

Sequencing Project Activities



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Module Overview



Introduce the **Sequence Activities** process

Precedence diagramming

Dependency determination

Leads and lags

Project schedule network diagrams

Sequence Activities process components

Introducing the Sequence Activities Process



...the process of identifying and documenting relationships among the project activities.



Sequence Activities

Planning

Project Schedule
Management

Knowing the order of tasks is almost as important as knowing the tasks themselves



The Importance of Activity Sequencing

Conducting activities in different orders can lead to vastly different results



Sequence Activities

Planning

Project Time Management

Process determines how work *must* be done when necessary

Also determines how work *should* be done when multiple options are possible

Maximizes project efficiency and effectiveness



Activity Sequencing



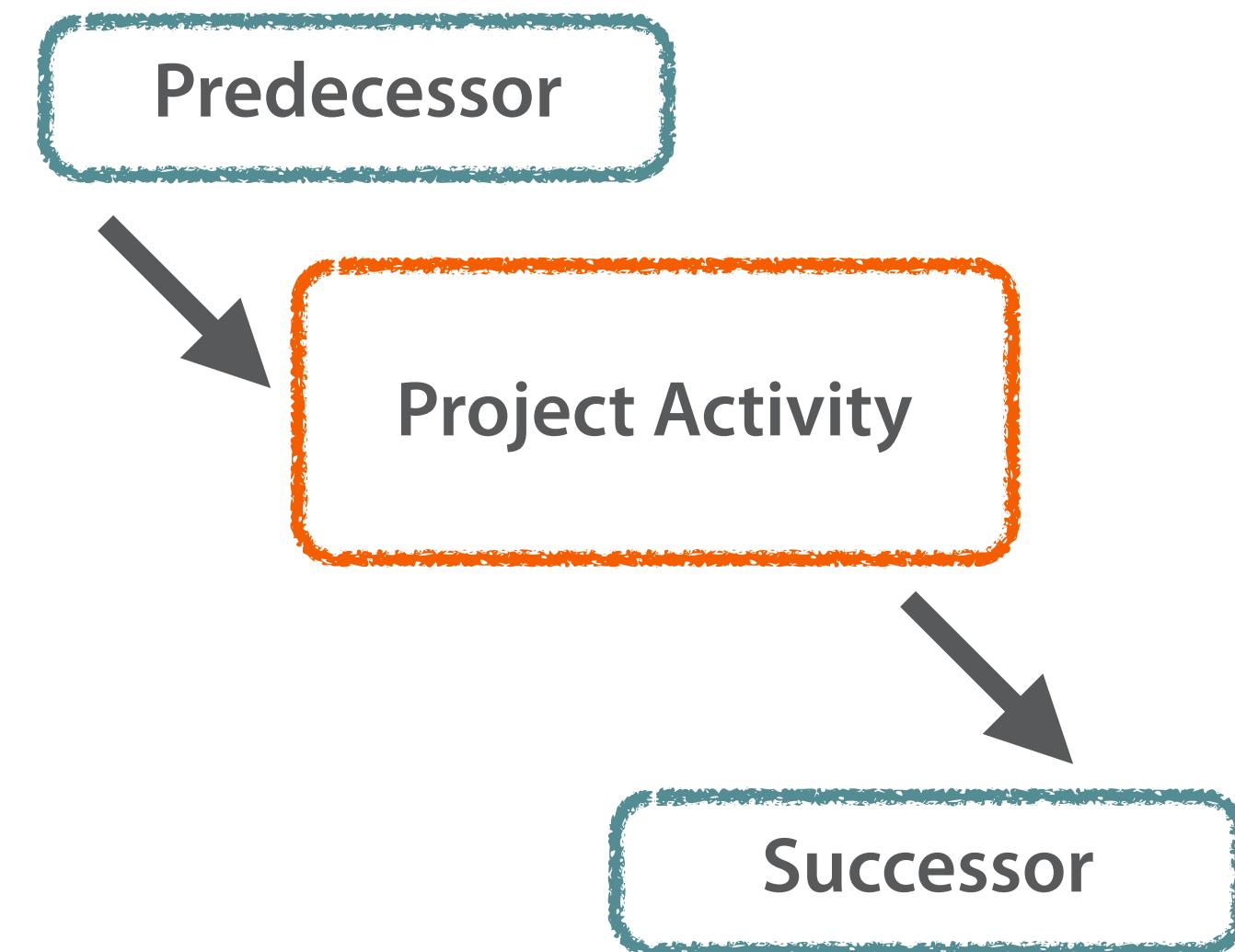
True for all but **first** and **last** activities scheduled for a project

Activity Sequencing



Finish-to-Start

Activity Sequencing



Start-to-Start

Sequence Activities

Planning

Project Time
Management

Activities can have differing relationships with predecessors and successors

Lead and lag time can be used to create reasonable buffers

How activities are related and how buffers are used helps make a schedule realistic



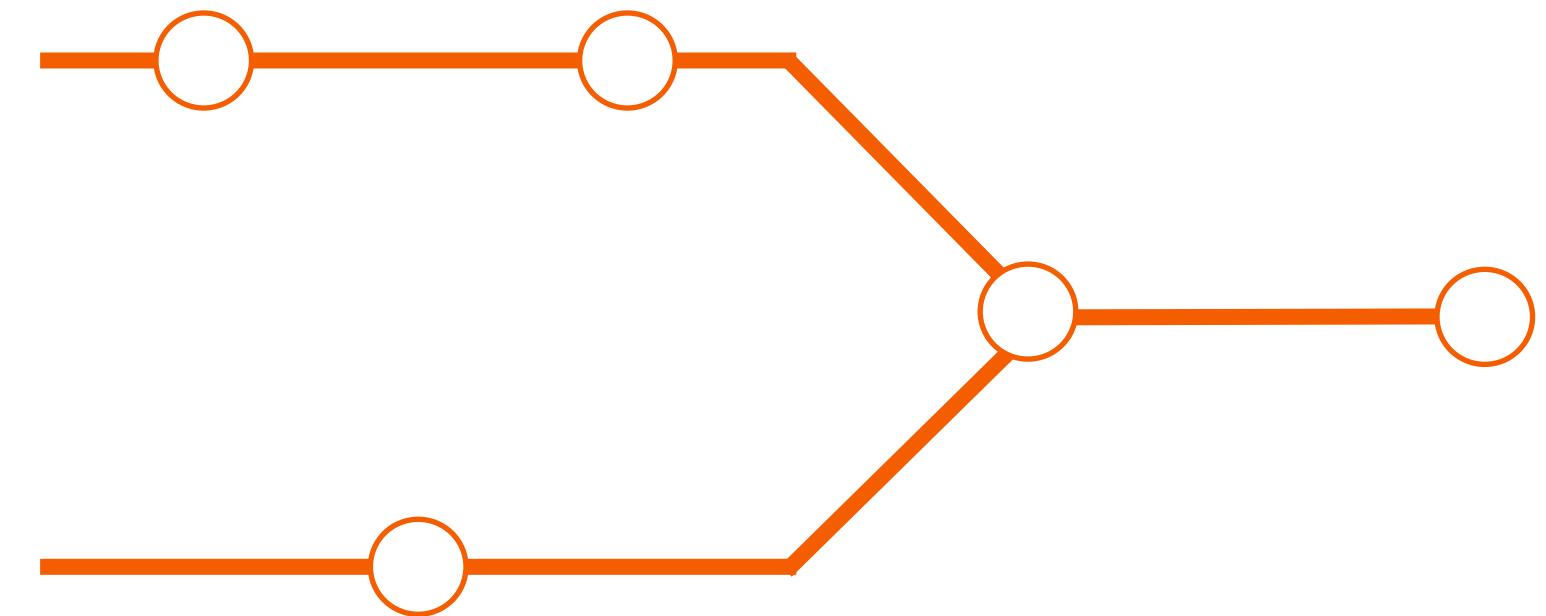
The Precedence Diagramming Method

The Precedence Diagramming Method

Method for visualizing how project activities are sequenced

Most popular variant node as **activity-on-node**, or AON

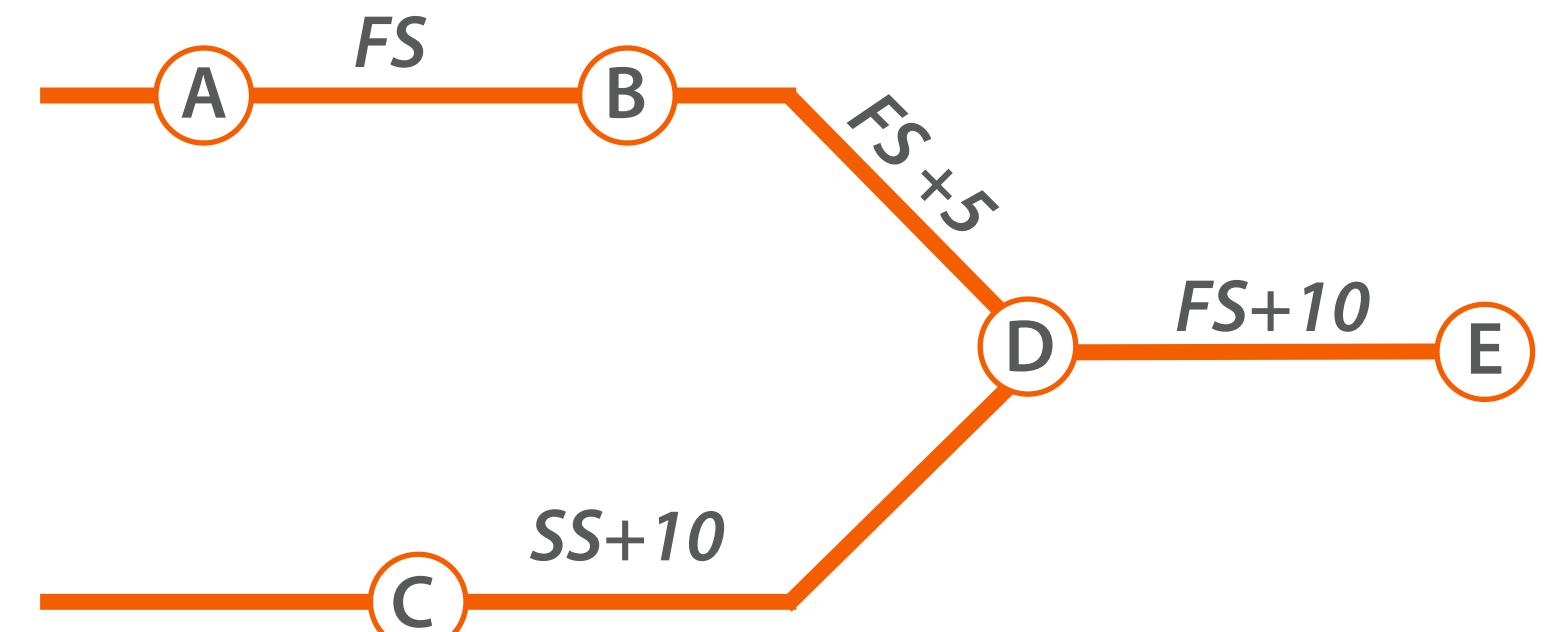
Shows activities as nodes graphically linked based on logical connections



The Precedence Diagramming Method

Makes it easy to see how one or more activities serve as predecessors or successors

Includes labels for activities and logical relationship types



Logical Activity Relationships

Finish to Start (FS)

Successor cannot begin until predecessor ends

“Step 1 must be complete before Step 2 can begin.”

Example: Can't build a house until the foundation is laid

Finish to Finish (FF)

Successor cannot end until predecessor ends

“Step 2 can't end before Step 1 ends.”

Example: Can't finish submission to the App Store until app is compiled

Logical Activity Relationships

Start to Start (SS)

Successor cannot begin until predecessor begins

“Step 1 must start before Step 2 can start.”

Example: Can't begin editing a movie until you've started shooting the movie

Start to Finish (SF)

Successor cannot end until predecessor begins

“Step 1 must start before Step 2 can end.”

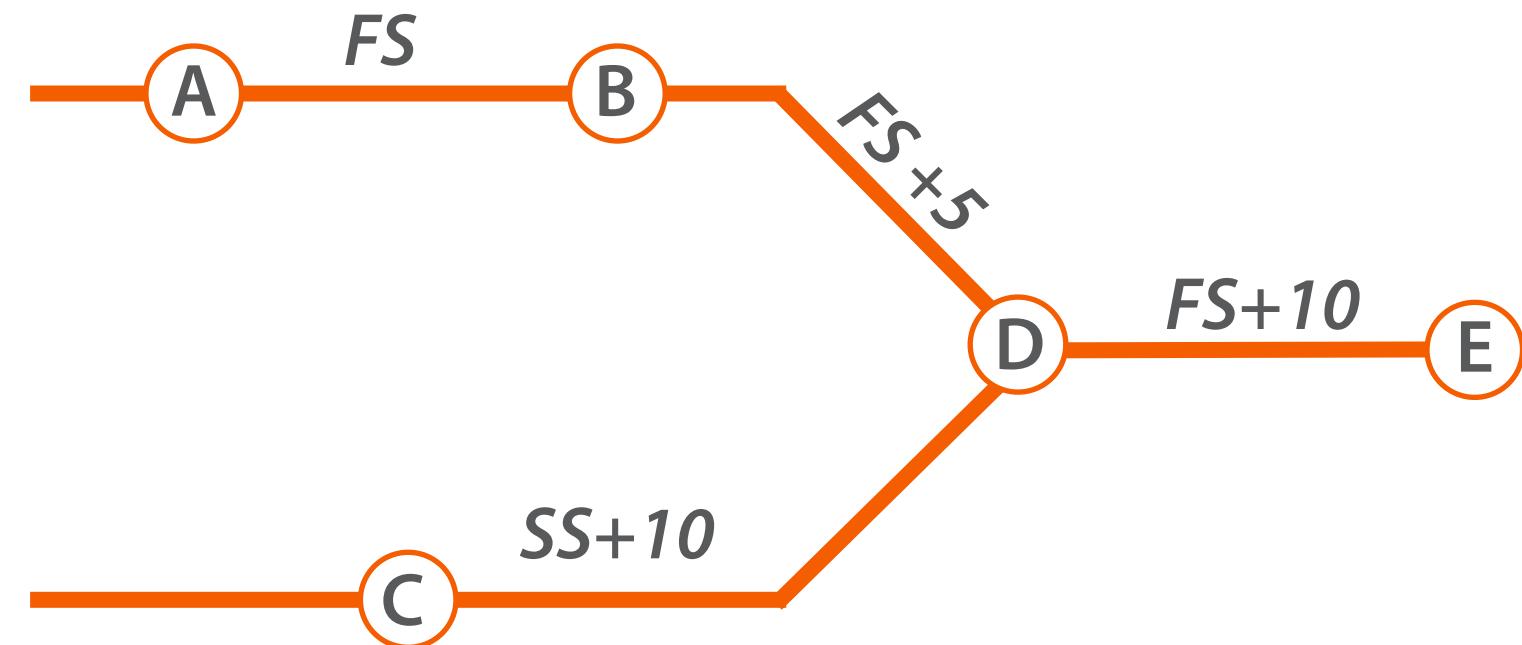
Example: Must turn on the new system before shutdown of the old system can be completed

The Precedence Diagramming Method

Finish to Start logical relationship
is most common

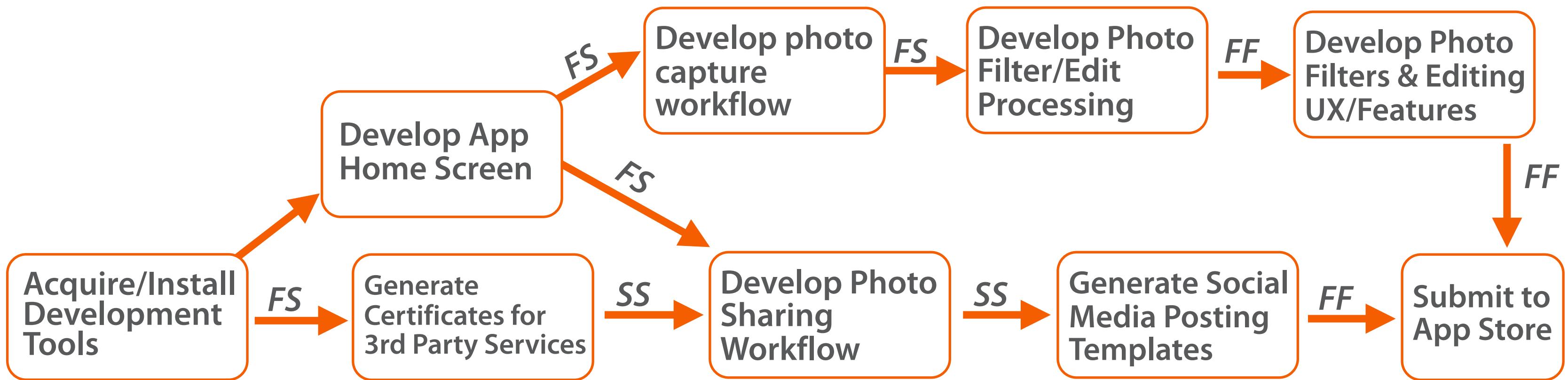
Start to Finish logical relationship
is least common

Numbers may represent days or
work periods of **lead** or **lag**
required or preferred between
steps



Precedence Network Diagram Example

Appyco Software – AppyPic



Determining Activity Dependencies

Determining Activity Dependencies

Ways in which activities *depend* on one or more factors in order to be started or finished



Determining Activity Dependencies

Mandatory or
Discretionary

Internal or
External



Mandatory vs. Discretionary Dependencies

Mandatory Dependencies

May be required by...

Law or contract

Nature of the project's work

Also known as hard logic

Other sequences are **not** possible

Discretionary Dependencies

May arise...

Based on best practices

When a sequence is desirable

Also known as soft/preferred logic

Other sequences **are** possible

Mandatory vs. Discretionary Dependencies

Mandatory Dependencies

Cannot begin building before a permit is approved

Per contract, must inspect phase one results before continuing to phase two

Must publish software beta before analyzing feedback from testing group

Discretionary Dependencies

Preferable for manuscript to be finished before editing begins

Landscaping after all construction is finished will eliminate rework

Waiting to announce product until development is complete is preferred

Project team determines which dependencies are mandatory or discretionary

Implications of Discretionary Dependencies

Discretionary dependencies create arbitrary **float values** (wiggle room in schedule)

Important to thoroughly document discretionary dependencies to understand their broader implications

Discretionary dependencies often modified when projects are fast-tracked



Internal vs. External Dependencies

Internal Dependencies

Involve relationships between project activities

Generally under control of the project management team

External Dependencies

Involve relationships between project and non-project activities

Generally *not* under control of the project management team

Internal vs. External Dependencies

Internal Dependencies

Can't submit app for publication until it is compiled

Work on post-production can begin as soon as filming is complete

External Dependencies

Must wait for supplies to be delivered before starting production

Subcontractor must complete work before moving on to next phase

Activity Dependencies

Mandatory Internal Dependency:

Must publish software beta before analyzing feedback from testing group

Discretionary Internal Dependency:

Waiting to announce product until development is complete is preferred

Mandatory External Dependency:

Cannot begin building before a permit is approved

Discretionary External Dependency:

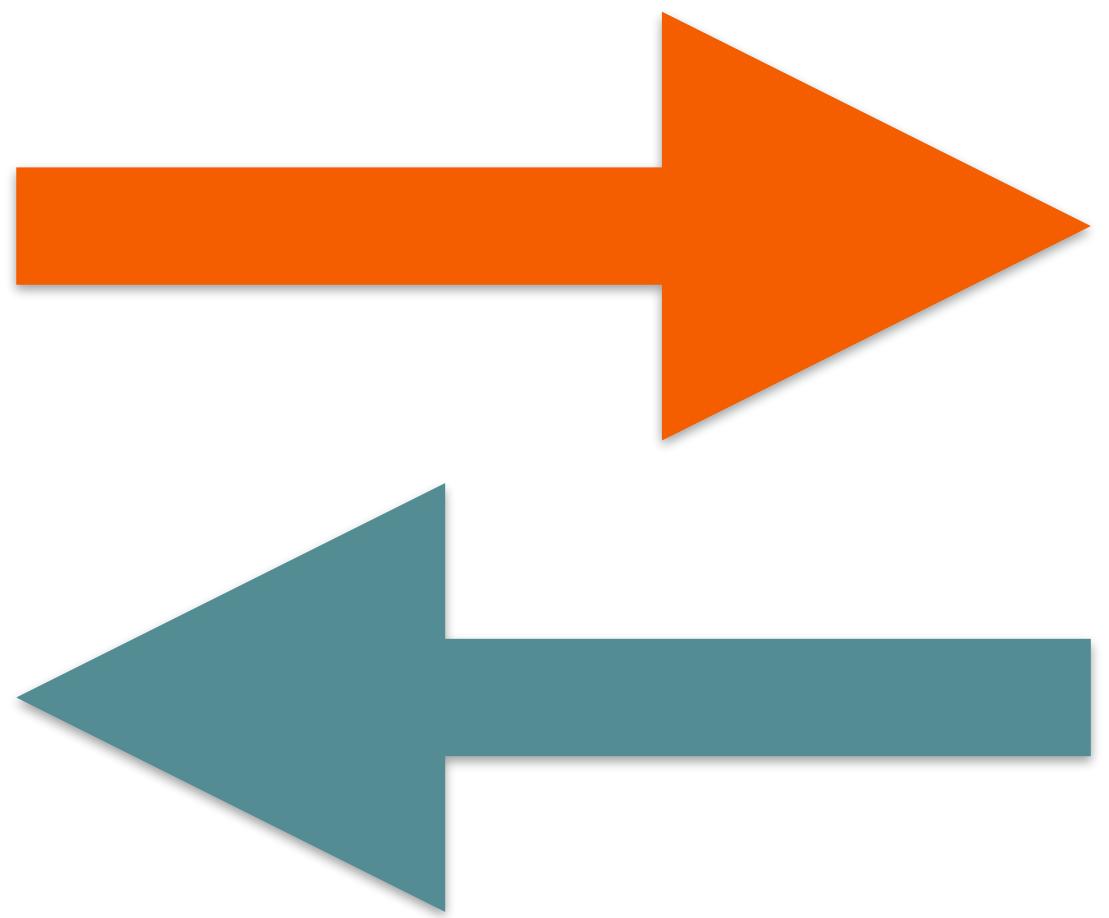
Landscaping after all construction is complete will eliminate rework

Leads and Lags

Leads and Lags

Lead- Amount of time an activity may be moved up to begin closer to or alongside predecessor

Lag- Amount of time that must pass until a successor activity may begin



Leads and Lags

Leading Activities

Only possible with Finish to Start activity relationships with discretionary dependencies

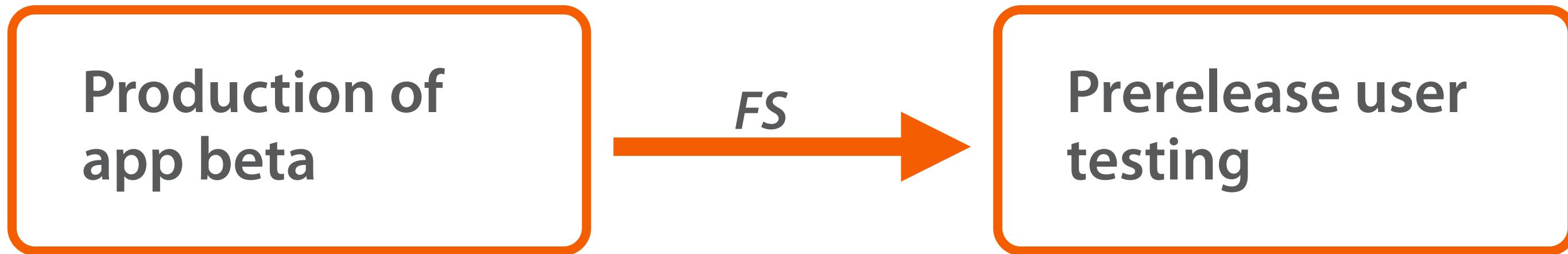
Example: May begin user testing of new mobile app three months before scheduled completion of app beta

Lagging Activities

Possible regardless of activity relationship type or kind of dependency

Example: Must wait three days after pouring foundation before proceeding with construction work

Example: Leads



Example: Leads

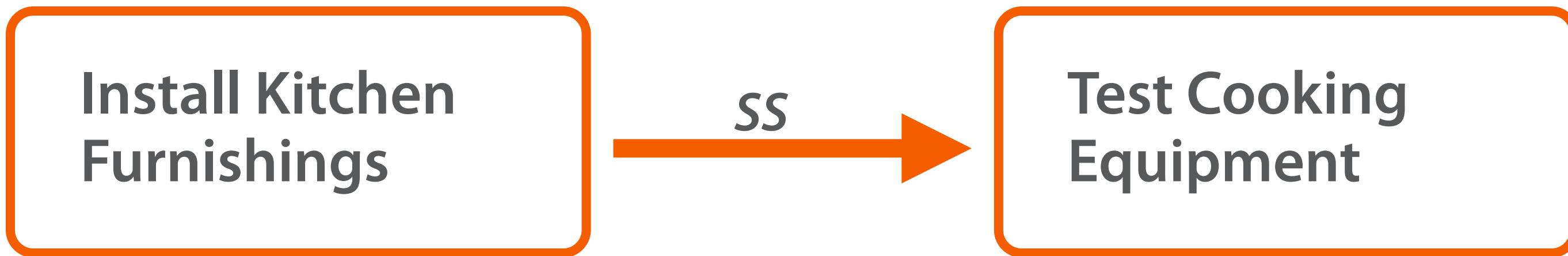
Production of
app beta

(3 Months)

Prerelease user
testing

May *prefer* to begin testing later,
but *could* begin at the alpha stage
**Leads are often taken advantage
of when using **schedule
compression** techniques**

Example: Lags



Example: Lags



Example: Lags

Often source of schedule bottlenecks
when improperly managed

May be mitigated to an extent using
schedule compression techniques

Often express **leads** as **negative**
numbers, **lags** as **positive** numbers in
software

Install Kitchen
Furnishings

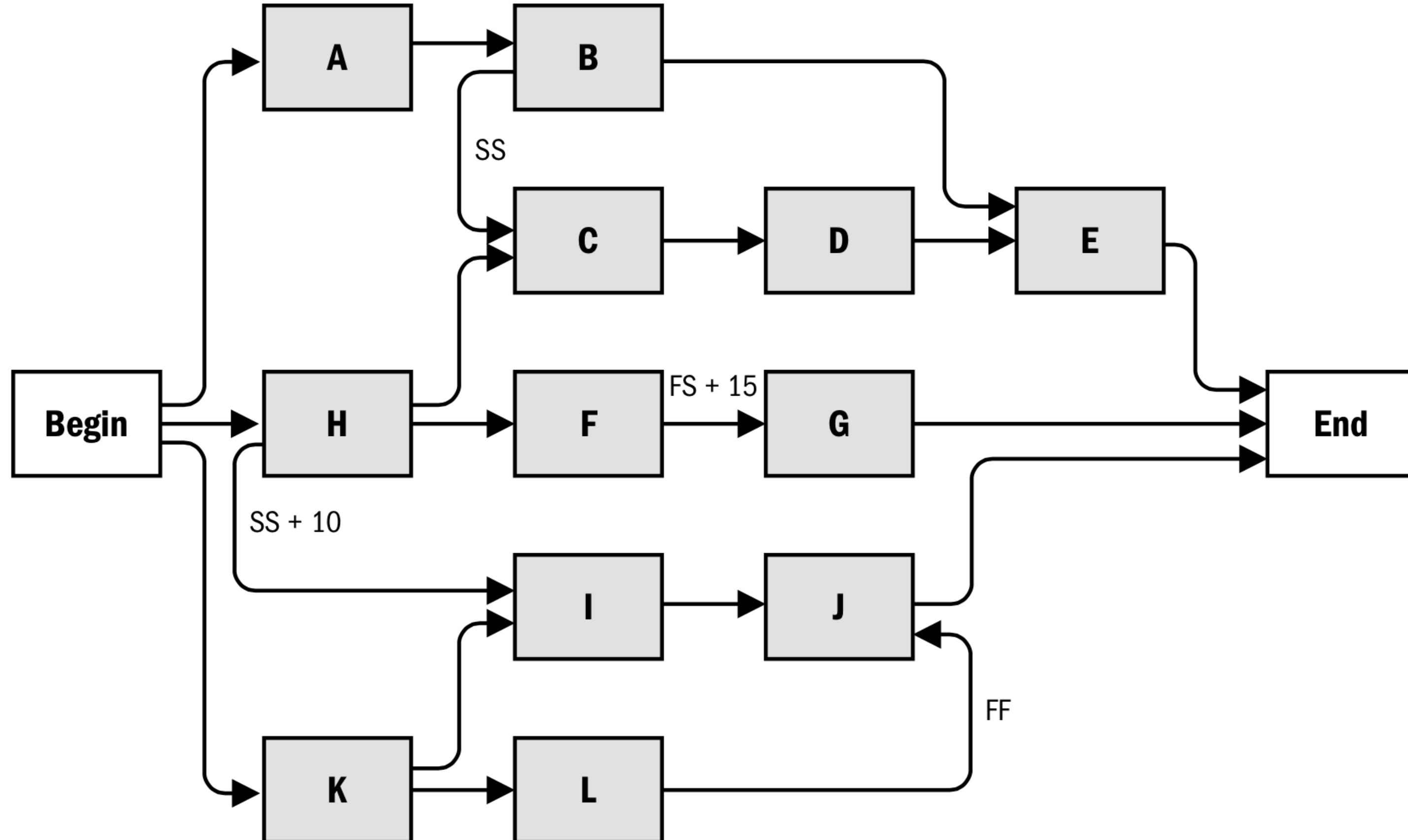
SS + 3 Days

Test Cooking
Equipment

Project Schedule Network Diagram Example

Begin





Sequence Activities

Process Inputs

Sequence Activities

Planning

Project Schedule Management

Inputs	Tools & Techniques	Outputs
Project Management Plan	Precedence Diagramming Method	Project Schedule Network Diagrams
Project Documents	Dependency Determination & Integration	Project Documents Updates
Enterprise Environmental Factors	Leads and Lags	
Organizational Process Assets	Project Management Information System	

Sequence Activities

Inputs

T&Ts

Outputs

Project Management Plan

Schedule Management Plan

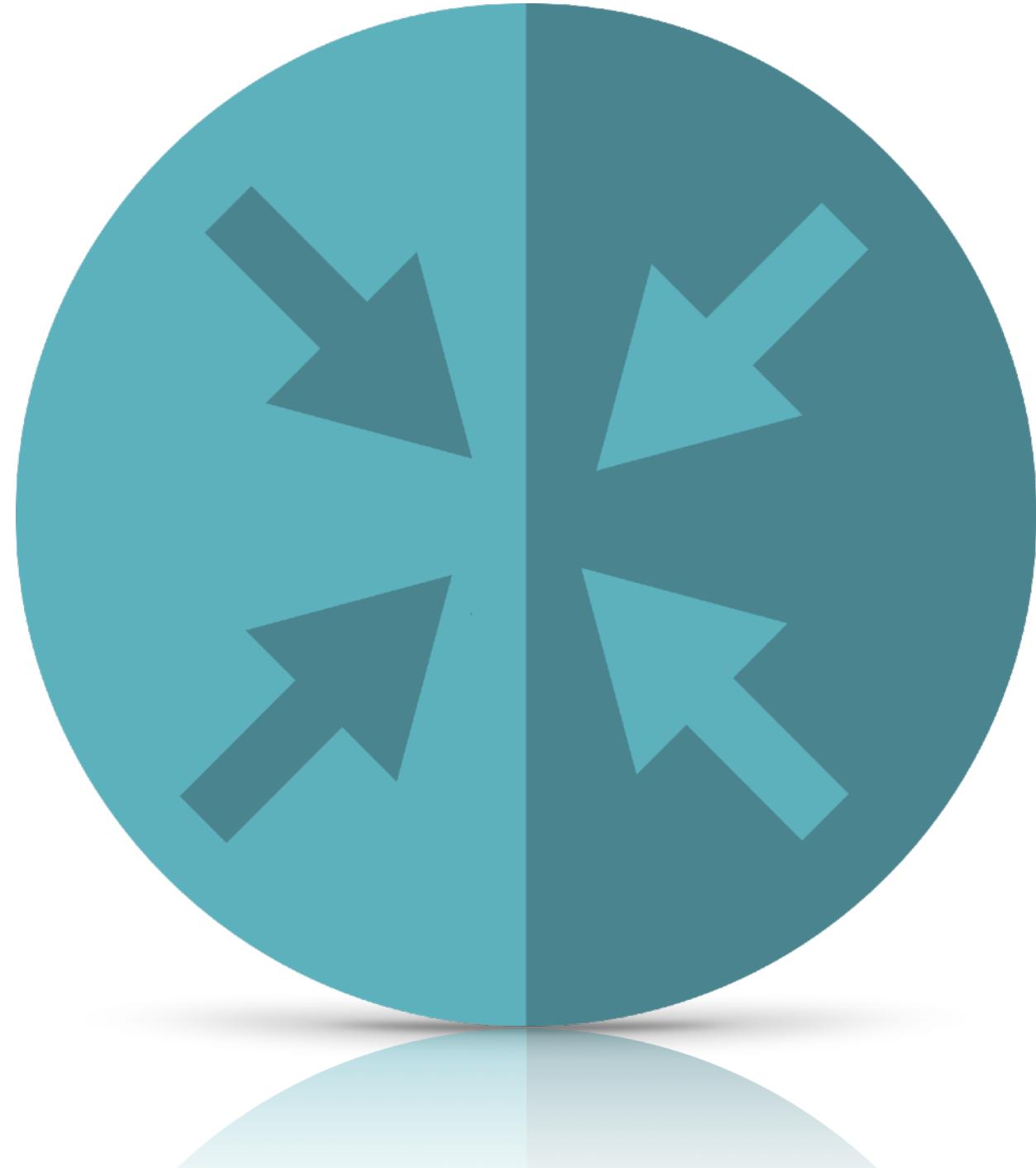
Scheduling methods and tools will influence how activities are sequenced

Plan may outline who assists in...

Sequencing activities

Determining dependencies

Dictating logical process relationships



Sequence Activities

Inputs

T&Ts

Outputs

Project Management Plan

Scope Baseline

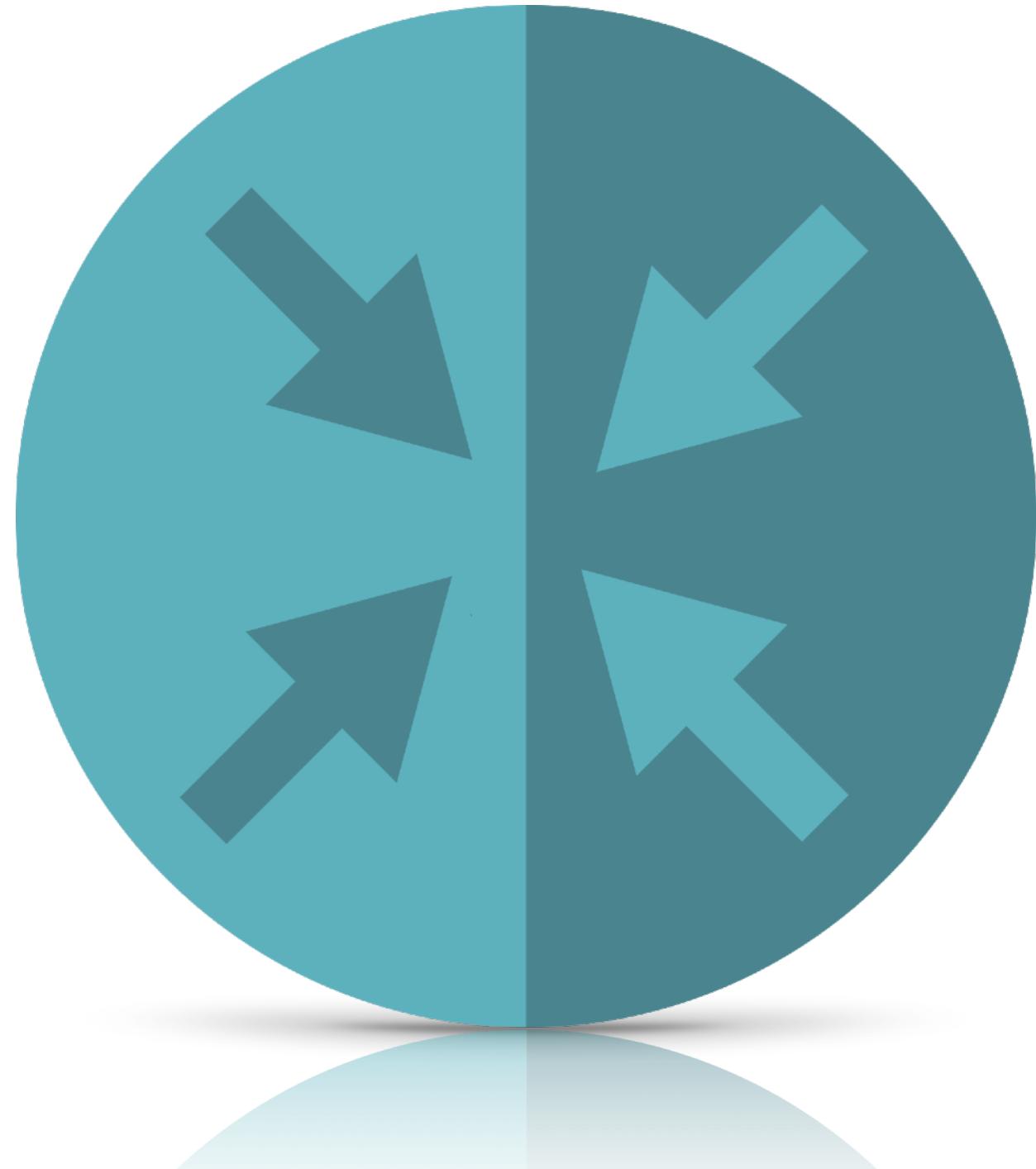
Key elements are central to activity definition and sequencing:

Project WBS

Deliverables

Constraints

Assumptions



Sequence Activities

Inputs

T&Ts

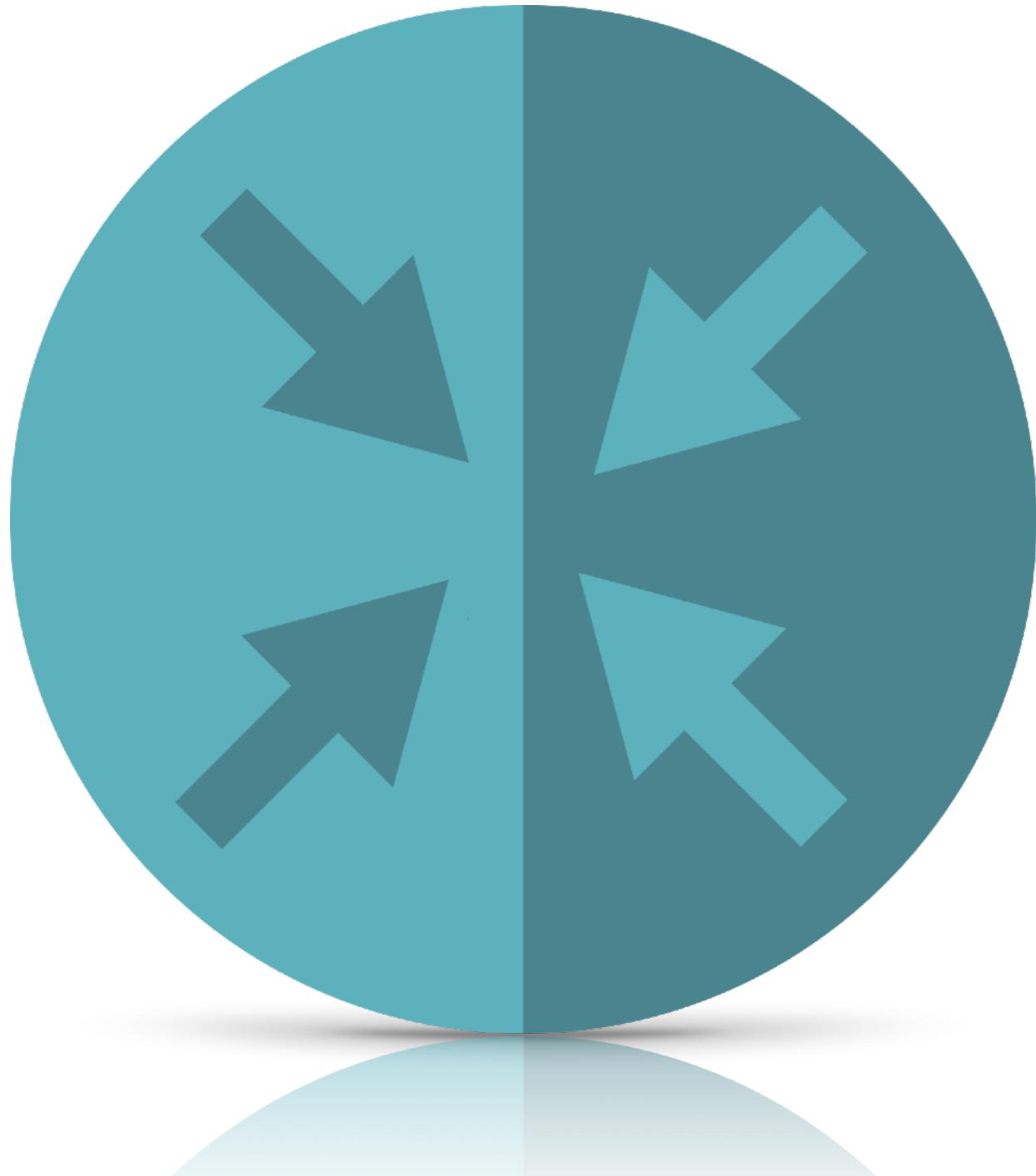
Outputs

Project Documents

Activity List

Includes all schedule activities to be sequenced

Constraints and dependencies of individual activities help determine how activities are sequenced



Sequence Activities

Inputs

T&Ts

Outputs

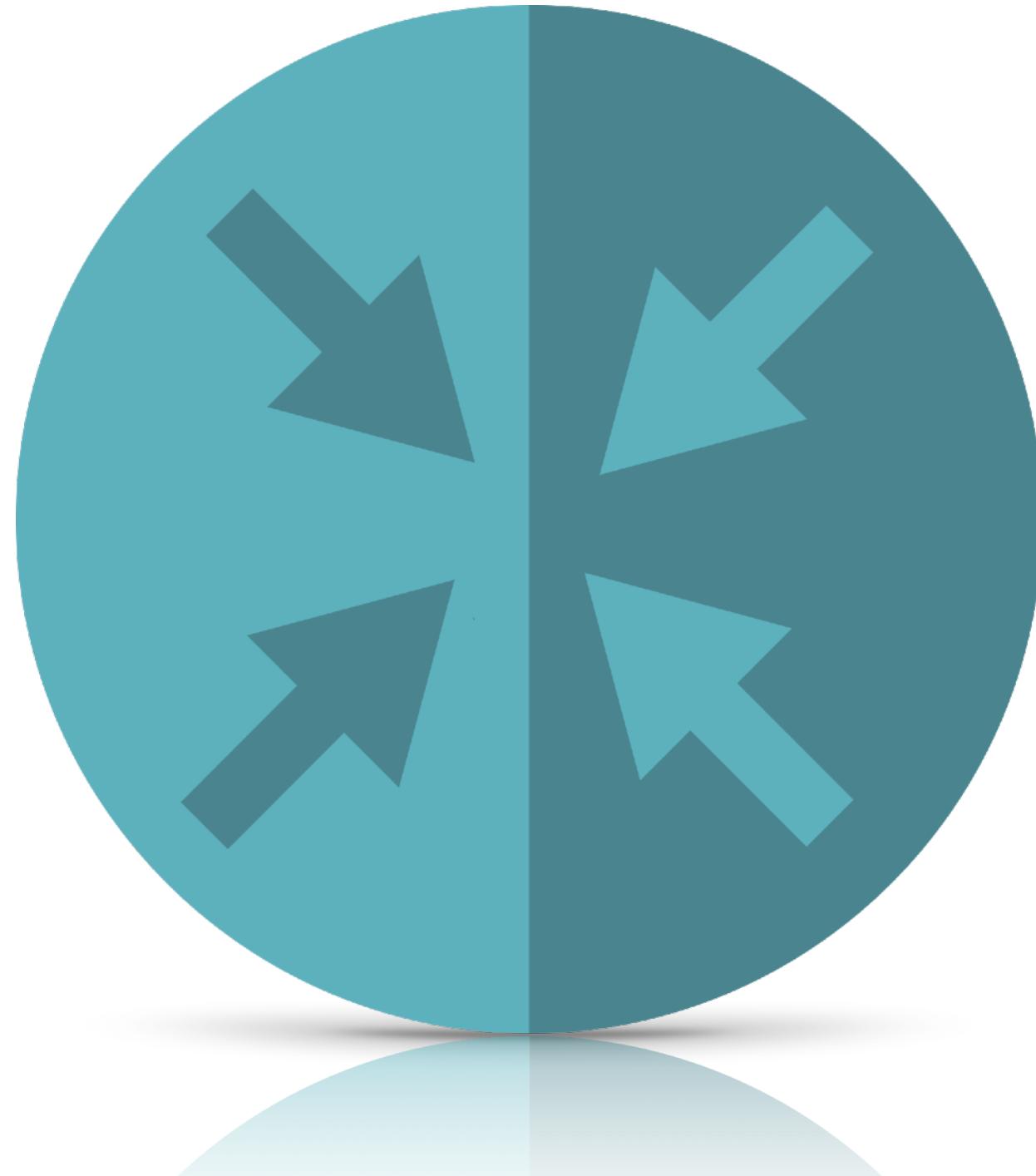
Project Documents

Activity Attributes

Provide valuable information on activities

Indicate which activities have clear predecessor/successor relationships with others

Helps determine what sequences may be required for certain activities



Sequence Activities

Inputs

T&Ts

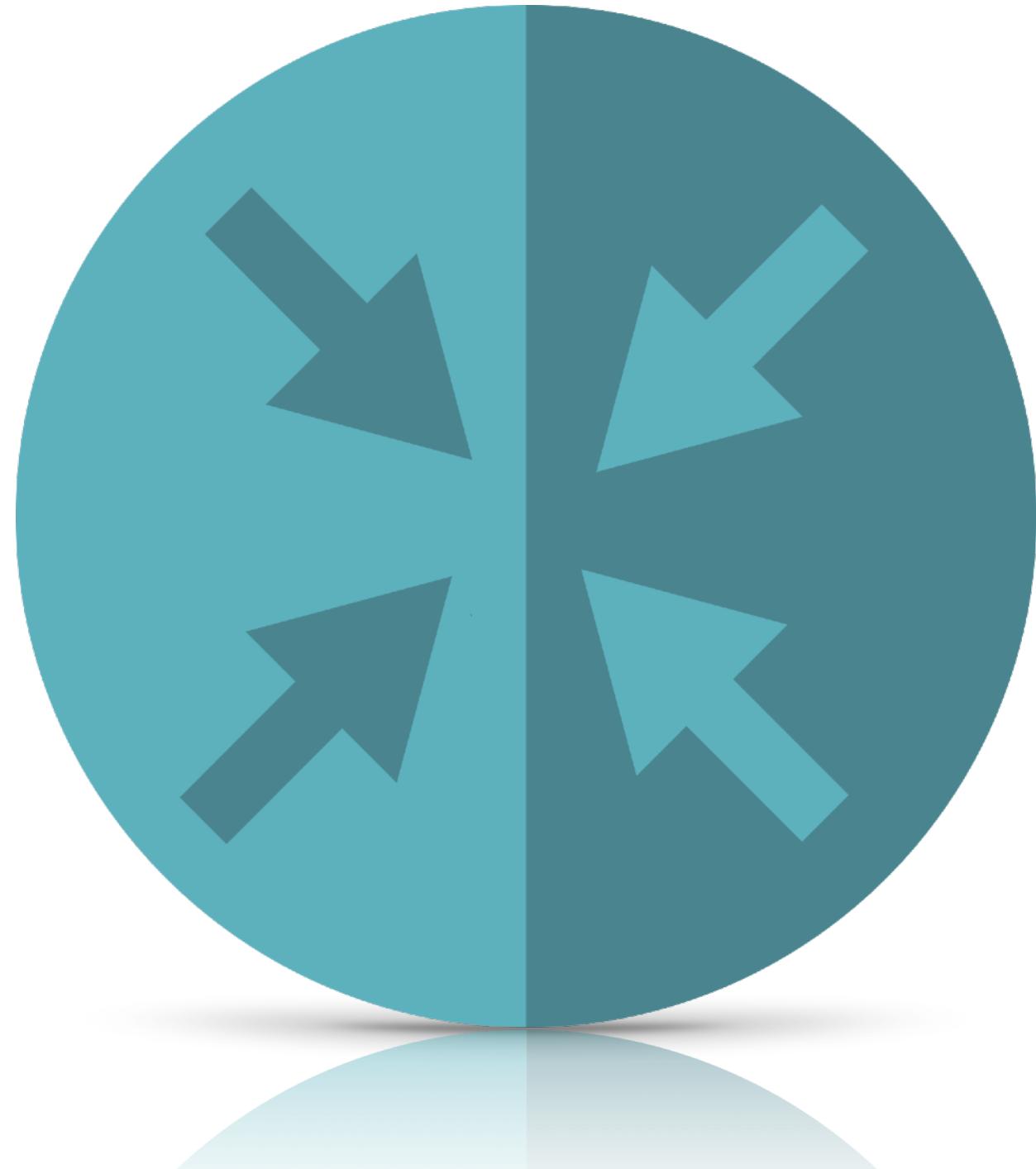
Outputs

Project Documents

Milestone List

Indicates which activities must be completed by each milestone

May indicate dates or durations considered acceptable for certain portions of work to be done



Sequence Activities

Inputs

T&Ts

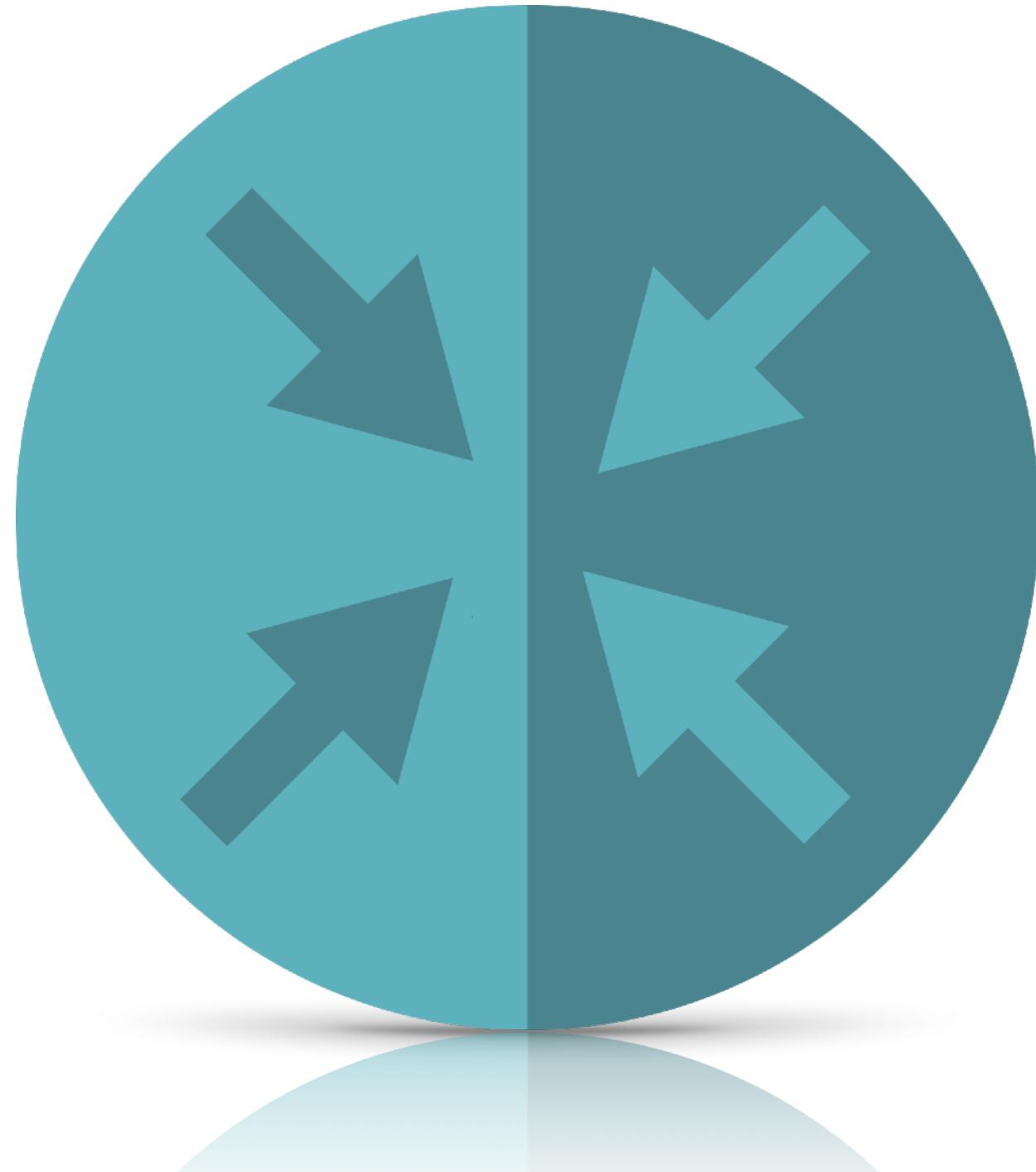
Outputs

Project Documents

Assumptions Log

Assumptions regarding sequencing benefits, activity relationships, and lead/lag requirements may influence sequencing choices

Constraints should also be considered in planning activity sequences



Sequence Activities

Inputs

T&Ts

Outputs

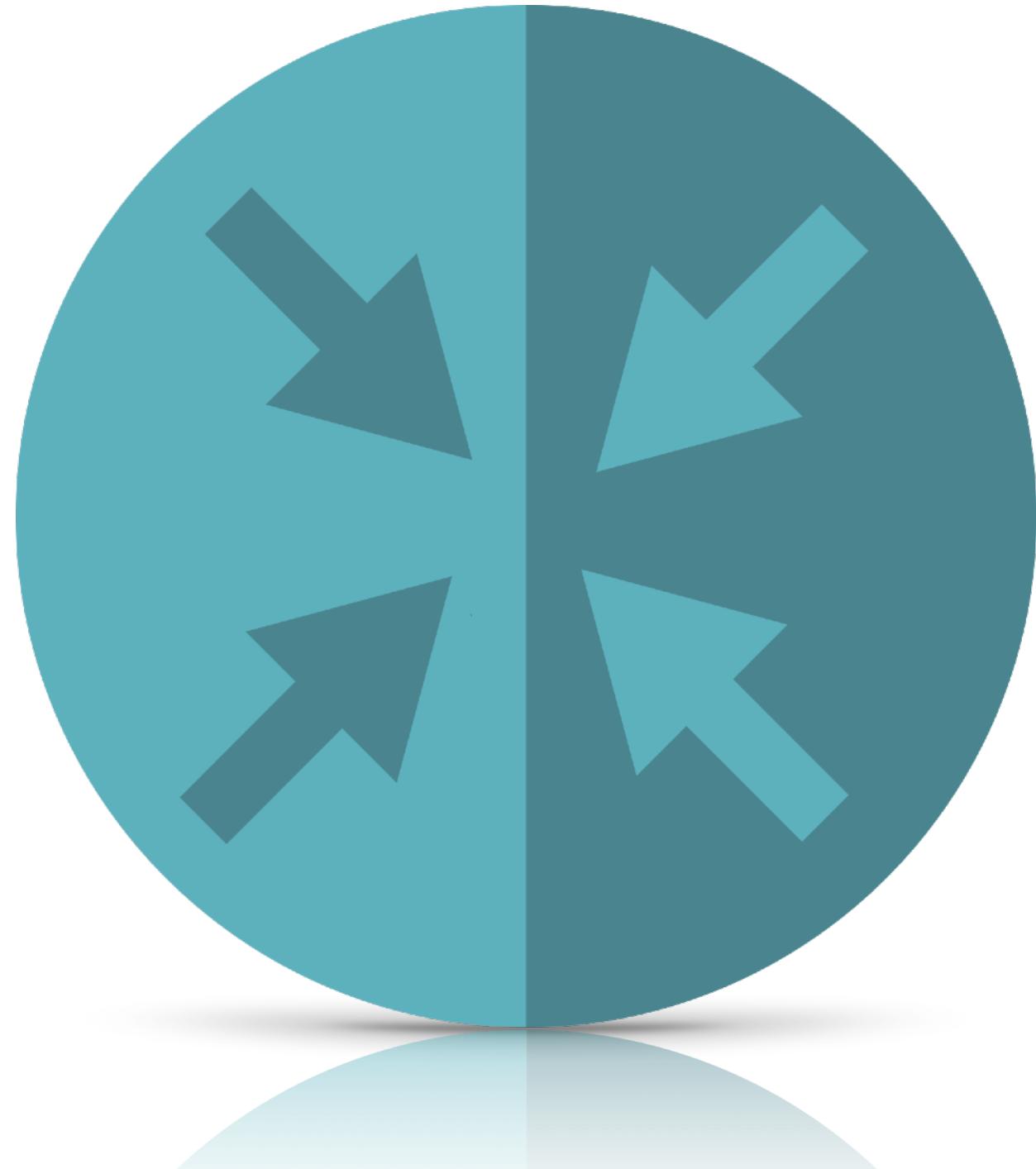
Enterprise Environmental Factors

Government or industry standards

Project management information system

Scheduling tool(s)

Work authorization systems



Sequence Activities

Inputs

T&Ts

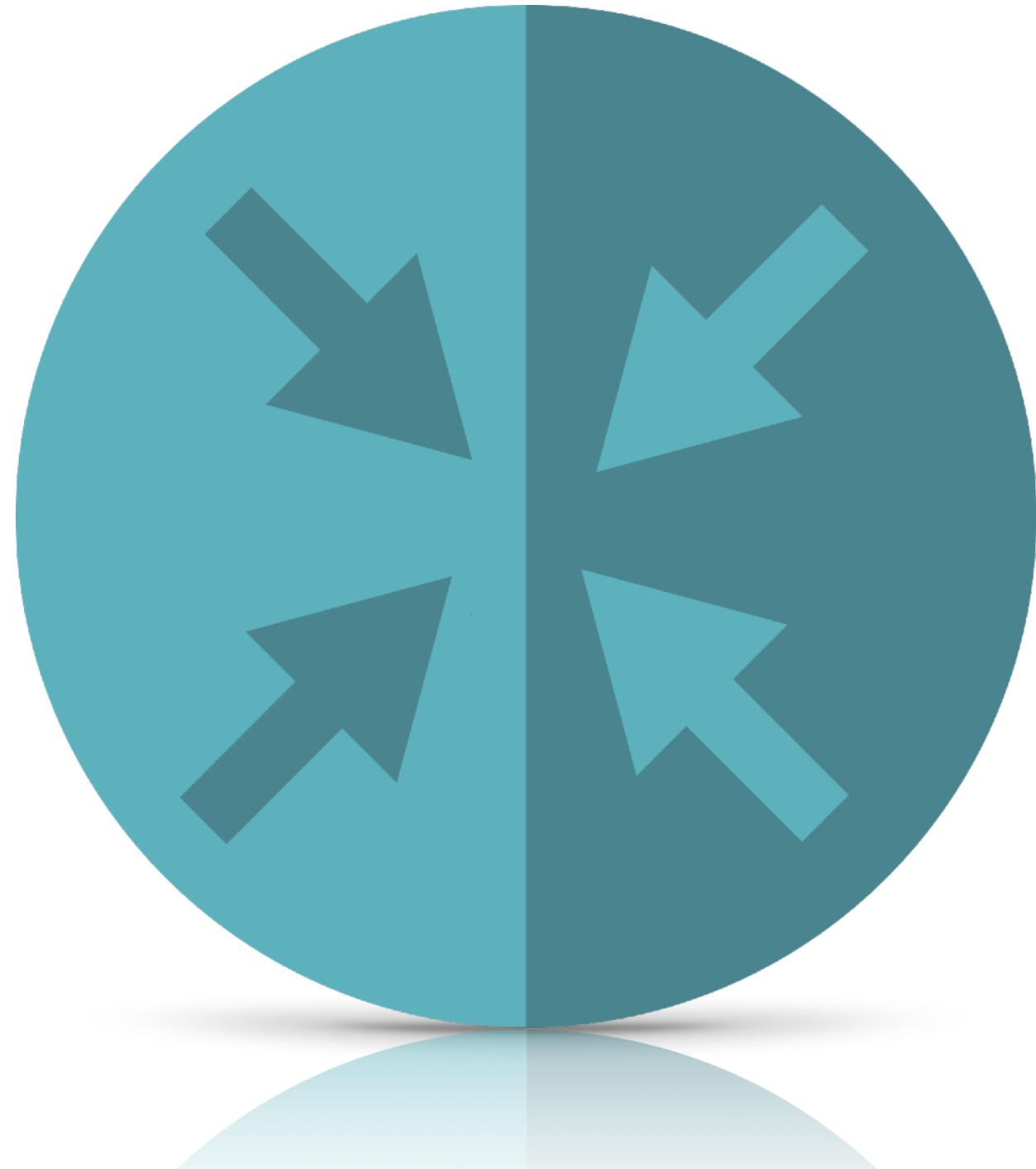
Outputs

Organizational Process Assets

Previous project files

Policies, procedures, guidelines
and templates

Established scheduling
methodologies



Sequence Activities

Process Tools, Techniques and Outputs

Sequence Activities

Inputs

T&Ts

Outputs

Precedence Diagramming Method

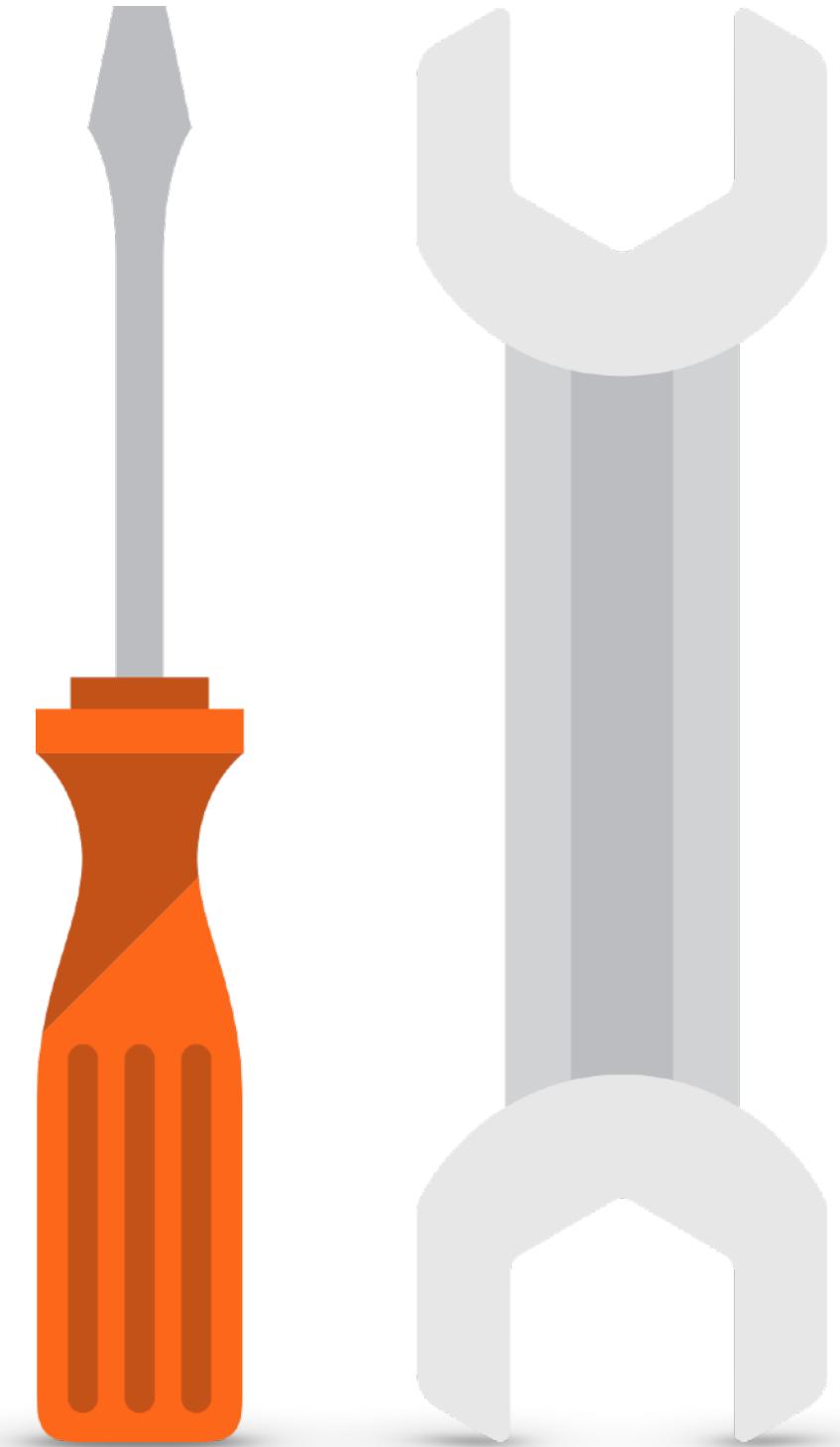
Visually represents relationship and progression of project activities

Finish to Start (FS)

Finish to Finish (FF)

Start to Start (SS)

Start to Finish (SF)



Sequence Activities

Inputs

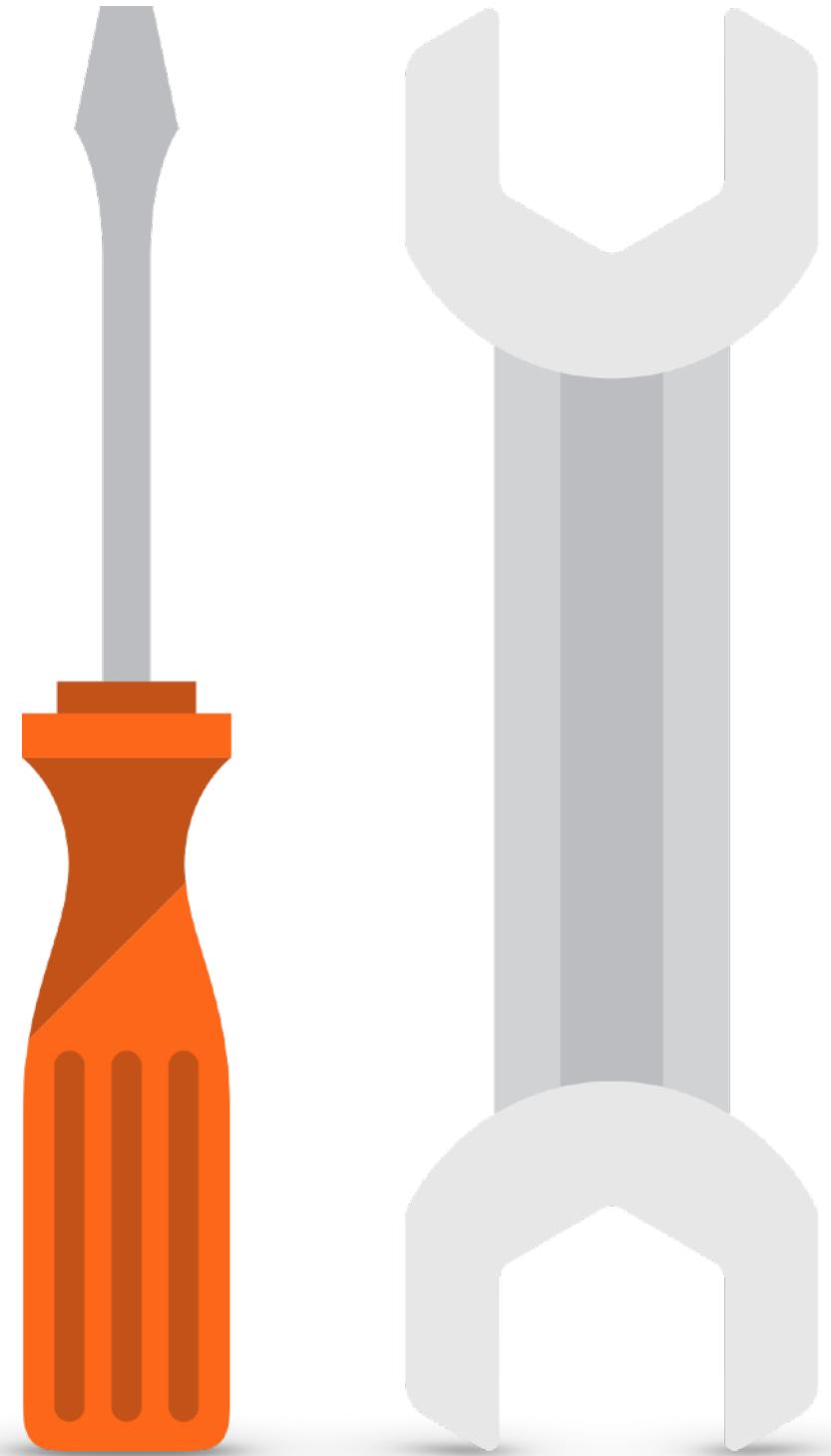
T&Ts

Outputs

Dependency Determination

Mandatory vs. Discretionary

Internal vs. External



Sequence Activities

Inputs

T&Ts

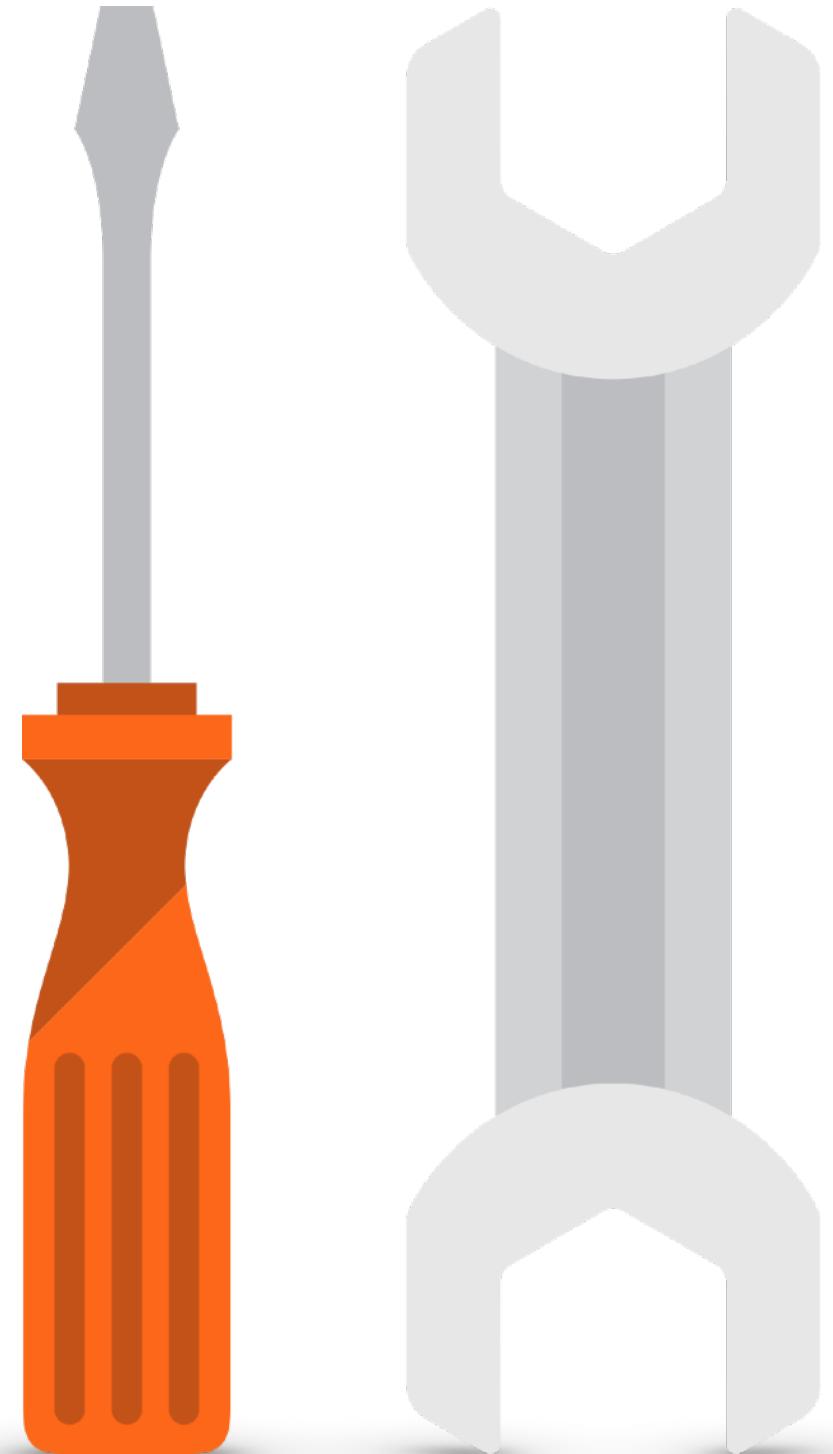
Outputs

Leads and Lags

Activities with lead time may commence more quickly

Activities with lag time must wait relative to a predecessor before proceeding

Used in addition to logical relationships when necessary



Sequence Activities

Inputs

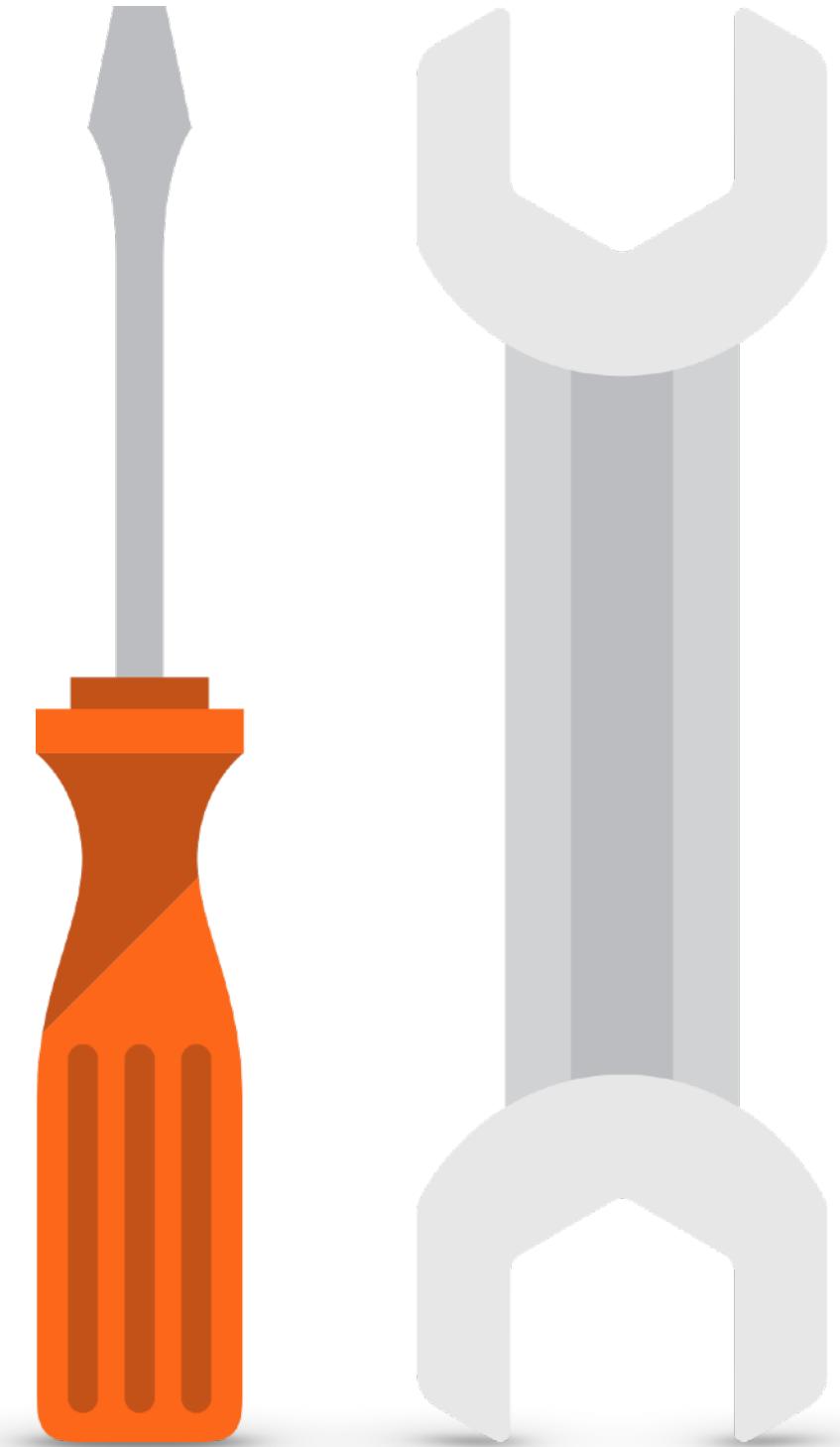
T&Ts

Outputs

Project Management Information Systems

Tools are essential to schedule creation, management, and collaboration

Includes all methods from software to Scrum and Kanban boards



Sequence Activities

Inputs

T&Ts

Outputs

Project Schedule Network Diagrams

Graphical representation of logical relationships between project activities

May include full detail or summaries

Often paired with a summary narrative



Sequence Activities

Inputs

T&Ts

Outputs

Project Documents Updates

Activity lists

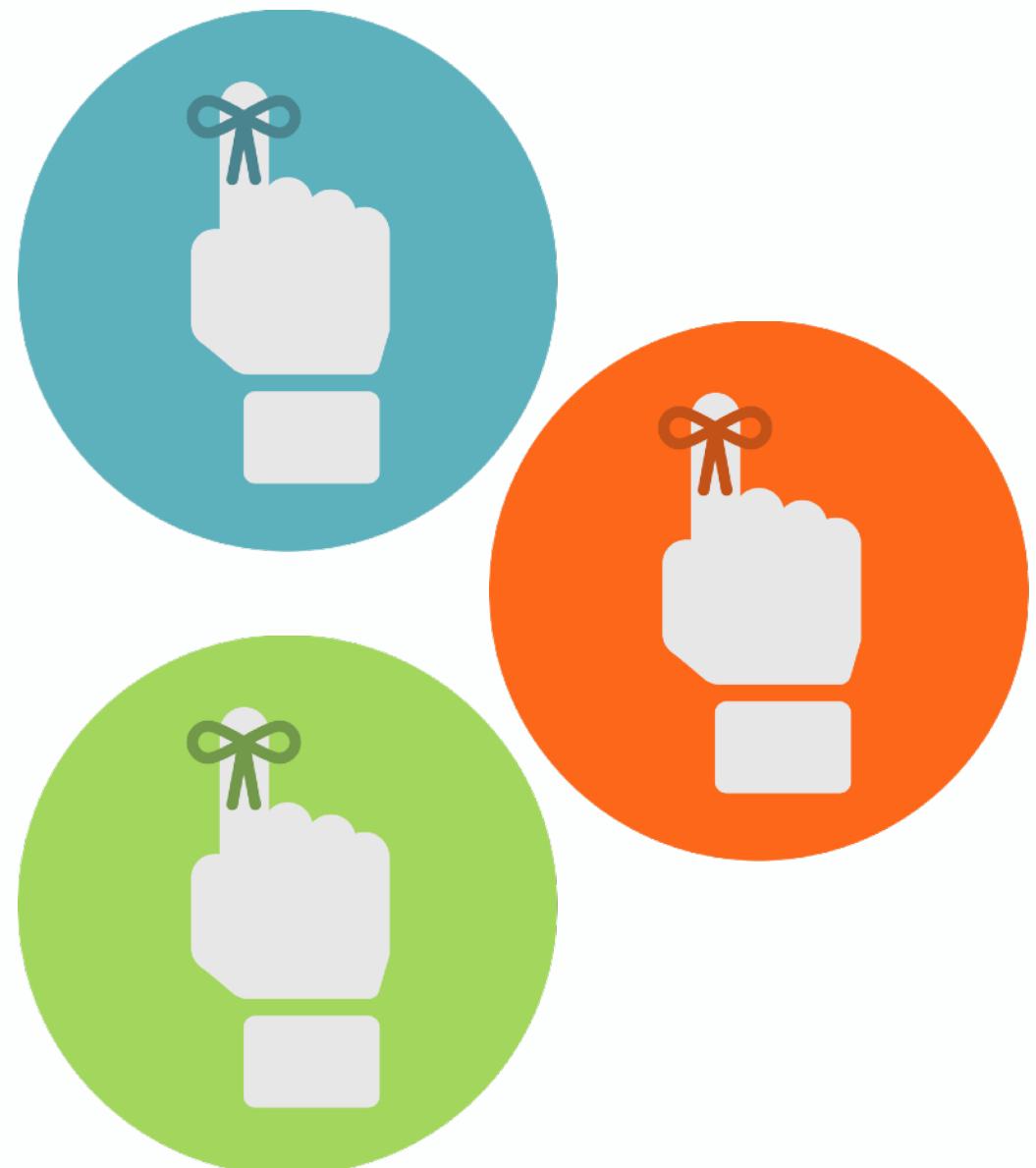
Activity attributes

Milestone list

Assumption log



Module Review:



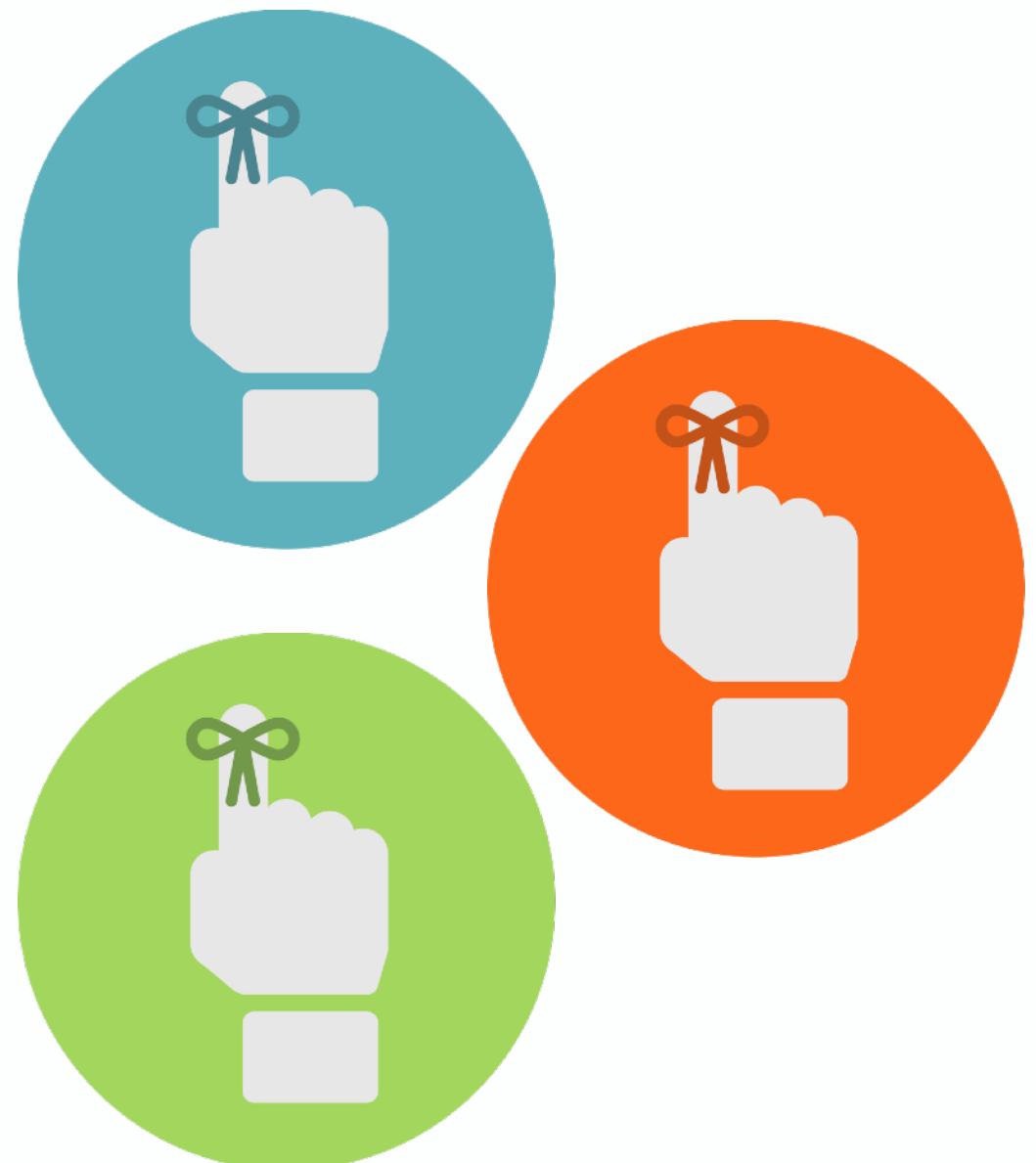
Sequencing Project Activities

Charting correct workflow nearly as important as determining scope and activity list

Determines how work *must* or *should* be done in order to meet project objectives

Maximizes project efficiency and effectiveness

Module Review:



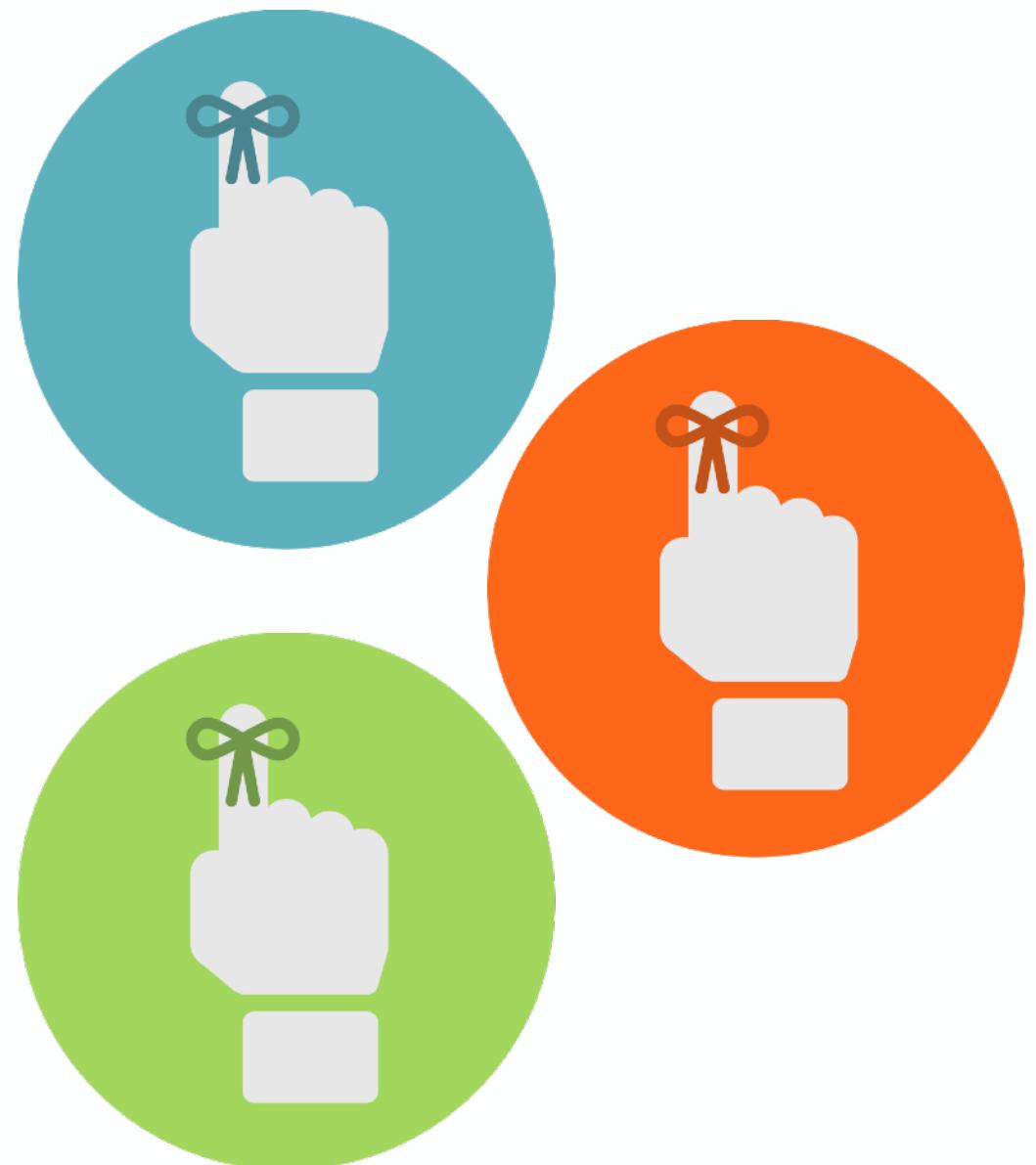
Sequencing Project Activities

All but first and last project activities have predecessors and successors

Relationship between activities may be mandatory or discretionary in nature

Logical relationships dictate when activities begin and end relative to others

Module Review:

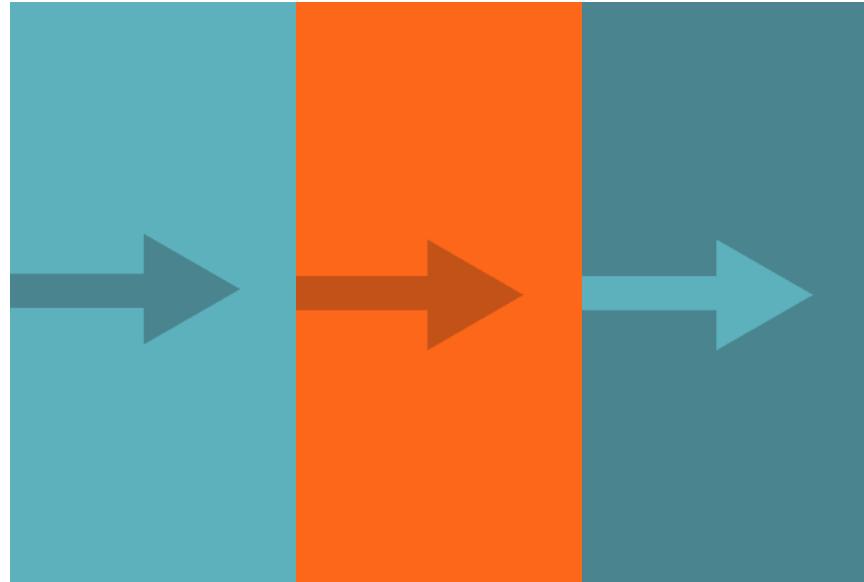


Sequence Activities

Inputs: Project management plan, project documents, EEFs and OPAs

Tools & Techniques: Precedence diagramming method, dependency determination and integration, leads and lags, and PMIS

Outputs: Project schedule network diagrams and project documents updates



Estimating Activity Durations