

٢٥ يناير ٢٠١٤
ثورة شعب



بسم الله الرحمن الرحيم

“وقل ربى زدنى علما”

(اللهم صل وسلم وبارك على سيد الخلق سيدنا محمد)

PMP 5th (Project Management Professional)

Presented by

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Project Time Management

Unit 6

Project Time Management

Includes the processes required to manage Timely completion of the project.

Planning

6.1 Plan Schedule Management

6.2 Define Activities

6.3 Sequence Activities

6.4 Estimate Activity Resources

6.5 Estimate Activity Durations

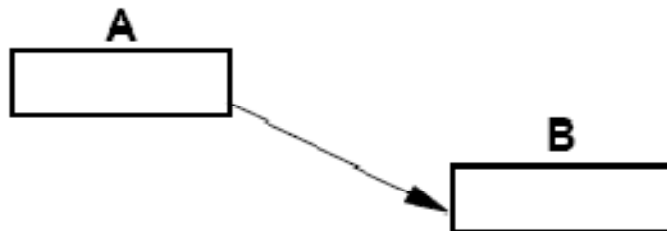
6.6 Develop Schedule

Monitoring and controlling

6.7 Control Schedule

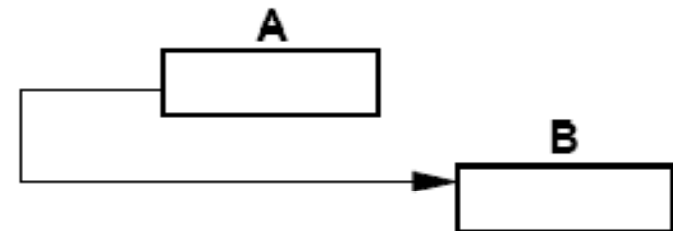
Dependency Relationships in the Precedence Diagramming Method (PDM)

Finish-to-Start (FS)



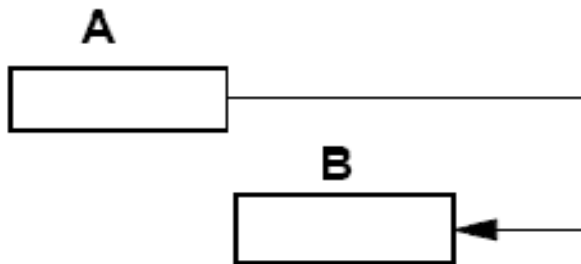
A must finish before B starts

Start-to-Start (SS)



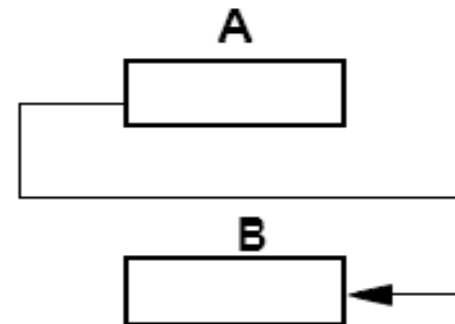
A must start before or simultaneously with B

Finish-to-Finish (FF)



A must finish before B can finish

Start-to-Finish (SF)



A must start before B can finish

Dependency Determination

Three types of dependencies are used to define the sequence among the activities

- **Mandatory dependencies**
 - Those that are contractually required or inherent in the nature of the work.
 - Are also sometimes referred to as hard logic
- **Discretionary dependencies (optional)**
 - Discretionary dependencies are sometimes referred to as preferred, or soft logic.
 - Should be fully documented since they can create arbitrary total float values and can Limit later scheduling options.
- **External dependencies**
 - Involve a relationship between project activities and non-project activities.

Applying Leads and Lags

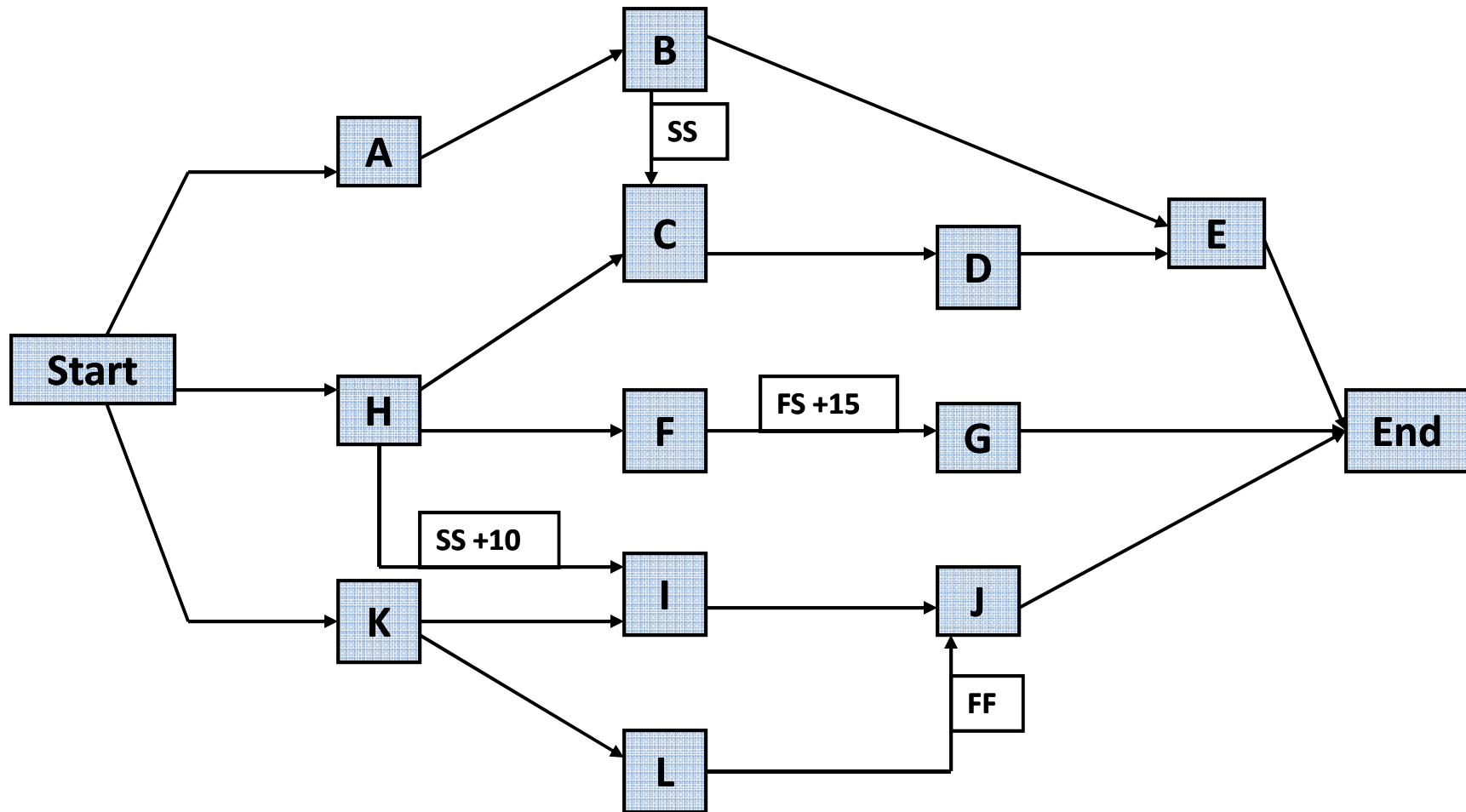
A Lead

Allows an acceleration of the successor activity.

A Lag

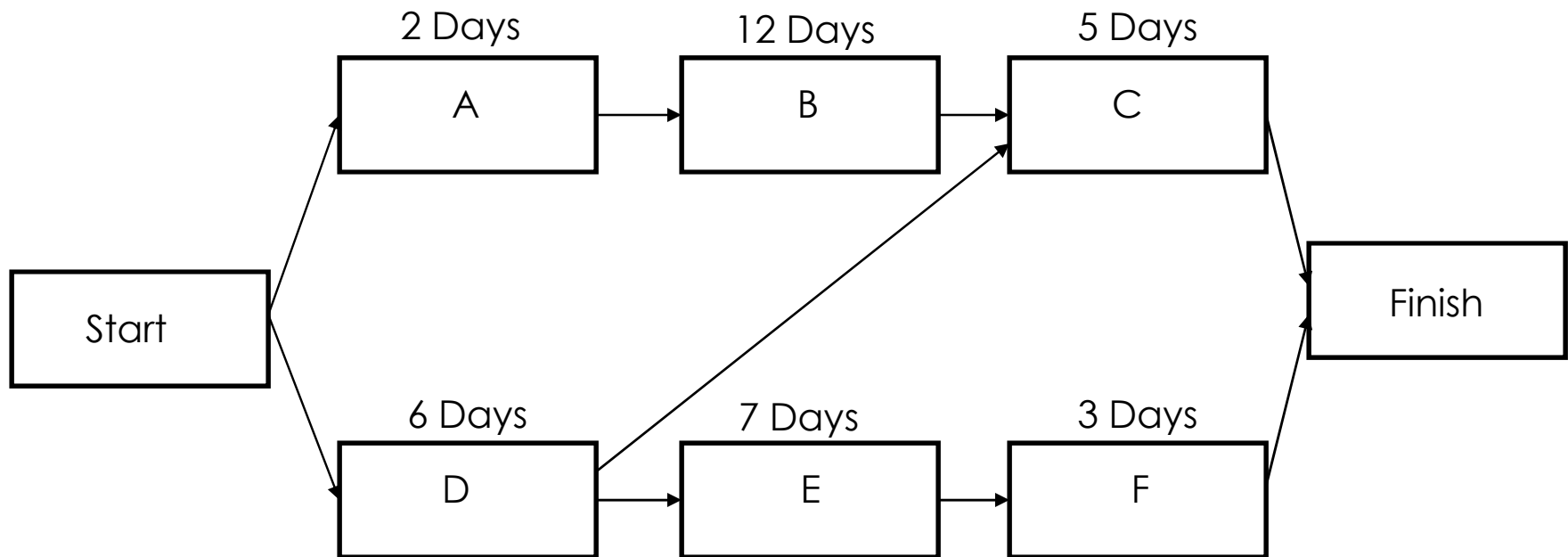
Directs a delay in the successor activity

Precedence Diagramming Method



Network Diagramming Analysis

A network diagrams is a schematic display of project's activities and dependencies

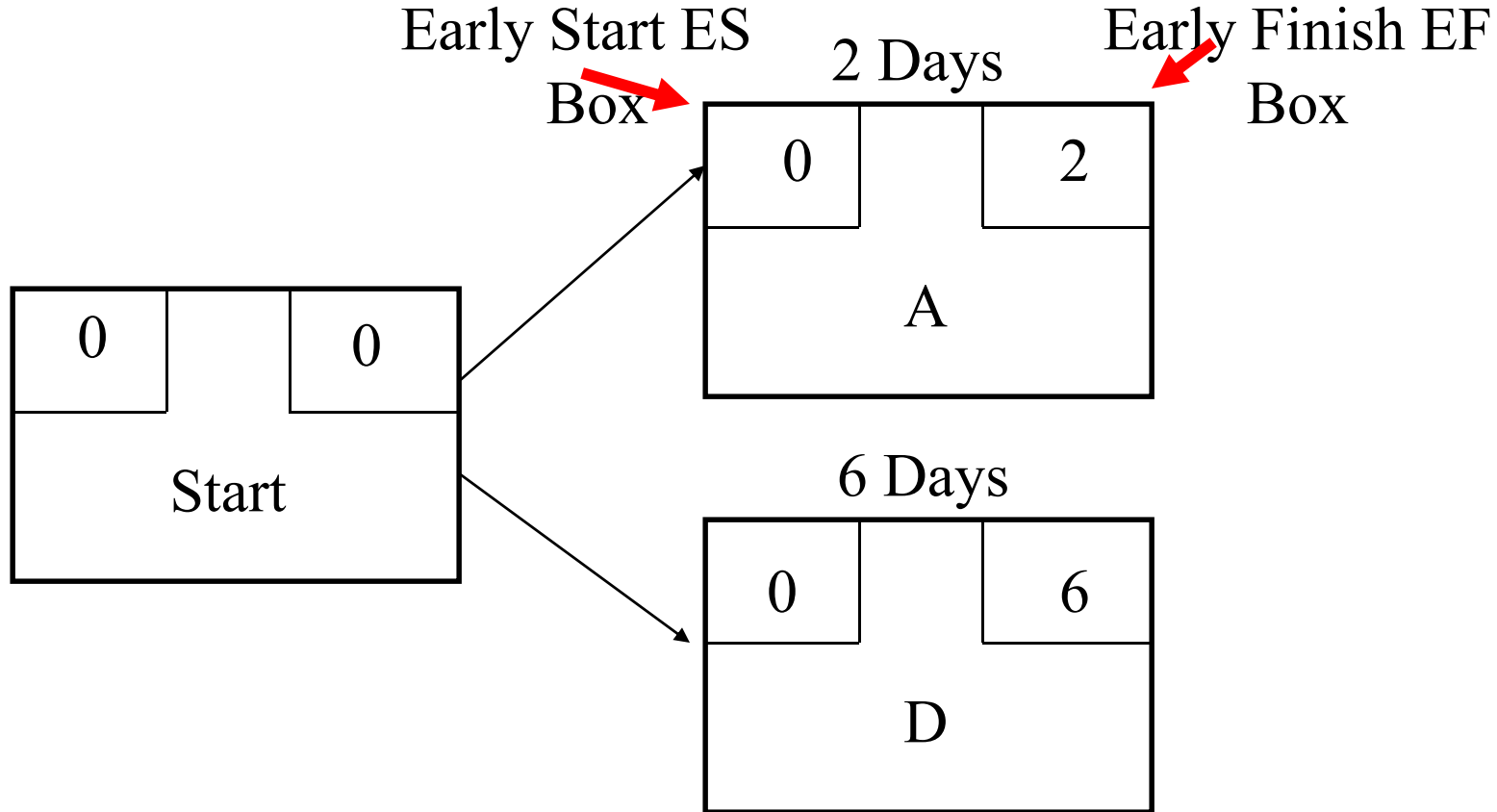


Network Diagramming

Activities Code	Activity Description	Resources Needed	Original Duration	Predecessor Logic
Start			0	-----
A			2	Start
B			12	A
C			5	B & D
D			6	Start
E			7	D
F			3	E
Finish			0	C & F

Network Diagram Analysis

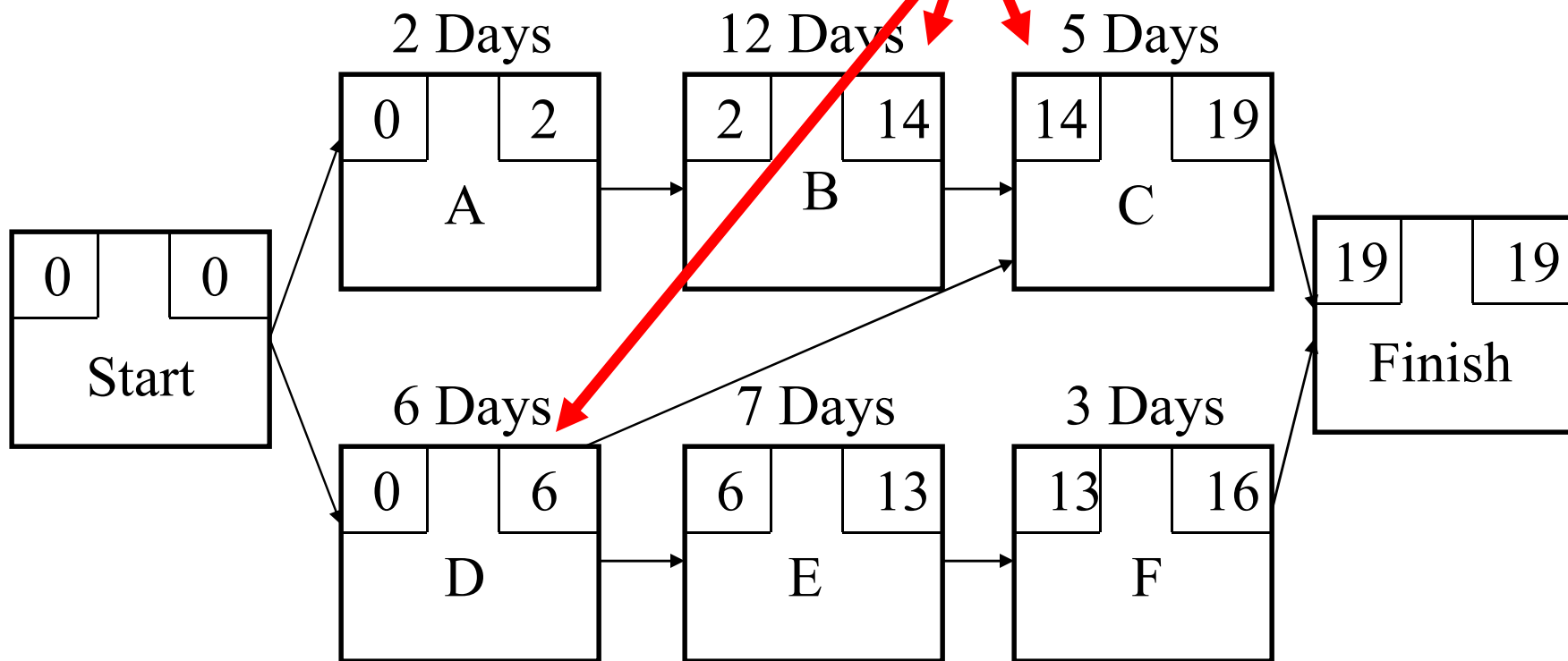
The Forward Pass ...



Network Diagram Analysis

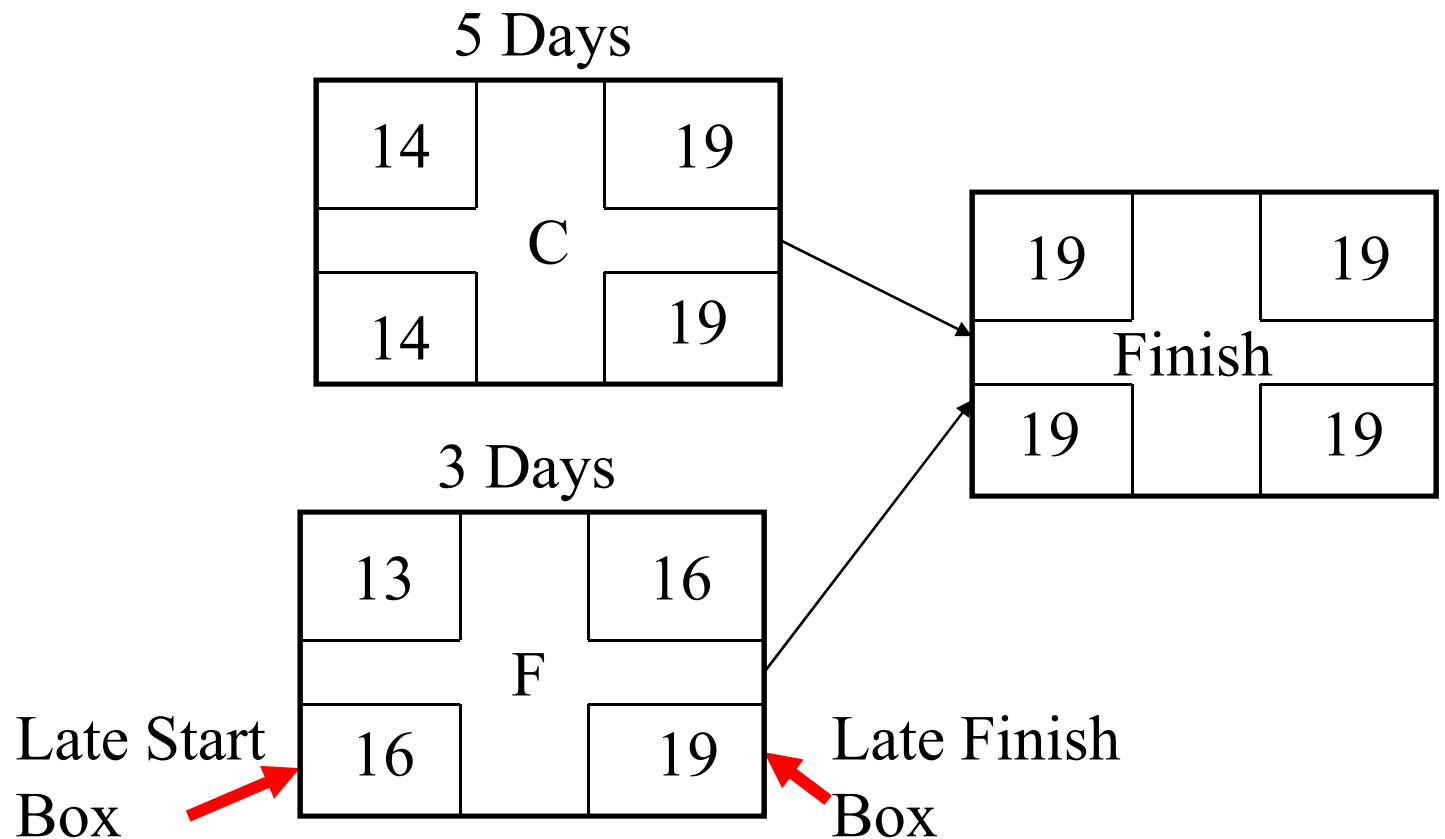
The Forward Pass ...

Early Start = *Highest* of predecessor's
Early Finish Times



Network Diagram Analysis

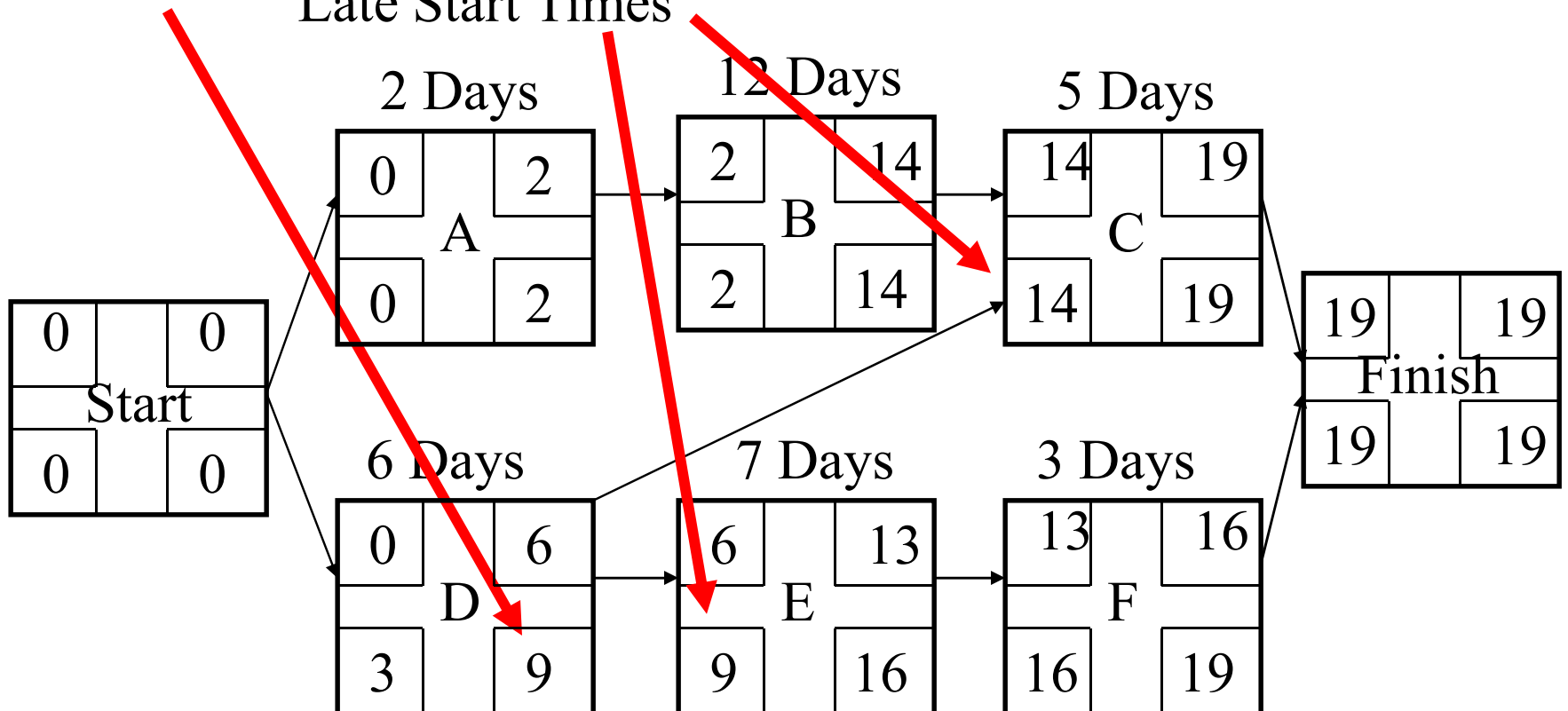
The Backward Pass ...



Network Diagram Analysis

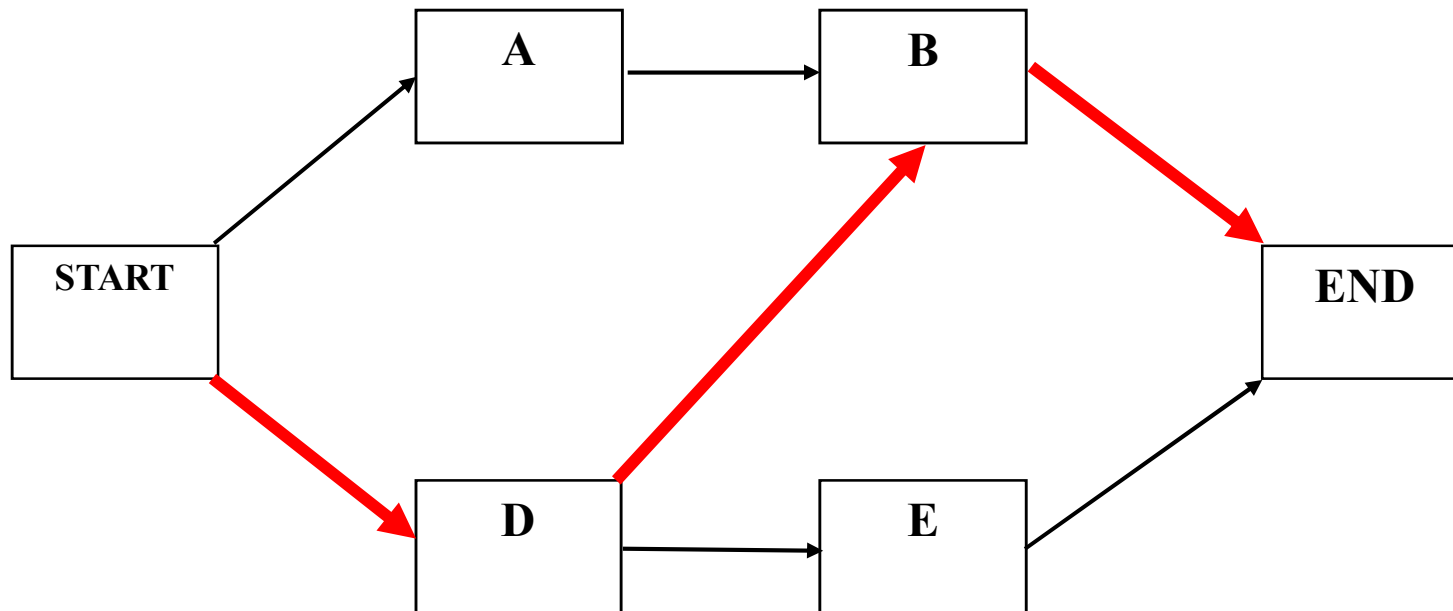
The Backward Pass ...

Late Finish = *Lowest* of successor's
Late Start Times

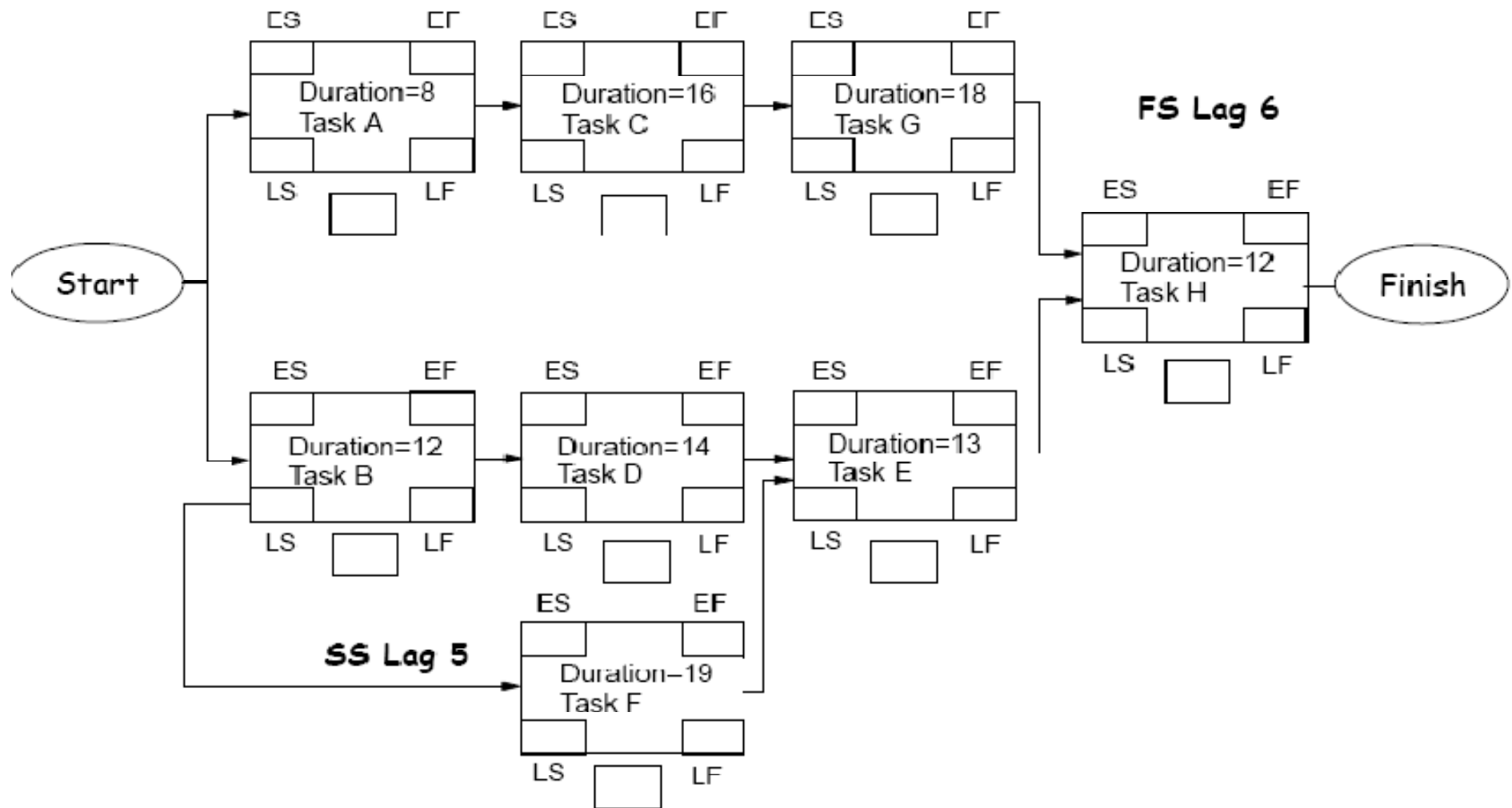


Network Diagram Analysis

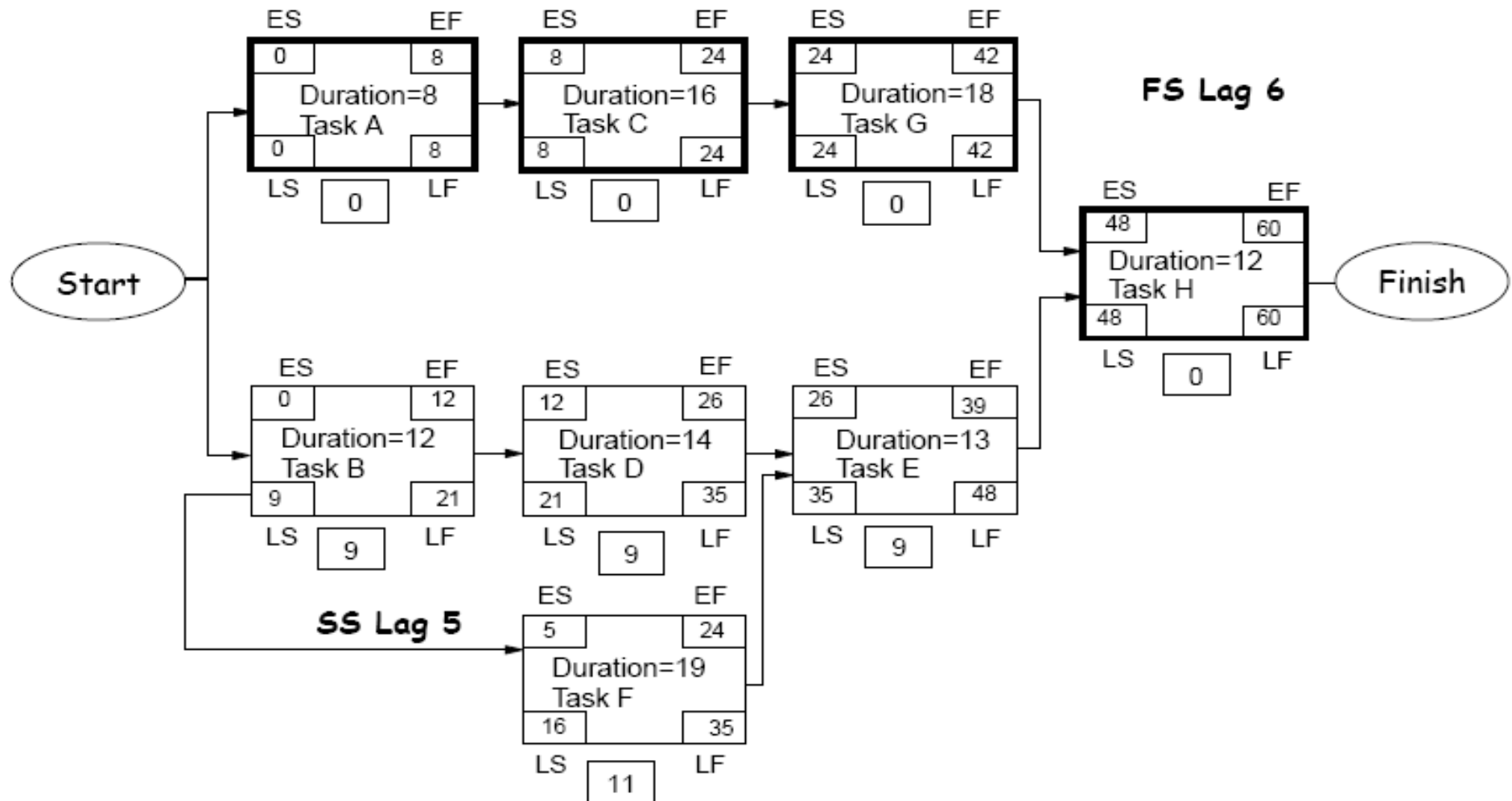
- Calculates the theoretical early start and finished dates.
- And late start and finish date for all schedule activities.
- **The Critical Path** is the longest time the project can last
- **Total Float (Slack)** The amount of time an activity can delay without delaying the project completion date



Precedence Diagramming Method Exercise



Precedence Diagramming Method Exercise





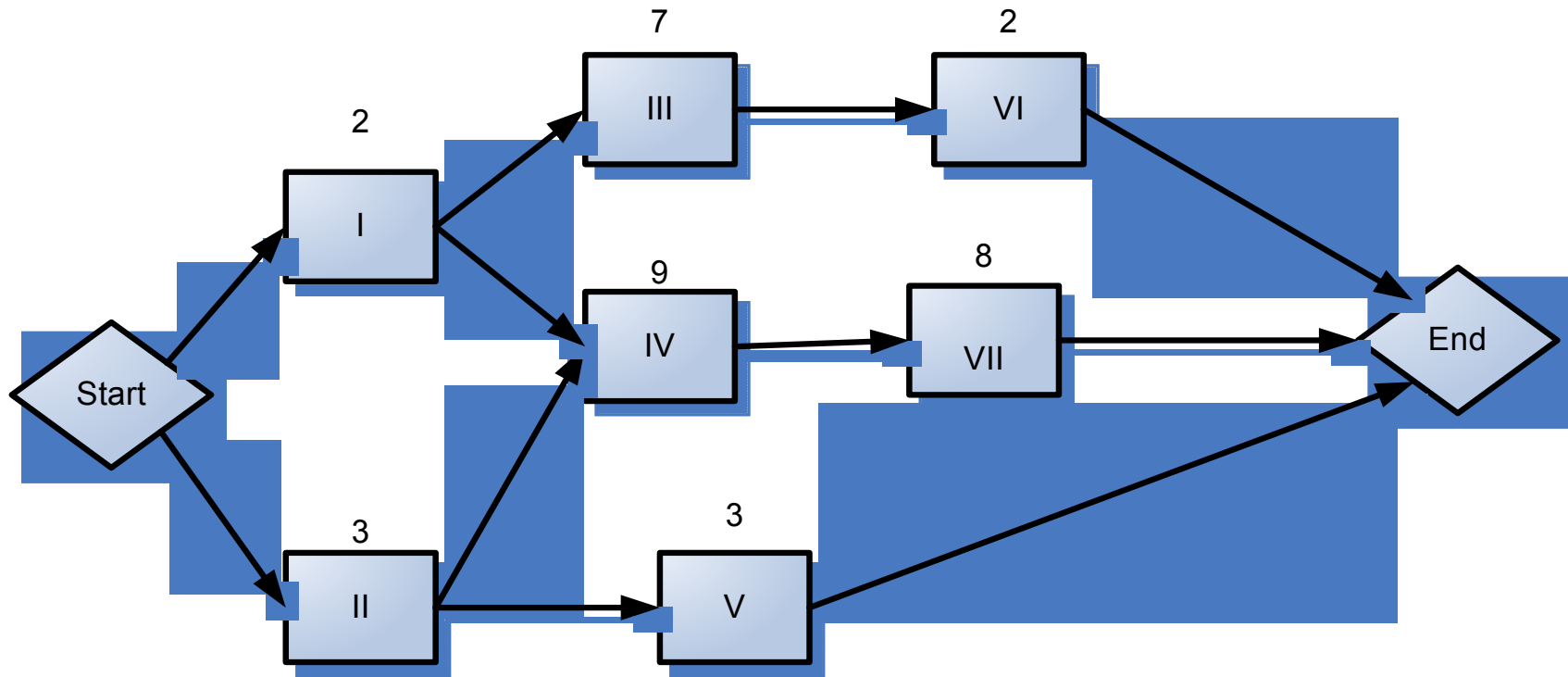
Exercise

30 minutes

You are the project manager for project with the following network diagram

- A. Draw the network diagram ?**
- B. Calculate all of the paths in this network diagram?**
- C. What is the duration of the critical path of this network diagram?**
- D. What is the float of task 3?**
- E. What is the float of task 5?**
- F. What is the float of task 1?**
- G. What is the slack of task 7?**

task	Preceding Activity	Estimate in months
Start		0
1	Start	2
2	Start	3
3	1	7
4	1,2	9
5	2	3
6	3	2
7	4	8
End	5,6,7	0



B. 1 - 3 - 6 : $2 + 7 + 2 = 11$ months

1 - 4 - 7 : $2 + 9 + 8 = 19$ months

2 - 4 - 7 : $3 + 9 + 8 = 20$ months

2 - 5 : $3 + 3 = 6$ months

C. 20 months

D. Using float = $LS - ES = 9$ months

E. 14 months

F. 1 month

G. Since Task VII is in the critical path by definition the slack is 0.

6.1 Plan Schedule Management

- Plan Schedule Management is the process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule

6.1 Plan Schedule Management

(Inputs)

- **Project Management Plan**

- **Project Charter**

The project charter defines the summary milestone schedule and project approval requirements that will influence the management of the project schedule.

- **Enterprise Environmental Factors**

- **Organizational Process Assets**

6.1 Plan Schedule Management

(Tools & Techniques)

- **Expert Judgment**
- **Analytical Techniques**

The Plan Schedule Management process may involve choosing strategic options to estimate and schedule the project such as: scheduling methodology, scheduling tools and techniques, estimating approaches, formats, and project management software.

- **Meetings**

6.1 Plan Schedule Management

(Outputs)

- **Schedule Management Plan**

A component of the project management plan that establishes the criteria and the activities for developing, monitoring, and controlling the schedule.

6.2 Define Activities

- Identifying the specific actions to be performed to produce the project deliverables
- Project work packages are typically decomposed into smaller component called activities that represent the work necessary to complete the work package.
- Activities provide a basis for estimating, scheduling, executing, and monitoring and controlling the project work

6.2 Define Activities

(Inputs)

Scope Baseline

Enterprise Environmental Factors

- Project management information system (PMIS).

Organizational Process Assets

- Existing formal and informal activity planning-related policies, procedures, and guidelines,
- Lessons-learned knowledge base

6.2 Define Activities

(Tools & Techniques)

Decomposition

- Involves subdividing the project work packages into smaller ,more manageable components called activities.
- Activities represent the effort needed to complete a work package.
- Defines the final outputs as activities rather than deliverables.
- The activity list, WBS, WBS dictionary can be developed either sequentially or concurrently as the basis for development of the final activity list.

Rolling Wave Planning

Is a form of progressive elaboration planning where the work to be accomplished in the near term is planned in detail and future work is planned at a higher level of the WBS

6.2 Define Activities

(Tools & Techniques)

Templates

A standard activity list or a portion of an activity list from a previous project is often usable as a template for a new project.

Expert Judgment

Project team members or other experts, who are experienced and skilled in developing detailed project scope statements, the WBS, and project schedules, can provide expertise in defining activities.

6.2 Define Activities (Outputs)

Activity List

The activity list includes the activity identifier and the scope of work description for each activity in sufficient detail to ensure that the project team members understand what work is required to be completed.

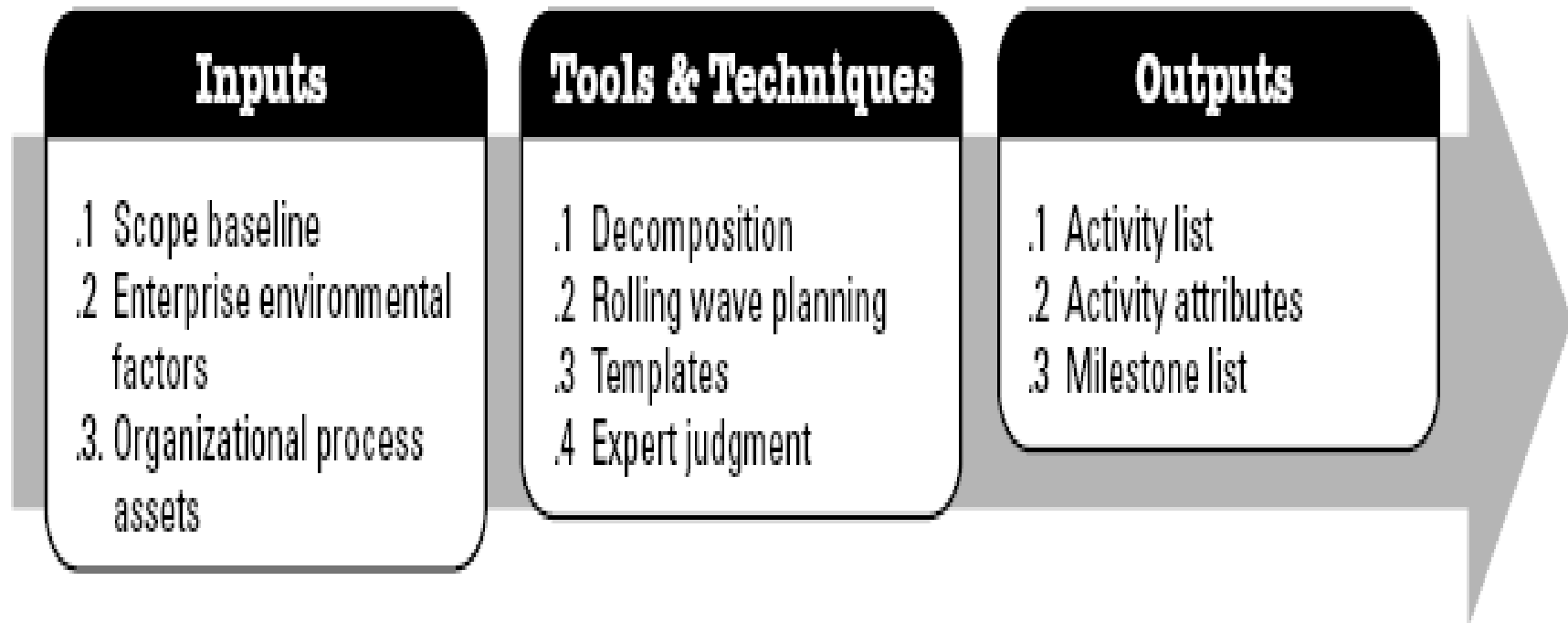
Activity Attributes

Activity attributes extend the description of the activity by identifying the multiple components associated with each activity.

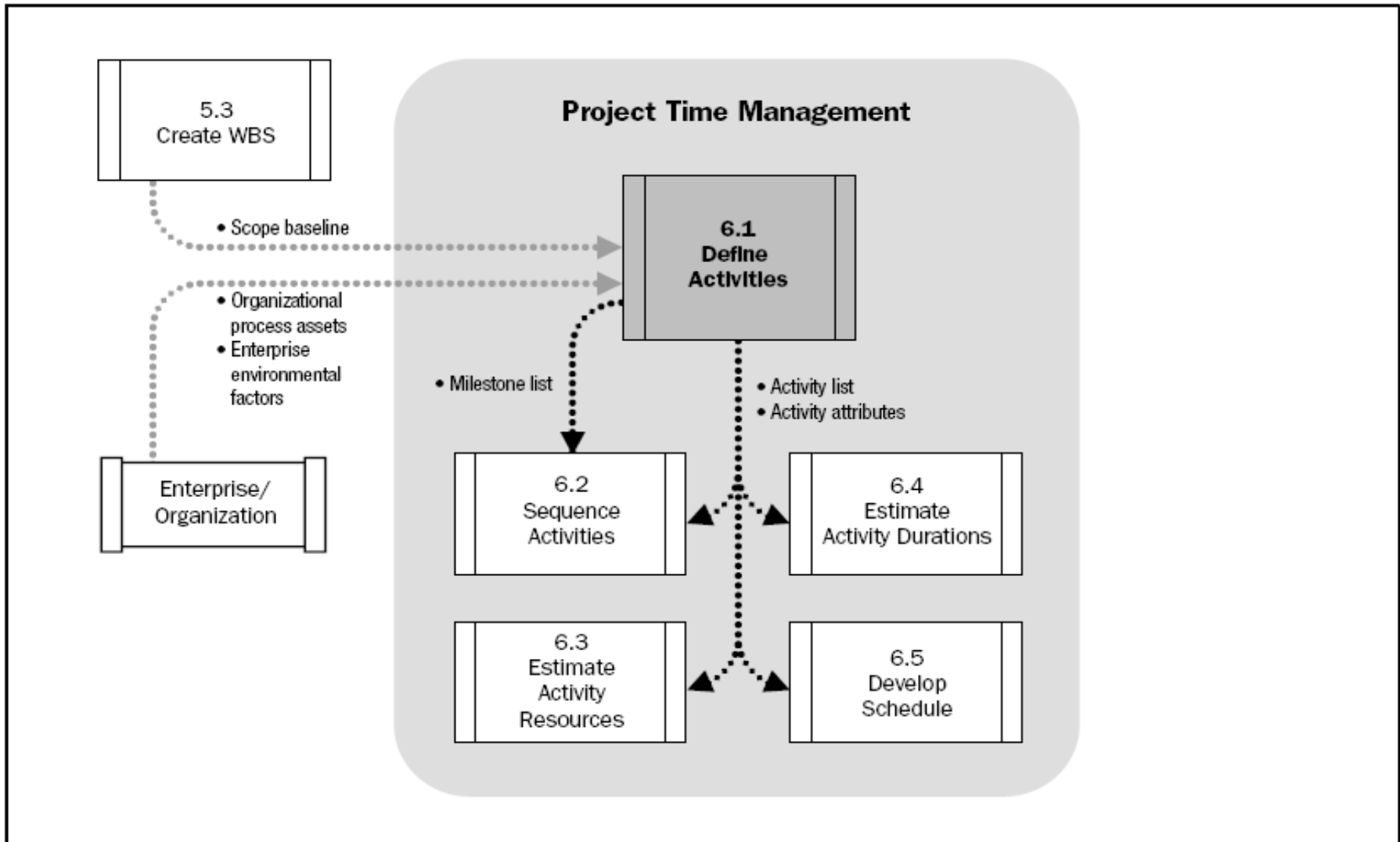
Milestone List

A milestone list identifies all milestones and indicates whether the milestone is mandatory, or optional.

6.2 Define Activities



6.2 Define Activities



6.3 Sequence Activities

- Sequence activities is the process of identifying and documenting relationships among the project activities.
- It may be necessary to use lead or lag time between activities to support a realistic and achievable project schedule.

6.3 Sequence Activities (Inputs)

- **Activity List**
- **Activity Attributes**
- **Milestone List**
- **Project Scope Statement**
- **Organizational Process Assets**

6.3 Sequence Activities

(Tools & Techniques)

- **Precedence Diagramming method (PDM)**
- **Dependency Determination**
- **Applying Leads and Lags**

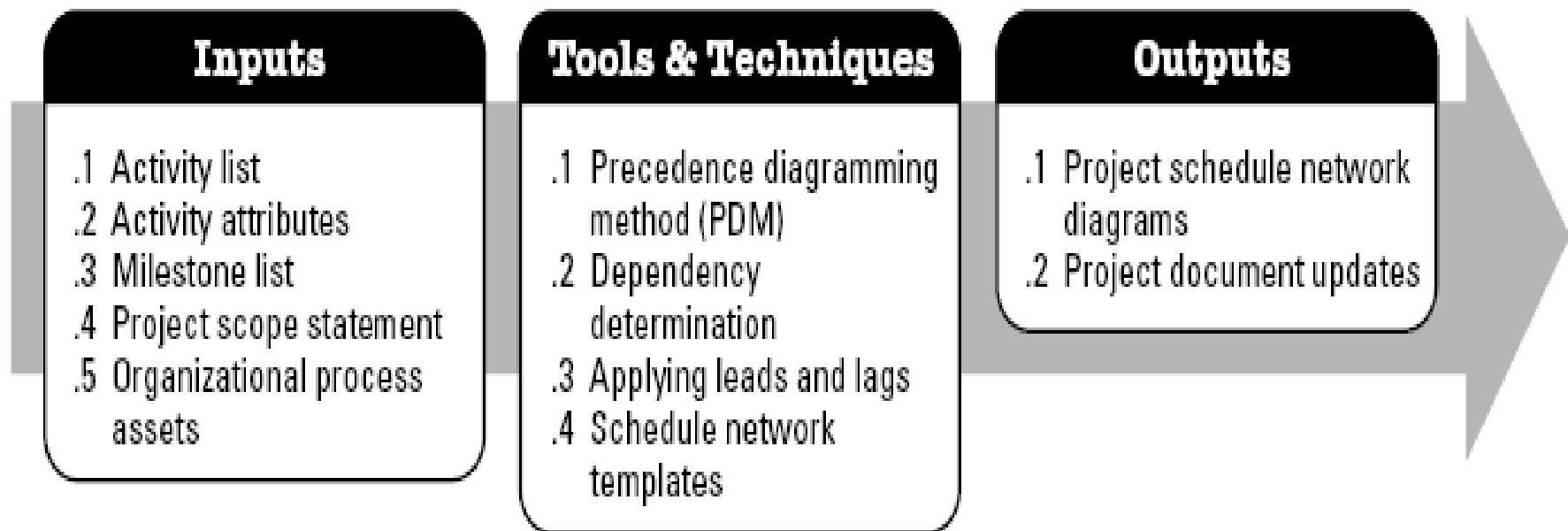
6.3 Sequence Activities (Output)

- **Project schedule network diagram**
 - Are schematic displays of the project's schedule activities and the logical relationships among them.
 - Can be produced manually or by using project management software.
- **Project document updates**

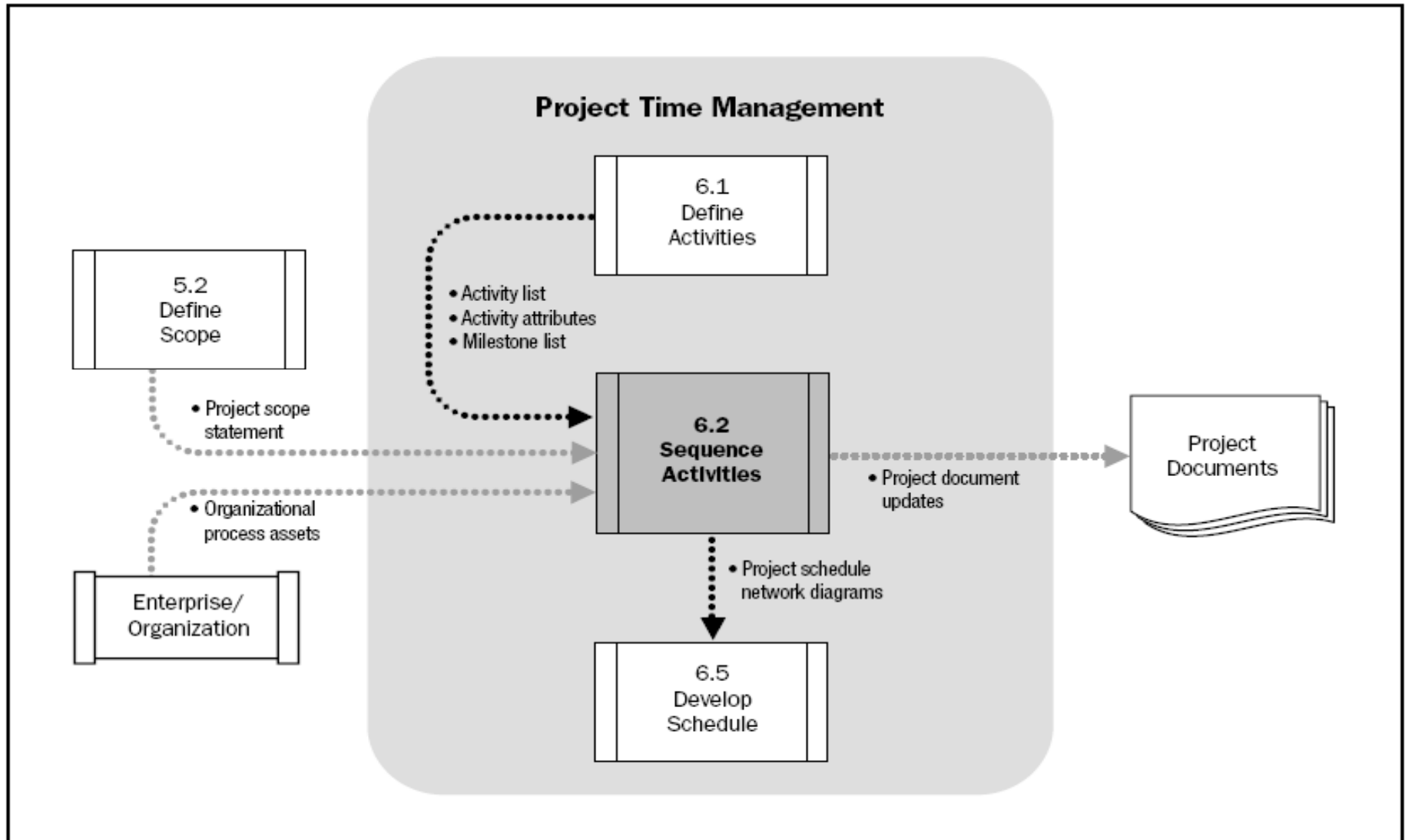
Project documents that may be updated include:

 - Activity lists,
 - Activity attributes,
 - Risk register

6.3 Sequence Activities



6.3 Sequence Activities



6.4 Estimate Activity Resources

Estimate activity resources is the process of estimating the type and quantities of material, people, equipment, or supplies required to perform each activity.

6.4 Estimate Activity Resources

(Inputs)

Activity List

Activity Attributes

Resource Calendars

- Specify when and how long identified project resources will be available during the project.

Enterprise Environmental Factors

- Resource availability and skills.

Organizational Process Assets

- Policies and procedures regarding staffing,
- Policies and procedures relating to rental and purchase of supplies and equipment, and
- Historical information regarding types of resources used for similar work on previous projects.

6.4 Estimate Activity Resources

(Tools & Techniques)

Expert Judgment

Any group or person with specialized knowledge in resource planning and estimating can provide such expertise.

Alternatives Analysis

Include using various levels of resources capability or skills, different size or type of machines, different tools, and make-or-buy decisions regarding the resources.

Published Estimating Data

Several companies routinely publish updated production rates and unit costs of resources, and equipment for different countries, and geographical locations within countries.

6.4 Estimate Activity Resources

(Tools & Techniques)

Bottom-Up Estimating

When an activity cannot be estimated with a reasonable degree of confidence, the work within the activity is decomposed into more detail. The resource needs are estimated. These estimates are then aggregated into a total quantity for each of the activity's resources.

Project Management Software

Project management software has the capability to help plan, organize, and manage resources pools and develop resources estimates

6.4 Estimate Activity Resources

(Outputs)

Activity Resource Requirements

Identifies the types and quantities of resources required for each activity in a work package

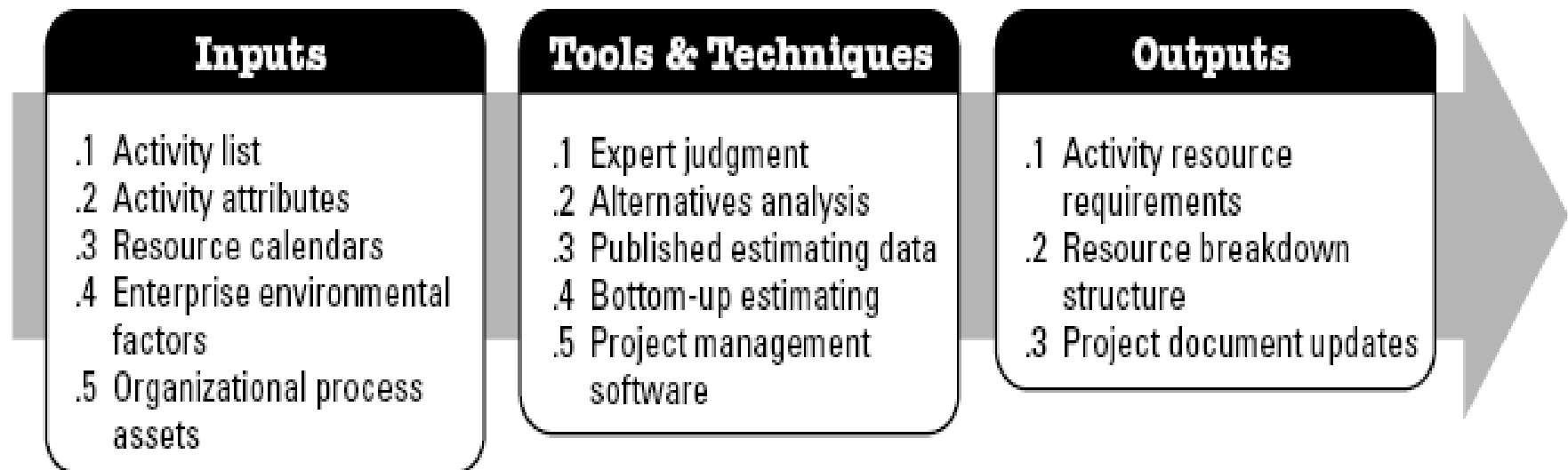
Resource Breakdown Structure

The resource breakdown structure is a hierarchical structure of the identified resources by resource category and resource type.

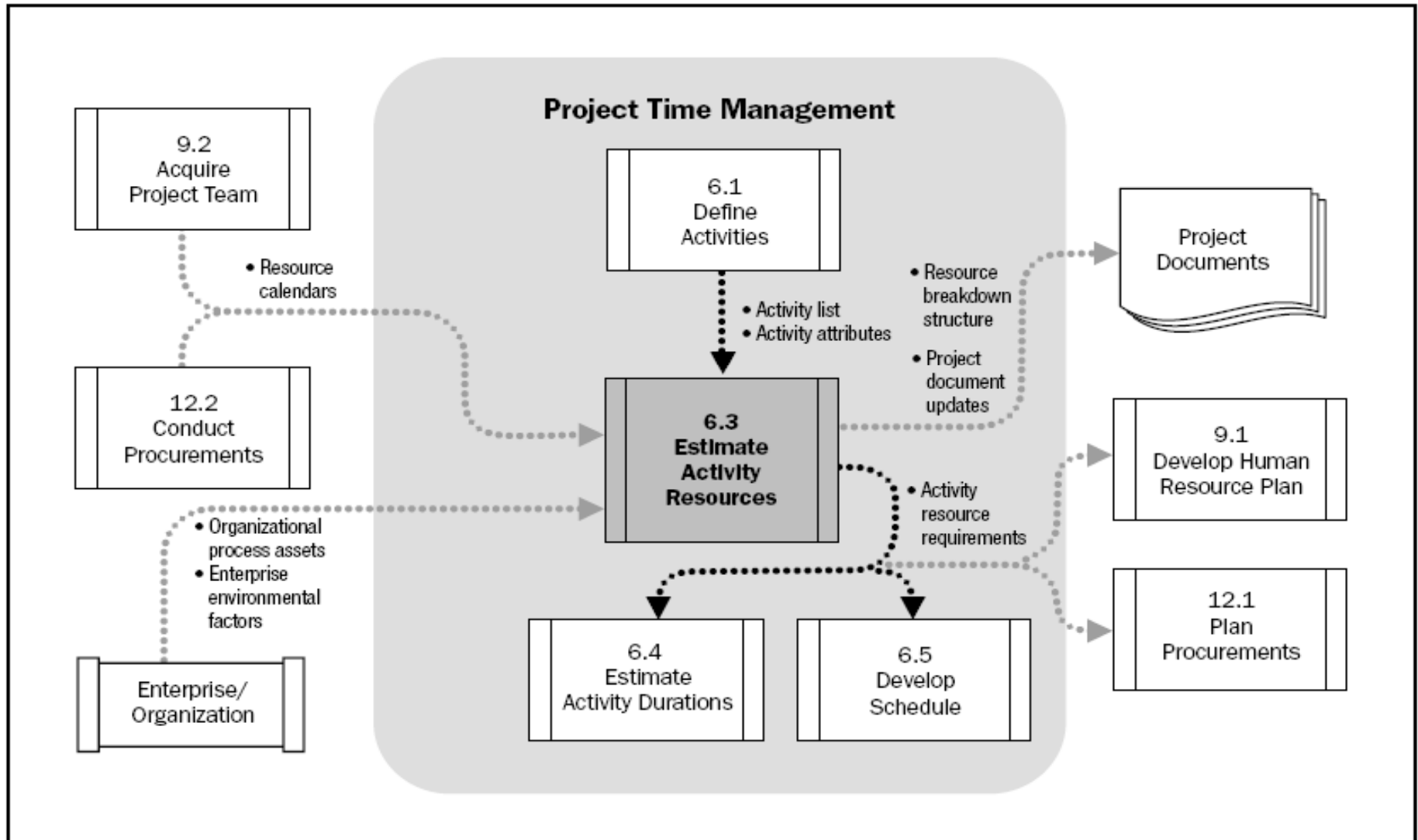
Project Document Updates

- Activity list,
- Activity attributes, and
- Resource calendars

6.4 Estimate Activity Resources



6.4 Estimate Activity Resources



6.5 Estimate Activity Durations

- Is the process of approximating the number of work periods needed to complete individual activities with estimated resources.
- The input for the estimates of activity duration originate from the person or group on the project team who is most familiar with the nature of the work in the specific activity.
- Most project management software for scheduling will handle this situation by using project calendar and alternative work-period resource calendars that are usually identified by the resource that require specific work periods.

6.5 Estimate Activity Durations (Inputs)

Activity List

Activity Attributes

Activity Resource Requirements

Resource Calendars

Project Scope Statement
Constraints and assumptions .

6.5 Estimate Activity Durations (Inputs)

Enterprise Environmental Factors

- Duration estimating databases and other reference data,
- Productivity metrics, and
- Published commercial information.

Organizational Process Assets

- Historical duration information,
- Scheduling methodology, and
- Lessons learned.

6.5 Estimate Activity Durations

(Tools & Techniques)

Expert Judgment

Expert judgment can provide duration estimate information or recommend maximum activity duration from prior similar projects.

Analogous Estimating

- This technique relies on the actual duration of previous similar projects as the basis for estimating the duration of the current project.
- Generally less costly and time consuming than other techniques, but it is also generally less accurate.

Reserve Analysis

Duration estimates may include contingency reserve, (time reserve or buffers) into the overall project schedule to account for schedule uncertainty.

6.5 Estimate Activity Durations (Tools & Techniques)

Parametric Estimating

Parametric estimating uses a statistical relationship between historical data and other variables to calculate an estimate for activity parameters, such as cost, budget, and duration.

Three-point estimates

PERT uses three estimates to define an approximate range for an activity's duration

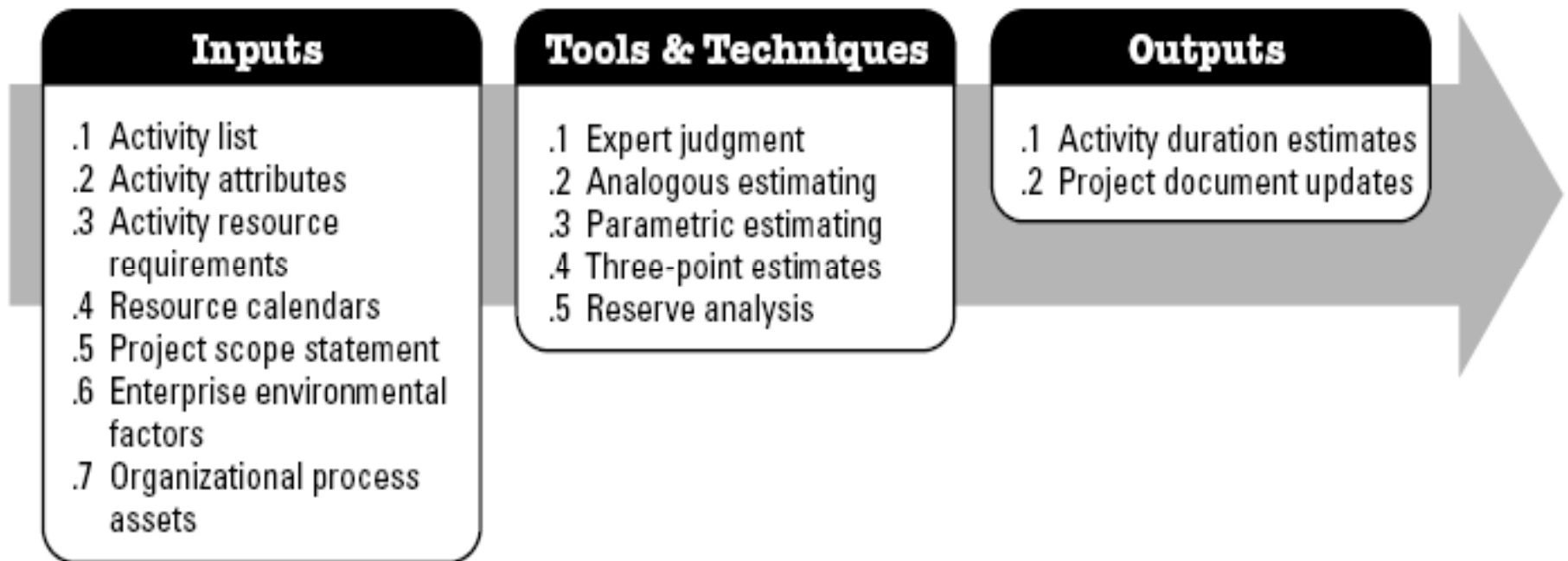
- Most likely:
the activity duration is based on analysis of the average productivity of the resource.
- Optimistic:
the activity duration is based on analysis of the best-case scenario for the activity.
- Pessimistic:
the activity duration is based on analysis of the worst-case scenario for the activity

$$T = \frac{O+4M+P}{6}$$

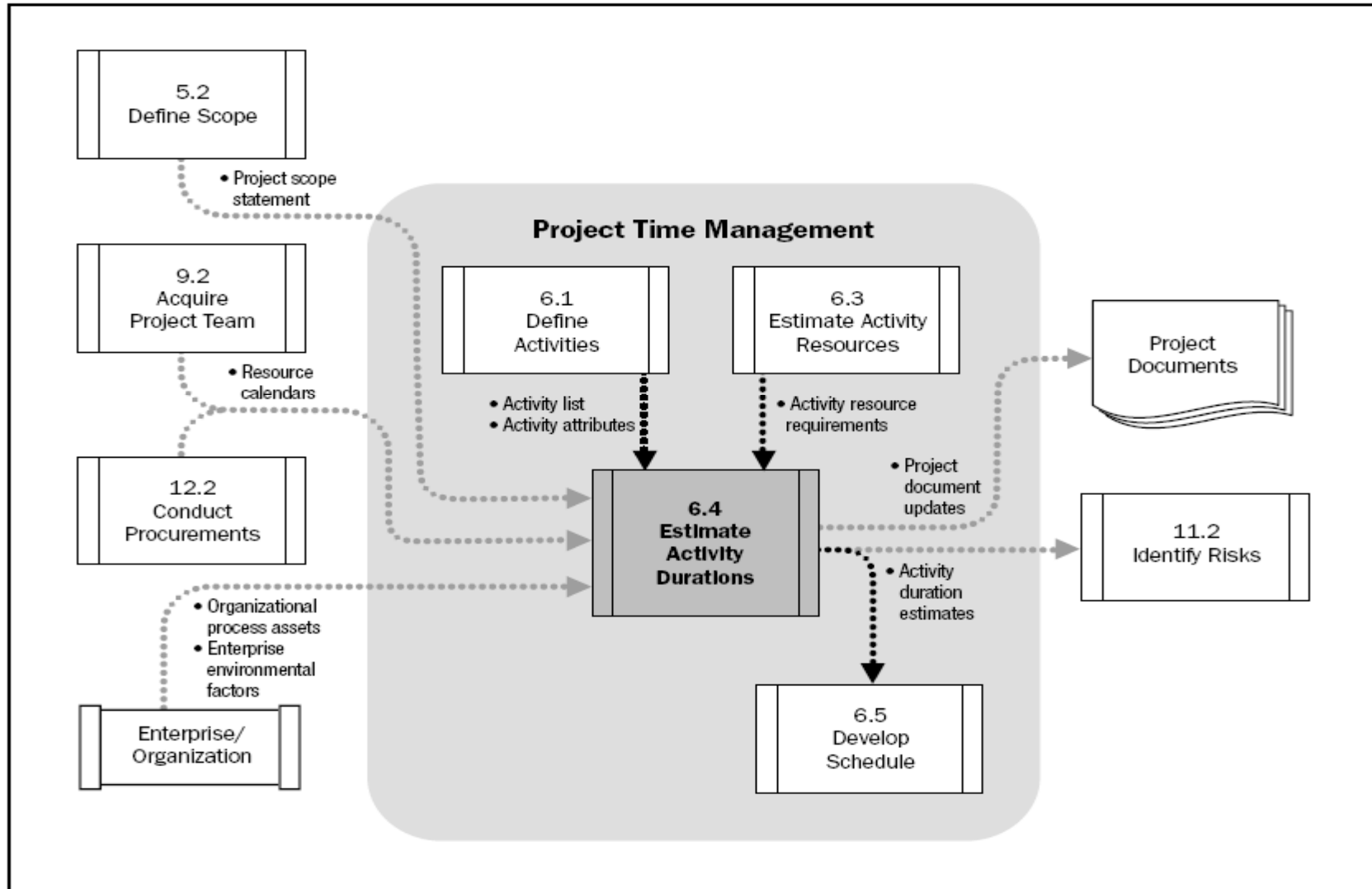
6.5 Estimate Activity Durations (Outputs)

- **Activity Duration Estimates**
- **Project Document Updates**
 - Activity Attributes

6.5 Estimate Activity Durations



6.5 Estimate Activity Durations



6.6 Develop Schedule

- Develop schedule is the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule.
- Developing an acceptable project schedule is often an iterative process.

6.6 Develop Schedule

(Inputs)

- **Activity List**
- **Activity Attributes**
- **Project Schedule network Diagrams**
- **Activity Resource Requirements**
- **Resource Calendars**
- **Activity Duration Estimates**
- **Project Scope Statement**
- **Enterprise Environmental Factors**
- **Organizational Process Assets**

6.6 Develop Schedule

(Tools & Techniques)

Schedule network analysis

- Is the technique that generate the project schedule
- It employs various analytical techniques, such as Critical Path Method, Critical Chain Method, what-if analysis, and resource leveling to calculate the early and late start and finish dates for the uncompleted portions of project activities

Critical Chain Method

- A schedule network analysis technique that modifies the project schedule to account for limited resources.
- Applied after critical path is identified, resource availability is entered and the resource-limited schedule result is determined, the resulting schedule often has an altered critical path.

6.6 Develop Schedule

(Tools & Techniques)

Resource Leveling

Schedule network analysis technique in which scheduling decisions are driven by resource constraints and applied to a schedule model that has already been analyzed by the critical path method.

Applying Leads and Lags

Leads and lags are refinements applied during network analysis to develop a viable schedule.

Scheduling Tool

Automated scheduling tools expedite the scheduling process by generating start and finish dates based on the inputs of activities, network diagrams, resources and activity durations.

6.6 Develop Schedule

(Tools & Techniques)

Schedule Compression

Shortens the project schedule without changing the project scope, to meet schedule constraints, imposed dates, or other schedule objectives.

Crashing:

Approving overtime, bringing in additional resources, or paying to expedite delivery to activities on the critical path.

Fast tracking:

Doing activities in parallel that would normally be done in sequence.
Fast tracking often results in rework and usually increases risk

6.6 Develop Schedule

(Outputs)

Project Schedule

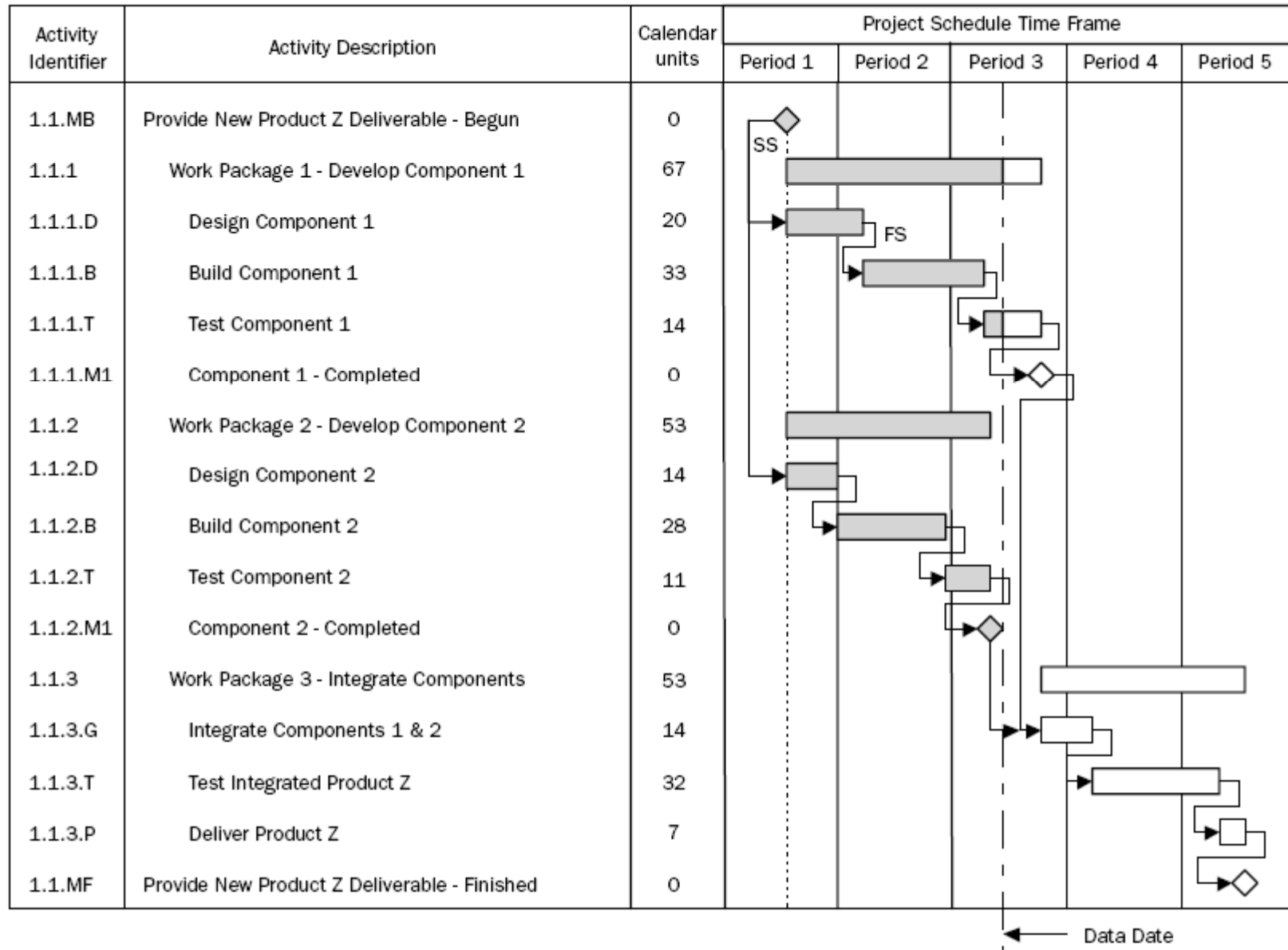
- As a minimum, the project schedule includes a planned start date and planned finish date for each activity.
- the project schedule may be presented in summary form, sometimes referred to as the master schedule, or presented in detail.
 - **Milestone Charts**

these charts are similar to bar charts, but only identify the scheduled start or completion of major deliverables and key external interfaces.
 - **Bar Charts**

These charts, with bars representing activities, show activity start and end dates as well as expected durations.
 - **Project Schedule Network Diagrams**

These diagrams, with activity date information, usually show both the project network logic and the project's critical path schedule activities.

6.6 Develop Schedule (Outputs)



6.6 Develop Schedule

(Outputs)

Schedule Baseline

Is the accepted and approved version of the project schedule.

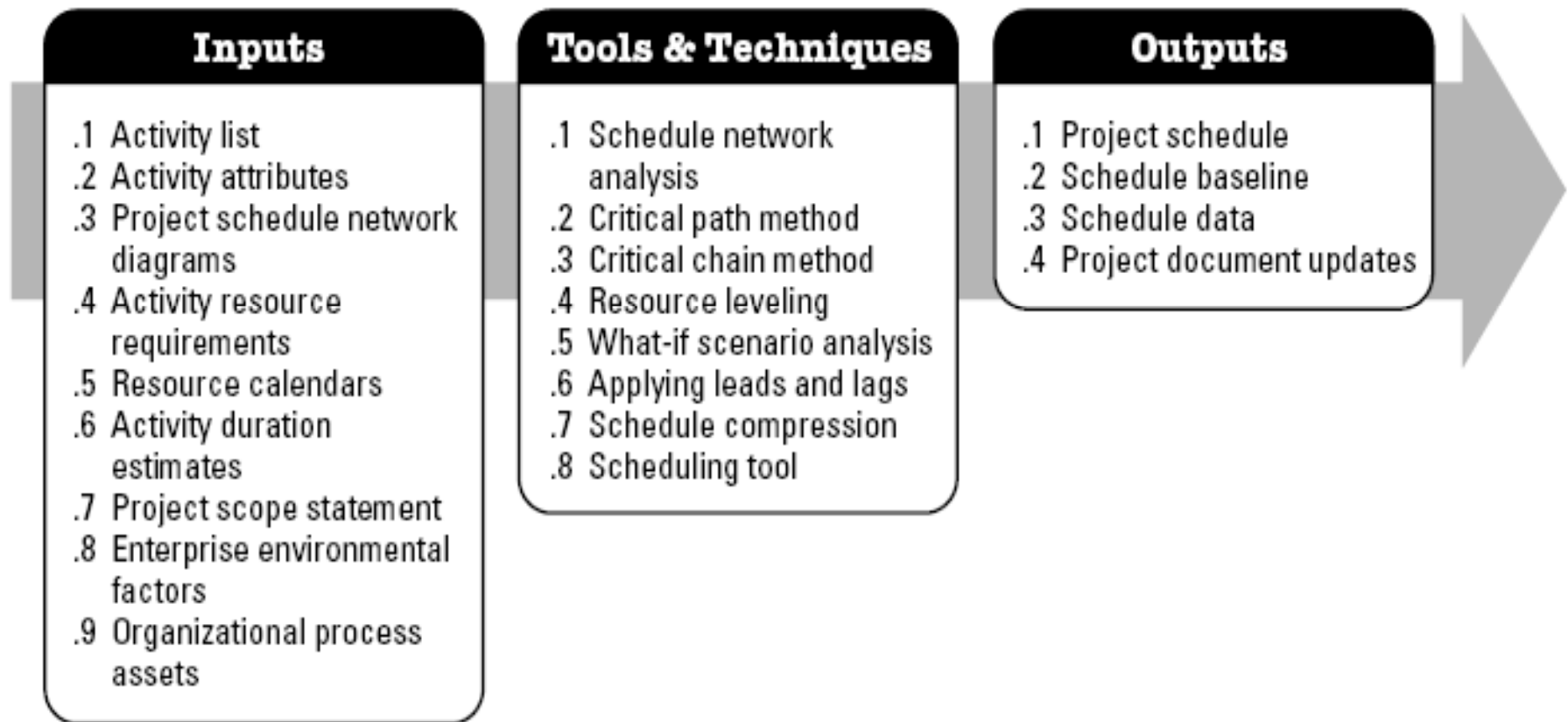
Schedule Data

The schedule data for the project schedule includes at least the schedule milestones, schedule activities, activity attributes, and documentation of all identified assumptions and constraints.

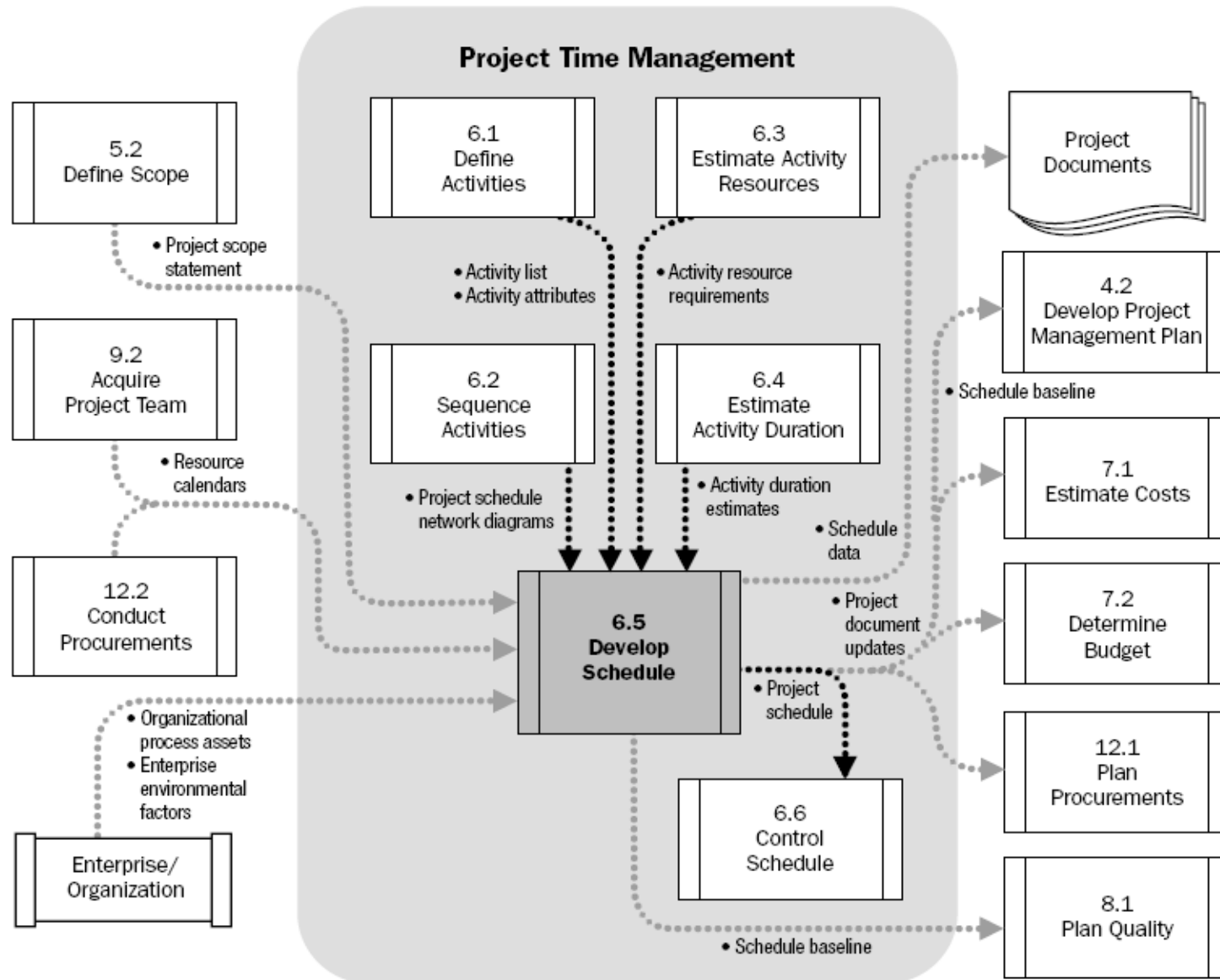
Project Document Updates

- Activity resource requirements
- Activity attributes
- Calendar
- Risk register

6.6 Develop Schedule



6.6 Develop Schedule



6.7 Control Schedule

- Determining the current status of the project schedule
- Influencing the factors that create schedule changes
- Determining that the schedule has changed
- Managing the actual changes when and as they occur

6.7 Control Schedule

(Inputs)

- **Project Management Plan**
- **Project Schedule**
- **Work Performance information**
- **Organizational Process Assets**

6.7 Control Schedule

(Tools & Techniques)

Performance Reviews

Measure, compare, and analyze schedule performance such as actual start and finish dates, percent complete, and remaining duration for work in progress.

Variance analysis

- Schedule performance measurements (SV, SPI) are used to assess the magnitude of variation to the original schedule baseline.
- The total float variance is an essential planning component to evaluate project time performance.

6.7 Control Schedule

(Tools & Techniques)

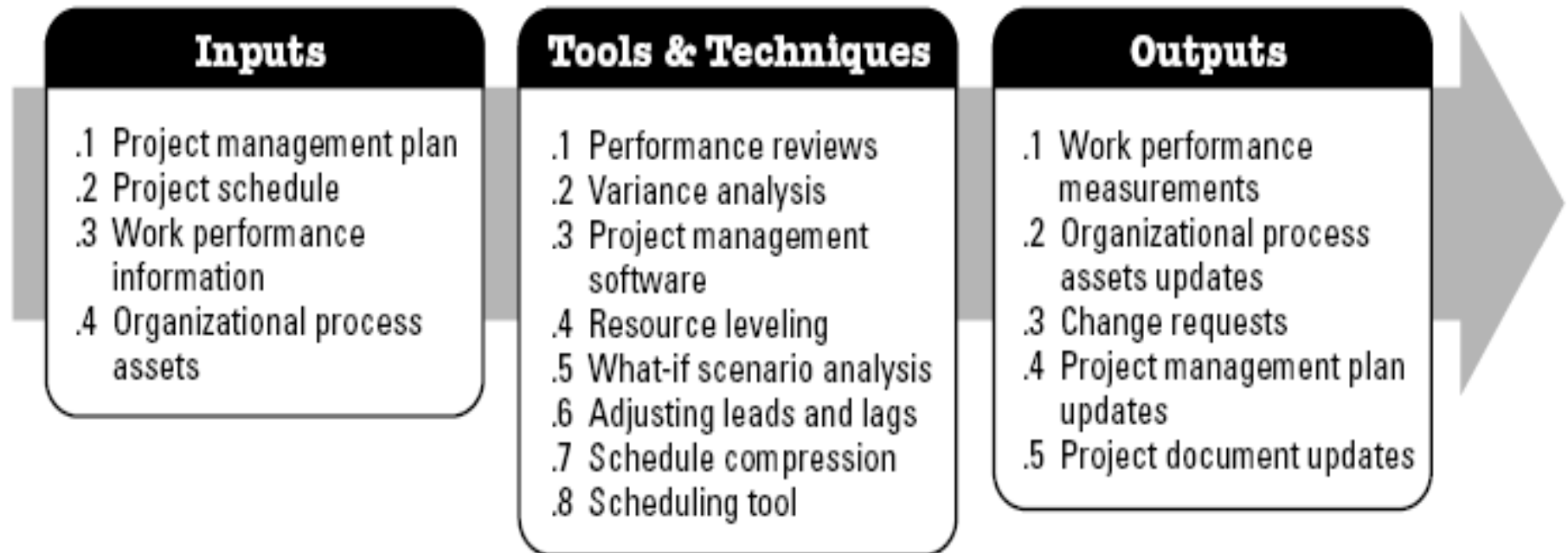
- **Project management Software**
- **Resource Leveling**
- **What-if Scenario Analysis**
- **Adjusting Leads and Lags**
- **Schedule Compression**
- **Scheduling Tool**

6.7 Control Schedule

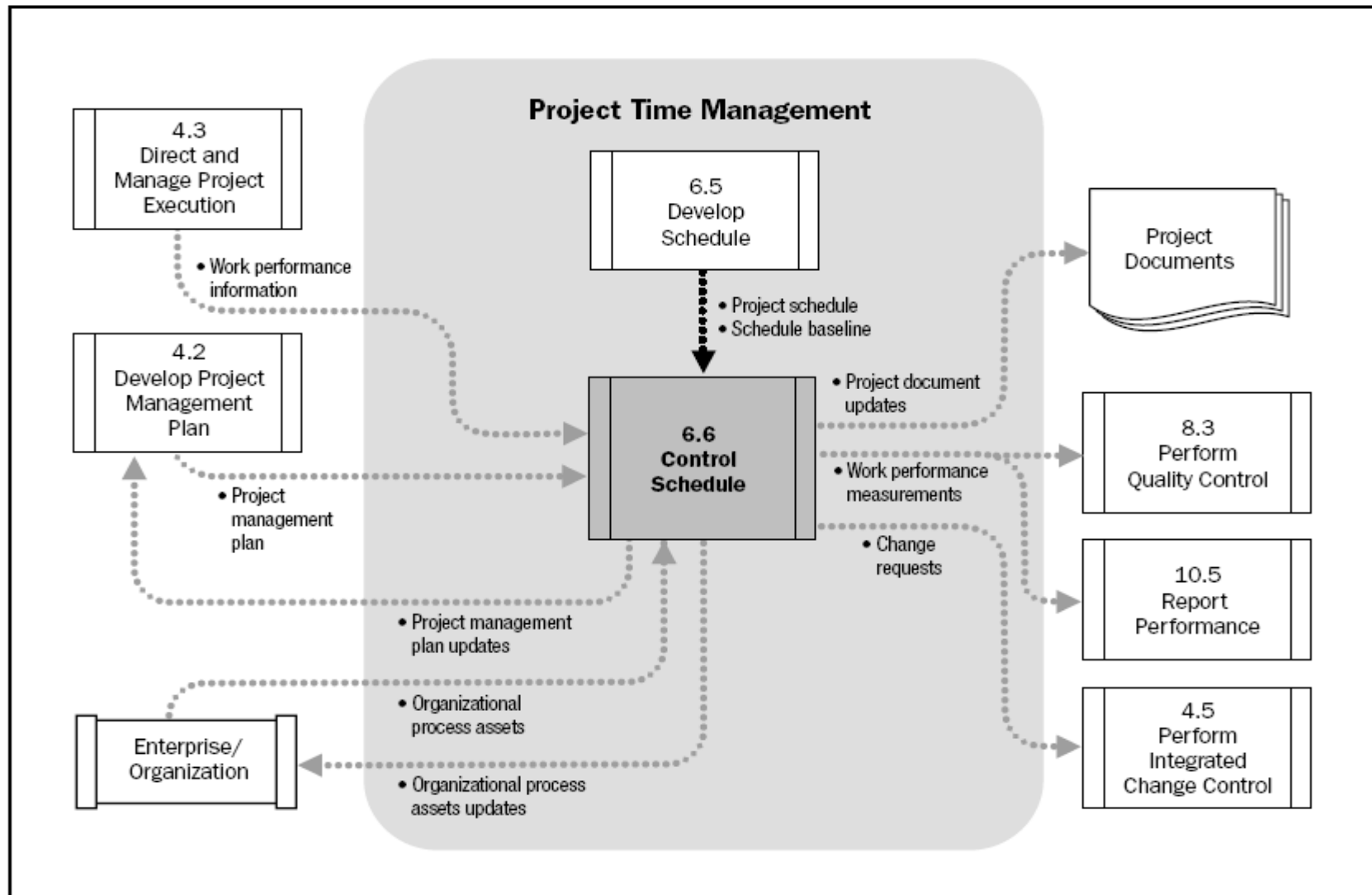
(Outputs)

- **Work Performance measurements**
- **Organizational Process Assets Updates**
- **Change Requests**
- **Project management Plan Updates**
 - Schedule baseline
 - Cost baseline
- **Project Document Updates**
 - Project Schedule

6.7 Control Schedule



6.7 Control Schedule



Questions

1- Which of the following is the BEST to do to try to complete your project two months earlier?

- A) Tell senior management that the project's critical path does not allow the project to be finished earlier.
- B) Tell your boss.
- C) Meet with the team and look for options for crashing or fast tracking the critical path.
- D) Work hard and see what the project status is next month.

1- Which of the following is the BEST to do to try to complete your project two months earlier?

- A) Tell senior management that the project's critical path does not allow the project to be finished earlier.
- B) Tell your boss.
- C) Meet with the team and look for options for crashing or fast tracking the critical path.**
- D) Work hard and see what the project status is next month.

2- A problem occurs on an activity with free float and the project manager has extended its duration. What is MOST likely to be affected?

- A) Project duration
- B) Resource schedules
- C) Project scope management plan
- D) The latest start for the successor activity

2- A problem occurs on an activity with free float and the project manager has extended its duration. What is MOST likely to be affected?

A) Project duration

B) Resource schedules

C) Project scope management plan

D) The latest start for the successor activity

3- An activity has an early start (ES) of day 3, a late start (LS) of day 13, an early finish (EF) of day 9 and a late finish (LF) of day 19. what is the activity float?

A) 10

B) 6

C) 3

D) 19

3- An activity has an early start (ES) of day 3, a late start (LS) of day 13, an early finish (EF) of day 9 and a late finish (LF) of day 19. what is the activity float?

A) 10

B) 6

C) 3

D) 19

4- An activity has an early start (ES) of day 3, a late start (LS) of day 13, an early finish (EF) of day 9 and a late finish (LF) of day 19. what is the duration of this activity?

A) 3

B) 6

C) 7

D) 10

4- An activity has an early start (ES) of day 3, a late start (LS) of day 13, an early finish (EF) of day 9 and a late finish (LF) of day 19. what is the duration of this activity?

A) 3

B) 6

C) 7

D) 10

5- Based on the chart, a resource on your project from the consumer affairs department comes to you to tell you that they are taking a two-week leave due to a family emergency. They are assigned to activity F, which is currently in progress. This is a problem because activity F has:

- a) One week of float
- b) Two months of float
- c) One month of float
- d) No float

Activity	Preceding activity	Estimate (months)
Start		
A	Start	3
B	Start	7
C	A	2
D	A	4
E	C, D	5
F	B	9
G	E, F	3
end	G	

5- Based on the chart, a resource on your project from the consumer affairs department comes to you to tell you that they are taking a two-week leave due to a family emergency. They are assigned to activity F, which is currently in progress. This is a problem because activity F has:

- a) One week of float
- b) Two months of float
- c) One month of float
- d) **No float**

Activity	Preceding activity	Estimate (months)
Start		
A	Start	3
B	Start	7
C	A	2
D	A	4
E	C, D	5
F	B	9
G	E, F	3
end	G	

6- Management wants the project completed in 40 days. The cost performance index (CPI) is 1.1, the project critical path duration is 38 days with a standard deviation of two days. What is the maximum project float?

- a) Zero days
- b) Two days
- c) Four days
- d) One day

6- Management wants the project completed in 40 days. The cost performance index (CPI) is 1.1, the project critical path duration is 38 days with a standard deviation of two days. What is the maximum project float?

a) Zero days

b) Two days

c) Four days

d) One day

7- Total float is the amount of time an activity can be delayed without delaying the :

A) project.

B) completion date required by the customer.

C) early start of its successor.

D) project completion date.

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A) project.

B) completion date required by the customer.

C) early start of its successor.

D) project completion date.

8- Your boss tells you that one of your resources is needed on another project. All the activities in the chart are occurring at the same time. Assuming that all the resources working on which activity would you pick to move to the other project?

A) Activity D

B) Activity C

C) Activity H

D) Activity B

activity	Float (month)
Start	
B	2
C	1
D	0
F	1
G	0
H	4
I	0
E	3
End	

8- Your boss tells you that one of your resources is needed on another project. All the activities in the chart are occurring at the same time. Assuming that all the resources working on which activity would you pick to move to the other project?

A) Activity D

B) Activity C

C) Activity H

D) Activity B

activity	Float (month)
Start	
B	2
C	1
D	0
F	1
G	0
H	4
I	0
E	3
End	

9- Lag means:

- A) The amount of time an activity can be delayed without delaying the project finish date.
- B) The amount of time an activity can be delayed without delaying the early start date of its successor.
- C) Waiting time
- D) The product of a forward and backward pass

9- Lag means:

- A) The amount of time an activity can be delayed without delaying the project finish date.
- B) The amount of time an activity can be delayed without delaying the early start date of its successor.
- C) Waiting time
- D) The product of a forward and backward pass

10- Management has decided to “crash” a project to avoid penalty payments for late deliveries. Additional costs are expected. To crash the project, either overtime or additional resources should be assigned to:

A) all activities

B) only those activities with the longest time durations

C) those activities on the critical path beginning with the lowest additional cost activities

D) those activities with the greatest degree of risk

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11- Using the chart, the resource for activity A is assigned to an additional, more important project. As a result the resource will not be able to devote as much time to your project. Activity A will now take 10 weeks. How does this affect the project?

- A) There are three critical paths**
- B) The project will be delayed**
- C) The project is riskier**
- D) Activity D will be delayed**

Activity	Preceding activity	Estimates (weeks)
Start		0
C	Start	3
D	C	6
A	C	8
E	D	4
B	A,E	5
F	E	3
end	B,F	0

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12- All of the following processes are included in project time management **except**:

A) define activities

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C) control schedule

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13- Any form of network analysis in which scheduling decisions, such as start and finish dates, are driven by resource management concern is called resource-----

A) allocation

B) leveling

C) partitioning

D) quantification

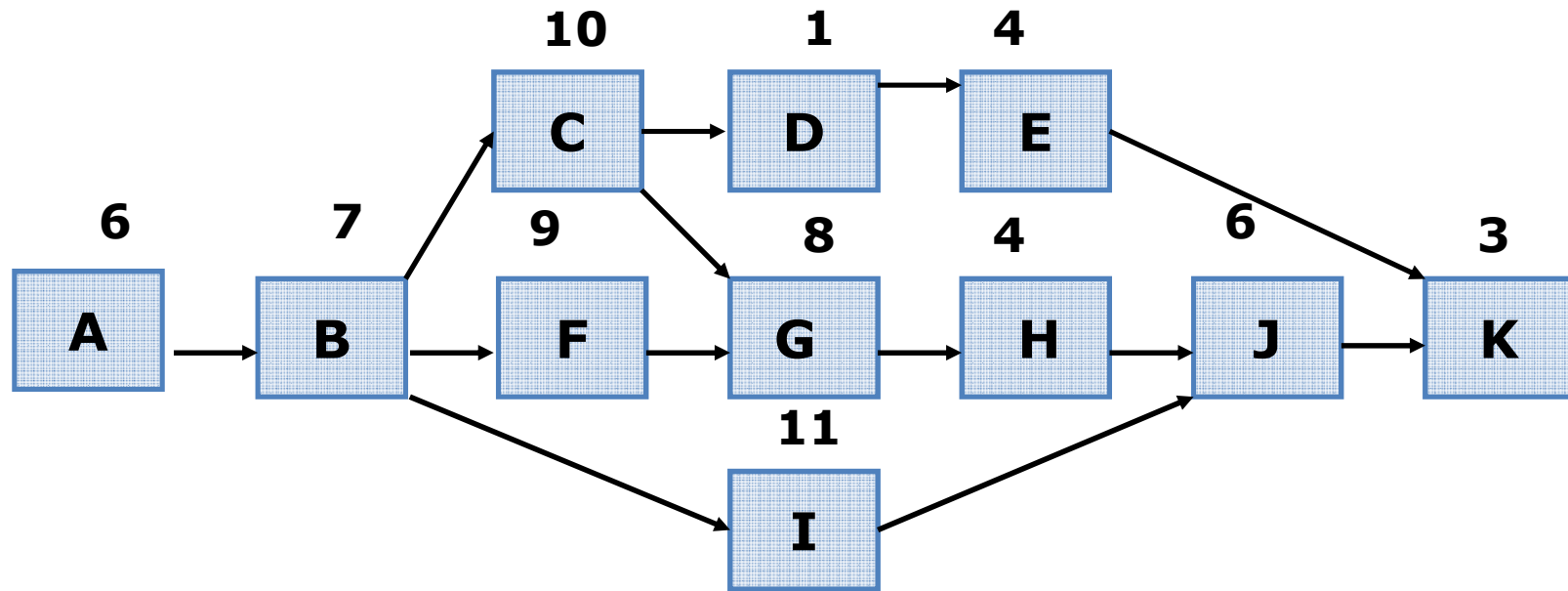
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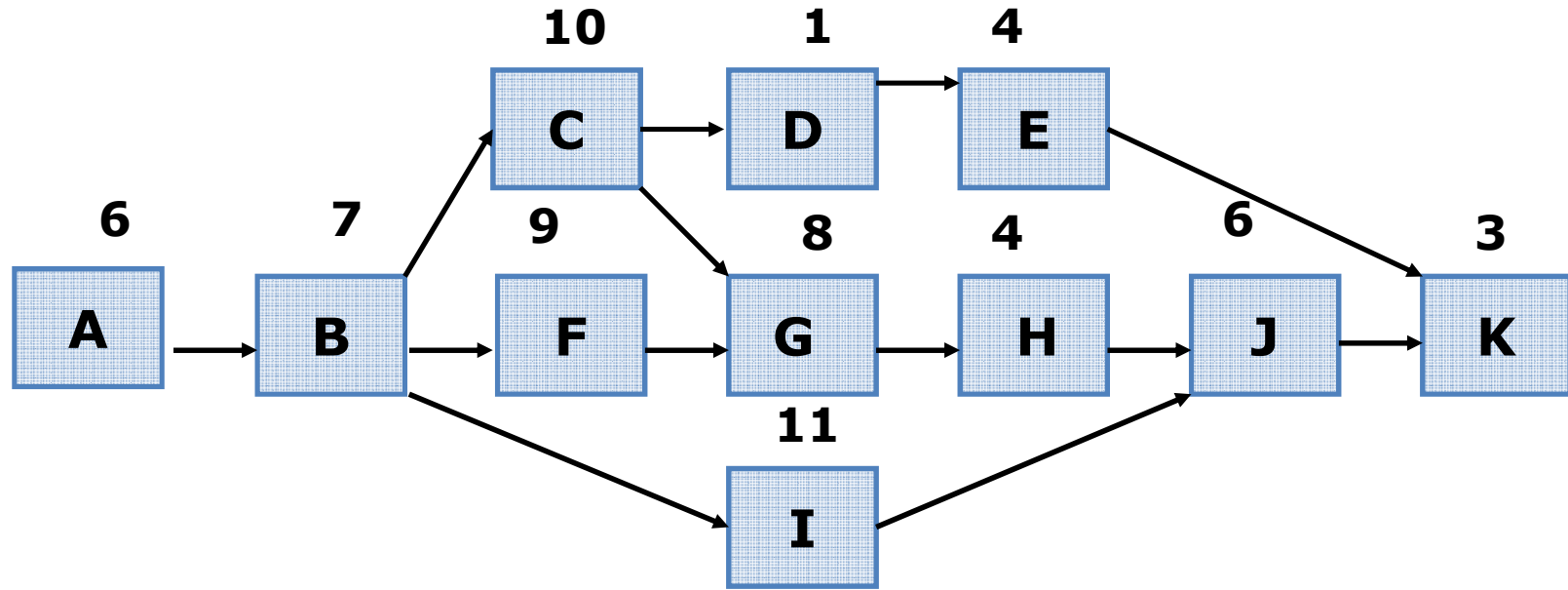
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14) What is the duration of the near critical path ?

- A. 33
- B. 44
- C. 47
- D. 43



14) What is the duration of the near critical path ?

A. 33

B. 44

C. 47

D. 43

Thank you