knowledge

Remembering previously learned material.

It is a ongoing process in every step

# Carry Through Check List

- Find the limits of your solution by making different simple models or assumptions that would clearly both
  - overestimate the answer, and
  - underestimate the answer.
- Make an educated guess of what your solution will look like.
- Construct a quick test or experiment to see if the solution you have decided upon will work under the simplest conditions.
- Continue to learn as much as you can about the solution you have chosen.
- Continue to challenge and/or validate the assumptions of the chosen solution. Make sure no physical laws are violated.
- Plan your computer experiments (i.e., simulations) as carefully as you would plan your experiments in the laboratory.

# Follow Up

Approval → Planning → Carry Through → **Follow Up**
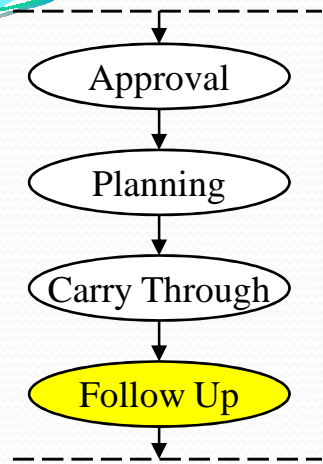
- Following the solution plan
  - meeting solution goals
  - fulfilling solution criteria
- Proceeding on schedule
- Within budget
- Of acceptable quality
- Still relevant to solving the original problem