西安电子科技大学
XIDIAN UNIVERSITY

04 系统分析与设计

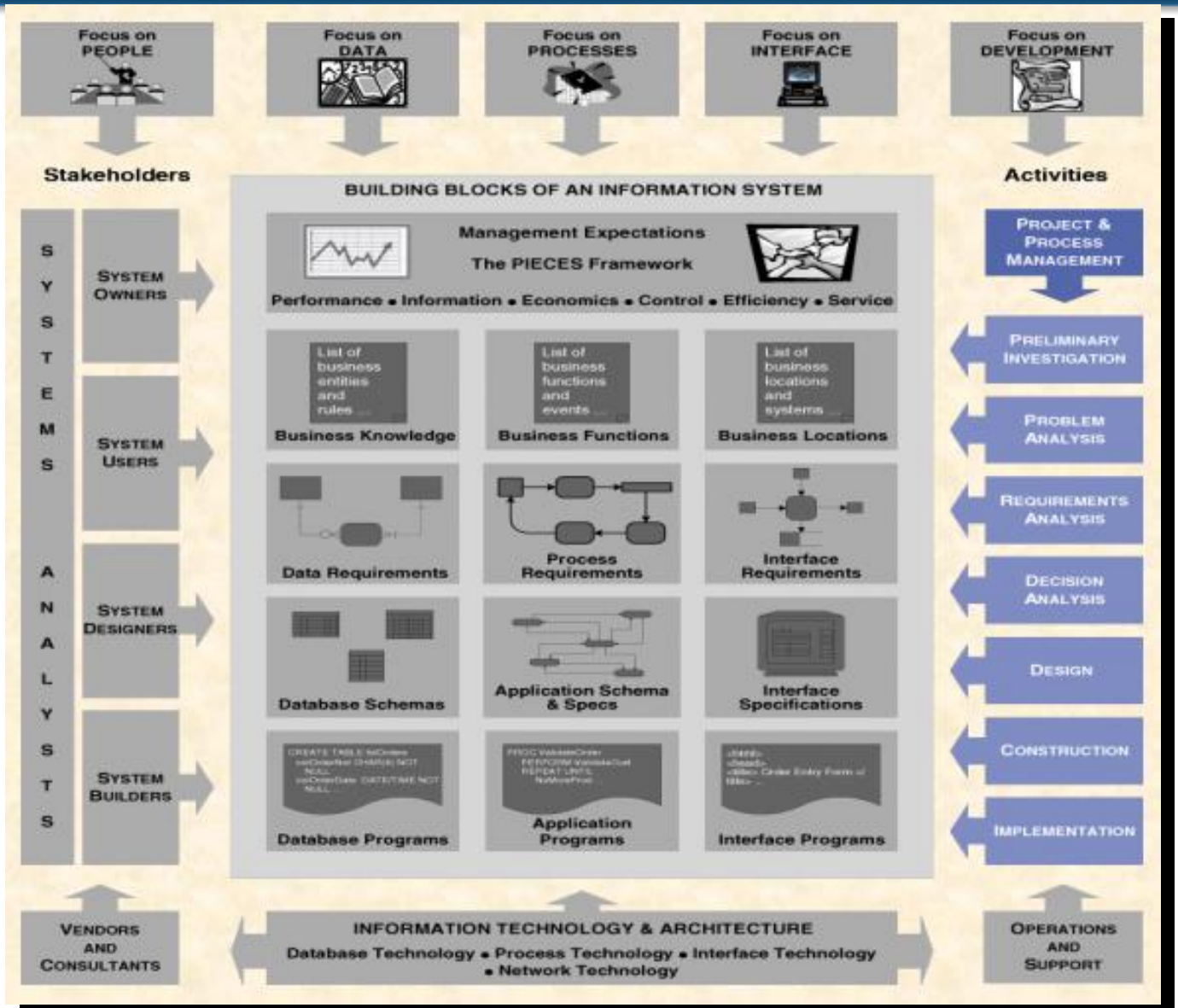
（System Analysis and Design）

Project Management

Content Structure

- **What is Project Management?**
  - 项目失败的原因；项目管理的知识结构和基本技术。
- **The Project Management Life Cycle**
  - 项目管理活动：确定项目的边界；认定项目中的各项任务；估计任务的持续期；规定任务之间的依赖关系；分配资源；指导项目组成员齐心协力地工作；监控开发过程；评估项目结果和总结经验。

Chapter Map


Focus on PEOPLE
Focus on DATA
Focus on PROCESSES
Focus on INTERFACE
Focus on DEVELOPMENT
Stakeholders
Activities
BUILDING BLOCKS OF AN INFORMATION SYSTEM
Management Expectations
The PIECES Framework
Performance • Information • Economics • Control • Efficiency • Service
SYSTEMS ANALYSTS
System Owners
System Users
System Designers
System Builders
List of business entities and rules
Business Knowledge
List of business functions and events
Business Functions
List of business locations and systems
Business Locations
Data Requirements
Process Requirements
Interface Requirements
Database Schemas
Application Schema & Specs
Interface Specifications
Database Programs
Application Programs
Interface Programs
Project & Process Management
Preliminary Investigation
Problem Analysis
Requirements Analysis
Decision Analysis
Design
Construction
Implementation
Vendors and Consultants
INFORMATION TECHNOLOGY & ARCHITECTURE
Database Technology • Process Technology • Interface Technology • Network Technology
Operations and Support

What is Project Management?

Project and Project Management

- A **project** is a [temporary] sequence of unique, complex, and connected activities having one goal or purpose and that must be completed by a specific time, within budget, and according to specification.
- **Project management** is the process of scoping, planning, staffing, organizing, directing, and controlling the development of an acceptable system at a minimum cost within a specified time frame.
- Project management is a process that starts at the beginning of a project, extends through a project, and doesn't culminate until the project is completed.

Project versus Process Management

- **Project management** is the process of scoping, planning, staffing, organizing, directing, and controlling the development of an acceptable system at a minimum cost within a specified time frame.
- **Process management** is an ongoing activity that documents, manages the use of, and improves an organization's chosen methodology (the "process") for system development. Process management is concerned with the activities, deliverables, and quality standards to be applied to all projects.

Measures of Project Success

- The resulting information system is acceptable to the customer. (客户接受)
- The system was delivered “on time.” (及时交付)
- The system was delivered “within budget.” (成本合理)
- The system development process had a minimal impact on ongoing business operations. (平稳过渡)

Some studies show that 60%-75% of all IT projects can be considered failures.

Causes of Project Failure

- Failure to establish upper-management commitment（高层管理义务） to the project – 自觉或不自觉地改变了项目的义务
- Lack of organization's commitment to the system development methodology – 组织或企业没有将应有的义务赋予开发过程
- Taking shortcuts through or around the system development methodology – 在时间、预算或人员技能等方面出了问题时，就在开发过程上偷工减料
- Poor expectations management – 对项目的期望随着时间而改变，以至于范围和/或技术特性超出了时间和预算能够支撑的程度
- Premature commitment to a fixed budget and schedule – 没有经过充分的分析就草率地确定了预算和时间表
- Poor estimating techniques – 没有采用科学方法来估计项目指标

Causes of Project Failure (continued)

- Overoptimism – 对项目中出现的问题过分乐观，总认为以后能够解决而不及时解决
- The mythical man-month – 认为有了问题时增加人力就可以解决，实际上人多不一定好办事
- Inadequate people management skills – 责任不明确，按管理者的主观意愿行事
- Failure to adapt to business change – 项目适应不了业务所发生的变化
- Insufficient resources – 对资源要求估计不足
- Failure to “manage to the plan” – 许多因素使得管理者自觉或不自觉地偏离了原来的项目计划

Project Manager Competencies

Business awareness	对业务的认识与理解能力
Business partner orientation	始终与业主和用户合作
Commitment to quality	对质量能够作出承诺
Initiative	主动性
Information gathering	获取信息的能力
Analytical thinking	分析能力
Conceptual thinking	理性思维能力
Interpersonal awareness	对人际关系的认识与处理能力
Organizational awareness	对组织或企业战略的认识
Anticipation of impact	对结果的预期能力
Resourceful use of influence	善于合作
Motivating others	善于调动人的积极性

Project Manager Competencies （continued）

- Communication skills 有效地进行交流
- Developing others 对项目组成员的组织能力
- Monitoring and controlling 对项目进展的监控能力
- Self-confidence 自信而不自负
- Stress management 承受压力的能力
- Concern for credibility 诚信
- Flexibility 有原则的灵活性

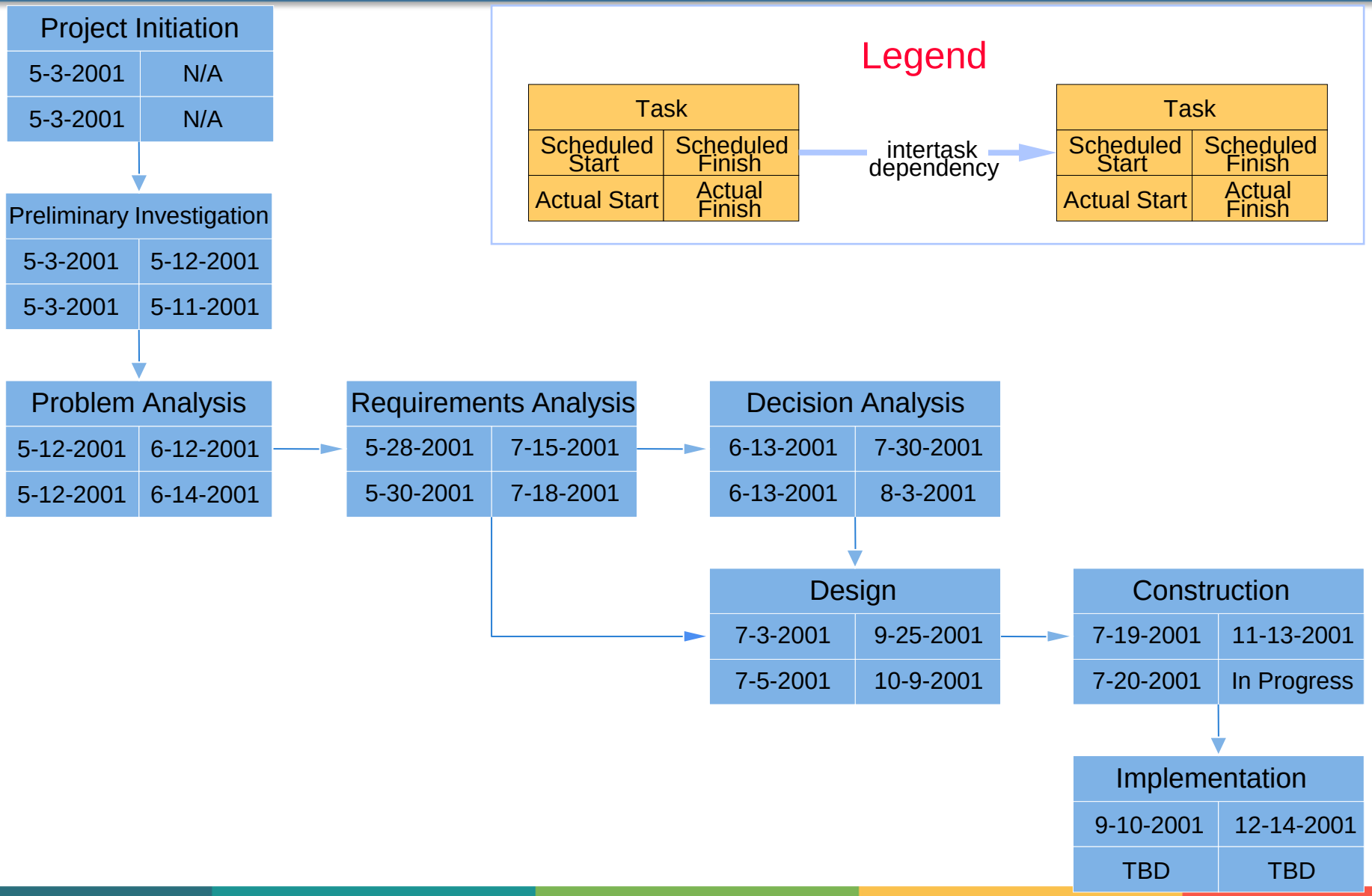
Project Management Functions

- Scoping 确定项目的边界
- Planning 认定需要完成的任务
- Estimating 评估所需资源
- Scheduling 任务进度安排
- Organizing 确保人员理解角色和职责
- Directing 指挥项目组成员的活动
- Controlling 控制项目开发过程
- Closing 总结经验和教训

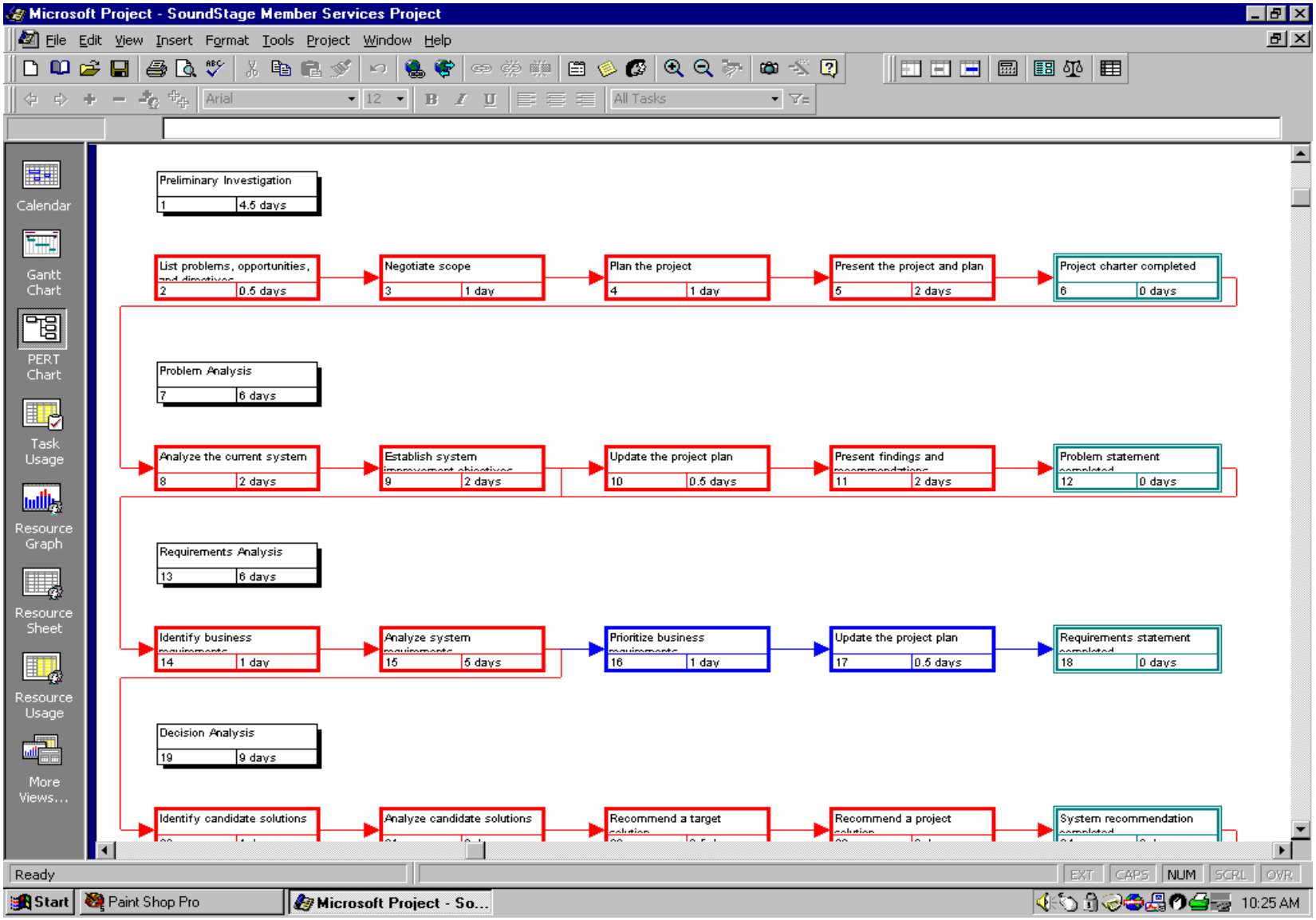
Project Management Tools & Techniques

- A **PERT chart** is a graphical network model that depicts a project's tasks and the relationships between those tasks. PERT was developed to make clear the interdependence between project tasks before those tasks are scheduled.
- A **Gantt chart** is a simple horizontal bar chart that depicts project tasks against a calendar. Each bar represents a named project task. The tasks are listed vertically in the left-hand column. The horizontal axis is a calendar timeline. Gantt charts offer the advantage of clearly showing overlapping tasks.

PERT Chart

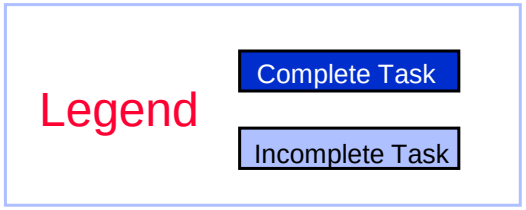

Project Initiation
5-3-2001
N/A
5-3-2001
N/A
Preliminary Investigation
5-3-2001
5-12-2001
5-3-2001
5-11-2001
Problem Analysis
5-12-2001
6-12-2001
5-12-2001
6-14-2001
Requirements Analysis
5-28-2001
7-15-2001
5-30-2001
7-18-2001
Decision Analysis
6-13-2001
7-30-2001
6-13-2001
8-3-2001
Design
7-3-2001
9-25-2001
7-5-2001
10-9-2001
Construction
7-19-2001
11-13-2001
7-20-2001
In Progress
Implementation
9-10-2001
12-14-2001
TBD
TBD
Legend
Task
Scheduled Start
Scheduled Finish
Actual Start
Actual Finish
intertask dependency
Task
Scheduled Start
Scheduled Finish
Actual Start
Actual Finish

Microsoft Project PERT Chart

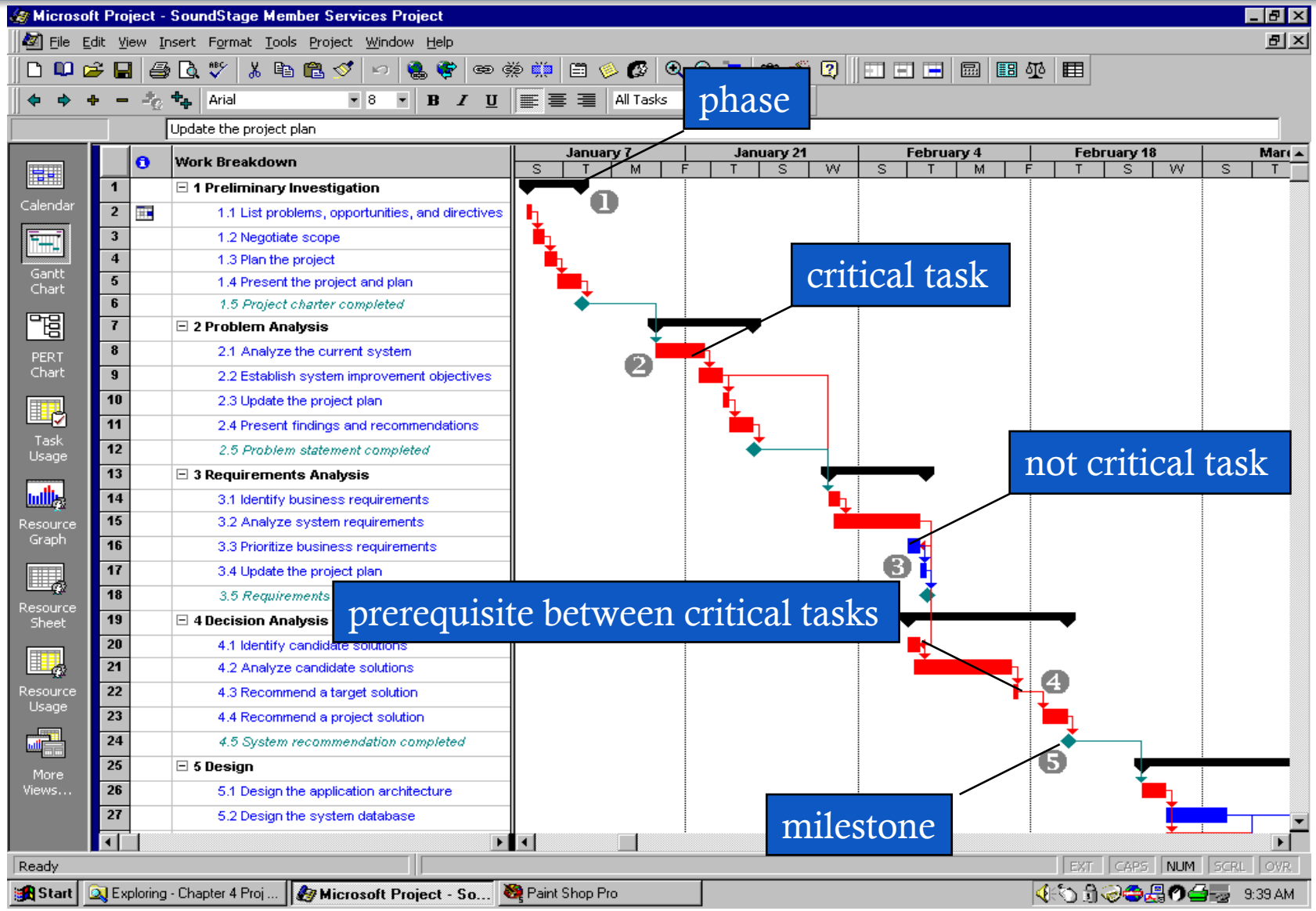


Gantt Chart

ID	Task Name	2001							
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Preliminary investigation								
2	Problem analysis								
3	Requirements analysis								
4	Decision analysis								
5	Design								
6	Construction								
7	Implementation								

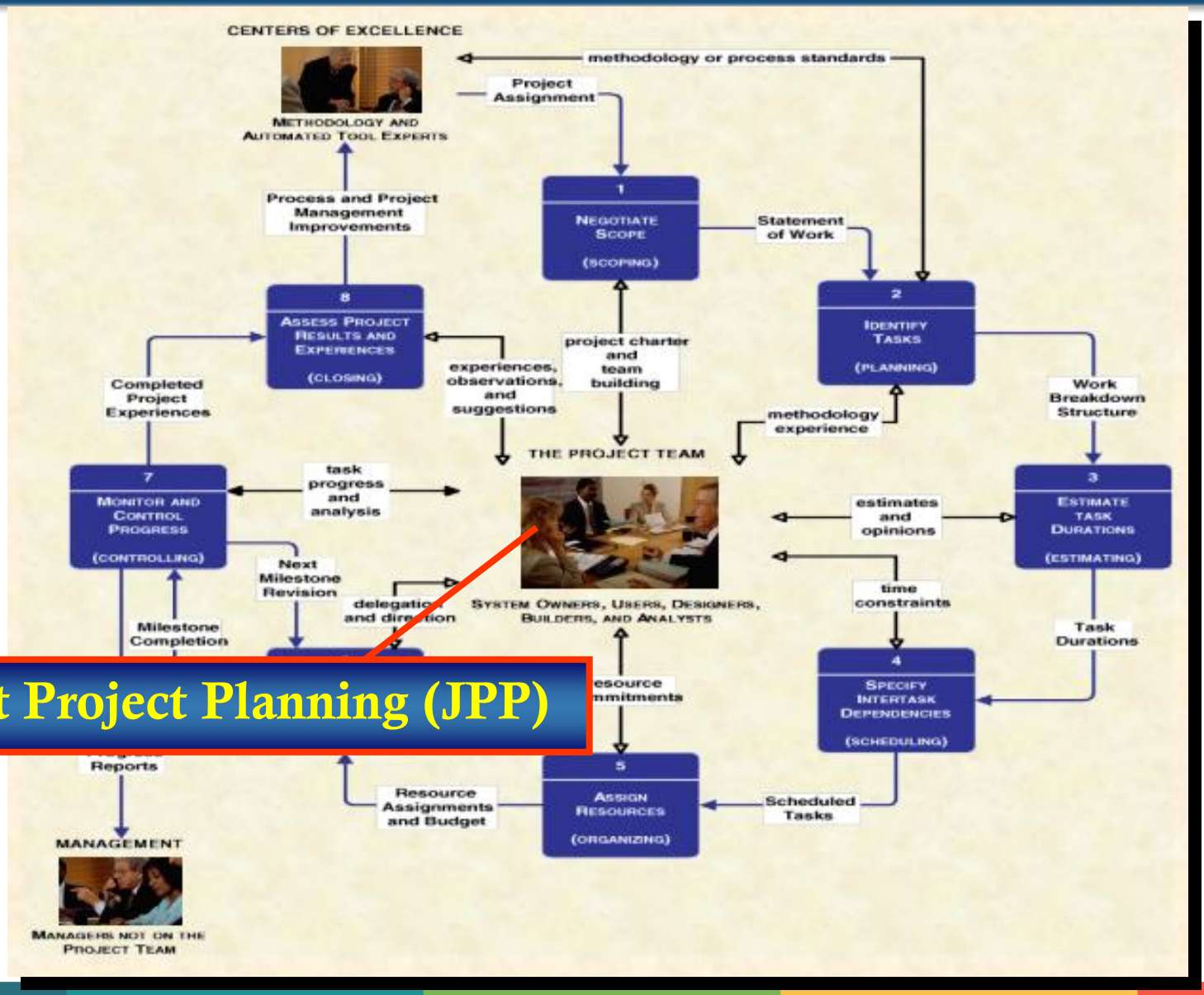


Microsoft Project Gantt Chart



The Project Management Life Cycle

Project Management Life Cycle

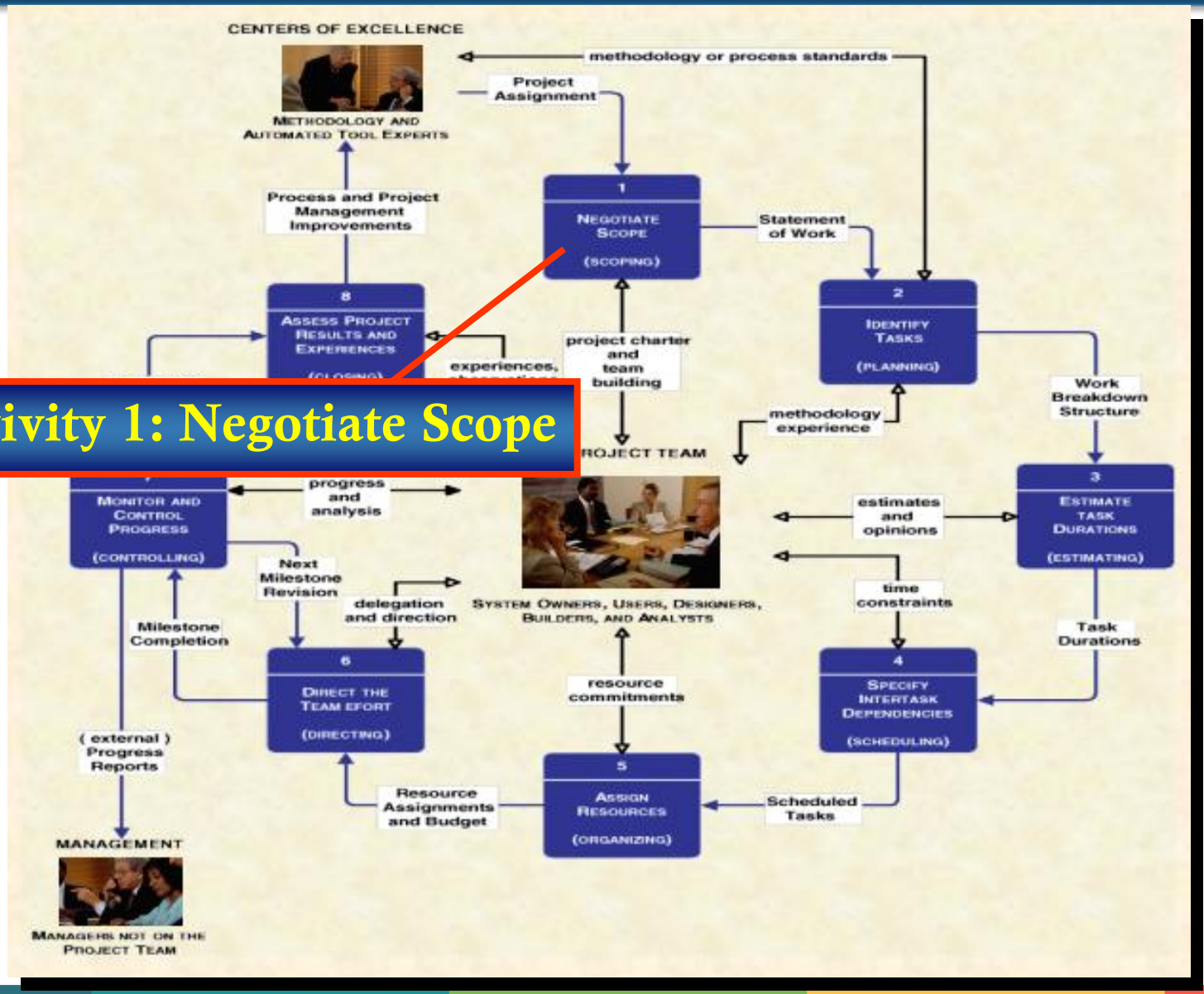


Joint Project Planning (JPP)

Joint Project Planning Strategy

- Joint project planning (JPP) is a strategy wherein all stakeholders in a project (meaning system owners, users, analysts, designers, and builders) participate in a one-to-three day project management workshop, the result of which is consensus agreement on project scope, schedule, resources, and budget. (Of course, subsequent workshops or meetings may be required to adjust scope, budget, and schedule.)

Project Management Life Cycle



Activity 1: Negotiate Scope

Activity 1: Negotiate Scope

- Scope defines the boundaries of a project—What part of the business is to be studied, analyzed, designed, constructed, implemented, and ultimately improved?
- The answers to five basic questions influence the negotiation of project scope:
  - Product – What do you want?
  - Quality – How good do you want it to be?
  - Time – When do you want it?
  - Cost – How much are you willing to pay for it?
  - Resources – What resource are you willing or able to bring to the table?

Activity 1: Negotiate Scope

- A statement of work is a narrative description（叙述性的描述）of the work to be performed as part of a project. Common synonyms include scope statement, project definition, project overview, and document of understanding.

Activity 1: Negotiate Scope

- A statement o … 描述
) of the work to … n
synonyms includ … ,
overview, and do …

Statement of Work

I. Purpose
II. Background
  A. Problem, opportunity, or directive statement
  B. History leading to project request
  C. Project goal and objectives
  D. Product description
III. Scope
  (notice the use of your information system building blocks)
  A. Stakeholders
  B. Data
  C. Processes
  D. Locations
IV. Project Approach
  A. Route
  B. Deliverables
V. Managerial Approach
  A. Team building considerations
  B. Manager and experience
  C. Training requirements
  D. Meeting schedules
  E. Reporting methods and frequency
  F. Conflict management
  G. Scope management

Notice the use of information system building blocks

(continued)

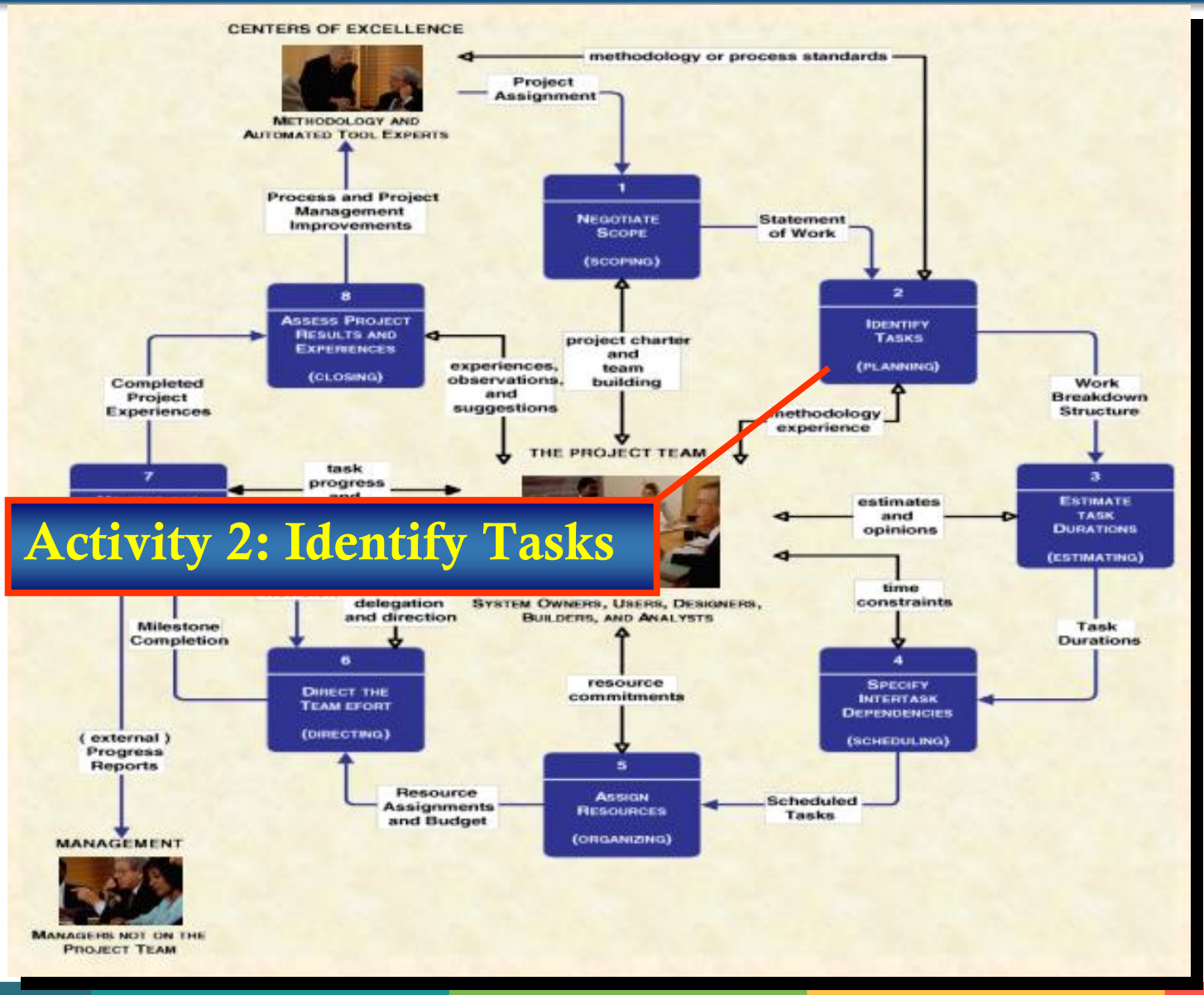
Activity 1: Negotiate Scope

- A statement o 描述
) of the work to
synonyms includ
overview, and do

Statement of Work *(concluded)*

VI. Constraints
  A. Start date
  B. Deadlines
  C. Budget
  D. Technology
VII. Ballpark Estimates（对阶段成果的估计）
  A. Schedule
  B. Budget
VIII. Conditions of Satisfaction
  A. Success criteria
  B. Assumptions
  C. Risks
IX. Appendices

Project Management Life Cycle



Activity 2: Identify Tasks

Activity 2: Identify Tasks

- A work breakdown structure (WBS) is a hierarchical decomposition of the project into phases, activities, and tasks.
- Milestones are events that signify the accomplishment or completion of major deliverables（可向下一阶段或活动交付的结果） during a project.

Work Breakdown Structures

1 Phase 1 of the project …
2 Phase 2 of the project …
  2.1 Activity 1 of Phase 2
  …
  2.2 Activity 2 of Phase 2
    2.2.1 Task 1 of Activity 2.2 in Phase 2
    2.2.2 Task 2 of Activity 2.2 in Phase 2
    2.2.3 Task 3 of Activity 2.2 in Phase 2
  2.3 Activity 3 of Phase 2
  …
3 Phase 3 of the project …

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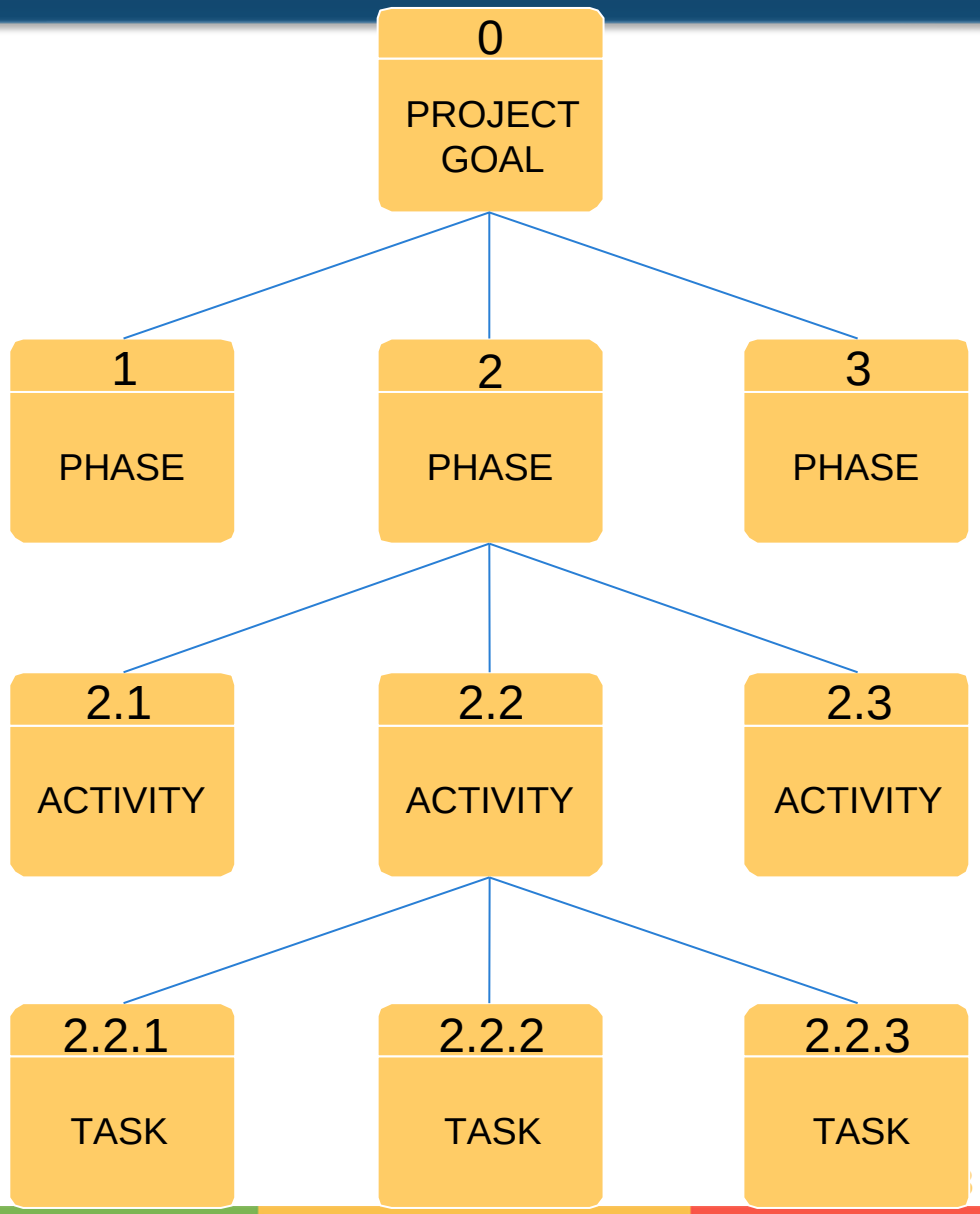
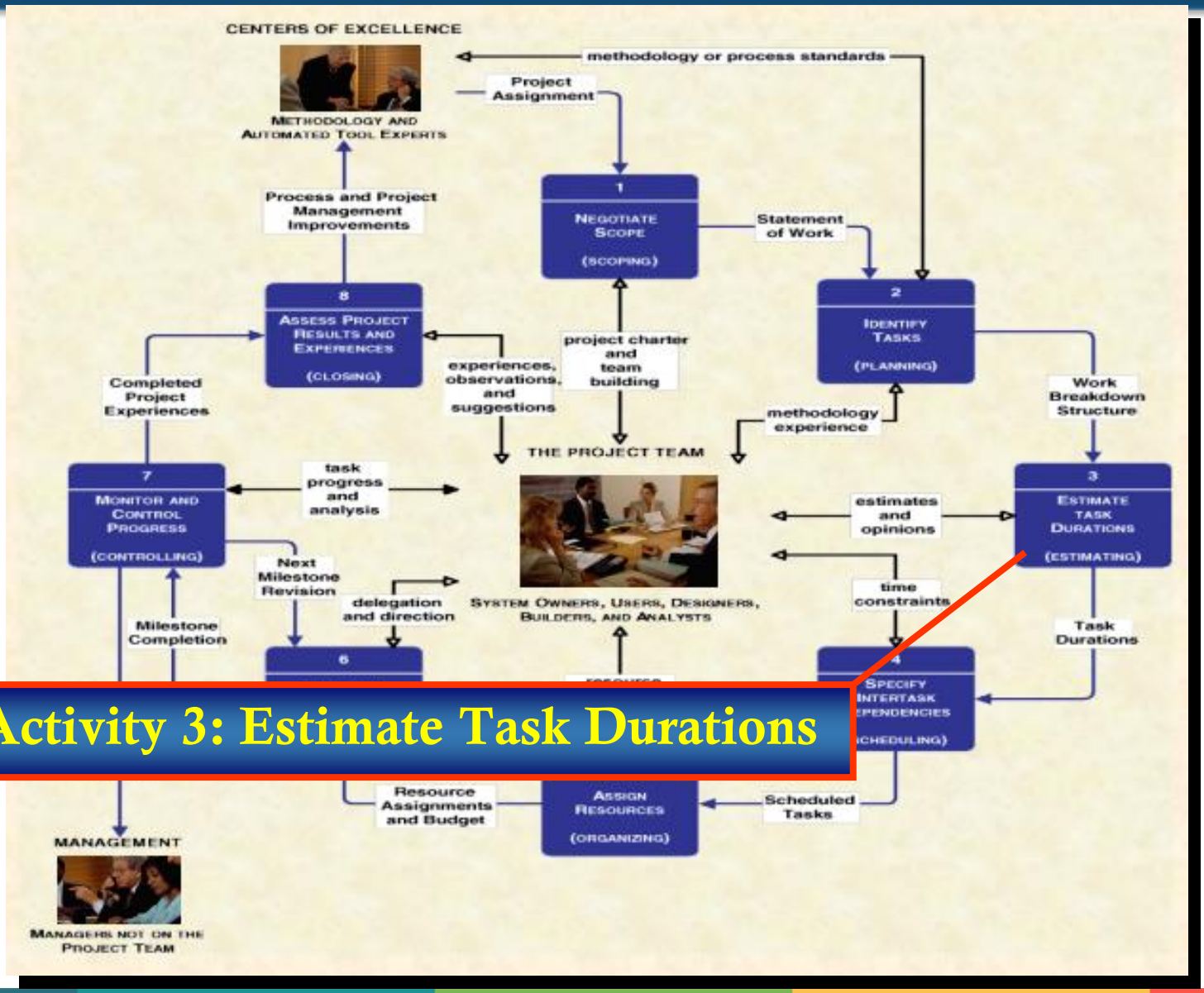


Project Management Life Cycle



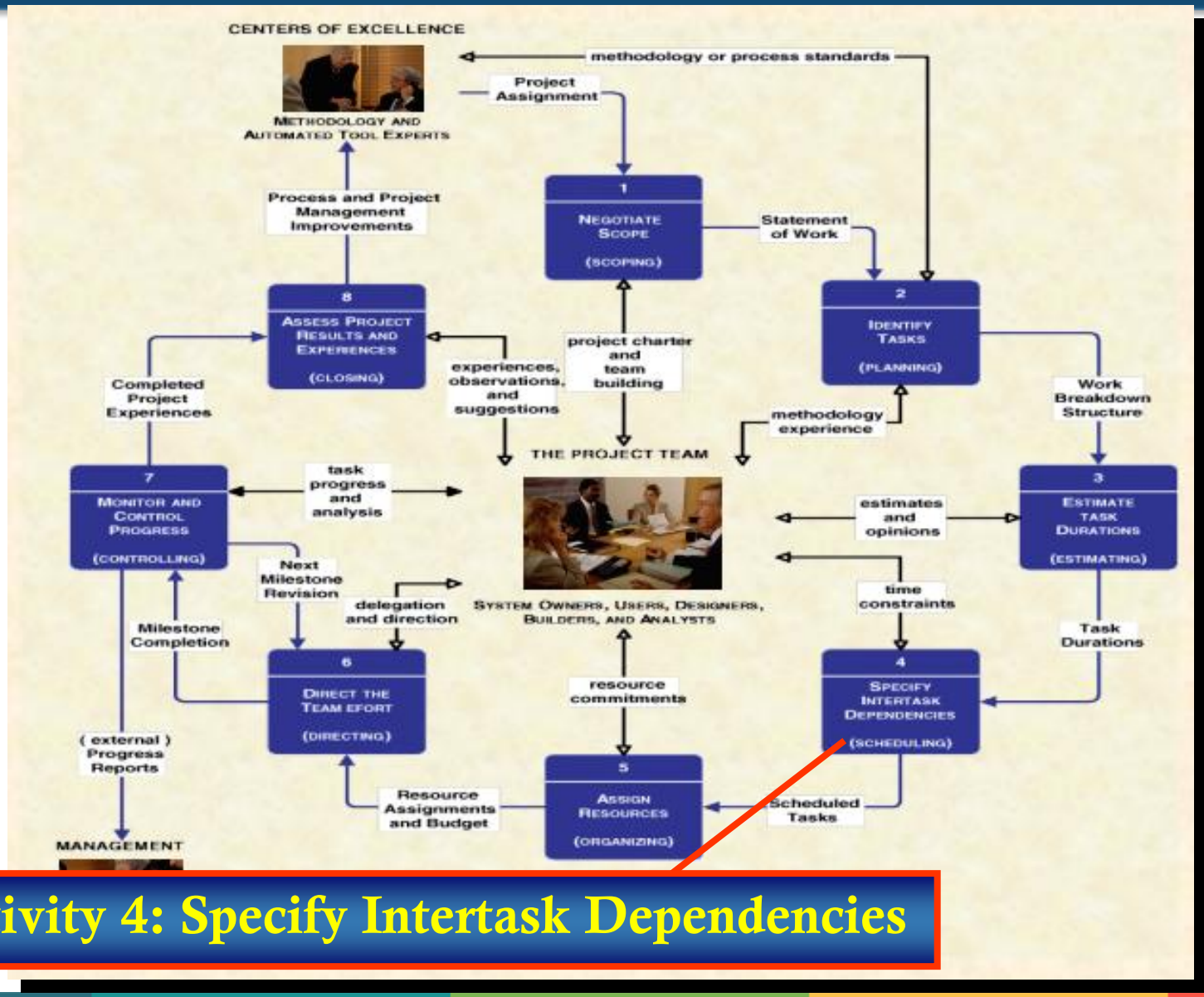
Activity 3: Estimate Task Durations

Activity 3: Estimate Task Durations

- 1. Estimate the minimum amount of time it would take to perform the task. We'll call this the optimistic duration (OD). – 乐观的持续期
- 2. Estimate the maximum amount of time it would take to perform the task. We'll call this the pessimistic duration (PD). – 悲观的持续期
- 3. Estimate the expected duration (ED) that will be needed to perform the task. – 期望的持续期
- 4. Calculate the most likely duration (D)（最有希望的持续期）as follows:

$$D = \frac{(1 \times OD) + (4 \times ED) + (1 \times PD)}{6}$$

Project Management Life Cycle

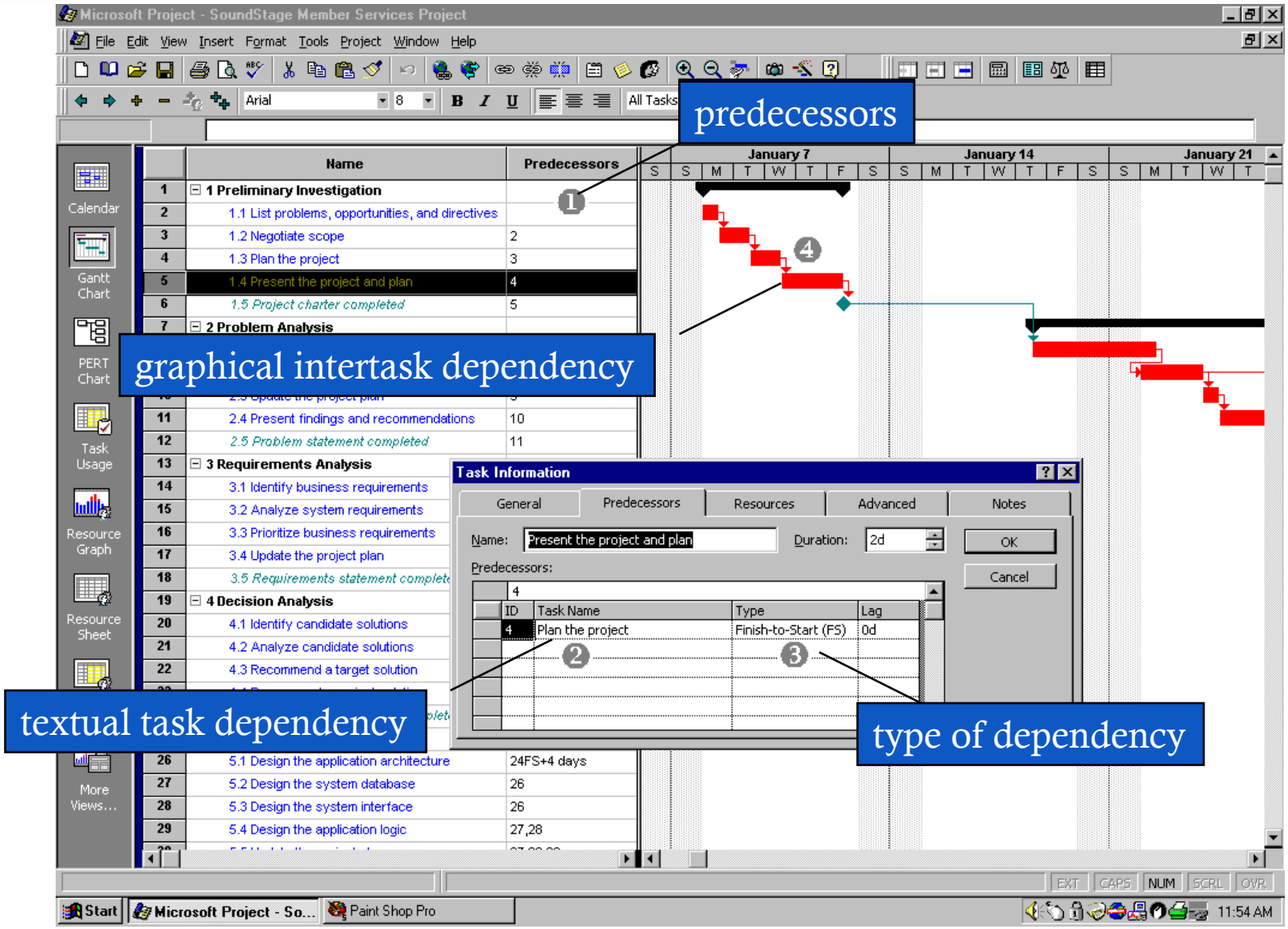


Activity 4: Specify Intertask Dependencies

Activity 4: Specify Intertask Dependencies

- Finish-to-start (FS)—The finish of one task triggers the start of another task.
- Start-to-start (SS)—The start of one task triggers the start of another task.
- Finish-to-finish (FF)—Two tasks must finish at the same time.
- Start-to-finish (SF)—The start of one task signifies the finish of another task.

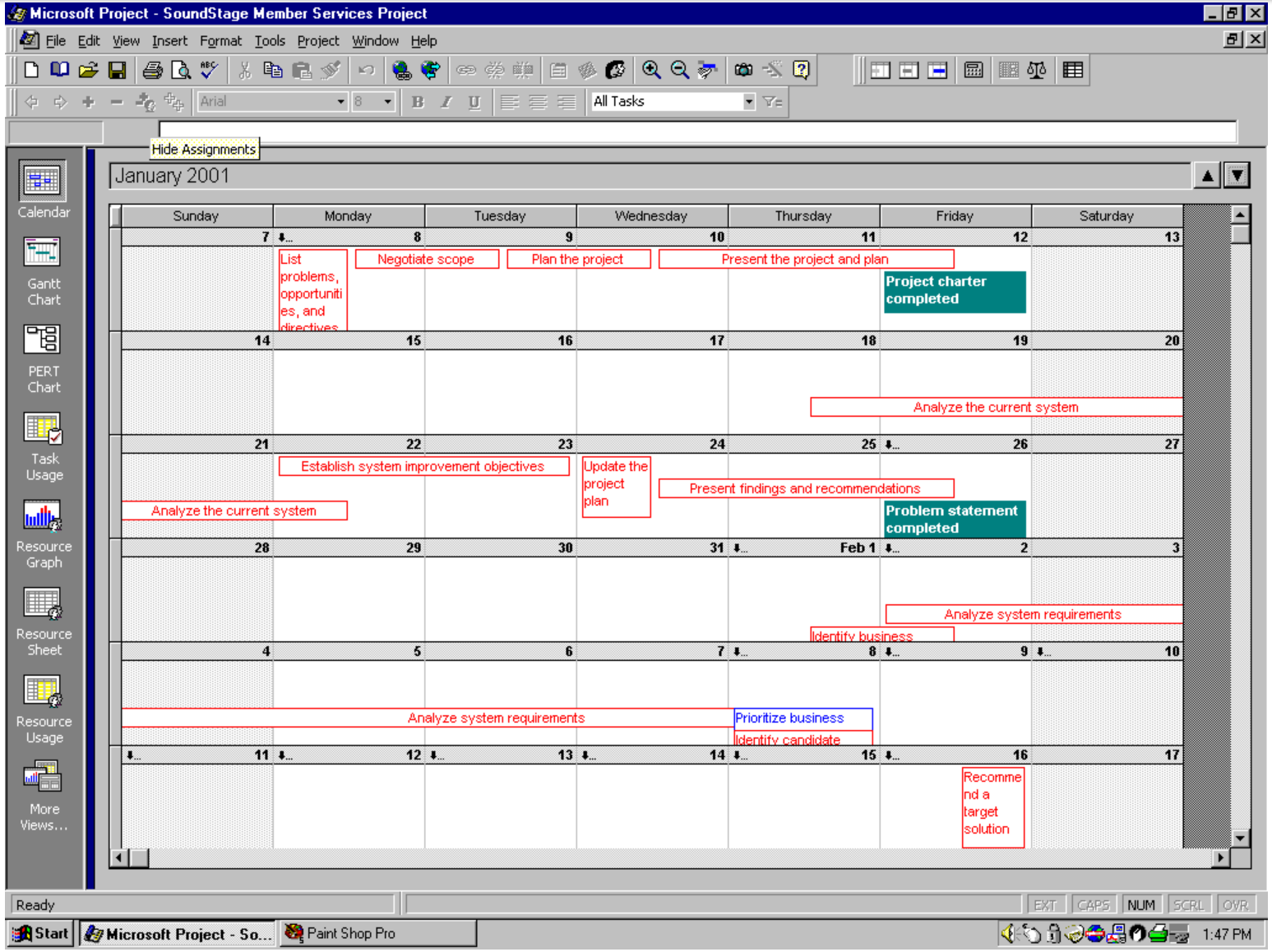
Entering Intertask Dependencies



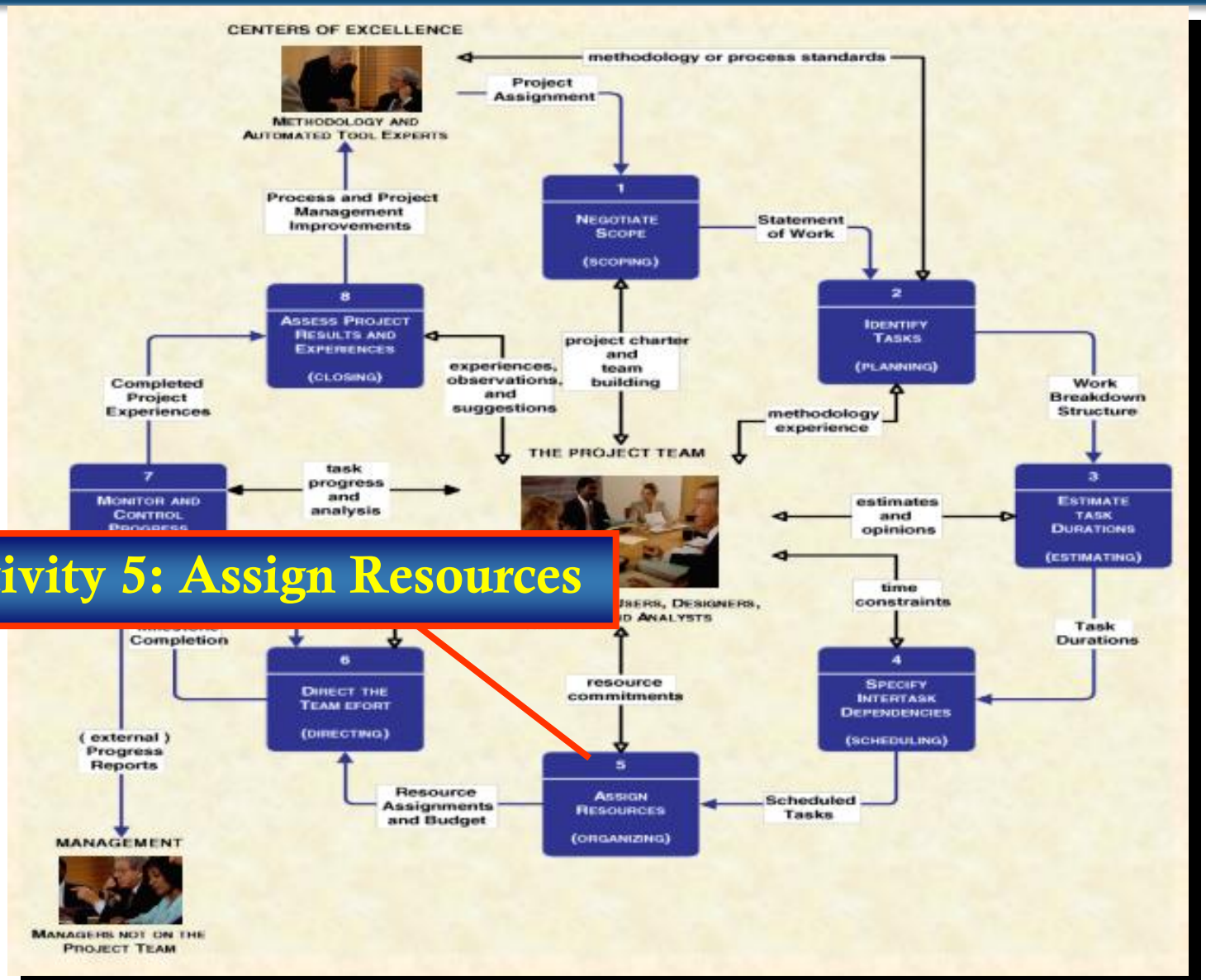
Scheduling Strategies

- Forward scheduling establishes a project start date and then schedules forward from that date. Based on the planned duration of required tasks, their interdependencies, and the allocation of resources to complete those tasks, a projected project completion date is calculated.
- Reverse scheduling establishes a project deadline and then schedules backward from that date. Essentially, tasks, their duration, interdependencies, and resources must be considered to ensure that the project can be completed by the deadline.

A Project Calendar



Project Management Life Cycle

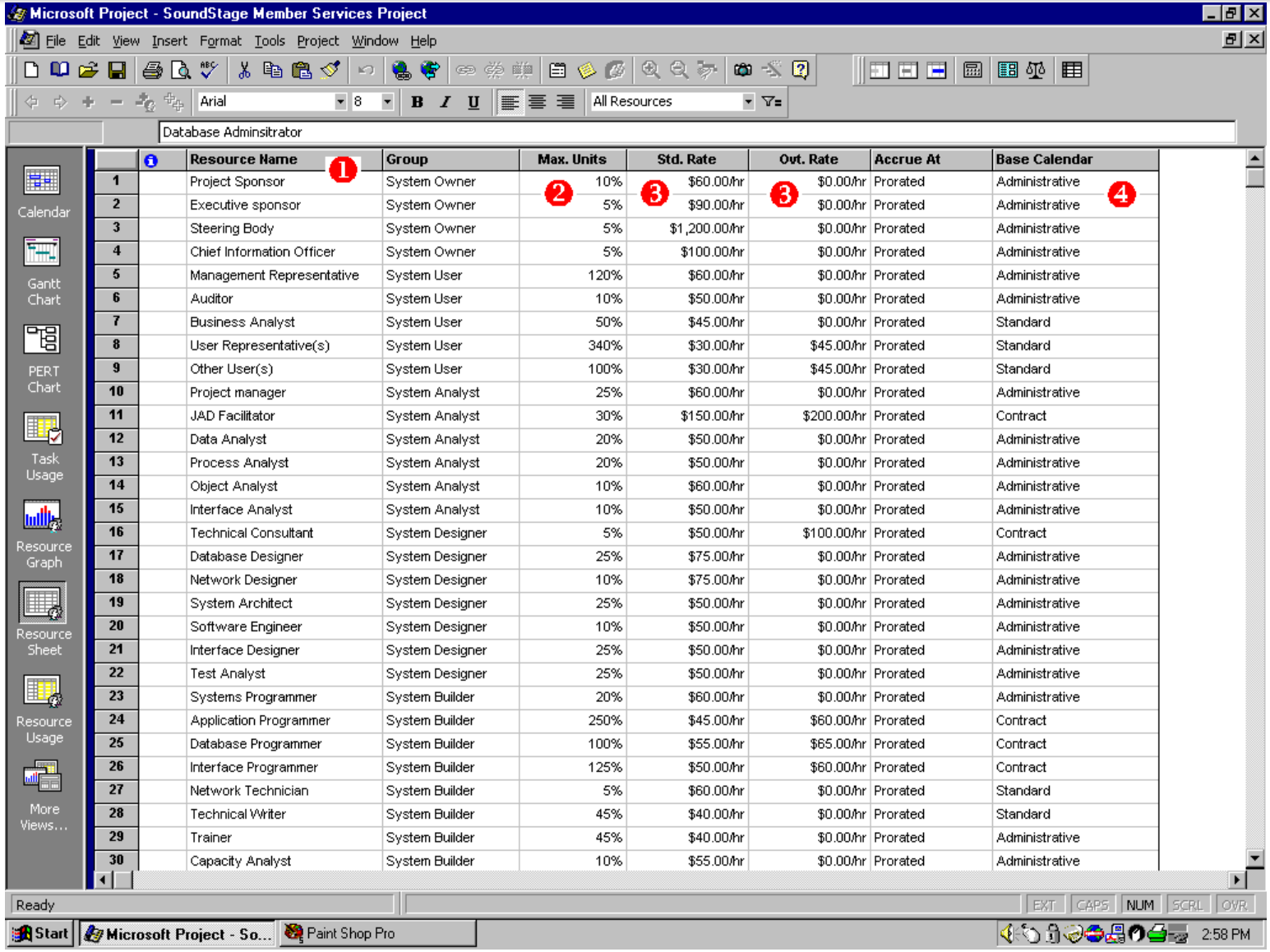


Activity 5: Assign Resources

Activity 5: Assign Resources

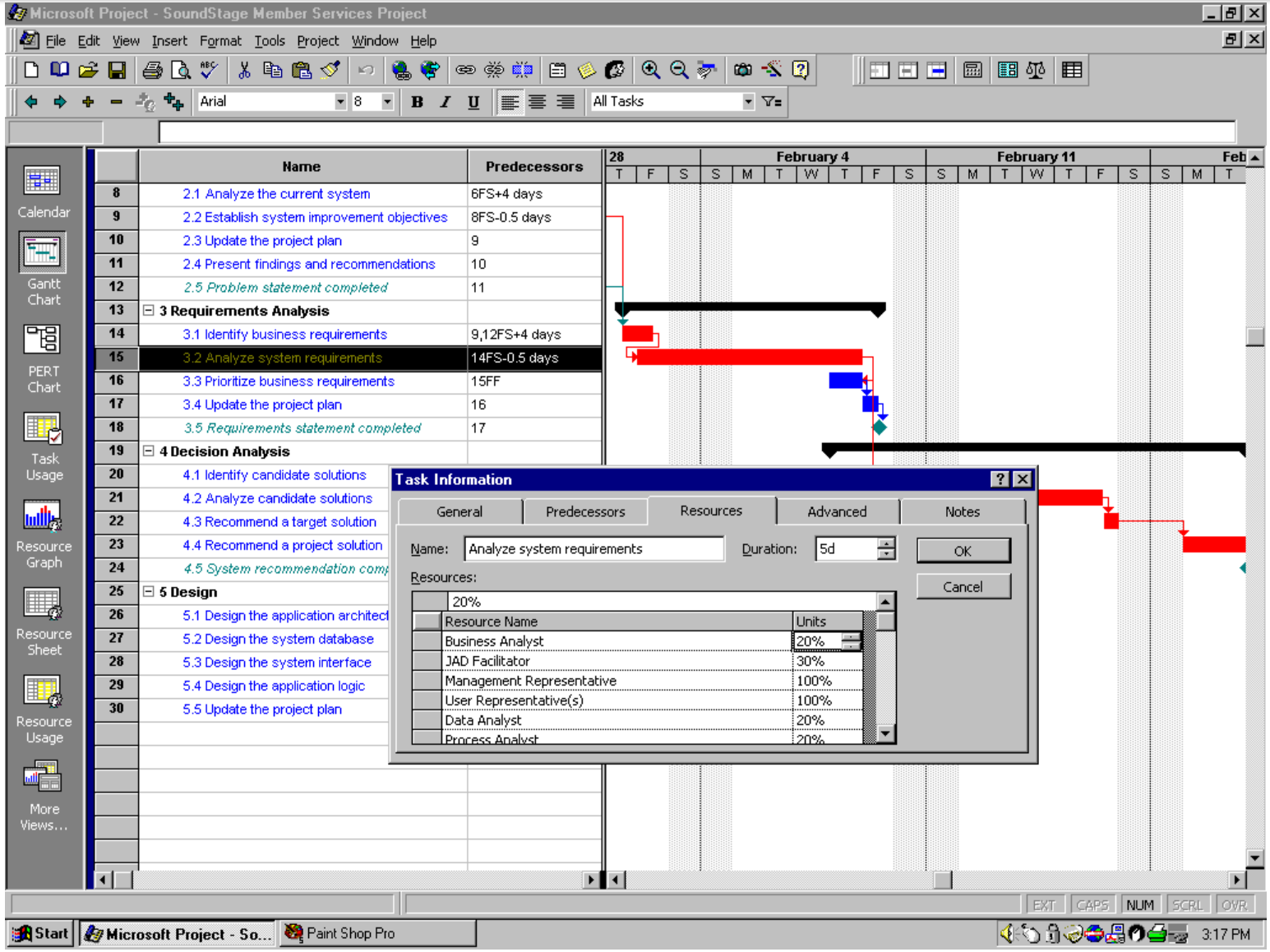
- People—inclusive of all the system owners, users, analysts, designers, builders, external agents, and clerical help that will be involved in the project in any way.
- Services—a service such as a quality review that may be charged on a per use basis.
- Facilities and equipment—including all rooms and technology that will be needed to complete the project.
- Supplies and materials—everything from pencils, paper, notebooks, toner cartridges, etc.
- Money—A translation of all of the above into the language of accounting—budgeted dollars!

Defining Project Resources



	Resource Name	Group	Max. Units	Std. Rate	Ovt. Rate	Accrue At	Base Calendar
1	Project Sponsor	System Owner	10%	$60.00/hr	$0.00/hr	Prorated	Administrative
2	Executive sponsor	System Owner	5%	$90.00/hr	$0.00/hr	Prorated	Administrative
3	Steering Body	System Owner	5%	$1,200.00/hr	$0.00/hr	Prorated	Administrative
4	Chief Information Officer	System Owner	5%	$100.00/hr	$0.00/hr	Prorated	Administrative
5	Management Representative	System User	120%	$60.00/hr	$0.00/hr	Prorated	Administrative
6	Auditor	System User	10%	$50.00/hr	$0.00/hr	Prorated	Administrative
7	Business Analyst	System User	50%	$45.00/hr	$0.00/hr	Prorated	Standard
8	User Representative(s)	System User	340%	$30.00/hr	$45.00/hr	Prorated	Standard
9	Other User(s)	System User	100%	$30.00/hr	$45.00/hr	Prorated	Standard
10	Project manager	System Analyst	25%	$60.00/hr	$0.00/hr	Prorated	Administrative
11	JAD Facilitator	System Analyst	30%	$150.00/hr	$200.00/hr	Prorated	Contract
12	Data Analyst	System Analyst	20%	$50.00/hr	$0.00/hr	Prorated	Administrative
13	Process Analyst	System Analyst	20%	$50.00/hr	$0.00/hr	Prorated	Administrative
14	Object Analyst	System Analyst	10%	$60.00/hr	$0.00/hr	Prorated	Administrative
15	Interface Analyst	System Analyst	10%	$50.00/hr	$0.00/hr	Prorated	Administrative
16	Technical Consultant	System Designer	5%	$50.00/hr	$100.00/hr	Prorated	Contract
17	Database Designer	System Designer	25%	$75.00/hr	$0.00/hr	Prorated	Administrative
18	Network Designer	System Designer	10%	$75.00/hr	$0.00/hr	Prorated	Administrative
19	System Architect	System Designer	25%	$50.00/hr	$0.00/hr	Prorated	Administrative
20	Software Engineer	System Designer	10%	$50.00/hr	$0.00/hr	Prorated	Administrative
21	Interface Designer	System Designer	25%	$50.00/hr	$0.00/hr	Prorated	Administrative
22	Test Analyst	System Designer	25%	$50.00/hr	$0.00/hr	Prorated	Administrative
23	Systems Programmer	System Builder	20%	$60.00/hr	$0.00/hr	Prorated	Administrative
24	Application Programmer	System Builder	250%	$45.00/hr	$60.00/hr	Prorated	Contract
25	Database Programmer	System Builder	100%	$55.00/hr	$65.00/hr	Prorated	Contract
26	Interface Programmer	System Builder	125%	$50.00/hr	$60.00/hr	Prorated	Contract
27	Network Technician	System Builder	5%	$60.00/hr	$0.00/hr	Prorated	Standard
28	Technical Writer	System Builder	45%	$40.00/hr	$0.00/hr	Prorated	Standard
29	Trainer	System Builder	45%	$40.00/hr	$0.00/hr	Prorated	Administrative
30	Capacity Analyst	System Builder	10%	$55.00/hr	$0.00/hr	Prorated	Administrative

Assigning Project Resources



Resource Leveling

- Resource leveling is a strategy used to correct resource overallocations by some combination of delaying or splitting tasks.
- There are two techniques for resource leveling:
  - task delaying
  - task splitting

Task Splitting and Delaying

- The critical path（关键路径） for a project is that sequence of dependent tasks that have the largest sum of most likely durations. The critical path determines the earliest possible completion date of the project.
  - Tasks that are on the critical path cannot be delayed without delaying the entire project schedule. To achieve resource leveling, critical tasks can only be split.
- The slack time（空闲时间） available for any noncritical task is the amount of delay that can be tolerated between the starting time and completion time of a task without causing a delay in the completion date of the entire project.
  - Tasks that have slack time can be delayed to achieve resource leveling

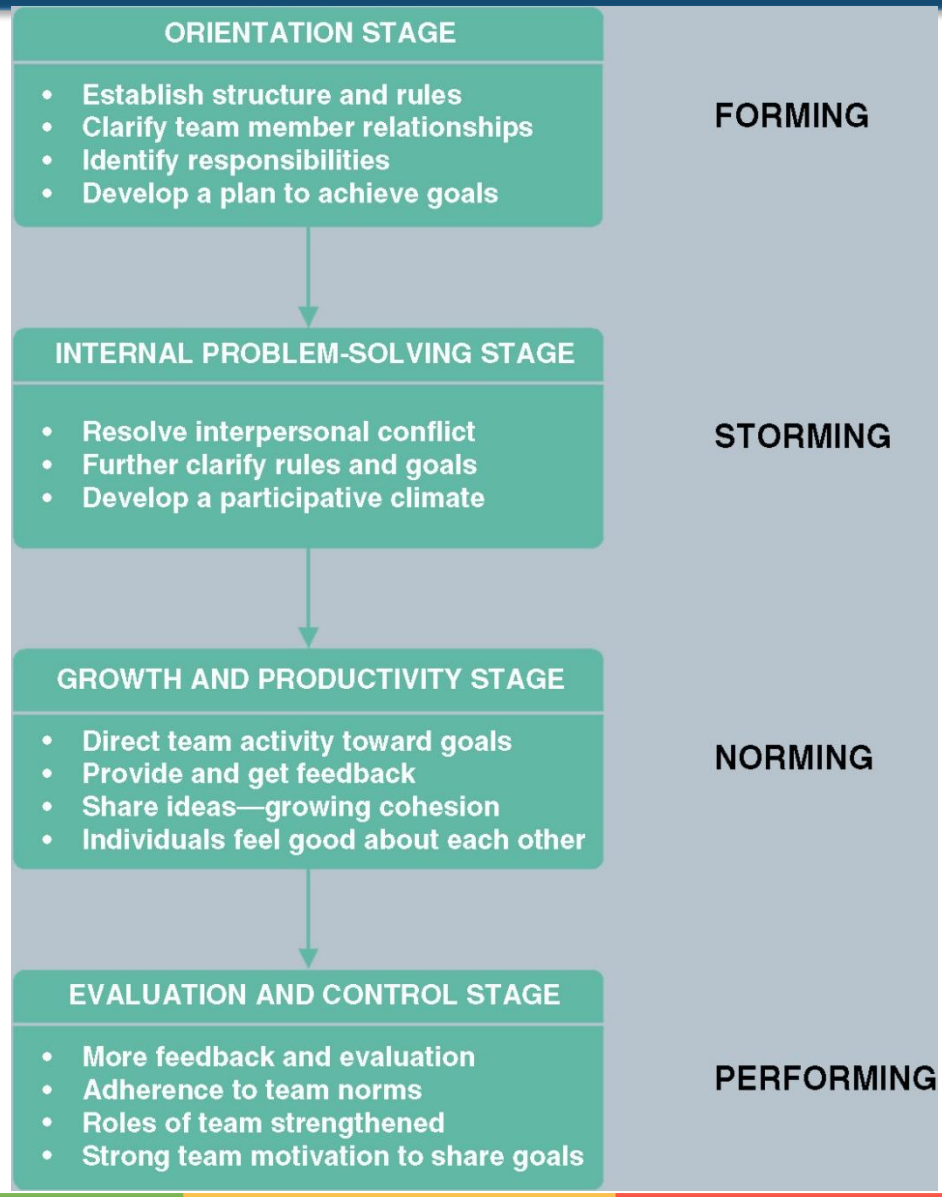
Project Management Life Cycle

Activity 6: Direct the Team Effort

- Supervision resources
  - The DEADLINE – A Novel About Project Management
  - The One Minute Manager（在一分钟里设定目标；只赞扬一分钟；只批评一分钟)
  - The Care and Feeding of Monkeys
  - The People Side of Systems
  - The One Minute Manager Meets the Monkey

Activity 6: Direct the Team Effort

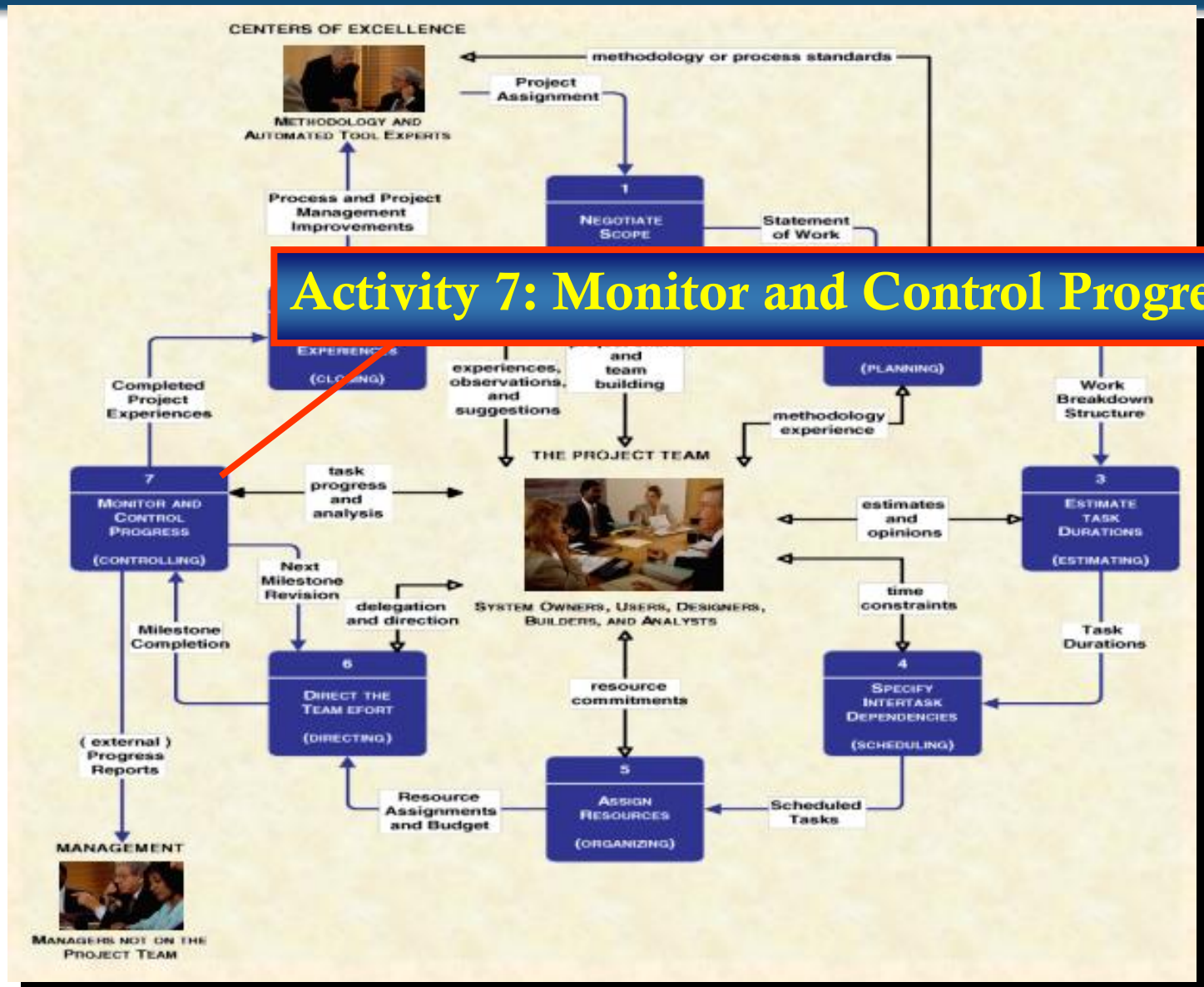
- Stages of Team Maturity



Activity 6: Direct the Team Effort

- 10 Hints for Project Leadership
  - Be consistent
  - Provide support
  - Don’t make promises you can’t keep
  - Praise in public, criticize in private
  - Be aware of morale danger points
  - Set realistic deadlines
  - Set perceivable targets
  - Explain and show, rather than do
  - Don’t rely just on [status reports]
  - Encourage a good team spirit

Project Management Life Cycle



Activity 7: Monitor and Control Progress

- Progress reporting
- Change management
- Expectations management
- Schedule adjustments—critical path analysis (CPA)

Sample Outline for a Progress Report

Progress Report

I. Cover Page
   - A. Project name or identification
   - B. Project manager
   - C. Date or report

II. Summary of progress
   - A. Schedule analysis
   - B. Budget analysis
   - C. Scope analysis
     (describe any changes that may have an impact on future progress)
   - D. Process analysis
     (describe any problems encountered with strategy or methodology)
   - E. Gantt progress chart(s)

III. Activity analysis
   - A. Tasks completed since last report
   - B. Current tasks and deliverables
   - C. Short term future tasks and deliverables

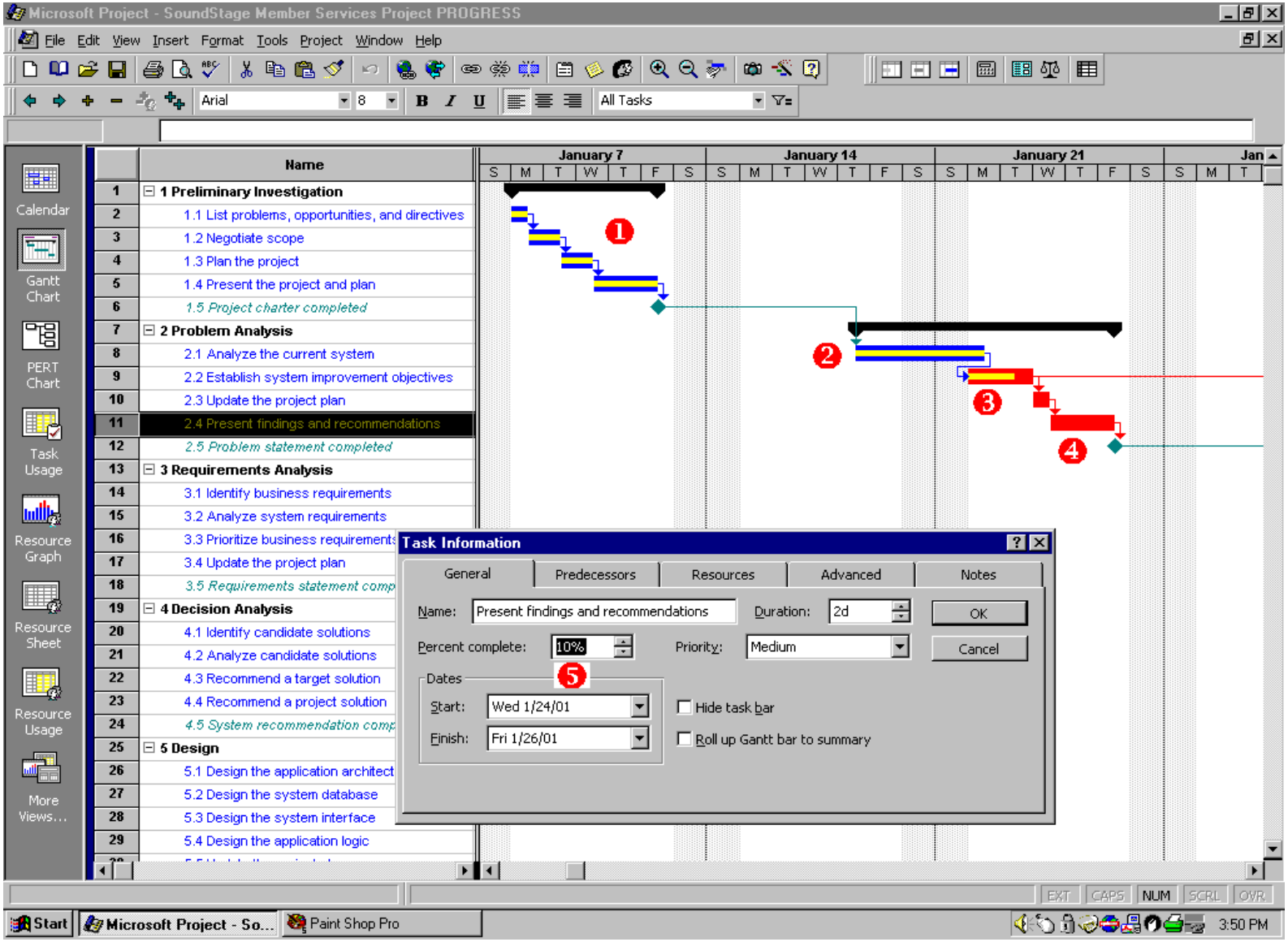
(continued)

Sample Outline for a Progress Report

Progress Report

V. Previous problems and issues
  A. Action item and status
  B. New or revised action items
    1. Recommendation
    2. Assignment of responsibility
    3. Deadline
V. New problems and issues
  A. Problems
    (actual or anticipated)
  B. Issues
    (actual or anticipated)
  C. Possible solutions
    1. Recommendation
    2. Assignment of responsibility
    3. Deadline
VI. Attachments
  (include relevant printouts from project management software)

Progress on a Gantt Chart



Change Management

- Change Management – a formal strategy in which a process is established to facilitate changes that occur during a project.

Expectations Management

- An expectations management matrix is a rule-driven tool for helping management understand the dynamics and impact of changing project parameters such as cost, schedule, scope, and quality.

PRIORITIES ➔ ⬇ MEASURES OF SUCCESS	Max or Min	Constrain	Accept
Cost			
Schedule			
Scope and/or Quality			

Three Simple Rules

- For any project, you must record three Xs within the nine available cells.
- No row may contain more than one X. In other words, a single measure of success must have one and only one priority.
- No column may contain more than one X. In other words, there must be a first, second, and third priority.

Lunar Project Expectations Management

PRIORITIES → ↓ MEASURES OF SUCCESS	Max or Min	Constrain	Accept
Cost • $20 billion (estimated)			X
Schedule • Dec 31, 1969 (deadline)		X	
Scope and/or Quality • Land a man on the moon • Get him back safely	X		

Typical, Initial Expectations for a Project

PRIORITIES ➔ ⬇ MEASURES OF SUCCESS	Max or Min	Constrain	Accept
Cost		X	
Schedule			X
Scope and/or Quality	X		

Adjusting Expectations

PRIORITIES ➔ ⬇ MEASURES OF SUCCESS	Max or Min	Constrain	Accept
Cost • Adjusted budget		X+ Increase budget	
Schedule • Adjusted deadline			X- Extend deadline
Scope and/or Quality • Adjusted scope	X+ Accept expanded requirements		

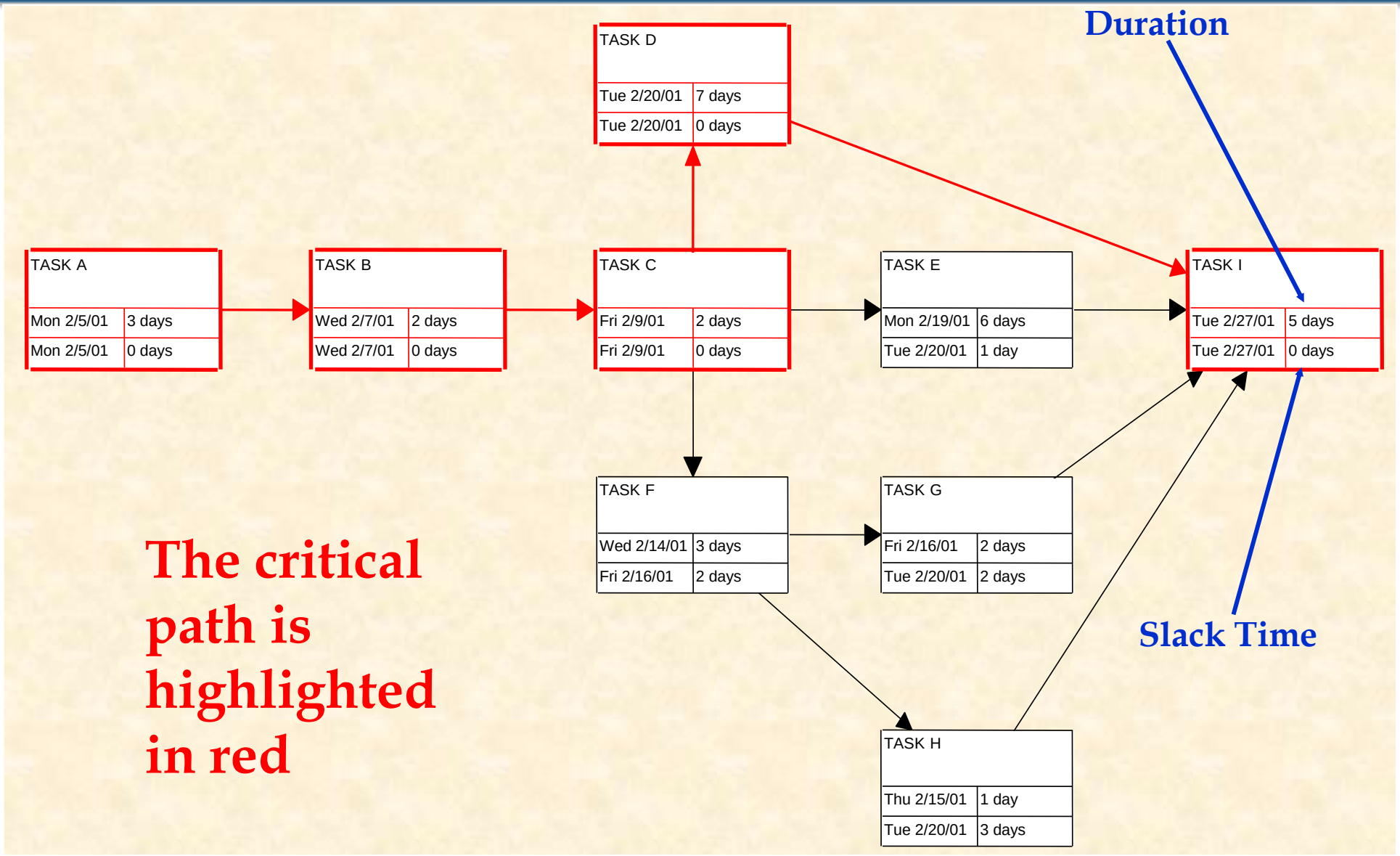
Changing Priorities

PRIORITIES ➔ ⬇ MEASURES OF SUCCESS	Max or Min	Constrain	Accept
Cost	Step 1 X ←	X	
Schedule			X
Scope and/or Quality	Step 2 X →	X	

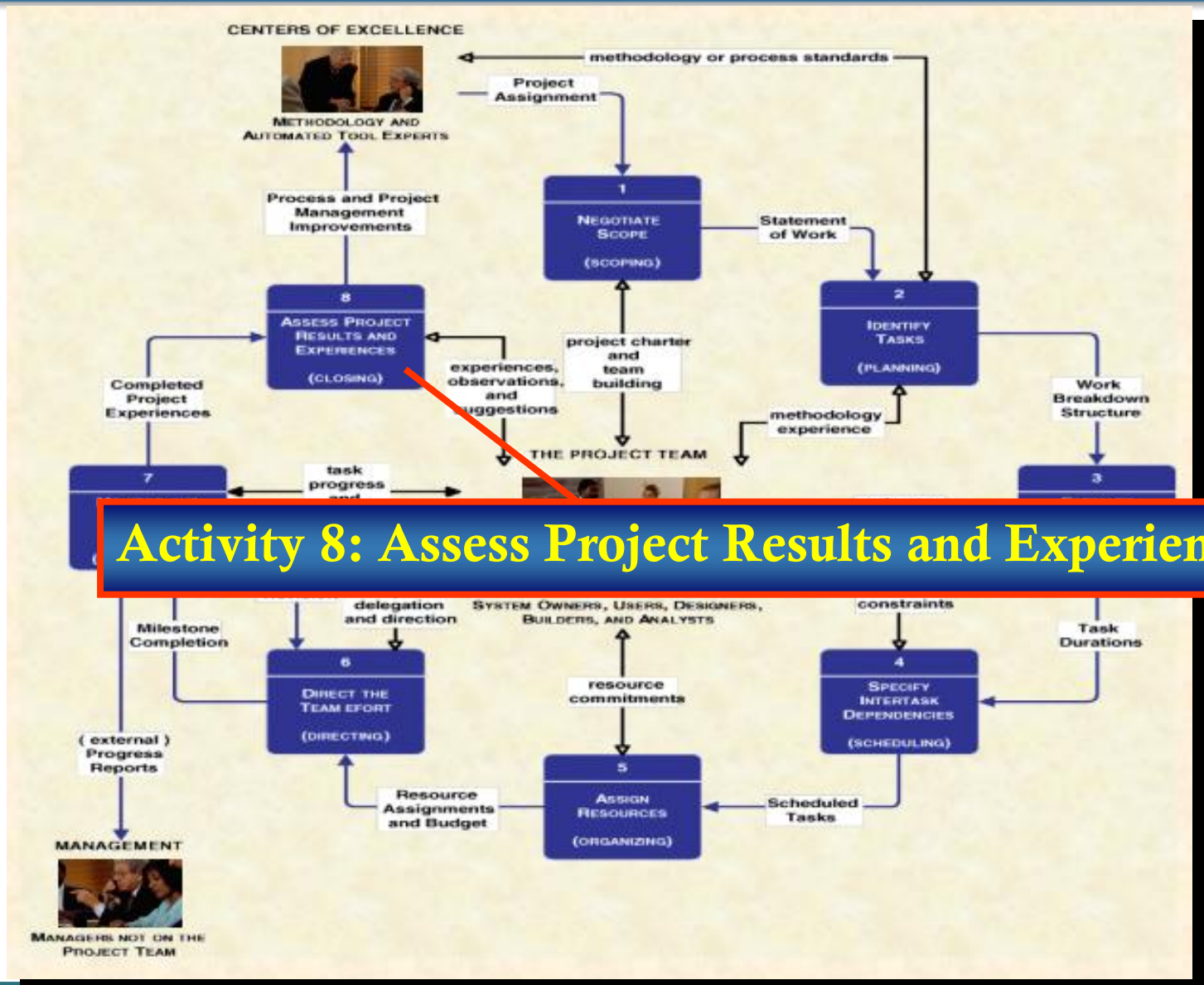
Critical Path Analysis (and Slack Time)

- Using intertask dependencies, determine every possible path through the project.
- For each path, sum the durations of all tasks in the path.
- The path with the longest total duration is the critical path.
  - The critical path for a project is that sequence of dependent tasks that have the largest sum of most likely durations. The critical path determines the earliest completion date of the project.
  - The slack time available for any noncritical task is the amount of delay that can be tolerated between the starting time and completion time of a task without causing a delay in the completion date of the entire project.

Critical Path



Project Management Life Cycle



Activity 8: Assess Project Results and Experiences

- Did the final product meet or exceed user expectations?
- Did the project come in on schedule?
- Did the project come in under budget?

Why or Why not?

要点与引申

- 有能力进行项目管理的前提之一，是能够很好地被管理。
- 项目管理是贯穿整个开发过程的。
- 理性地使用相应工具，来进行项目管理。
- 如果你准备考研，不妨采用这次课讲的一些技术，来规划你的考研过程。

西安电子科技大学
XIDIAN UNIVERSITY

05 系统分析与设计
（System Analysis and Design）

Systems Analysis

Content Structure

- What is Systems Analysis?
- **Systems Analysis Approaches**
  - 5种系统分析方法。
- **The Preliminary Investigation Phase**
- **The Problem Analysis Phase**
- **The Requirements Analysis Phase**
- **The Decision Analysis Phase**
- The Next Generation of Systems Analysis