Управление времето на проекта

Лекция 6

Курс “Управление на проекти ”

Основни теми

- Дефиниране на дейностите и тяхната последователност
- Оценка на ресурсите и продължителниостта на дейностите
- Подготовка и контрол на графика

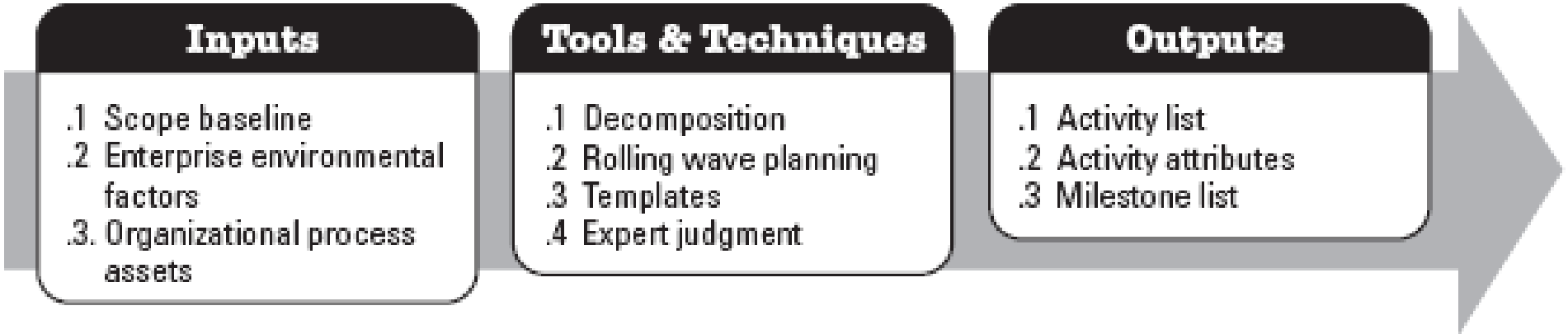
PROJECT TIME MANAGEMENT

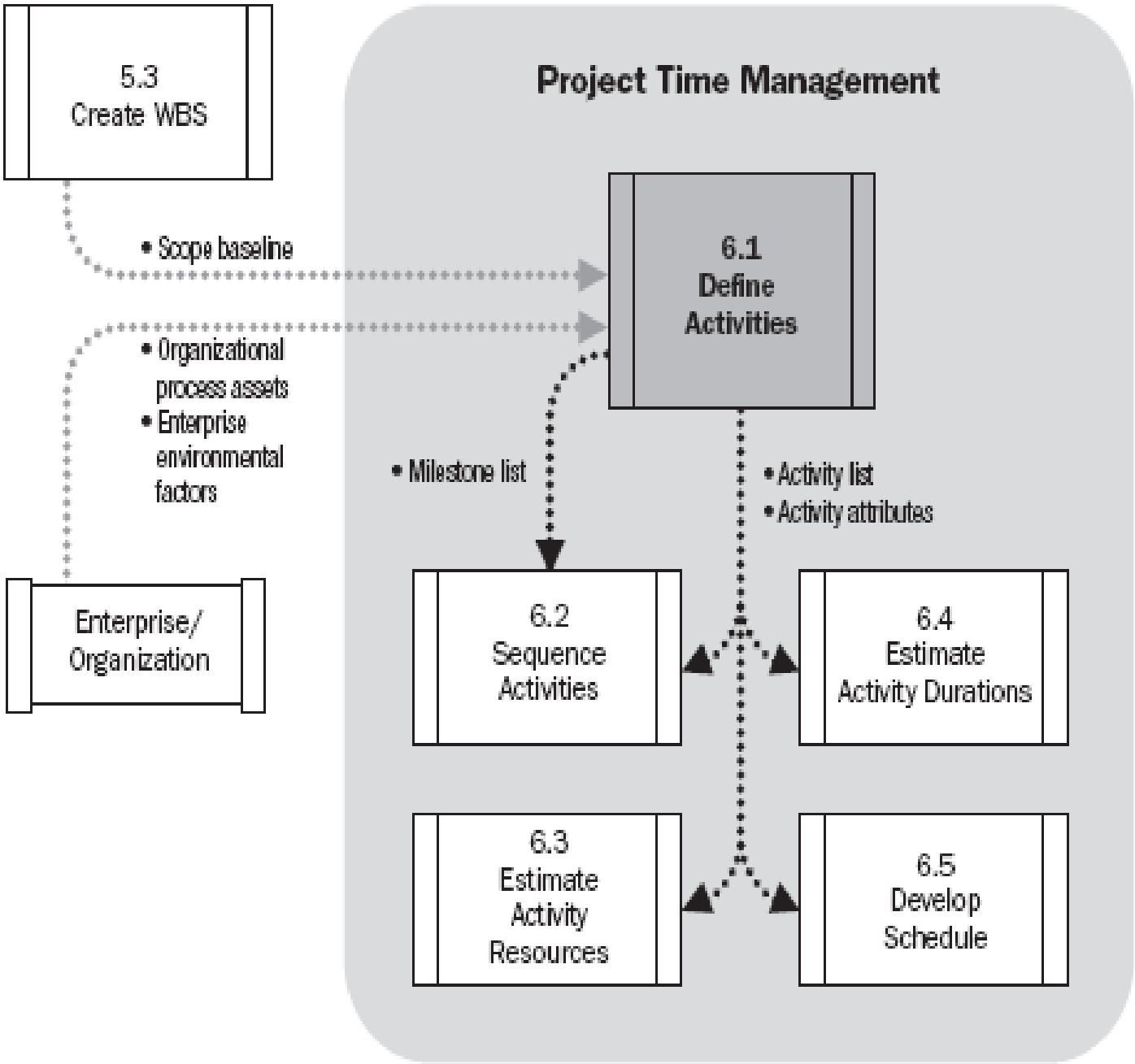
includes the processes required to manage timely completion of the project:

- **Define Activities**—The process of identifying the specific actions to be performed to produce the project deliverables.
- **Sequence Activities**—The process of identifying and documenting relationships among the project activities.
- **Estimate Activity Resources**—The process of estimating the type and quantities of material, people, equipment, or supplies required to perform each activity.
- **Estimate Activity Durations**—The process of approximating the number of work periods needed to complete individual activities with estimated resources.
- **Develop Schedule**—The process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule.
- **Control Schedule**—The process of monitoring the status of the project to update project progress and managing changes to the schedule baseline.

Define Activities

- process of identifying the specific actions to be performed to produce the project deliverables. The Create WBS process identifies the deliverables at the lowest level in the Work Breakdown Structure, the work package.
- Project work packages are typically decomposed into smaller components 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.




5.3
Create WBS
Project Time Management
• Scope baseline
6.1
Define
Activities
• Organizational process assets
• Enterprise environmental factors
• Milestone list
• Activity list
• Activity attributes
Enterprise/
Organization
6.2
Sequence
Activities
6.4
Estimate
Activity Durations
6.3
Estimate
Activity
Resources
6.5
Develop
Schedule

Define Activities: Tools and Techniques

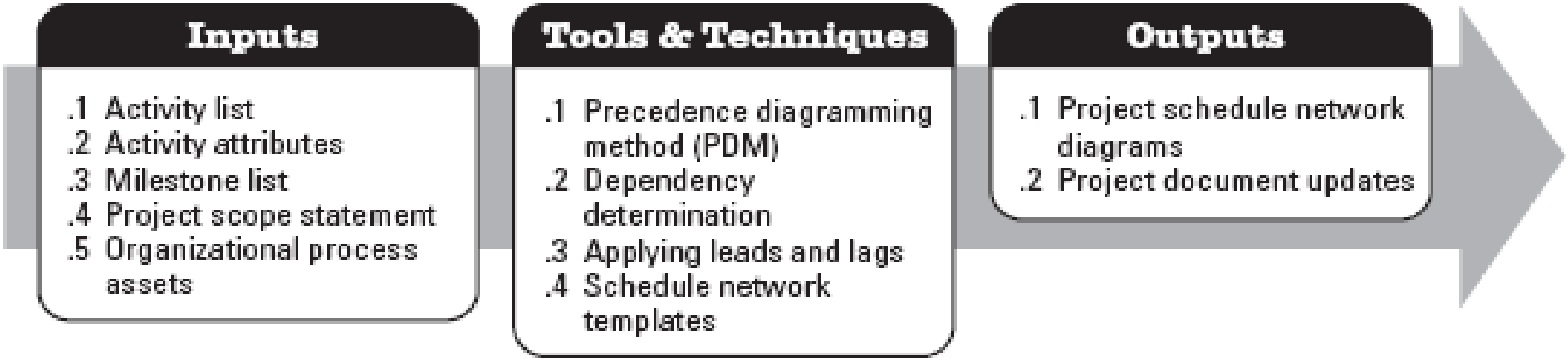
- **Decomposition -** involves subdividing the project work packages into smaller, more manageable components called activities. Activities represent the effort needed to complete a work package. The process defines the final outputs as activities rather than deliverables, as done in the Create WBS process
- **Rolling Wave Planning -** 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. Therefore, work can exist at various levels of detail depending on where it is in the project life cycle.
  - For example, during early strategic planning, when information is less defined, work packages may be decomposed to the milestone level. As more is known about the upcoming events in the near term it can be decomposed into activities.

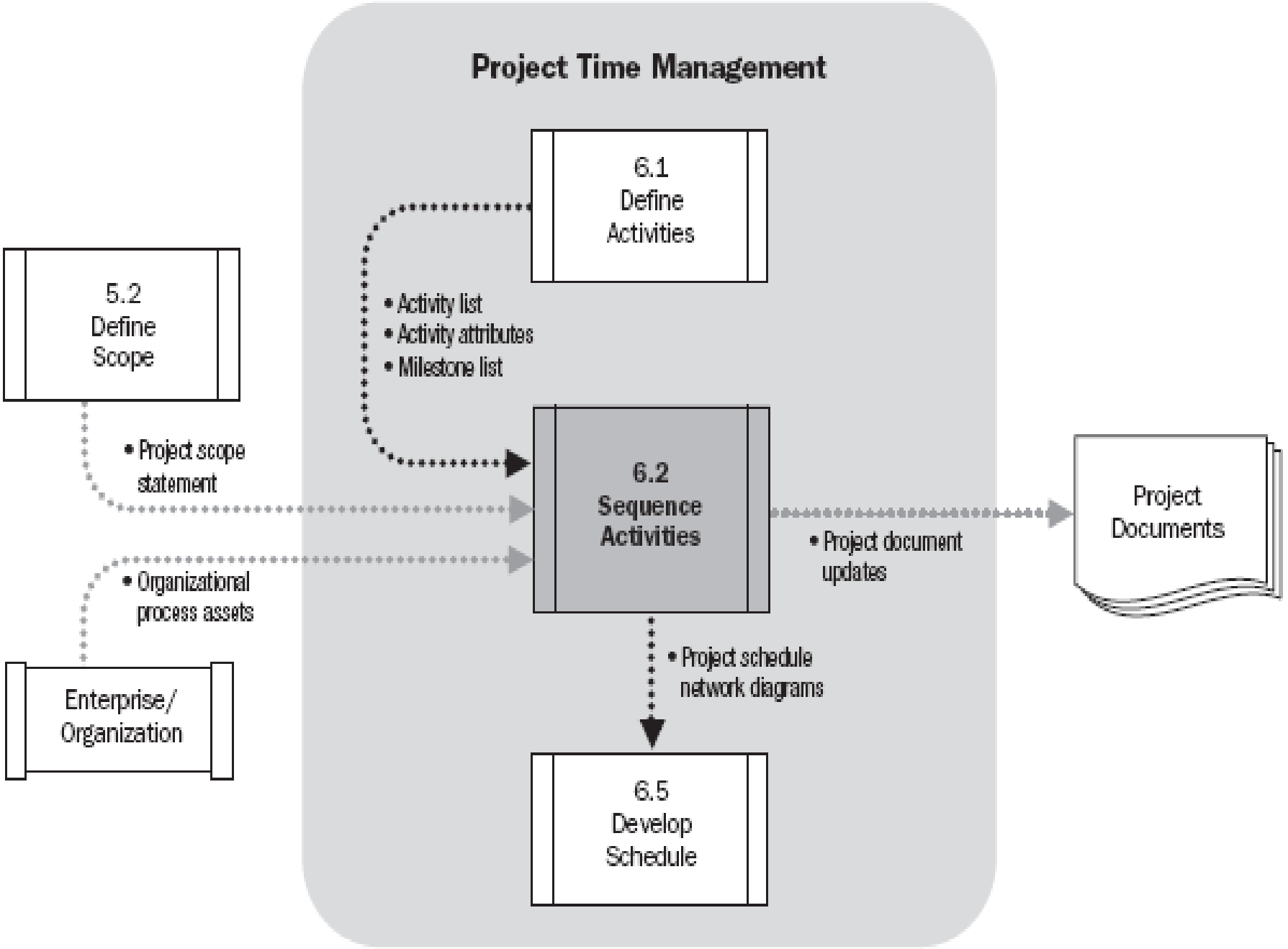
Define Activities: Tools and Techniques

- **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. The related activity attributes information in the templates can also contain other descriptive information useful in defining activities. Templates can also be used to identify typical schedule milestones.
- **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.

Sequence Activities

- the process of identifying and documenting relationships among the project activities.
- Activities are sequenced using logical relationships.
- Every activity and milestone except the first and last are connected to at least one predecessor and one successor.
- It may be necessary to use lead or lag time between activities to support a realistic and achievable project schedule.
- Sequencing can be performed by using project management software or by using manual or automated techniques.

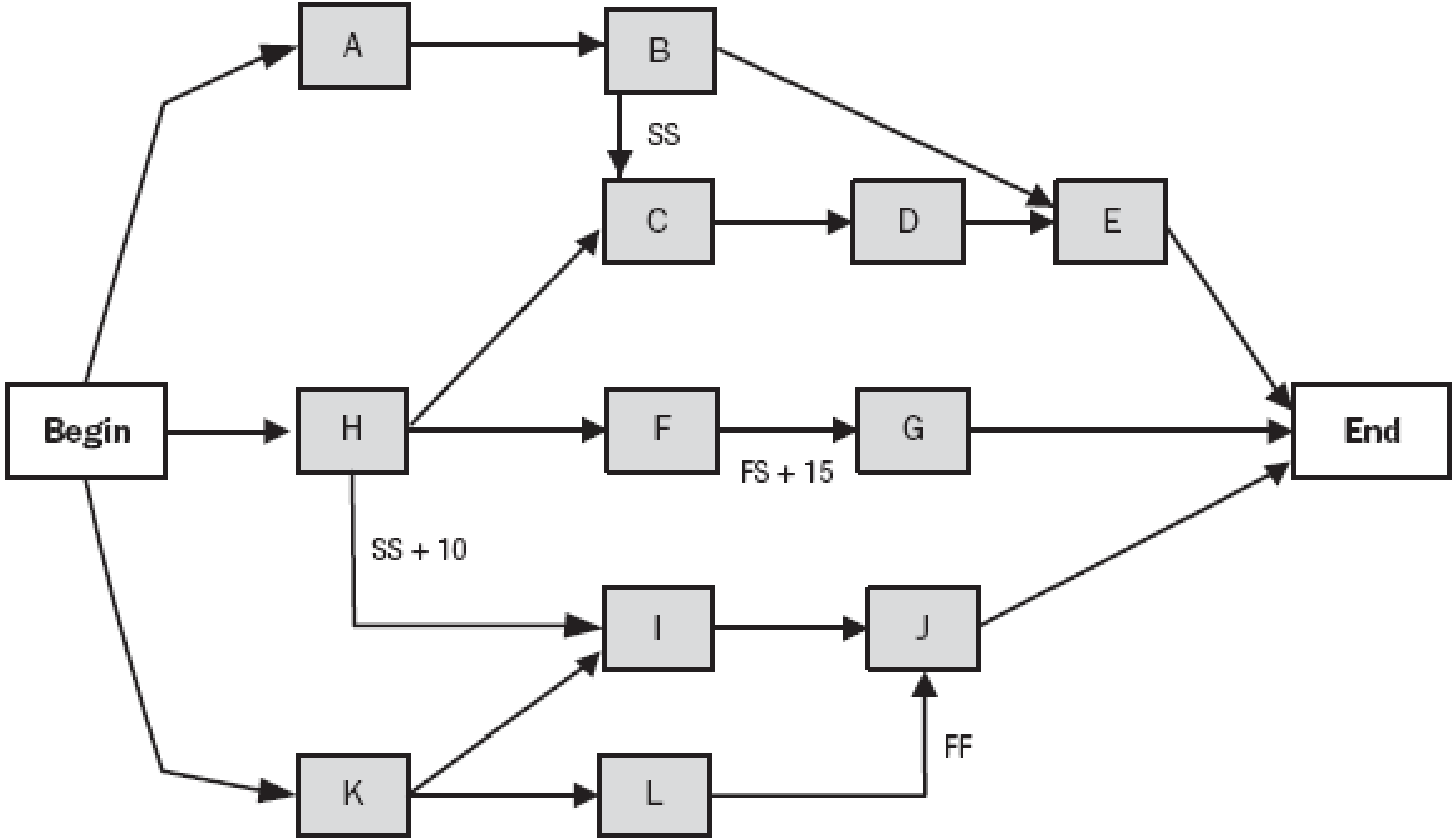



Project Time Management
6.1
Define
Activities
• Activity list
• Activity attributes
• Milestone list
5.2
Define
Scope
• Project scope
statement
6.2
Sequence
Activities
Project
Documents
• Project document
updates
• Organizational
process assets
Enterprise/
Organization
• Project schedule
network diagrams
6.5
Develop
Schedule

Sequence Activities: Tools and Techniques

- **Precedence Diagramming Method (PDM) -** used in Critical Path Methodology (CPM) for constructing a project schedule network diagram that uses boxes or rectangles, referred to as nodes, to represent activities, and connects them with arrows that show the logical relationships that exist between them. This technique is also called Activity-On-Node (AON), and is the method used by most project management software packages.
- PDM includes four types of dependencies or logical relationships:
  - **Finish-to-start (FS).** The initiation of the successor activity depends upon the completion of the predecessor activity.
  - **Finish-to-finish (FF).** The completion of the successor activity depends upon the completion of the predecessor activity.
  - **Start-to-start (SS).** The initiation of the successor activity depends upon the initiation of the predecessor activity.
  - **Start-to-finish (SF).** The completion of the successor activity depends upon the initiation of the predecessor activity.

Precedence Diagramming Method



Sequence Activities: Tools and Techniques

- **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. The project team determines which dependencies are mandatory during the process of sequencing the activities.
  - **Discretionary dependencies.** sometimes referred to as preferred logic, preferential logic, or soft logic. Discretionary dependencies are established based on knowledge of best practices within a particular application area or some unusual aspect of the project where a specific sequence is desired, even though there may be other acceptable sequences.
  - **External dependencies.** involve a relationship between project activities and non-project activities. These dependencies are usually outside the project team's control. For example, the testing activity in a software project can be dependent on the delivery of hardware from an external source, or governmental environmental hearings may need to be held before site preparation can begin on a construction project.

Sequence Activities: Tools and Techniques

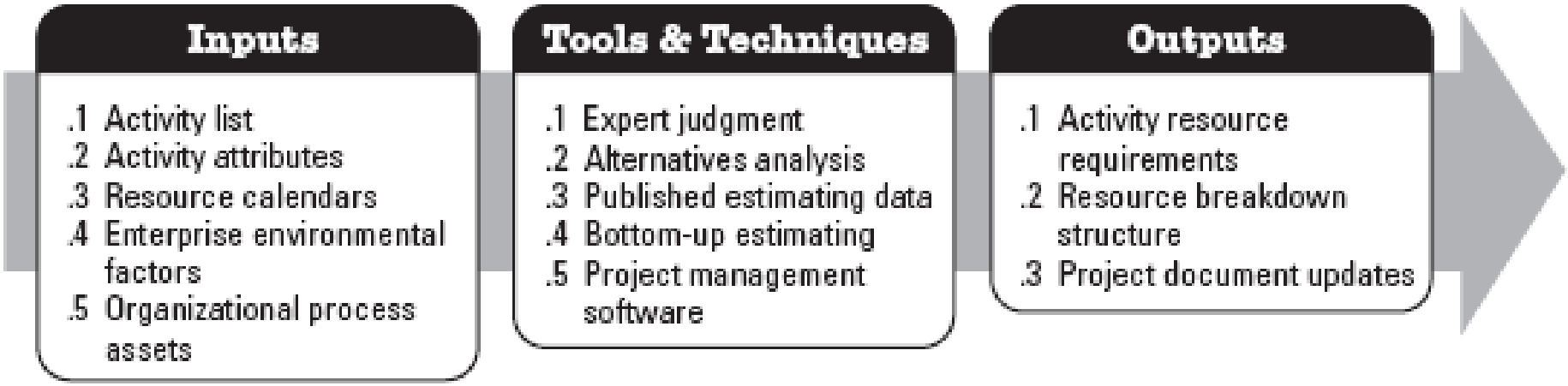
- **Applying Leads and Lags**
- The project management team determines the dependencies that may require a lead or a lag to accurately define the logical relationship. The use of leads and lags should not replace schedule logic. Activities and their related assumptions should be documented.
  - A **lead** allows an acceleration of the successor activity. For example, on a project to construct a new office building, the landscaping could be scheduled to start 2 weeks prior to the scheduled punch list completion. This would be shown as a finish-to-start with a 2-week lead.
  - A **lag** directs a delay in the successor activity. For example, a technical writing team can begin editing the draft of a large document 15 days after they begin writing it. This could be shown as a start-to-start relationship with a 15-day lag.

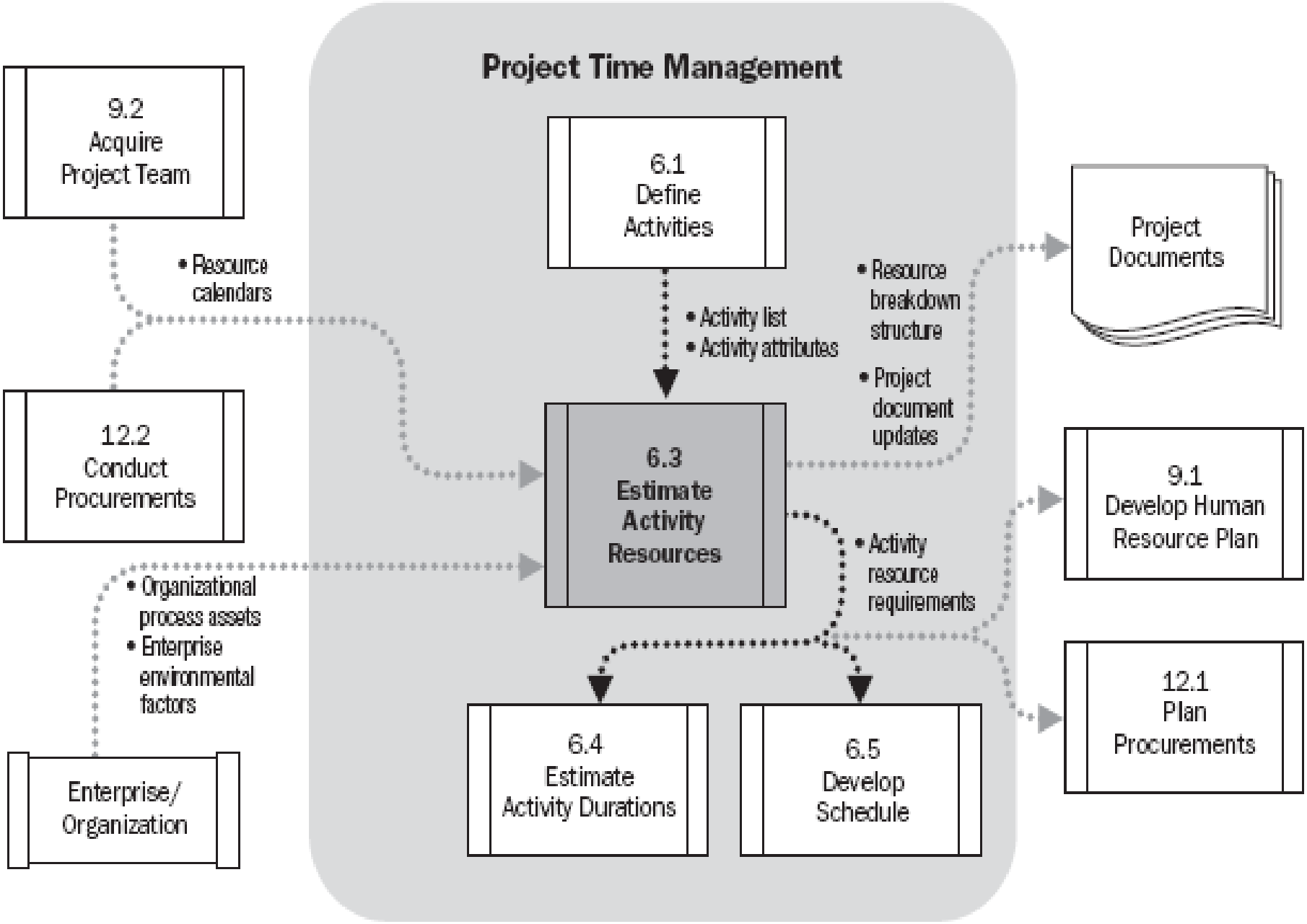
Sequence Activities: Tools and Techniques

- **Schedule Network Templates**
- Standardized schedule network diagram templates can be used to expedite the preparation of networks of project activities. They can include an entire project or only a portion of it.
- Portions of a project schedule network diagram are often referred to as a subnetwork or a fragment network.
- Subnetwork templates are especially useful when a project includes several identical or nearly identical deliverables, such as floors on a high-rise office building, clinical trials on a pharmaceutical research project, coding program modules on a software project, or the start-up phase of a development project

Estimate Activity Resources

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



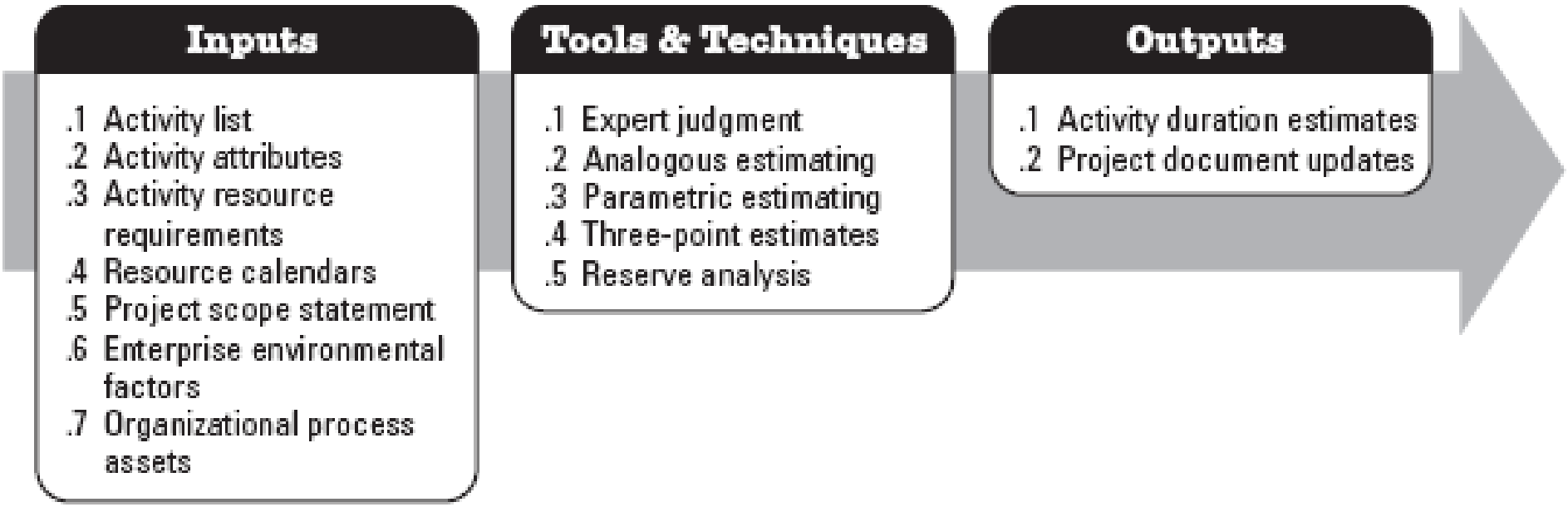

Project Time Management
9.2
Acquire
Project Team
6.1
Define
Activities
Project
Documents
• Resource
calendars
• Activity list
• Activity attributes
• Resource
breakdown
structure
• Project
document
updates
12.2
Conduct
Procurements
6.3
Estimate
Activity
Resources
9.1
Develop Human
Resource Plan
• Activity
resource
requirements
• Organizational
process assets
• Enterprise
environmental
factors
12.1
Plan
Procurements
Enterprise/
Organization
6.4
Estimate
Activity Durations
6.5
Develop
Schedule

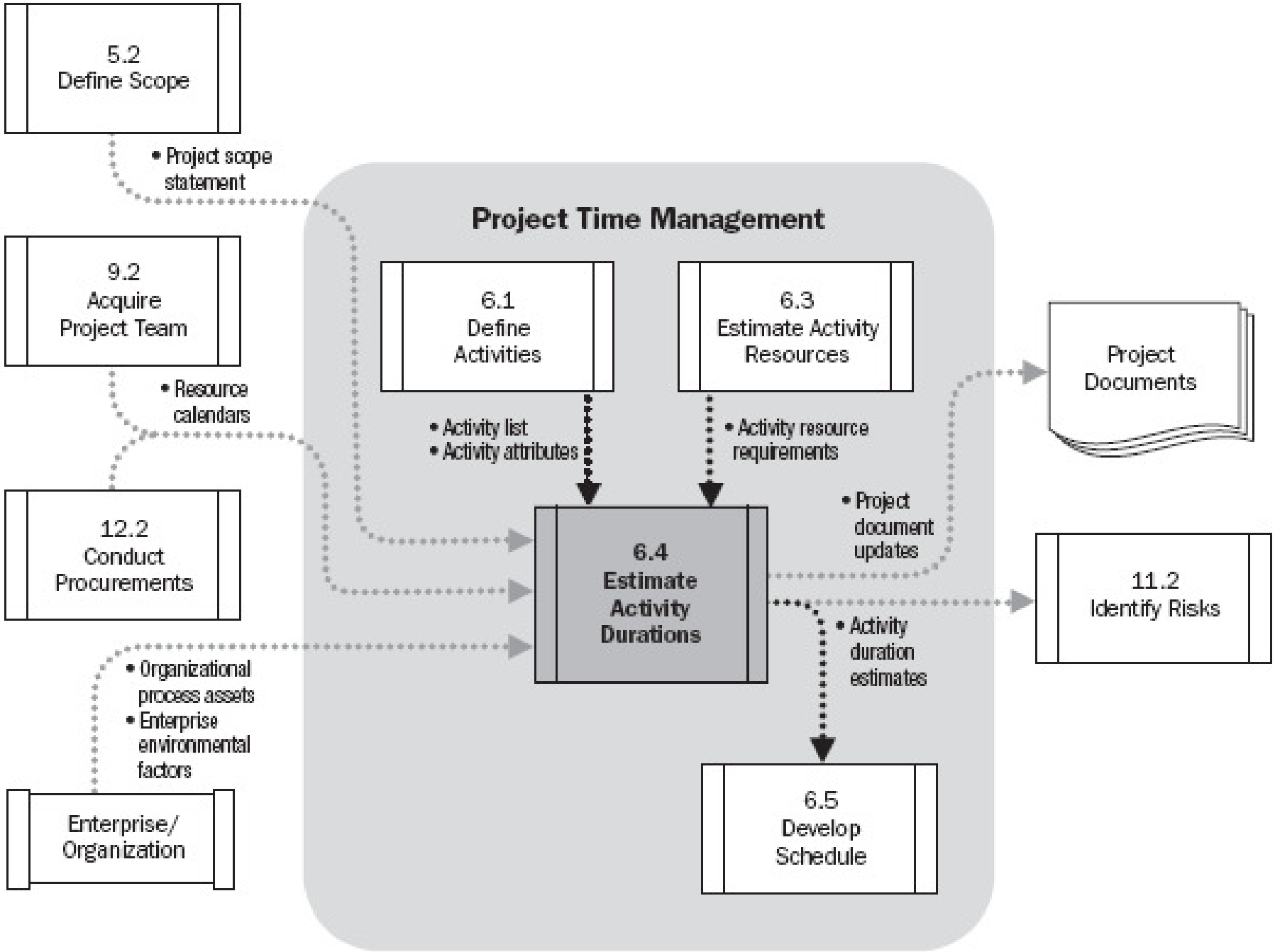
Estimate Activity Resources: Tools and Techniques

- **Expert Judgment -** often required to assess the resource-related inputs to this process. Any group or person with specialized knowledge in resource planning and estimating can provide such expertise.
- **Alternatives Analysis -** Many schedule activities have alternative methods of accomplishment. They include using various levels of resource capability or skills, different size or type of machines, different tools (hand versus automated), and make-or-buy decisions regarding the resource.
- **Published Estimating Data -** Several companies routinely publish updated production rates and unit costs of resources for an extensive array of labor trades, material, and equipment for different countries and geographical locations within countries.
- **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. Activities may or may not have dependencies between them that can affect the application and use of resources. If there are dependencies, this pattern of resource usage is reflected and documented in the estimated requirements of the activity.
- **Project Management Software -** help plan, organize, and manage resource pools and develop resource estimates. Depending on the sophistication of the software, resource breakdown structures, resource availability, resource rates and various resource calendars can be defined to assist in optimizing resource utilization

Estimate Activity Durations

- the process of approximating the number of work periods needed to complete individual activities with estimated resources.
- Estimating activity durations uses information on activity scope of work, required resource types, estimated resource quantities, and resource calendars




5.2
Define Scope
• Project scope statement
Project Time Management
9.2
Acquire
Project Team
6.1
Define
Activities
6.3
Estimate Activity
Resources
Project
Documents
• Resource calendars
• Activity list
• Activity attributes
• Activity resource requirements
12.2
Conduct
Procurements
6.4
Estimate
Activity
Durations
• Project document updates
11.2
Identify Risks
• Activity duration estimates
• Organizational process assets
• Enterprise environmental factors
Enterprise/
Organization
6.5
Develop
Schedule

Estimate Activity Durations: Tools and Techniques

- **Expert Judgment -** guided by historical information, can provide duration estimate information or recommended maximum activity durations from prior similar projects. Expert judgment can also be used to determine whether to combine methods of estimating and how to reconcile differences between them.
- **Analogous Estimating** - uses parameters such as duration, budget, size, weight, and complexity, from a previous, similar project, as the basis for estimating the same parameter or measure for a future project.
  - When estimating durations, this technique relies on the actual duration of previous, similar projects as the basis for estimating the duration of the current project. It is a gross value estimating approach, sometimes adjusted for known differences in project complexity.
  - Analogous estimating is generally less costly and time consuming than other techniques, but it is also generally less accurate.

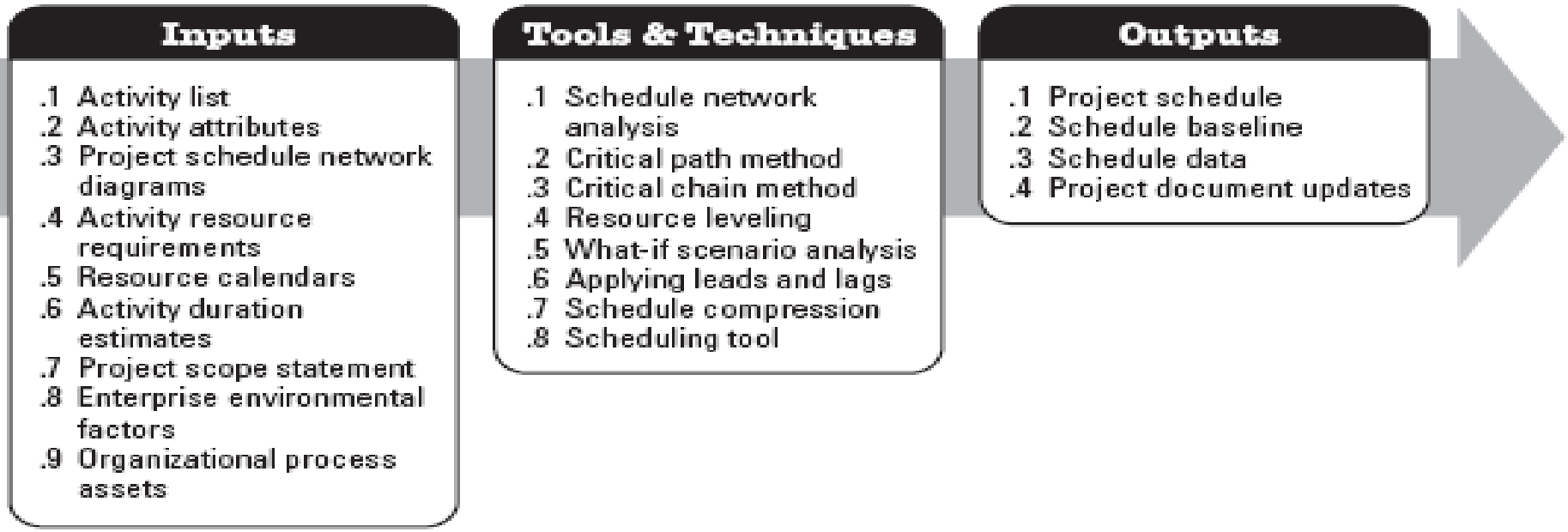
Estimate Activity Durations: Tools and Techniques

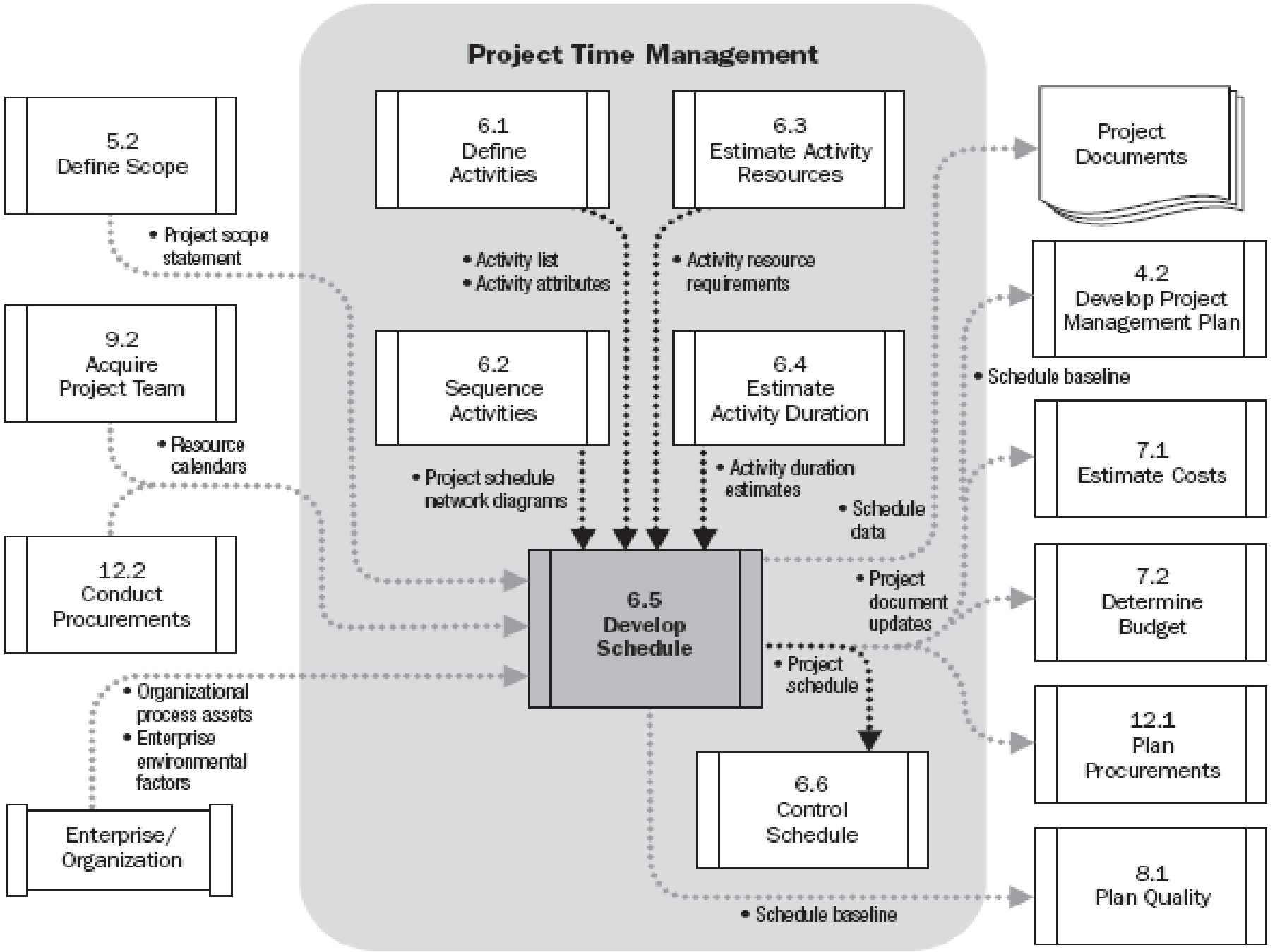
- **Parametric Estimating -** uses a statistical relationship between historical data and other variables (e.g., square footage in construction) to calculate an estimate for activity parameters, such as cost, budget, and duration.
  - Activity durations can be quantitatively determined by multiplying the quantity of work to be performed by labor hours per unit of work.
  - This technique can produce higher levels of accuracy depending upon the sophistication and underlying data built into the model. Parametric time estimates can be applied to a total project or to segments of a project, in conjunction with other estimating methods.
- **Three-Point Estimates -** The accuracy of activity duration estimates can be improved by considering estimation uncertainty and risk. This concept originated with the Program Evaluation and Review Technique (PERT). PERT uses three estimates to define an approximate range for an activity's duration:
  - **Most likely (tM).** The duration of the activity, given the resources likely to be assigned, their productivity, realistic expectations of availability for the activity, dependencies on other participants, and interruptions.
  - **Optimistic (t0).** The activity duration is based on analysis of the best-case scenario for the activity.
  - **Pessimistic (tP).** The activity duration is based on analysis of the worst-case scenario for the activity.
  - PERT analysis calculates an **Expected** (tE) activity duration using a weighted average of these three estimates:

$$t_E = (t_O + 4t_M + t_P) / 6$$

Develop Schedule

- the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule.
- Entering the activities, durations, and resources into the scheduling tool generates a schedule with planned dates for completing project activities.

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Define
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6.3
Estimate Activity
Resources
• Activity list
• Activity attributes
• Activity resource requirements
6.2
Sequence
Activities
6.4
Estimate
Activity Duration
• Project schedule network diagrams
• Activity duration estimates
6.5
Develop
Schedule
• Schedule data
• Project document updates
• Project schedule
6.6
Control
Schedule
• Schedule baseline
Project
Documents
4.2
Develop Project
Management Plan
• Schedule baseline
7.1
Estimate Costs
7.2
Determine
Budget
12.1
Plan
Procurements
8.1
Plan Quality

Develop Schedule: Tools and Techniques

- **Schedule Network Analysis -** technique that generates 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. Some network paths may have points of path convergence or path divergence that can be identified and used in schedule compression analysis or other analyses.
- **Critical Path Method -** calculates the theoretical early start and finish dates, and late start and finish dates, for all activities without regard for any resource limitations, by performing a forward and backward pass analysis through the schedule network. The resulting early and late start and finish dates are not necessarily the project schedule; rather, they indicate the time periods within which the activity could be scheduled, given activity durations, logical relationships, leads, lags, and other known constraints.

Develop Schedule: Tools and Techniques

- **Critical Chain Method -** schedule network analysis technique that modifies the project schedule to account for limited resources. Initially, the project schedule network diagram is built using duration estimates with required dependencies and defined constraints as inputs. The critical path is then calculated. After the 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.

Develop Schedule: Tools and Techniques

- **Resource Leveling -** analysis technique applied to a schedule that has already been analyzed by the critical path method.
  - can be used when shared or critical required resources are only available at certain times, are only available in limited quantities, or to keep resource usage at a constant level.
  - necessary when resources have been over-allocated, such as when a resource has been assigned to two or more activities during the same time period, when shared or critical required resources are only available at certain times or are only available in limited quantities. Resource leveling can often cause the original critical path to change.
- **What-If Scenario Analysis -** This is an analysis of the question "What if the situation represented by scenario 'X' happens?"
  - A schedule network analysis is performed using the schedule to compute the different scenarios, such as delaying a major component delivery, extending specific engineering durations, or introducing external factors, such as a strike or a change in the permitting process.
  - The outcome of the what-if scenario analysis can be used to assess the feasibility of the project schedule under adverse conditions, and in preparing contingency and response plans to overcome or mitigate the impact of unexpected situations.
  - Simulation involves calculating multiple project durations with different sets of activity assumptions.
  - The most common technique is Monte Carlo Analysis, in which a distribution of possible activity durations is defined for each activity and used to calculate a distribution of possible outcomes for the total project.
- **Applying Leads and Lags -** refinements applied during network analysis to develop a viable schedule.

Develop Schedule: Tools and Techniques

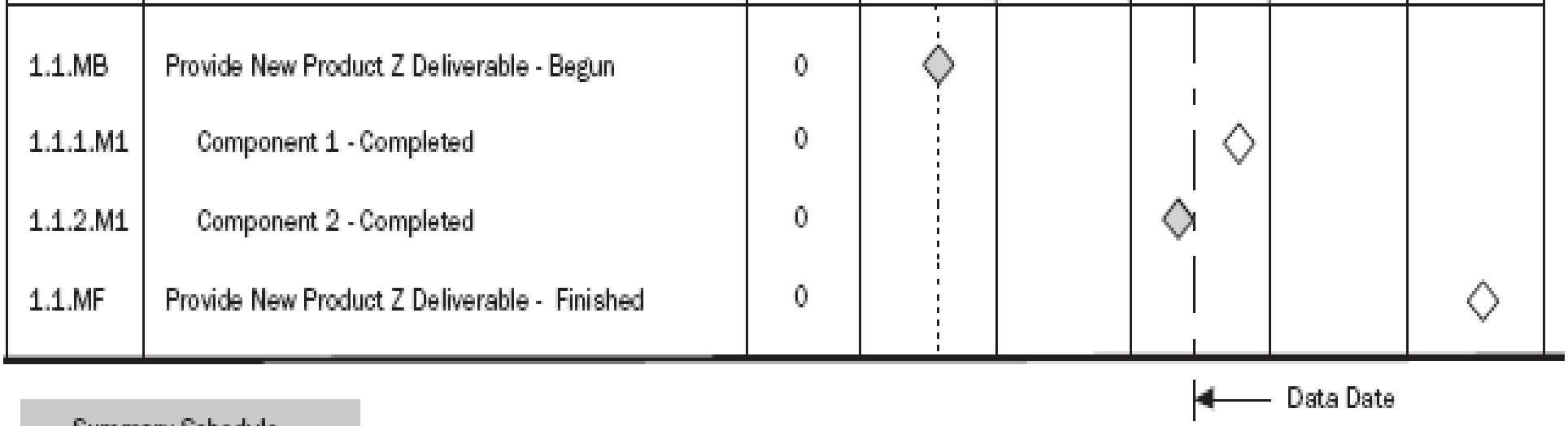
- **Schedule Compression** - shortens the project schedule without changing the project scope, to meet schedule constraints, imposed dates, or other schedule objectives.
- Schedule compression techniques include:
  - **Crashing.** cost and schedule tradeoffs are analyzed to determine how to obtain the greatest amount of compression for the least incremental cost. Examples of crashing could include approving overtime, bringing in additional resources, or paying to expedite delivery to activities on the critical path.
  - **Fast tracking.** phases or activities normally performed in sequence are performed in parallel. Fast tracking may result in rework and increased risk. Fast tracking only works if activities can be overlapped to shorten the duration.

Develop Schedule: Outputs

- **Project Schedule -** includes a planned start date and planned finish date for each activity.
  - If resource planning is done at an early stage, then the project schedule would remain preliminary until resource assignments have been confirmed and scheduled start and finish dates are established.
  - A project target schedule may also be developed with a defined target start and target finish for each activity.
- The project schedule may be presented graphically, using one or more of the following formats:
  - **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. Bar charts are relatively easy to read, and are frequently used in management presentations. For control and management communication, the broader, more comprehensive summary activity, sometimes referred to as a hammock activity, is used between milestones or across multiple interdependent work packages, and is displayed in bar chart reports.
  - **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.

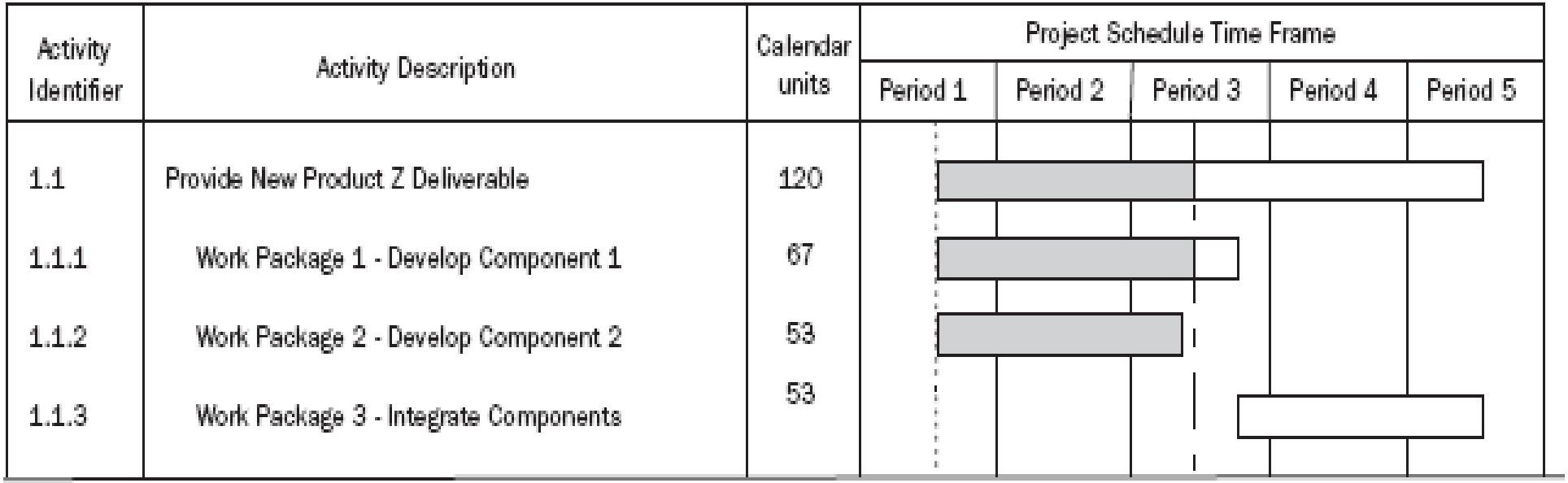
Milestone Schedule

Activity Identifier	Activity Description	Calendar units	Project Schedule Time Frame
			Period 1 / Period 2 / Period 3 / Period 4 / Period 5
1.1.MB	Provide New Product Z Deliverable - Begun	0	
1.1.1.M1	Component 1 - Completed	0	
1.1.2.M1	Component 2 - Completed	0	
1.1.MF	Provide New Product Z Deliverable - Finished	0	



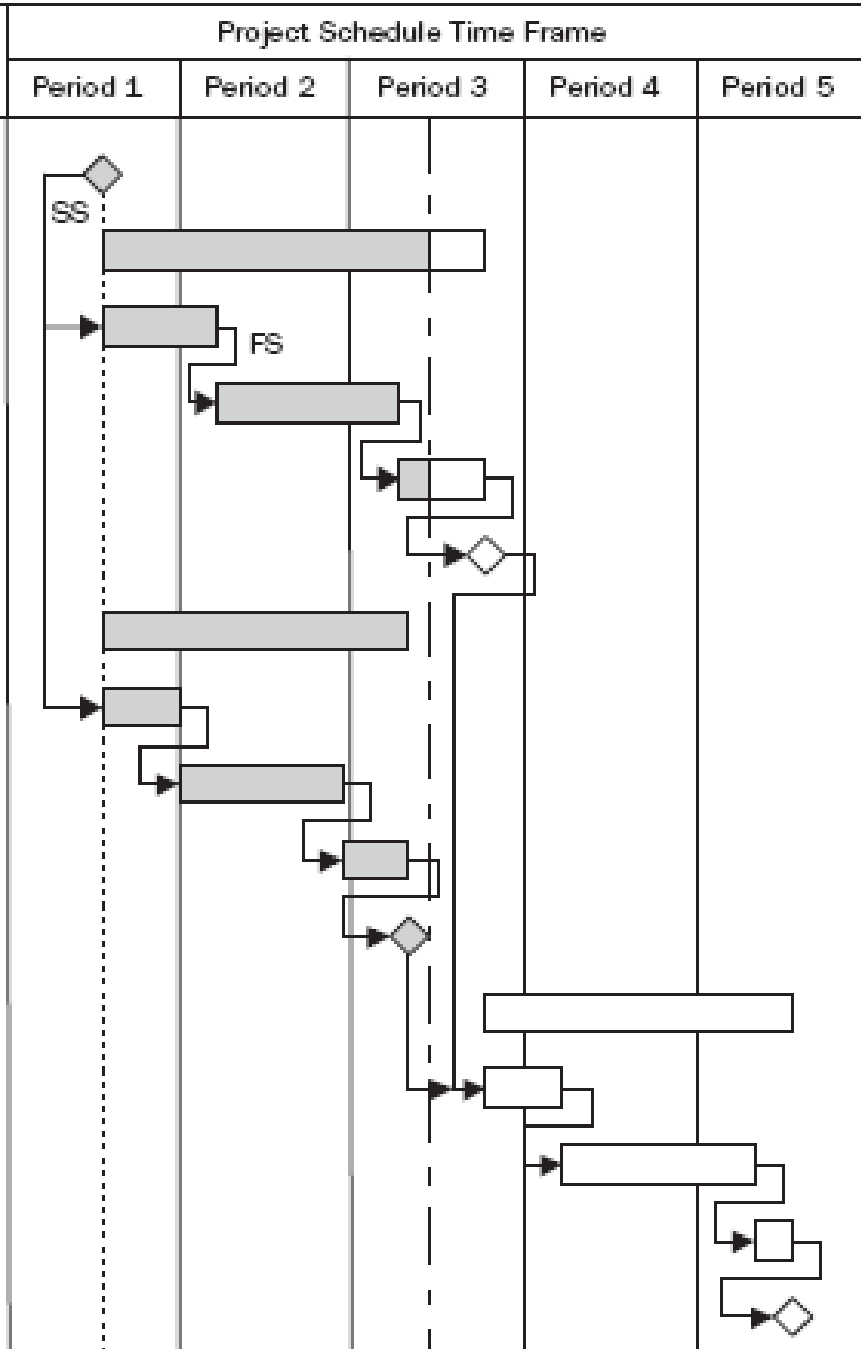
Summary Schedule

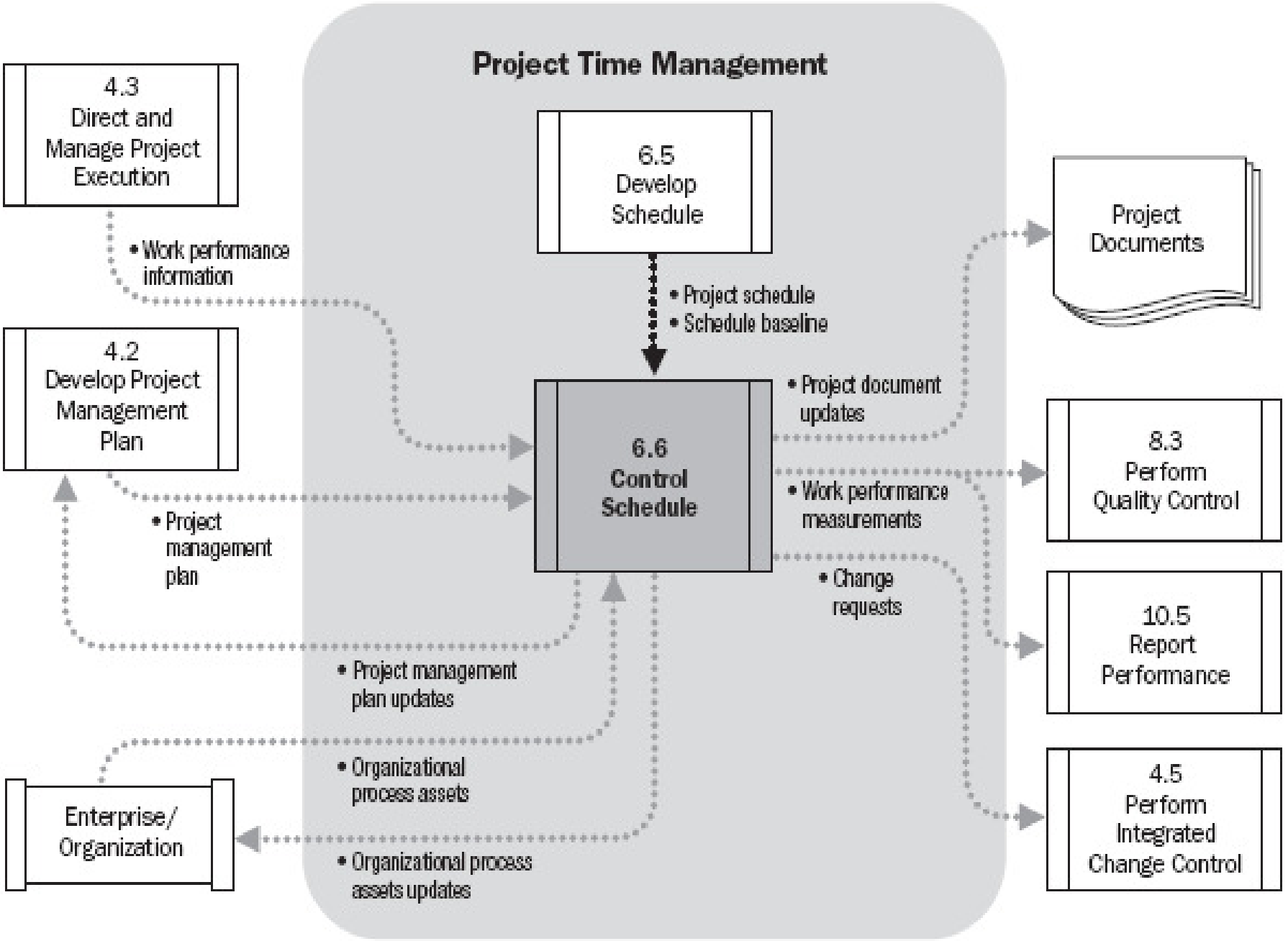
Activity Identifier	Activity Description	Calendar units	Project Schedule Time Frame
			Period 1 / Period 2 / Period 3 / Period 4 / Period 5
1.1	Provide New Product Z Deliverable	120	
1.1.1	Work Package 1 - Develop Component 1	67	
1.1.2	Work Package 2 - Develop Component 2	53	
1.1.3	Work Package 3 - Integrate Components	53	



Detailed Schedule with Logical Relationships

Activity Identifier	Activity Description	Calendar units
1.1.MB	Provide New Product Z Deliverable - Begun	0
1.1.1	Work Package 1 - Develop Component 1	67
1.1.1.D	Design Component 1	20
1.1.1.B	Build Component 1	33
1.1.1.T	Test Component 1	14
1.1.1.M1	Component 1 - Completed	0
1.1.2	Work Package 2 - Develop Component 2	53
1.1.2.D	Design Component 2	14
1.1.2.B	Build Component 2	28
1.1.2.T	Test Component 2	11
1.1.2.M1	Component 2 - Completed	0
1.1.3	Work Package 3 - Integrate Components	53
1.1.3.G	Integrate Components 1 & 2	14
1.1.3.T	Test Integrated Product Z	32
1.1.3.P	Deliver Product Z	7
1.1.MF	Provide New Product Z Deliverable - Finished	0




Project Time Management
4.3
Direct and
Manage Project
Execution
• Work performance
information
4.2
Develop Project
Management
Plan
• Project
management
plan
6.5
Develop
Schedule
• Project schedule
• Schedule baseline
6.6
Control
Schedule
• Project document
updates
• Work performance
measurements
• Change
requests
• Project management
plan updates
• Organizational
process assets
• Organizational process
assets updates
Enterprise/
Organization
Project
Documents
8.3
Perform
Quality Control
10.5
Report
Performance
4.5
Perform
Integrated
Change Control

Въпроси?

За контакти:

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