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# **Project Management Techniques**

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IE-Special Projects Manager

# Introduction

- Project Management is one of the most powerful tools that an IE can utilize, but unfortunately some IEs don't always use it very well
  
- Focus of this presentation:
  - How IE projects are different
  - Main project steps
  - Some examples of project Synergy
  - The Project Manager's role
  - The Project Team
  - Some ways to avoid typical problems
  - Some sample forms
  - Project Scheduling & Budgeting
  - Some useful Organizations

# IE Projects Usually Differ from Conventional Construction Projects

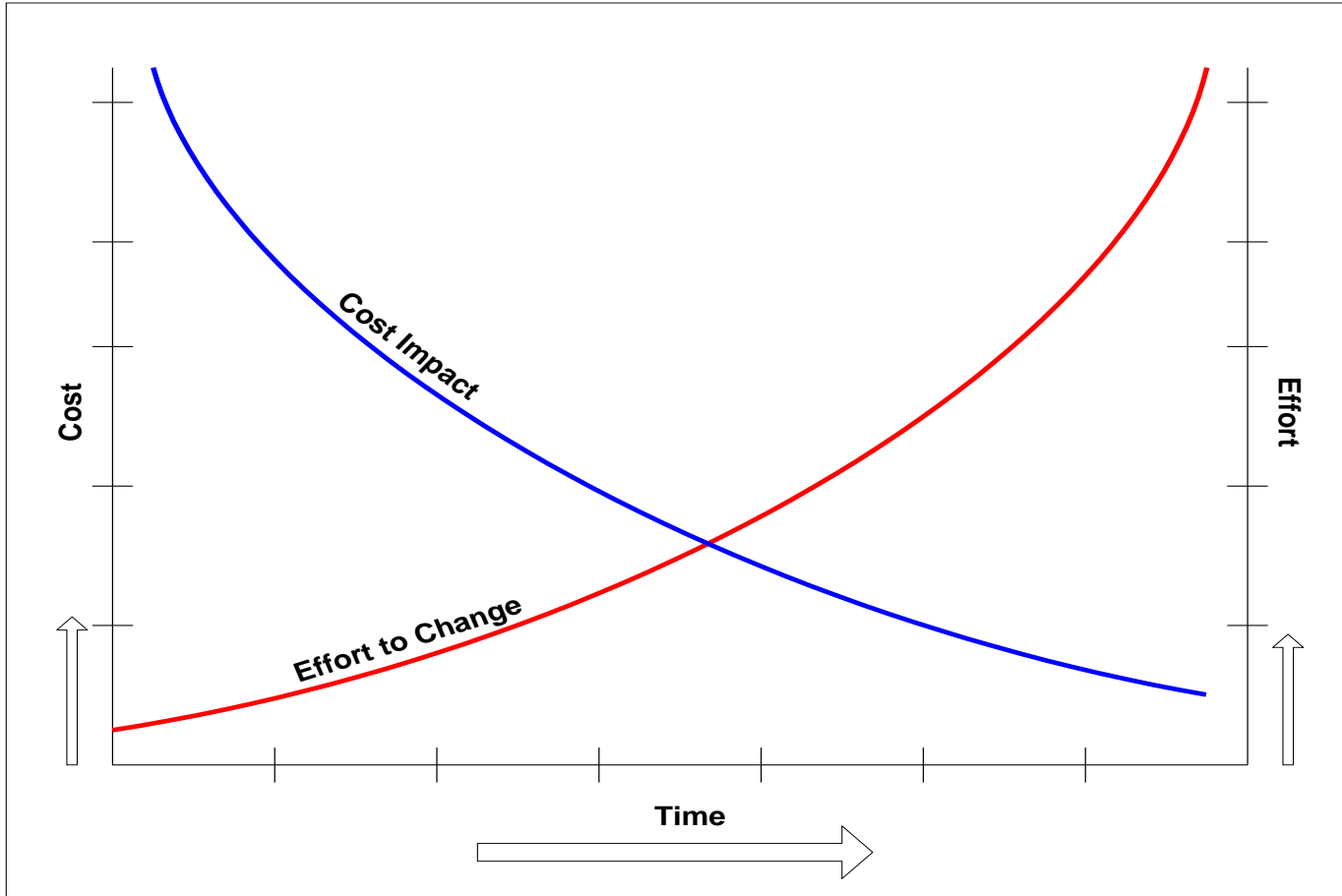
- A typical construction project focuses more on the physical structure
- IE projects are frequently more about analysis and process improvement
- Construction projects refer to the “big underground rock” - risk of significant hidden costs
- Risks can impact IE projects as well, but they are usually less obvious than a big rock

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# Some Types of IE Projects

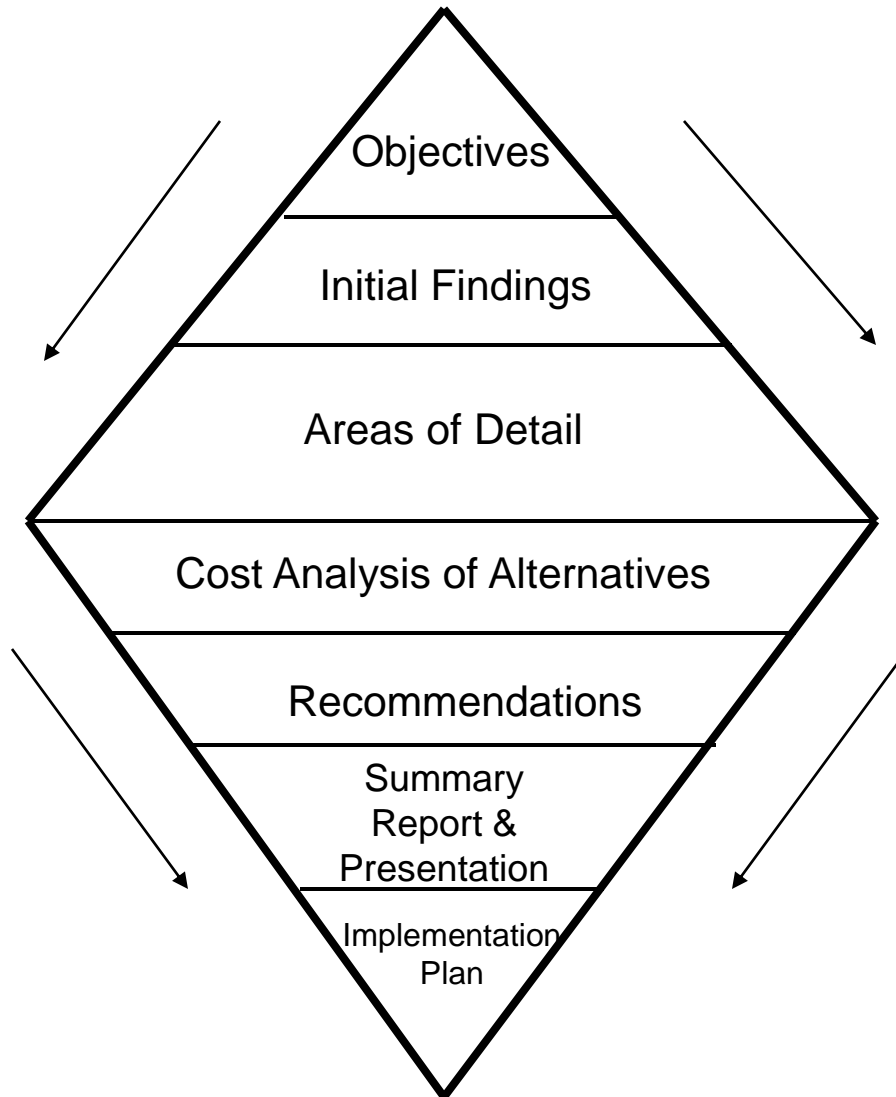
- Process improvement
- Problem resolution
- Elimination of rework
- Cost analysis
- Equipment justification
- Facility layout
- Stand alone benchmarking
- Systems integration

# Cost Impact Graph



The ability to influence costs on a project is much easier at the beginning (e.g. a new plant design)

# Logical Progression of a an IE Project



# Basic Project Steps for IE Projects

- Project request received
- Discuss project objective with customer
- Tour the problem area (if possible)
- Meet with people close to the problem
- Do some preliminary analysis of the problem
- Form a Project Team
- Develop a Project Plan (objective, scope, approach, deliverables)
- Analyze existing process or data
- Obtain and analyze new data

# Basic Project Steps (continued)

- Document findings & observations
- Benchmark similar processes (if applicable)
- Develop solutions & check against actual conditions
- Evaluate & test solutions
- Document conclusions & recommendations
- Review Findings & Recommendations with the customer
- Develop an Implementation Plan (if required)
- Follow-up with the customer



# Project Synergy



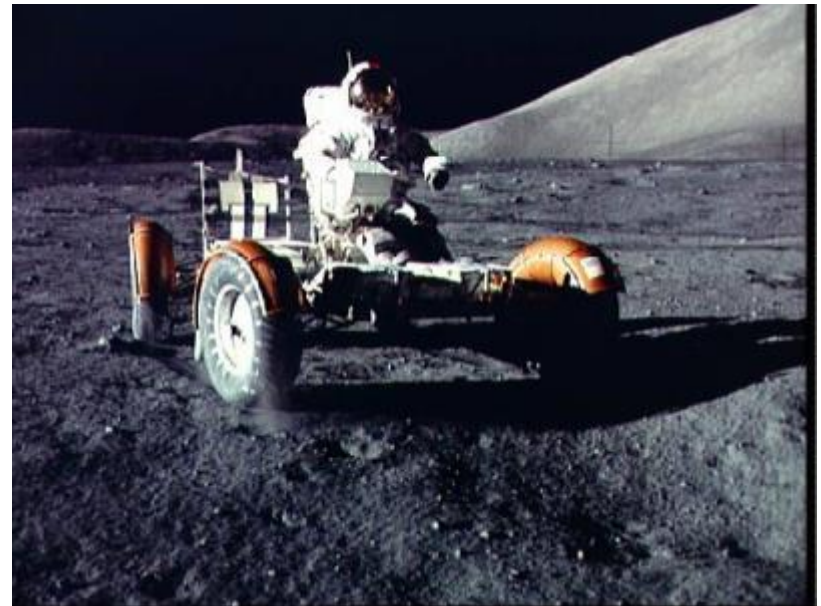
On a great project, the whole can be greater than the mere sum of its parts

# Project Synergy



Just as a Symphony Conductor gets Synergy from all the individual musicians, so can a Project Manager get Synergy from a cross-functional team

# Historical Examples of Project Synergy



NASA – Apollo Moon Landings projects

# Other Examples of Project Synergy



NASA – Hubble Telescope & Space Station projects

# The Project Manager's Experience



# The Project Manager's Experience



- The Project Manager brings their background & experience to the role:
  - Education & Training
  - Past Jobs
  - Past Projects
    - Successes
    - Mistakes
  - Good time management & daily management skills
    - Bad multi-tasking can waste days & weeks

# Project Manager's Experience (continued)

- Project Management skills can be enhanced by:
  - Plant visits
  - Study
  - Practice
  - Coaching
  - Professional associations
  - Books & Conferences



# The Project Manager's Role



- The Project Manager is critical to the success of the project
- Ensures that each day and each week, regular progress is being made on the project
- Manages team members, particularly matrix organizations, and members loaned on a limited basis
- Encourages the customer to help the project be successful
- Manages changes, particularly Scope changes



# Project Manager's Role (continued)



- Keeps the project on track
  - “Projects are like trains, they run a lot better when you keep them on track and it’s very hard to get them back on track”
- Effectively uses various communication methods: E-mail, meetings, phone calls, & file servers
- Resolves conflicts
- Leads the team in developing solutions
- Reports project status on a pre-agreed basis
- Keeps organized records & documentation

# The Project Team



# The Project Team



- You are not alone on most projects
- Selecting other team members:
  - Knowledge of the problem
  - Cross-functional skills
  - Industry experience
  - Availability
  - Team compatibility
  - Optimistic & Results oriented
  - Change agents

# Project Team (continued)

- Try to teach good daily management & time management skills to all team members
- The Team helps develop the Project Plan, then works the Plan to its conclusion
- Assign & track tasks for each team member
- The Team strives for Synergy



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# Some Project Dangers



# Some Project Dangers



- Vague commitment from customer
- Multiple customers (not in agreement)
- Undefined objective
- Unrealistic scope
- Unrealistic deliverables
- Poorly defined tasks
- Too tight a schedule
- No safety margin for late tasks
- Key team members busy with other projects

# Some Project Dangers (continued)



- Poor communication with customer
- Poor data storage & sharing of files
- Late outside data sources
- Quality of data being used
- Bad team dynamics
- Tight deadlines within the project
- Non action-oriented report (or final presentation)
- Overlap with other project teams
- Legal issues

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# Lessons Learned to Avoid Project Dangers





# Lessons Learned to Avoid Project Dangers



- Seek the highest level customer
- Develop a realistic scope
- Form a strong, versatile, optimistic team
- Develop a Project Plan (objective, approach, schedule, & required resources)
- Build recovery time into the schedule for contingencies
- Review Project Plan with customer for concurrence
- Provide on-going status to customer
- Manage scope changes & customer expectations
- Reassess approach & schedule periodically
- Use good daily & time management techniques

## Lessons Learned (continued)



- Check findings against actual applications
- Recheck results to see if objectives were met
- Provide ground rules of all assumptions used
- Provide explanation to support observations
- Check and verify all calculations and tables
- Review conclusions with entire team
- Use a good format for final report & presentation
- Provide an implementation plan (if required)

# Sample Forms Used by Boeing IEs

## Project Profile

### Project Profile

Project #: PE- 0410 Analyst: Steve Snelling

Assignment Title: 747 T.O.C./Critical Chain Pilot Area

Customers: Final Assembly General Supervisor  
A/C Bay Supervisor

Date Assigned: 4/1/2004 ECD: 12/10/2004

**Description:**

To determine if a pilot area for T.O.C. (Critical Chain) is viable for an area in FBJ systems. Then set up and run the pilot area for several airplanes.

**Scope:**

FBJ Air Conditioning Installation area (~110 jobs).

**Expected Benefits:**

Determine potential savings by using alternate scheduling methods.  
Determine if feasible. If there are measurable savings by this approach.

**Statement of Work:**

Develop a project plan and schedule  
Learn from F-22 usage and 777 S&I pilot area  
Define the true Critical Chain (note: differs from the Critical Path, and also more detailed than current P-nets), including revised job times and buffers  
Investigate software options  
Get IE Resource Commitment  
Prepare report on turning on the pilot  
Decide to go or no-go  
Start up the pilot area

**Deliverables:**

Detailed precedence networks  
Calculated (or estimated) Project Buffer and Feeder Buffers  
A detailed Critical Chain network that represents the entire pilot area (all skills)  
Sample management reports & tracking charts  
A recommendation to proceed or not to proceed with turning on the pilot  
A recommendation after running the pilot, to expand or not to expand it to other systems areas in Final Assembly

**Schedule:** (see attached MS Project schedule)

## Monthly Report

### Activity Report

747 PROGRAM

**747 T.O.C./Critical Chain Pilot Area**

**Study** PE- 0410

**Start Date:** 4/1/2004 **ECD:** 12/10/2004

**Customers:** Final Assembly General Supervisor  
A/C Bay Supervisor

**Description:** To determine if a pilot area for T.O.C. (Critical Chain) is viable for an area in FBJ systems. Then set up and run the pilot area for several methods. Determine potential for savings by using alternate scheduling methods. Determine if feasible. If there are measurable savings by this approach.

**Expected Benefits:** Determine potential for savings by using alternate scheduling methods. Determine if feasible. If there are measurable savings by this approach.

**Status:** Complete.

747 Air Conditioning Bay Installation, T.O.C./Critical Chain pilot area was developed and activated on line #1351 and tracked for the next 5 airplanes using the newly developed Critical Chain schedule and PS8 software. Status of jobs done daily was taken from A&I SFC to produce a "fever chart" of Project Buffer usage & posted in the production area. Prepared a summary for management on the results of the pilot area. Pilot project deemed a success and is now complete. The new Critical Chain schedule will be continued - but no longer as just a pilot project.

The continued new T.O.C./Critical Chain activity in 747 Final Assembly will be done under a separate Implementation project (PE-0414).

**Analyst:** Steve Snelling

# Sample Forms Used by Boeing IEs

## Bi-Weekly Status Note

### **T.O.C./Critical Chain – Pilot Area project**

#### **Project Status as of Dec. 16, 2004**

##### **CURRENT ACTIVITIES:**

###### **747 A/C Bay Installation Area**

Tracked the 5<sup>th</sup> airplane using the new “waterfall” schedule chart; good start on cross-training of jobs by crew. Did additional 5S activity documentation with crew. Conducted several tours of pilot area for senior managers.

###### **Overall Pilot project**

Pilot project success reviewed with IE and Production managers as a full presentation. The pilot area will continue as a full implementation under a new project name and number.

###### **747 Final Assembly Implementation Plan**

Continuing to get PS8 software training for IE Methods people. Have several copies of PS8 software to start with. Started the expansion of T.O.C./Critical Chain scheduling into other control code areas, with IE Methods and production crews.

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##### **NEXT PLANNED ACTIVITIES:**

###### **A/C Bay Installation Area**

Plan to work with A/C Bay crew and Team Leader on some empowerment items, similar to what F/A-22 program used. Plan to continue to track daily progress with Fever Charts.

###### **Overall Pilot project**

Plan to close out the pilot project in the Monthly Activity report. The pilot will switch over to be part of the new implementation project profile.

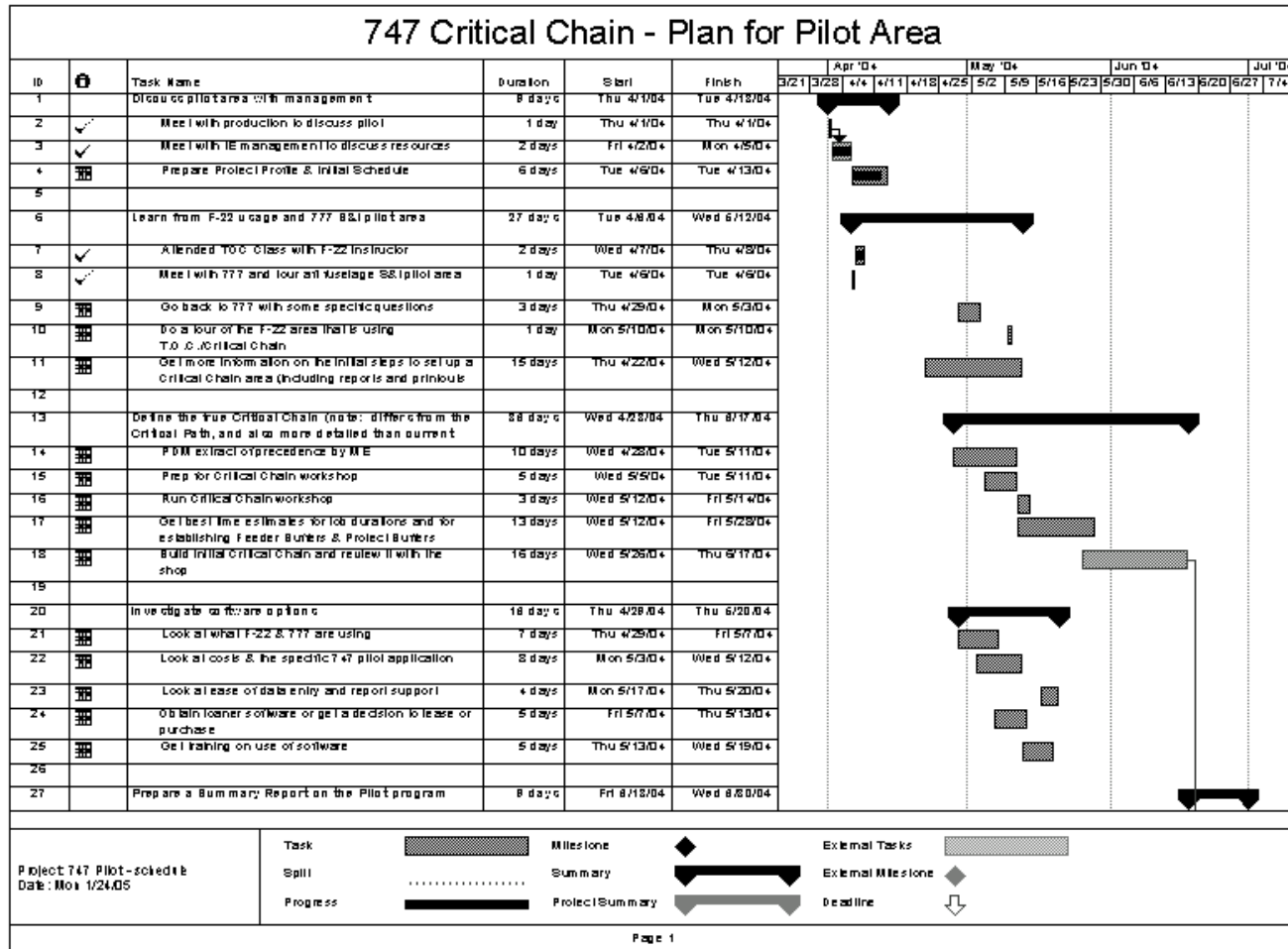
###### **Final Assembly Implementation Plan**

Plan to work on a full Final Assembly implementation plan and schedule to cover out for the next ten crews to convert to T.O.C./Critical Chain schedules. Plan to review the implementation plan and initial cost estimates with management.

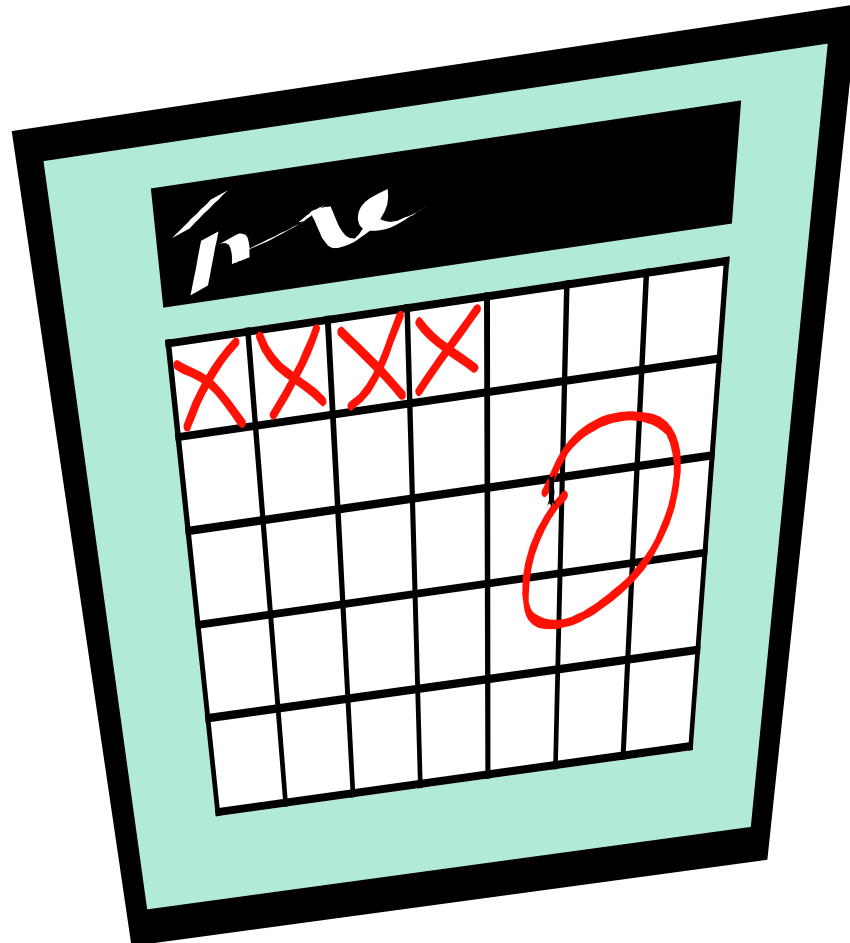
Steve Snelling

# Sample Forms Used by Boeing IEs

## Project Schedule



# Project Scheduling



# Project Scheduling



- Much of the Project Management literature focuses on scheduling projects
- I suggest taking an outline approach to building your project schedule
- Most big & complex projects can be broken down into phases or smaller projects
- Make the project schedule only as detailed and complex as the project requires
- The schedule needs to be a useful and dynamic tool, and not a static one-time use document

# Project Scheduling (continued)



- There are a variety of project scheduling software types that can be helpful with different features for the different schedule methods & schedule views:
  - Major milestones
  - Outline of activities
  - Linked tasks (gant chart)
  - Precedence (network diagram)
  - Resource matrix
  - T.O.C./Critical Chain
  - others
- Use whichever view & software works best for you
- Any scheduling software cannot take the place of logical steps and good task time estimates



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# Project Costs & Budgets



# Project Costs & Budgets



- Usually, I only do cost projections for Implementation Plans
- Cost estimates are built up from a good detailed outline:
  - List one-time costs & savings separately from recurring costs & savings
  - Get a good unit cost estimate for anything with a large number of occurrences (biggest impact)
  - Get the owning organizations to confirm your costs & savings estimates
  - Check the overall cost summaries against what seems feasible (a “reality check”)

# Good Source Organizations:



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***PMI (Project Management Institute)***, a national organization that has some local chapters, & has certification *pmi.org*

***IISE (Institute of Industrial & Systems Engineers)***,  
at the national level and local chapter level  
*iise.org*

***Other Engineering Societies (ASCE, SME, ASME)***

# Some Closing Comments



# Some Closing Comments



- Recognize when to use Project Management techniques on your IE assignments
- Form a strong Project Team
- Develop a good Plan, then work your Plan to a successful conclusion, with your Team
- Utilize good daily management and time management techniques
- Monitor progress (overall & to the assigned tasks) and make adjustments as required

# Closing Comments (continued)



- Keep your customer informed throughout the project
- Learn from your own project management experiences (both the good and the bad)