Project Stages, Tips & Dangers
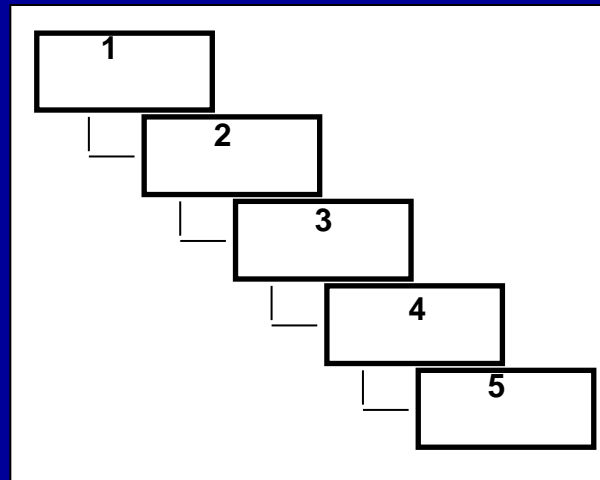
Steve Snelling & Shamshad Alam

Retired, Boeing Industrial Engineers

Presentation Outline

- Project Stages with descriptions & Projects Coaching Reviews

- Project Tips including things to do that will help with Project Management

- Project Dangers and ways to plan for and minimize most project pitfalls

Five Project Stages

Main Areas Many IEs Work In

- **MANAGE PROJECTS**
  - Project Management
  - Project Scheduling
  - Risk Management

- **PROCESS IMPROVEMENT**
  - Lean Manufacturing
  - Engineering Economic Analysis
  - Process Modeling
  - Root Cause Analysis
  - Statistical Methods
  - Six Sigma
  - Time Studies
  - Work Sampling

- **SUPPLY CHAIN ANALYSIS**
  - Supply Chain Alignment
  - Material Logistic
  - Inventory Control
  - Supplier Support
  - Make/Buy Mfg Process

- **OPERATIONS IMPROVEMENT**
  - Ergonomics & Human Factors
  - Operating Plans
  - Recovery Planning
  - Capacity Planning

- **INTEGRATED SYSTEMS**
  - Value Stream Analysis
  - Facilities Layout
  - Production System Design
  - Manufacturing Process Design
  - Systems Thinking

- **DIRECT SUPPORT TO PRODUCTION**
  - Production Scheduling
  - Theory of Constraints
  - Budgets & Forecasts
  - Crew Empowerment
  - Defect Analysis
  - Benchmarking Analysis

Industrial Engineering Functional Work Areas

Project Management

- Project Planning
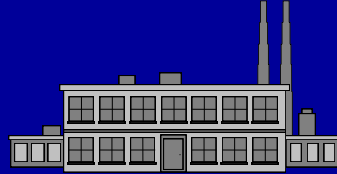- Project Scheduling
- Projects Coaching
- Risk Assessment

Factory Operations

- Production Scheduling
- Lean Manufacturing
- Systems Integration

Quality

- Chronic Rework
- Supplier Quality

Production Control

-Product Mix Analysis
- Forecasting

Material

- Supplier On-Site Visits
- Supply Chain Management
- Parts Storage & Movement

Facilities

- Layout Design
- Process Flow Analysis

Product Engineering

- Integrated Product Teams
- Product Development
- Product Costing

Costing

- Comparison of Alternatives
- Cost & Savings Estimating

Safety

- Safety Investigations
- Ergonomic Evaluations

Tooling

- Machine Capacity
- Tool Usage
- Tool Certifications

Transportation

- Logistics Planning
- Material Handling
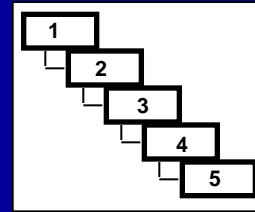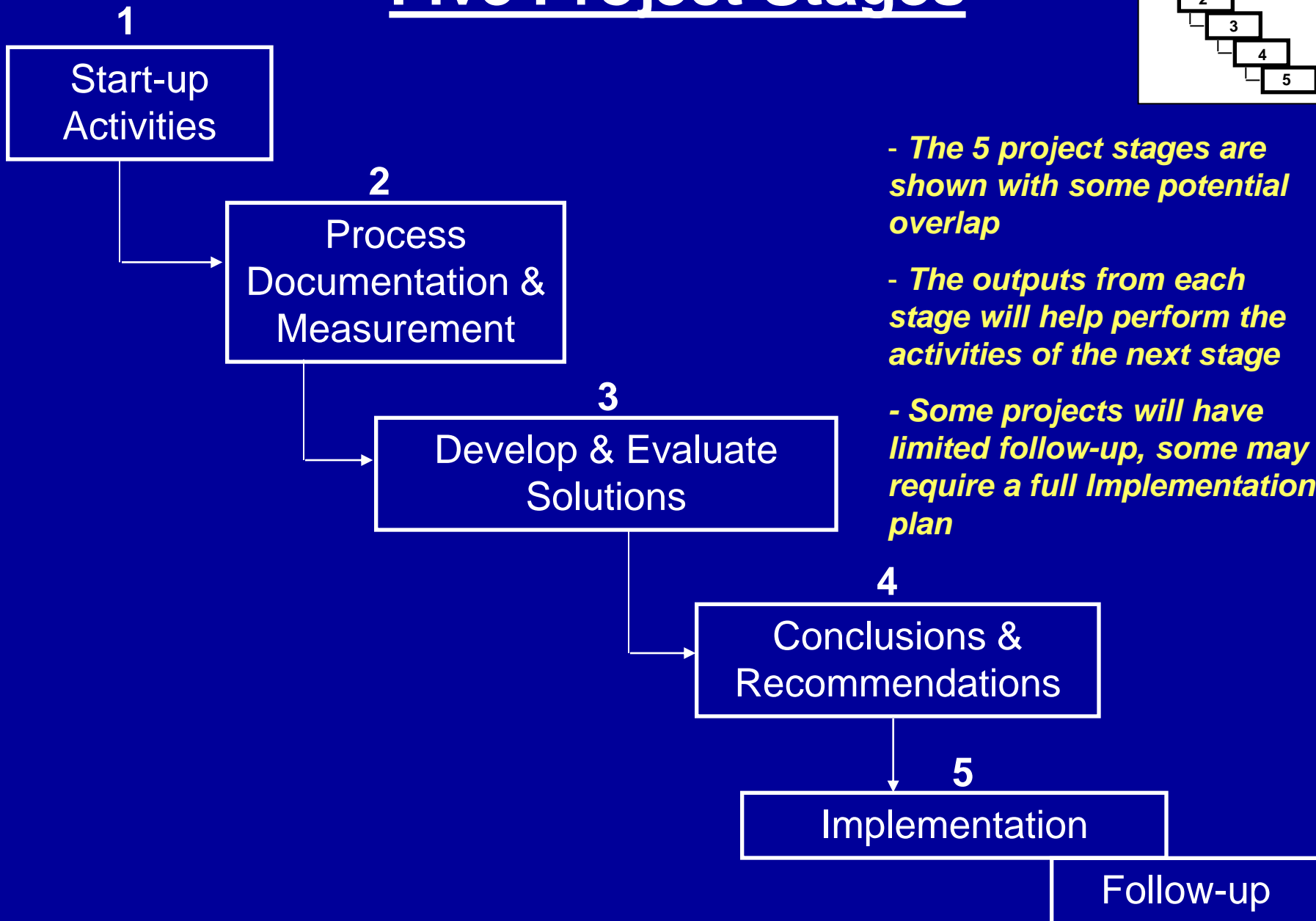- Alternative Methods

Training

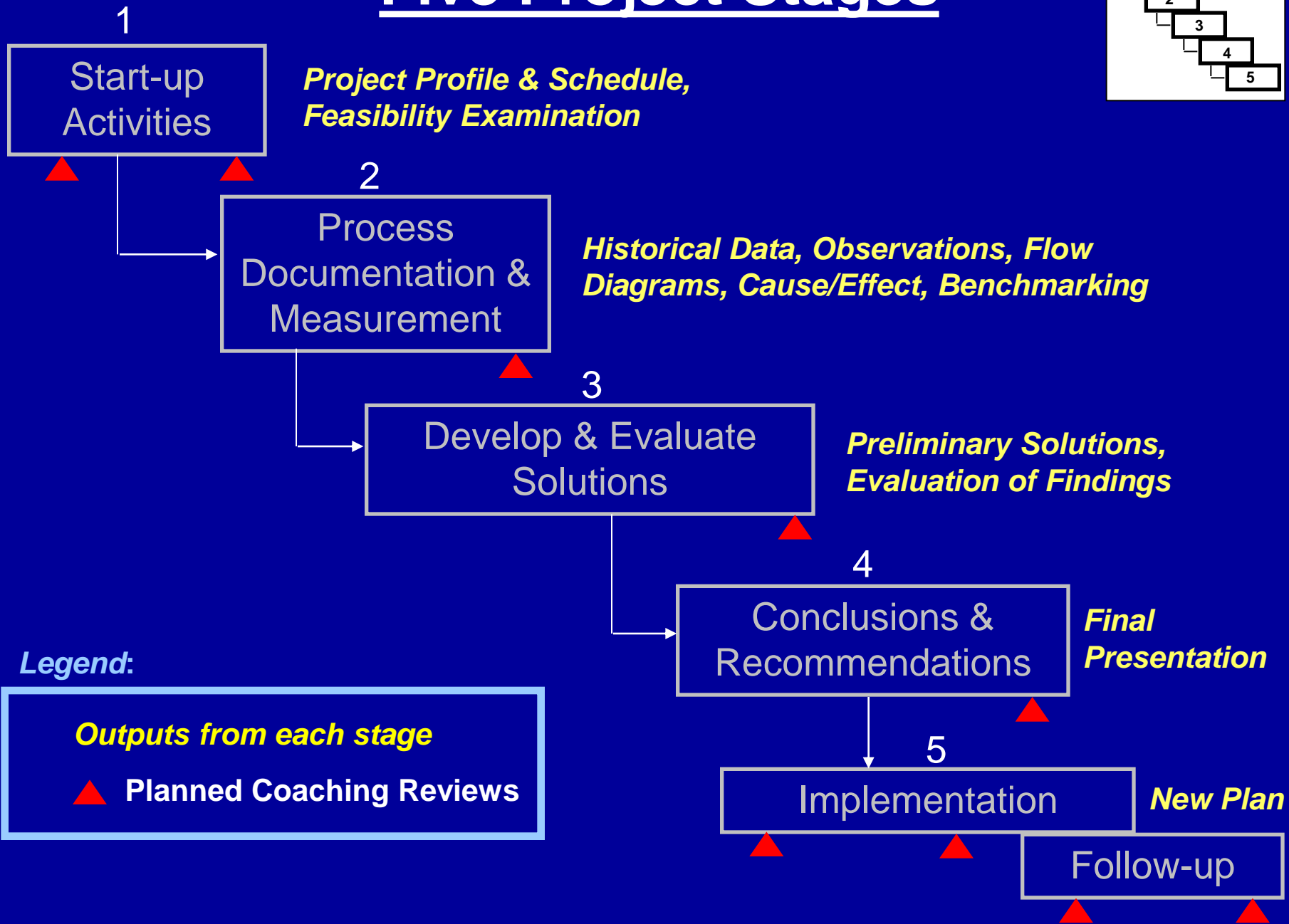- Training Presentations
- Course Scheduling

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IE Analysis Projects

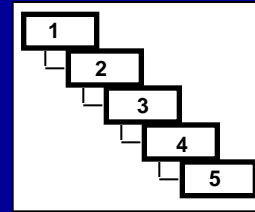- IE projects are primarily analysis type projects
  - For most new IEs these will be relatively small in scope and not include large teams
  - Later with more experience, these IE projects may become larger in scope and include larger teams

- This IE Projects activity is not to be confused with Program Managers and others with the title of Project Manager (New Product Developers, Design Engineers, etc.)

Five Project Stages

1

Start-up Activities

2

Process Documentation & Measurement

3

Develop & Evaluate Solutions

4

Conclusions & Recommendations

5

Implementation

Follow-up

- The 5 project stages are shown with some potential overlap

- The outputs from each stage will help perform the activities of the next stage

- Some projects will have limited follow-up, some may require a full Implementation plan

Five Project Stages

1

Start-up
Activities

*Project Profile & Schedule,
Feasibility Examination*

2

Process
Documentation &
Measurement

*Historical Data, Observations, Flow
Diagrams, Cause/Effect, Benchmarking*

3

Develop & Evaluate
Solutions

*Preliminary Solutions,
Evaluation of Findings*

4

Conclusions &
Recommendations

*Final
Presentation*

Legend:

Outputs from each stage

▲ **Planned Coaching Reviews**

5

Implementation

New Plan

Follow-up

Project Coaching Reviews

- There are several opportunities for some Project Coaching Reviews, at each stage of a project
- Review status to the original Project Profile
  - Is it still valid? Has the scope changed?
- Review status to the project Schedule
- Encourage extensive project documentation
- Coach and advise the outputs for each project stage (rather than try to influence the projects' findings & conclusions)
- Team should print out copies of outputs to bring to the review session – but not prepare any new material
- Discuss next planned activities & any project concerns
- Review presentations prior to being shown to the project's customer (outline, format, & likely questions)

Five Project Stages
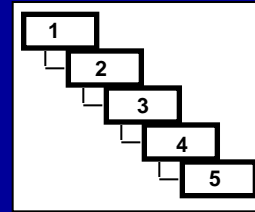
1. Project Start-up Activities

- Project is authorized and assigned
- Initial meetings with the project's customer
- Project Team is formed
- Initial understanding about project
- A feasibility study may be required before proceeding too far
- Project Profile is prepared & reviewed with the project's customer
- Project Schedule is prepared & reviewed with the project's customer

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*)

- Write a clear, concise project description/ objective
- Define a realistic project scope/ boundaries
- List the main planned deliverables
- Describe the main project steps (Statement of Work)

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Project Schedule

- Use an outline approach to build the schedule
- Include the entire project & keep the schedule updated
- Break larger projects down into phases
- Keep the schedule as simple as possible
- Minimize overlapping tasks for small teams
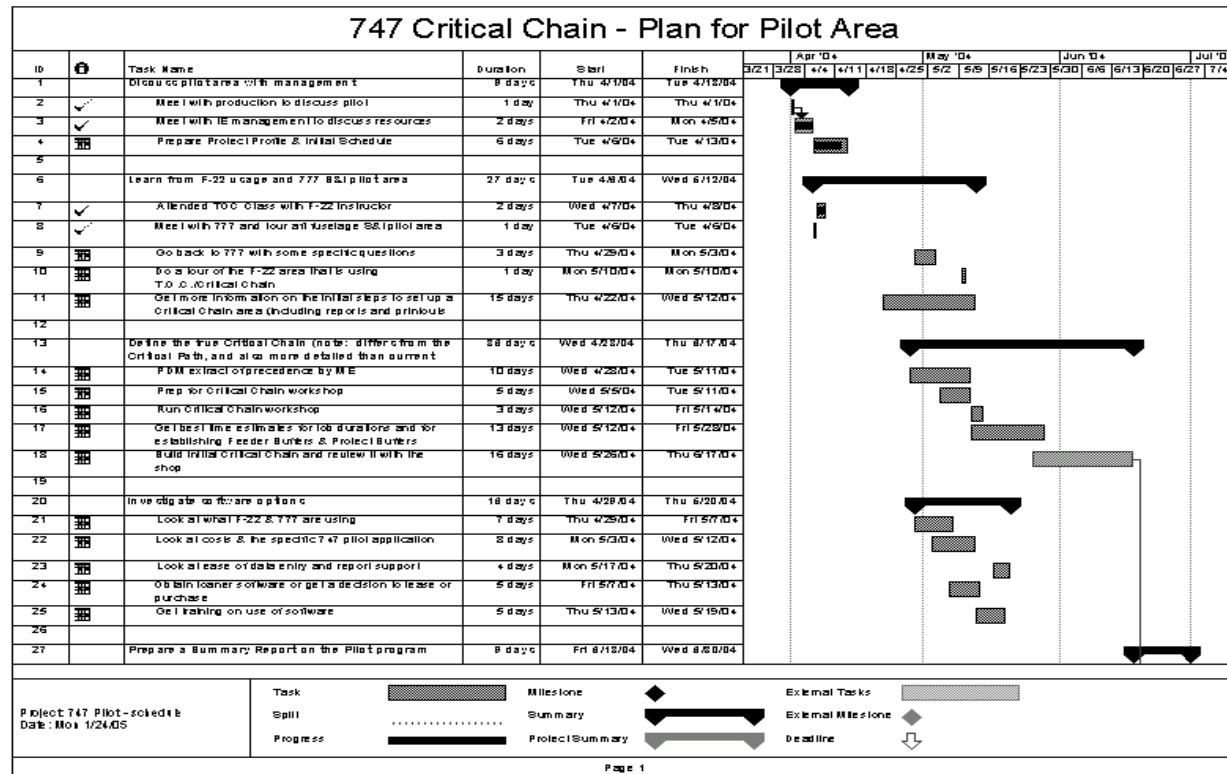
Five Project Stages (continued)
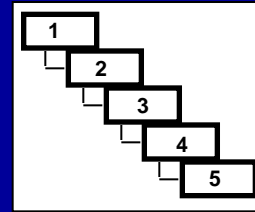
2. Process Documentation & Measurement

- Process flow charts are prepared, if applicable
- Historical data is obtained & analyzed
- New data is obtained & analyzed (e.g. Time Studies, direct observations)
- Direct observations of current conditions
- Digital pictures of current conditions
- Interviewing for Information
- Cause and effect diagrams, etc.
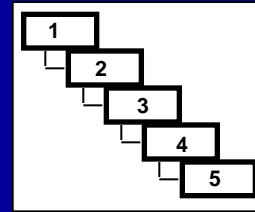- Possible Benchmarking tours

Five Project Stages (continued)
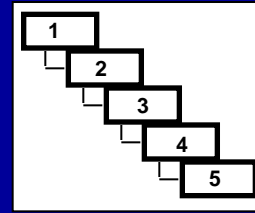
3. Develop & Evaluate Solutions

- Solutions are listed and organized
- Additional benchmarking, if needed
- Simulations (mathematical or using simulation software) are performed, if applicable
- Evaluation criteria are determined and utilized
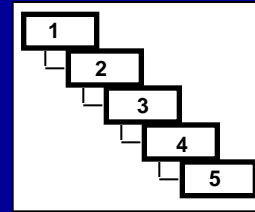- All viable solutions are evaluated

Five Project Stages (continued)

4. Prepare Conclusions & Recommendations

- Conclusions are documented and investigated
- Final recommendations are documented
- Final presentations are prepared, reviewed & given

Five Project Stages (continued)

5. <u>Implementation & Follow-up</u>

- – Implementation items are planned and assisted
- – Follow-up is done as necessary
- – A large scale implementation may become a new project

Summary Comments for this Section

- Utilize the five Project Stages on any IE project that is reasonably complex:
  - Taking more than 3 weeks to complete
  - Not a simple, quick analysis
- The Project Start-up stage is very important to a successful project
  - And is where projects can often run into trouble

- Plan to have specific documented outputs from each stage of a project

- Look for opportunities to do IE Analysis projects in a variety of functional areas
- Utilize some "Project Coaching" opportunities

Project Management Tips for IE Analysis Projects
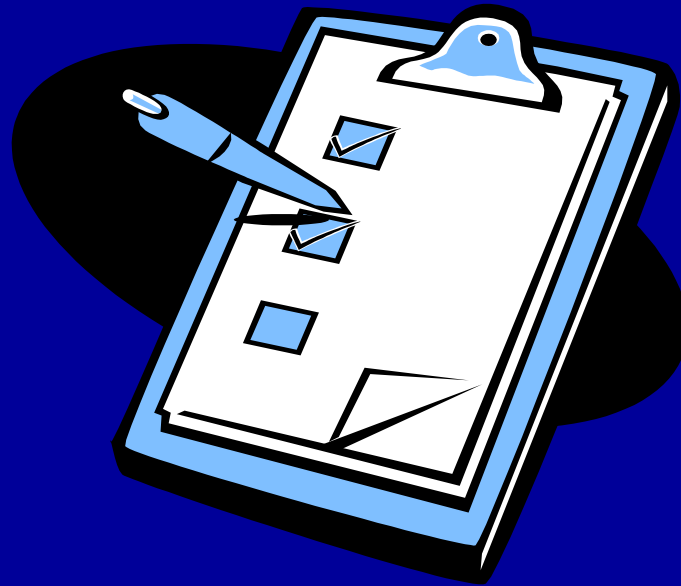
Project Management Tips

Project Profile, Scope & Schedule

- Develop a good Project Profile & Scope as covered earlier

- Keep track of the Estimated Completion Date (ECD) - adjust to complete on time, if possible

- Any Scheduling software cannot take the place of logical steps and good task time estimates

- Software is just a tool that needs to be used wisely

- Ask for Resource help, as soon as the need is identified

Project Management Tips (continued)

Project Phases

- Consider breaking larger projects into several phases

- Work on project phases sequentially as smaller projects, if enough resources are available

- Break out portions of the project, if necessary, due to delays in the project customer's decision making

- Implementation and significant follow-up activity is commonly viewed as a separate phase of the project

Project Management Tips (continued)

Getting Help

- Look for ways of partnering with other individuals or groups on projects
- Your Research & Development group may have some experts on call & may be able to purchase some inexpensive items for testing
- Other groups of "Subject Experts" bring additional needed expertise
  - (e.g. Tool Engineering, Quality Engineering, Design Engineering, etc.)
- Most IE projects are collaborative
  - How well you coordinate with other groups is critical to a project's success

Project Management Tips (continued)
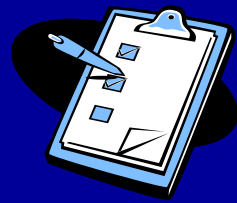
Project Communication

- Use a variety of medium to communicate with your Team
  - (meetings, e-mail, digital pictures, file servers, white board discussions, WebEx, etc.)
- Ask for reviews during the project
  - Don't wait for everyone to chase you down to find out how it is going
- Regularly communicate with your project's customer
  - The more frequent - the less "forced" the final presentation will seem

- A positive & team-focused "Attitude" is critical to today's project communications
 - A "bad attitude" is rarely tolerated for long

Project Management Tips (continued)

Data Analysis & Measurement

- Understand what data is needed, then develop your collection plan
    - (both historical & new data)
- Use data to verify and help investigate findings
- Utilize good statistical analysis skills, and check all calculations
- Link data to actual observations, when possible
- Set up lab tests and mathematical models
- Constantly do "reality checks" with your subject experts

Project Management Tips (continued)
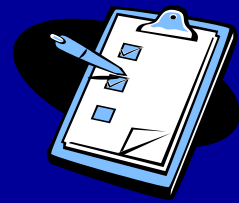
Benchmarking

- Do the main benchmarking only after you fully understand your current process
  - If done too early, you are not ready
  - If done too late, the benchmarking can't properly influence the solution development
- Utilize "white board" discussions (that are later typed up) to reach consensus with your Team
- Try to include your project's customer on some of the benchmarking tours

Project Management Tips (continued)
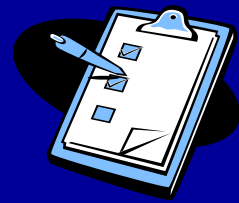
Solutions & Evaluations

- Write down alternative solutions throughout the project
    - Plan to research and investigate them
- Be creative and comprehensive when developing initial solutions ideas
- Develop an evaluation approach
    - (The criteria you want to use to determine which solutions are best)
- Rank the most likely solutions
    - (The ranking may be based on cost, schedule, or risk factors)
- Bring the project's customer in on the selection process and to offer real applications information
    - (A "reality check")

Project Management Tips (continued)

Conclusions & Recommendations

- Research & investigate the most likely conclusions with the entire Team
- Review the possible conclusions ongoing with your project's customer
- Take the best of the ideas and form a logical recommendation
- Assess the Recommendations by cost & risk when presented
- Time phase the recommendations, if needed

Project Management Tips (continued)

Presentations & Reports

- Review all final presentations (and final reports) prior to being given to the project's customer
- Make sure all files (hard copies & electronic) are organized and stored properly at the conclusion of the assignment

Some Project Dangers

Some Project Dangers

- Vague commitment from customer
- Poor project description Undefined or unclear objective
- Unrealistic scope
- Unrealistic deliverables
- Poorly defined tasks
- Too tight a schedule
- Multiple customers not in agreement
- 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
- Sub standard quality of data being used
- Bad team dynamics
- Non action-oriented report (or final presentation)
- Overlap with other project teams
- Legal issues

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 description, approach, schedule, & required resources
- Build recovery time into the schedule for contingencies
- Review 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)

Some Summary Comments from this Section

- Recognize when to use Project Management techniques on your IE assignments
- Form a good Team, with the needed Subject Experts
- 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
- Keep your customer & your Team informed throughout the project
- Learn from your own project management experiences (both the good and the bad)