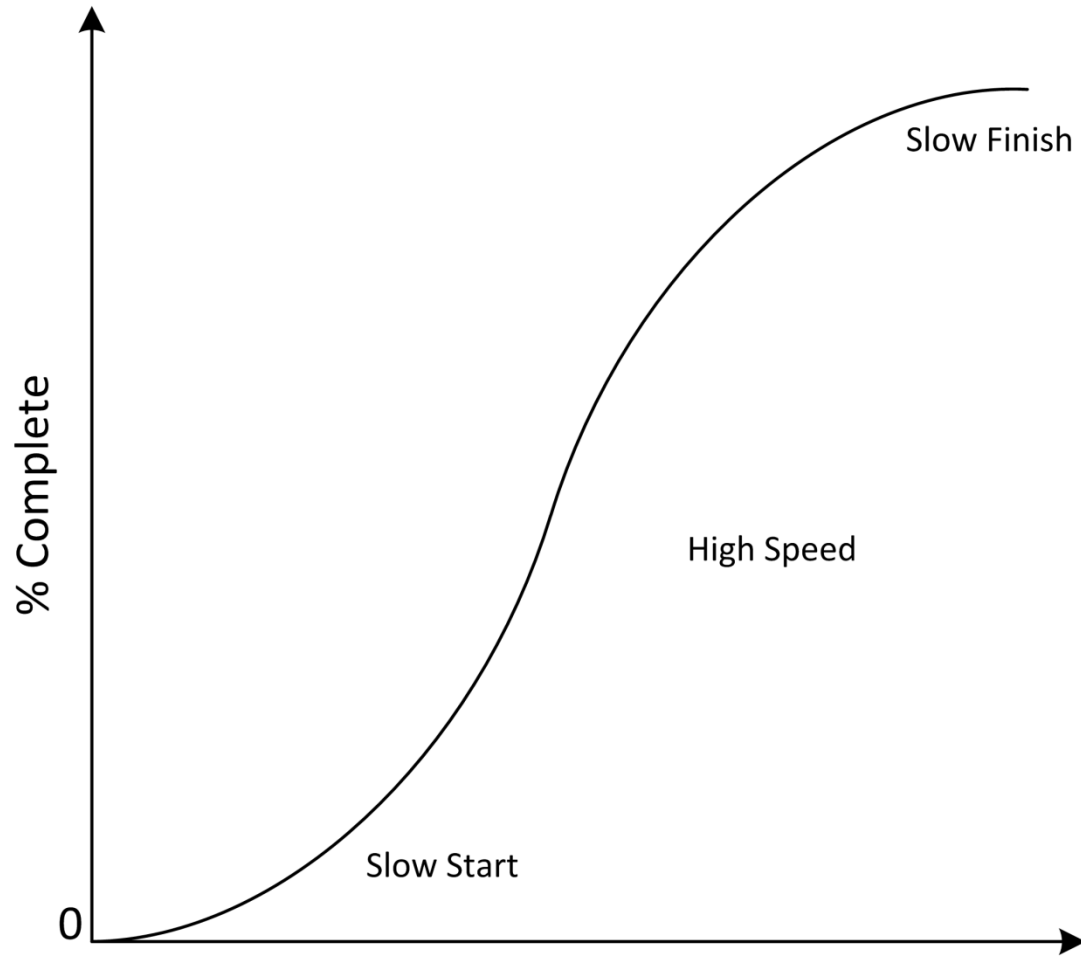


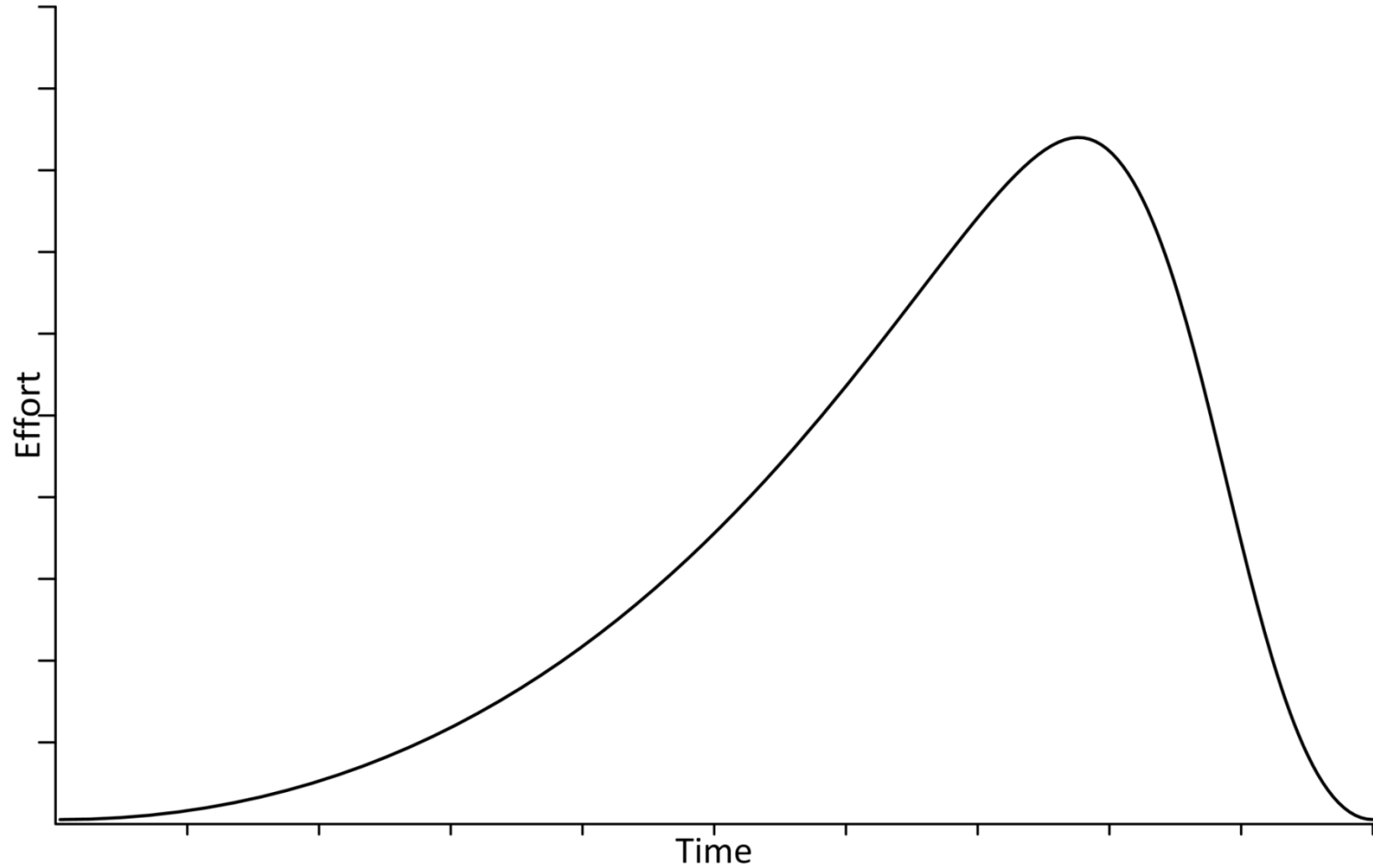
Project Management Simulation

Project Life Cycle

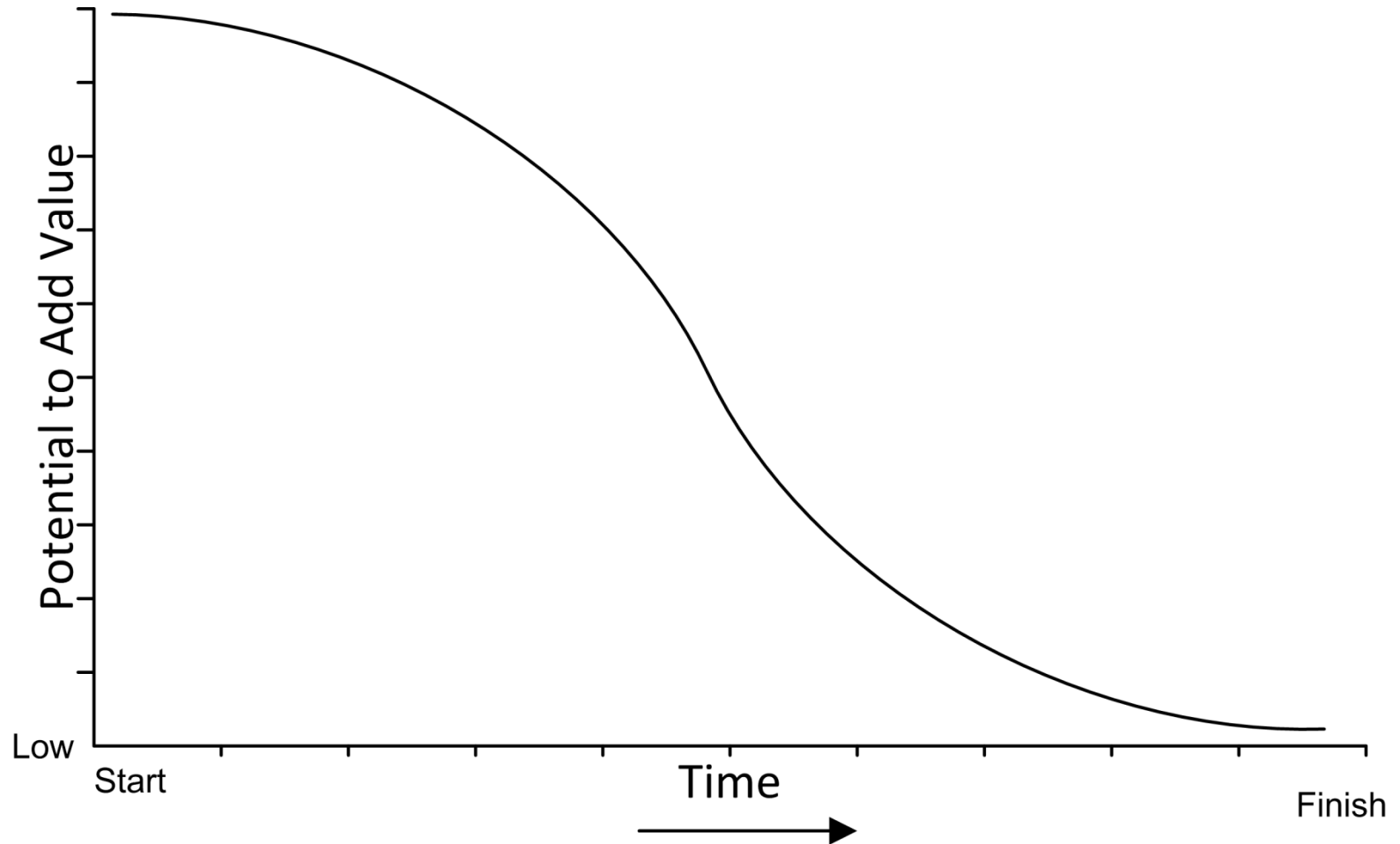
Understanding the “Speed Factor”



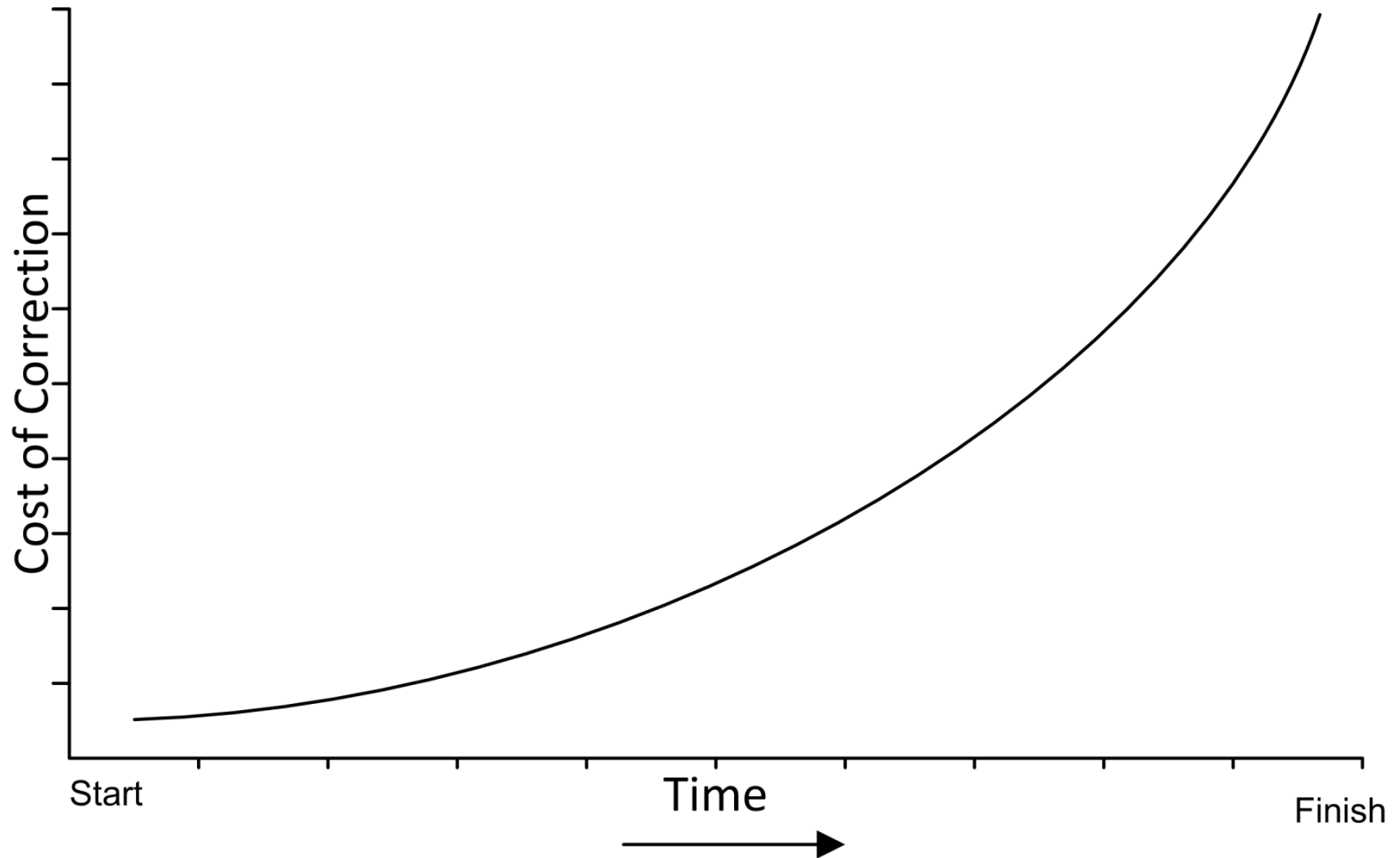
Effort During the Project



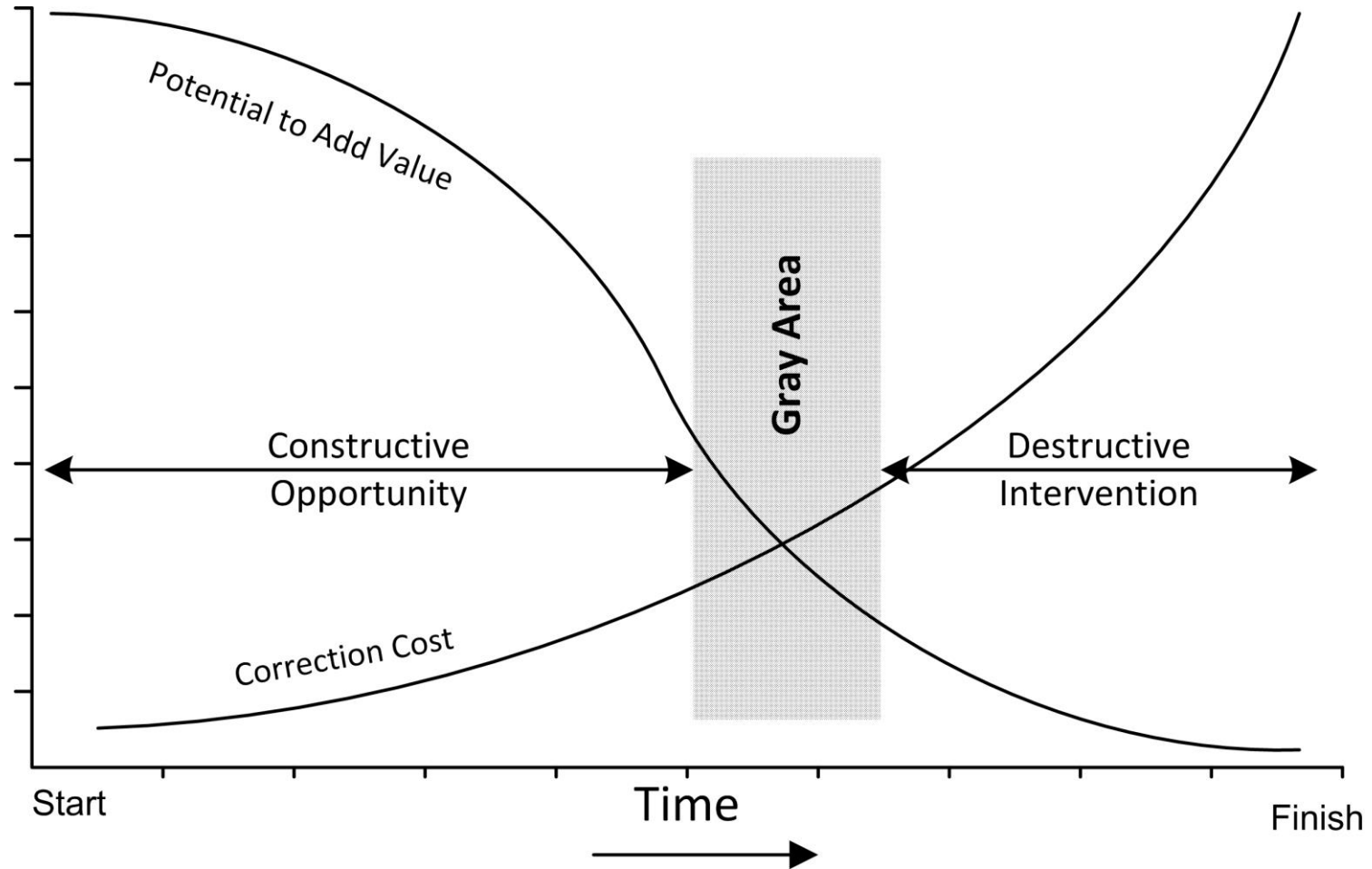
Adding Value Over the Time



Correction Costs Over the Time



When is Right Time to Plan?



Planning and Executing a Project: Sustainable Bridge Simulation Exercise

Why We Need to Plan Before Executing?

Increase
success rate

Reduce the
chances of
problems

Improve time
and cost
estimates

Increase
control

Optimize
resource
allocation

Reduce waste
(time, money,
resources)

Before We Start... What do I expect from you?

Strategic
thinking

Teamwork

Haste makes
waste

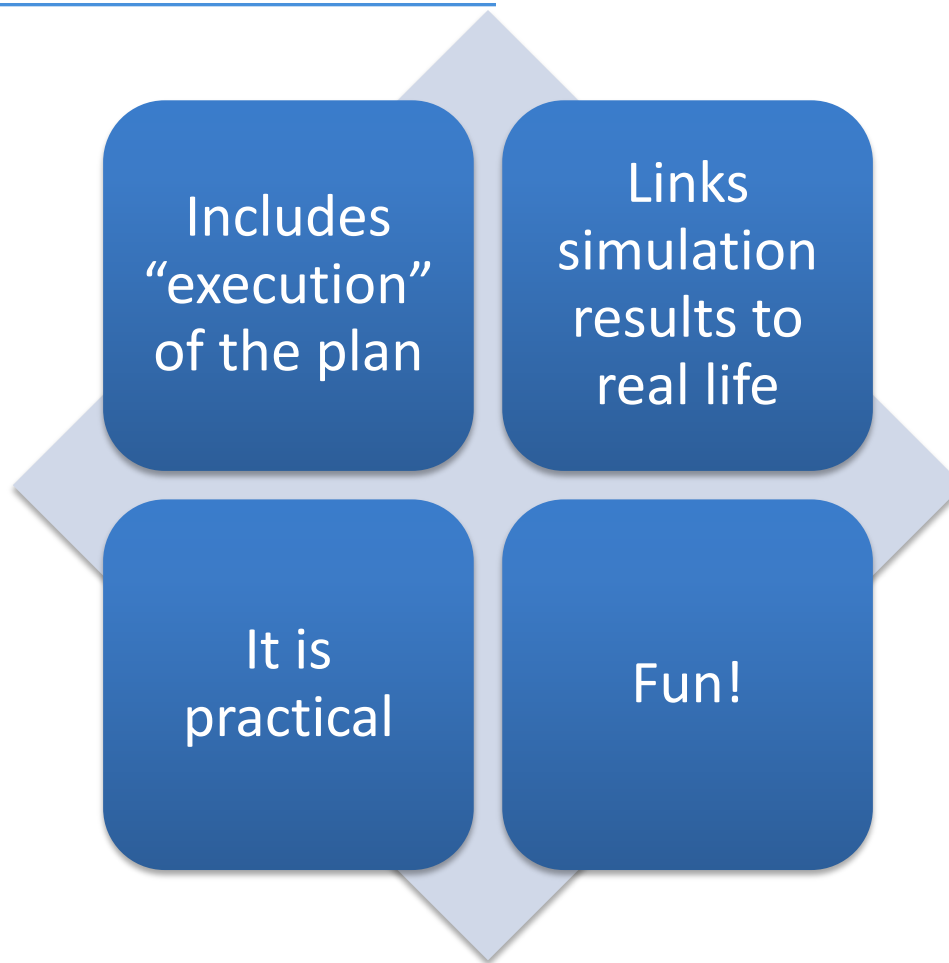
Attention to
the rules

Team ethics



Sustainable Bridge Workshop

Simulation Benefits



Background – Understanding the Context

Kapolla has been without an effective central government since the government was overthrown in 1998.

Years of fighting between rival warlords and an inability to deal with famine and disease have led to the deaths of up to one million people.

A new federal government was democratically elected in March 2011. Kapolla has now enjoyed relative peace for over a year and is now focused on development.

Full Country Name: Kapolla Democratic Republic

Area: 500,896 sq. km

Population: 8.5 million

Capital City: Kapolla City

Languages: Kapolli, English

Government: The Federal Government of Kapolli was formed in March 2011.

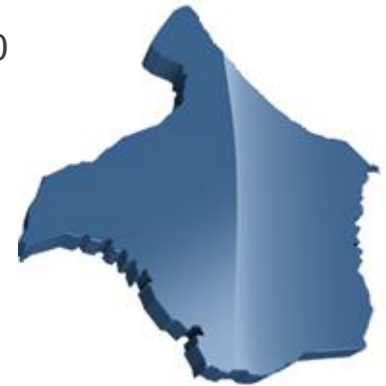
GDP: \$6.3

Life Expectancy: 46 years

Infant Mortality: 87 per 1,000 live births

Maternal Mortality: 380 per 100,000 live births

GDP Per Capita: \$600



Expected Outcome

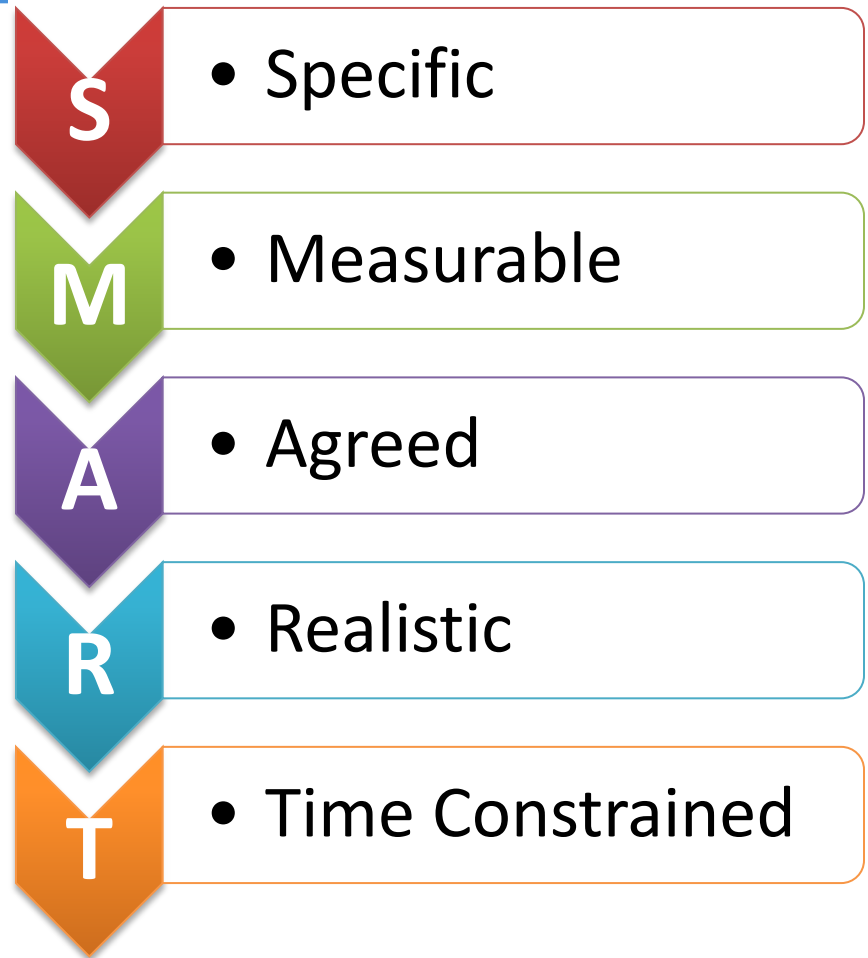
This would provide improved access to market for agricultural products and remove isolation of communities as well as facilitating for the implementation of aid and development programs.

What is “OUR” Project?

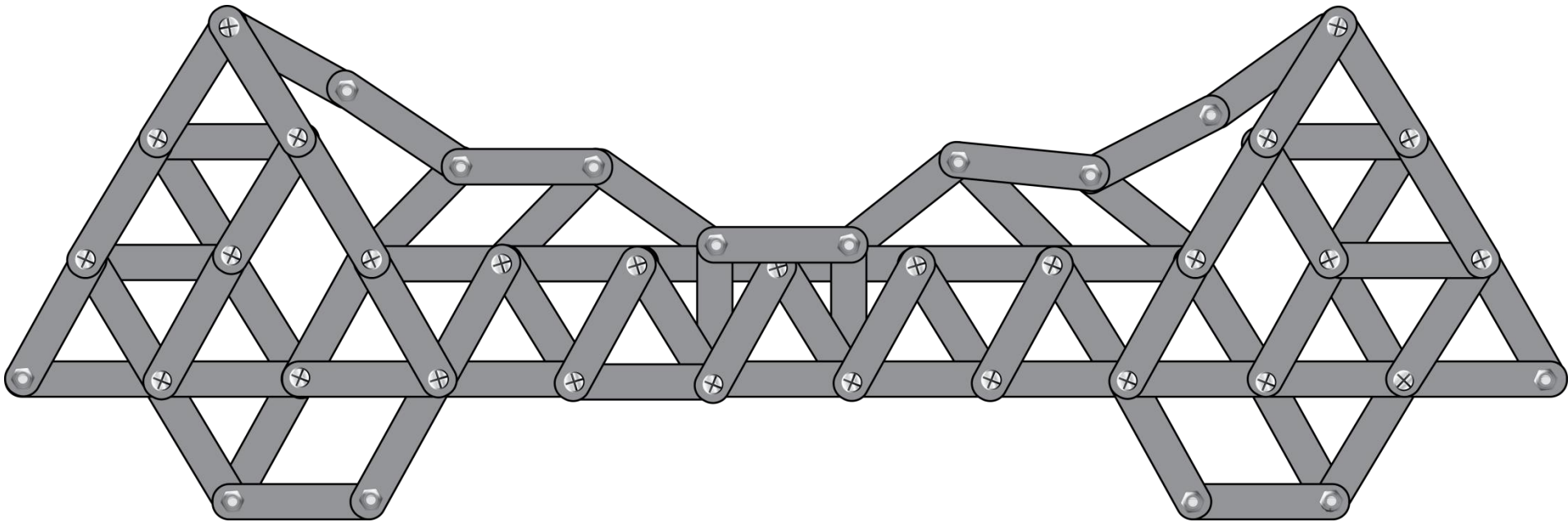
You are submitting a proposal and have been requested to provide accurate estimates in terms of time/cost/quality. To assist with this, you have decided to build a prototype of the bridge.

Project Objective

Build a 2 dimensional prototype of the Kapolla Sustainable Bridge using the materials provided, within a duration under **50 minutes** and a **cost below \$5,000.00** as agreed with the Kapolla procurement agency.



Project Product



Bridge prototype with provided materials

Based on the concept drawing of Vista Learning Company - Canada

Expected Performance and Quality Criteria

Solid construction

Exact design

Parts can not be
bended or twisted

Resources can not
be shared between
work packages and
teams

Work area must be
kept organized

Duration must be
below 50 minutes
and the cost should
be below \$5,000

And the Winner is...

Initial Score of All
Teams: 1,00

Penalties

**Time
(40%)**

**Cost
(30%)**

**Quality
(30%)**

Penalty 1 (70%)

= (Actual Duration – Actual Duration of the Fastest Team)/Actual Duration of the Fastest Team

Penalty 2 (30%)

= |(Planned Duration – Actual Duration)| / Planned Duration

Penalty 3 (70%)

= (Actual Cost – Actual Cost of the Cheapest Team)/Actual Cost of the Cheapest Team

Penalty 4 (30%)

= |(Planned Cost – Actual Cost)| / Planned Cost

Penalty 5 (30%)

Zero Noncompliance = 0
1 NC = 25%
2 NC = 50%
+ 2 NC = 100%

Project Planning



Project Manager Selection Team Formation



**PROJECT
MANAGER**

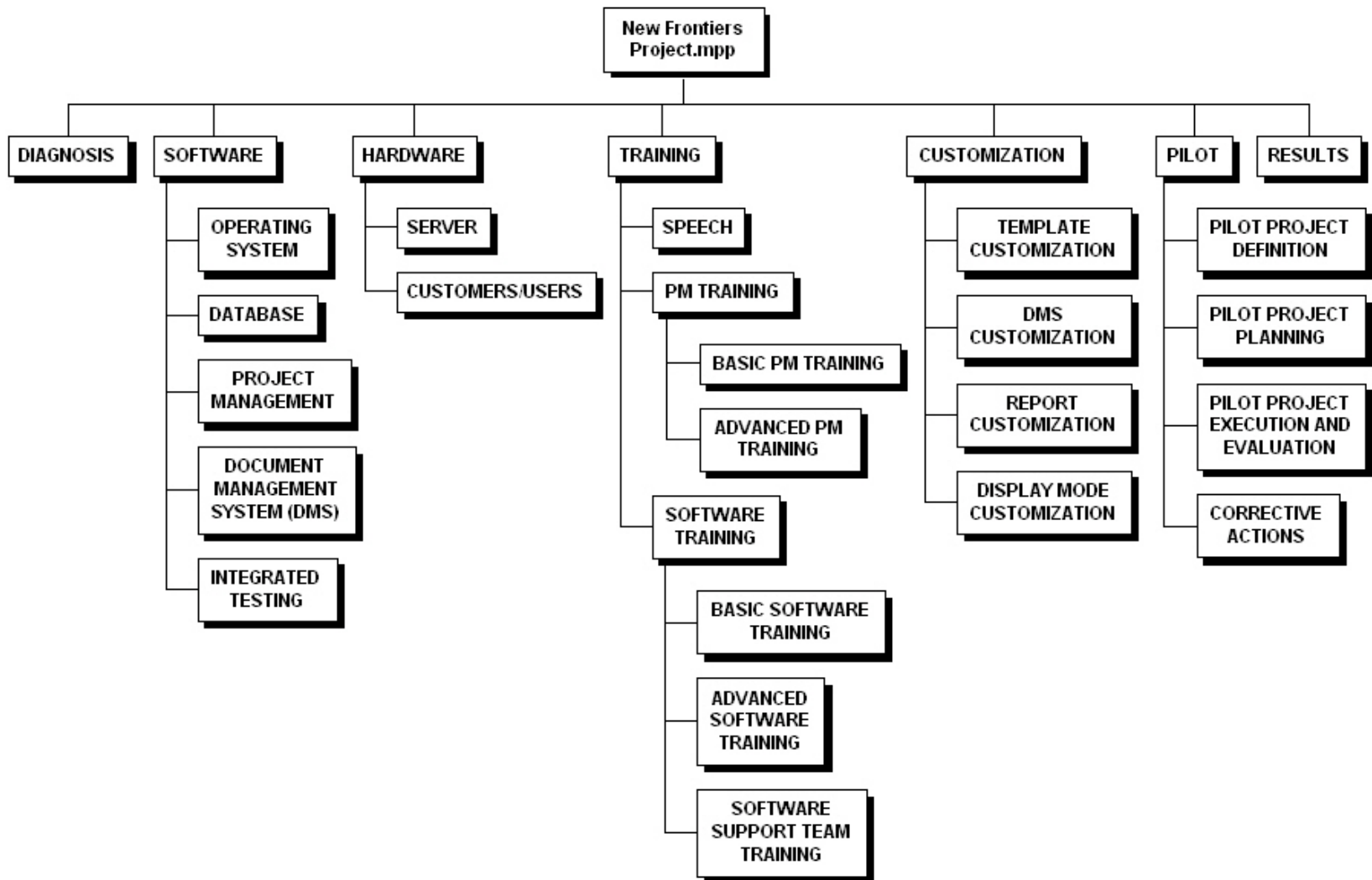
www.unops.org

Work Breakdown Structure (WBS)

- Scope management tool
- Addresses all work that must be completed
- Can be detailed to the level you and the team feel comfortable with



Work Breakdown Structure (WBS)



Milestones and Deliverables



- Related to the deliverables
- Zero duration
- Checkpoints
- Simplify the reporting process

Understanding the WBS

The Good!

- Arrange the work in a logical way
- Group elements by affinity
- Easy to assign resources/responsibilities



The Bad!

- Does not relate the duration with the size of the boxes
- Does not show relationships among packages



Some tips...

Product
Oriented
(PBS)

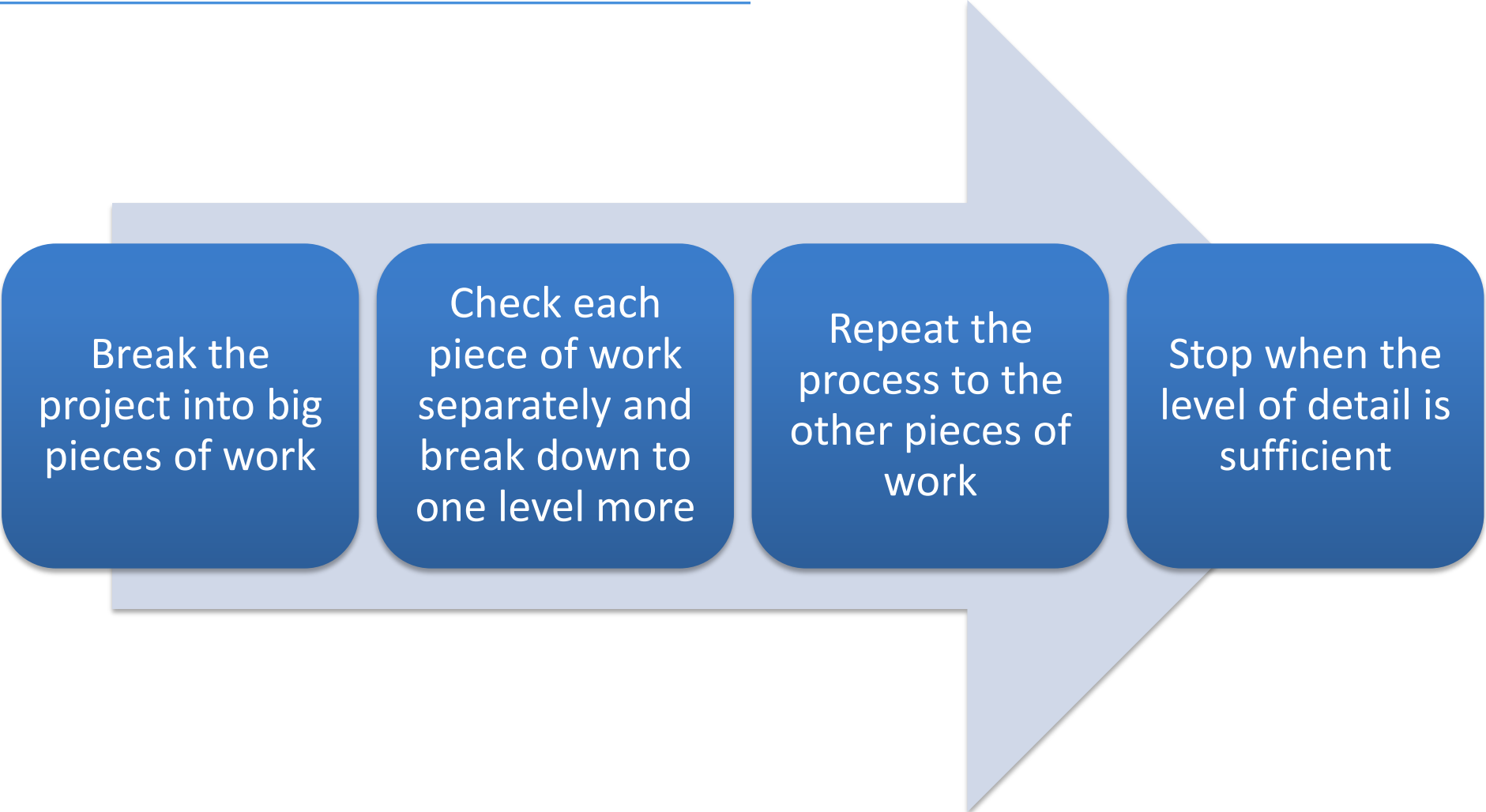
Foundation of
the planning
process

Usually
detailed to
4/6 levels

Does not
contain verbs
(actions)

No “single
child” for
package

Decomposition Technique



Break the project into big pieces of work

Check each piece of work separately and break down to one level more

Repeat the process to the other pieces of work

Stop when the level of detail is sufficient

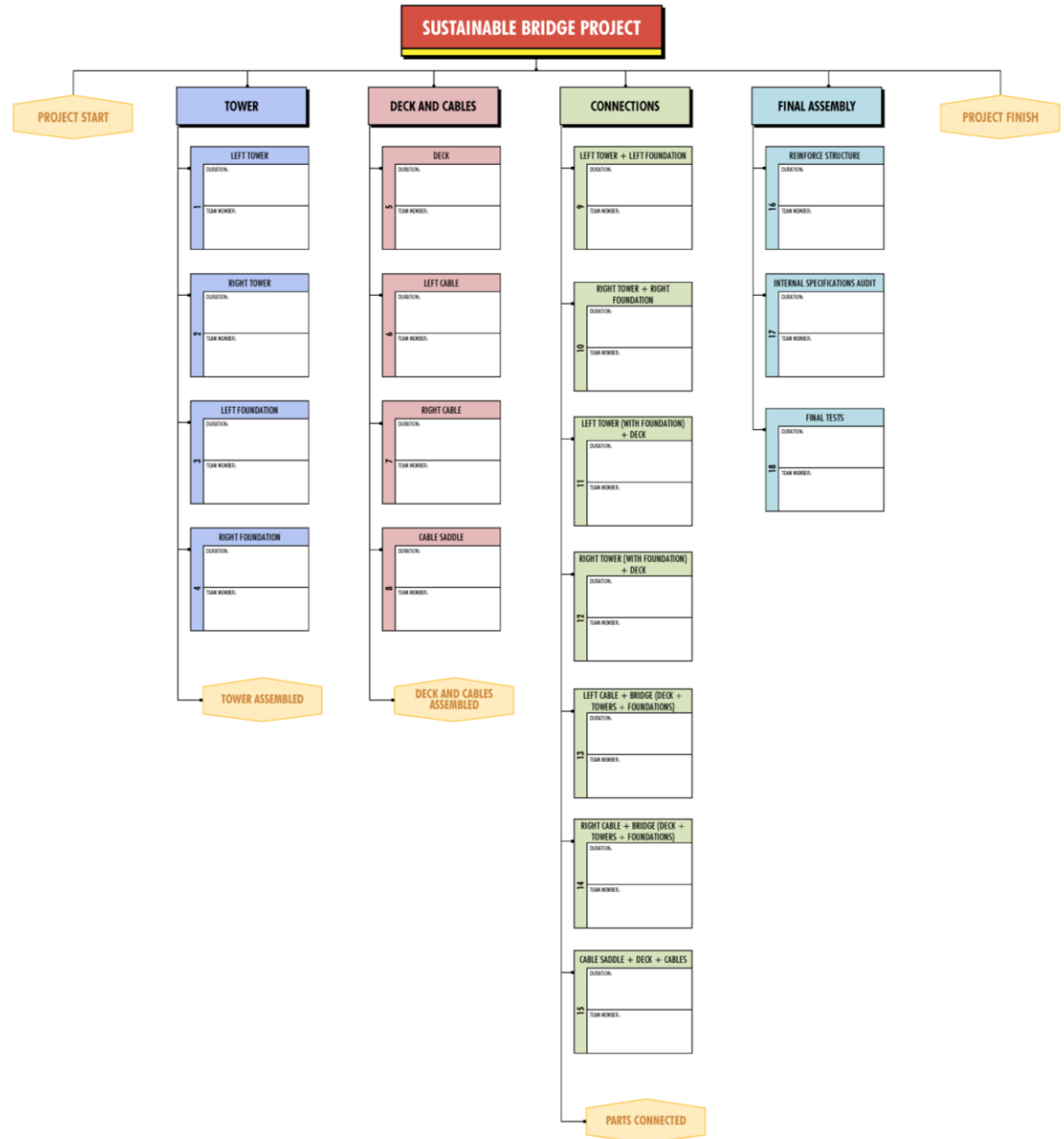
Exercise

- Using Post-It Notes, suggest a WBS for the Sustainable Bridge Project
 - Up to 3 levels (including the project level)
 - No “single child”

- 10 minutes



Proposed WBS



Network Diagram



Network Diagram

Organize tasks / packages in a specific order of execution

Predecessor

- A task (or activity) that must be started or finished before another task or milestone can be performed.

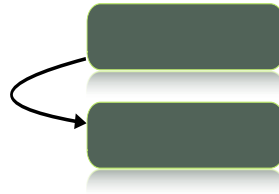
Successor

- A task or milestone that is logically linked to one or more predecessor tasks.

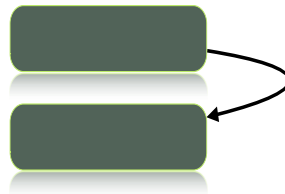
Different Types of Relationships



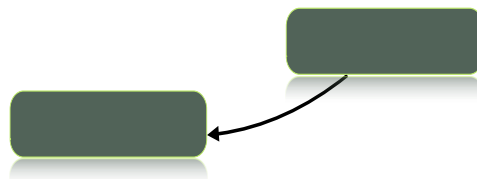
Finish - Start



Start - Start



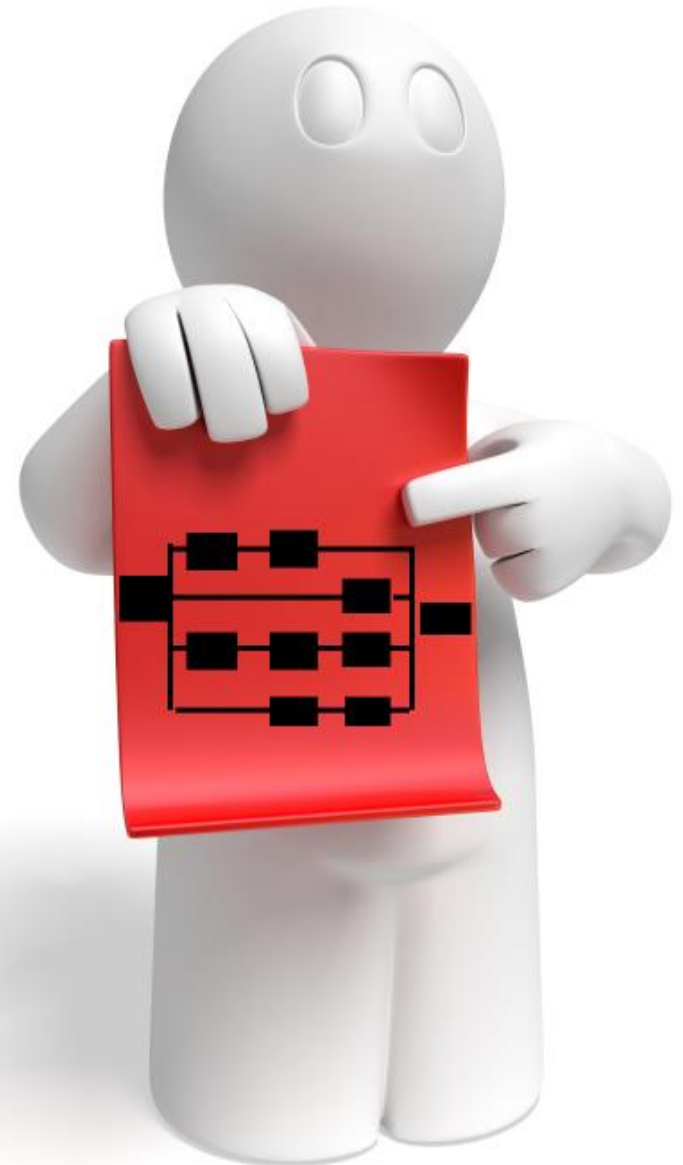
Finish - Finish



Start - Finish

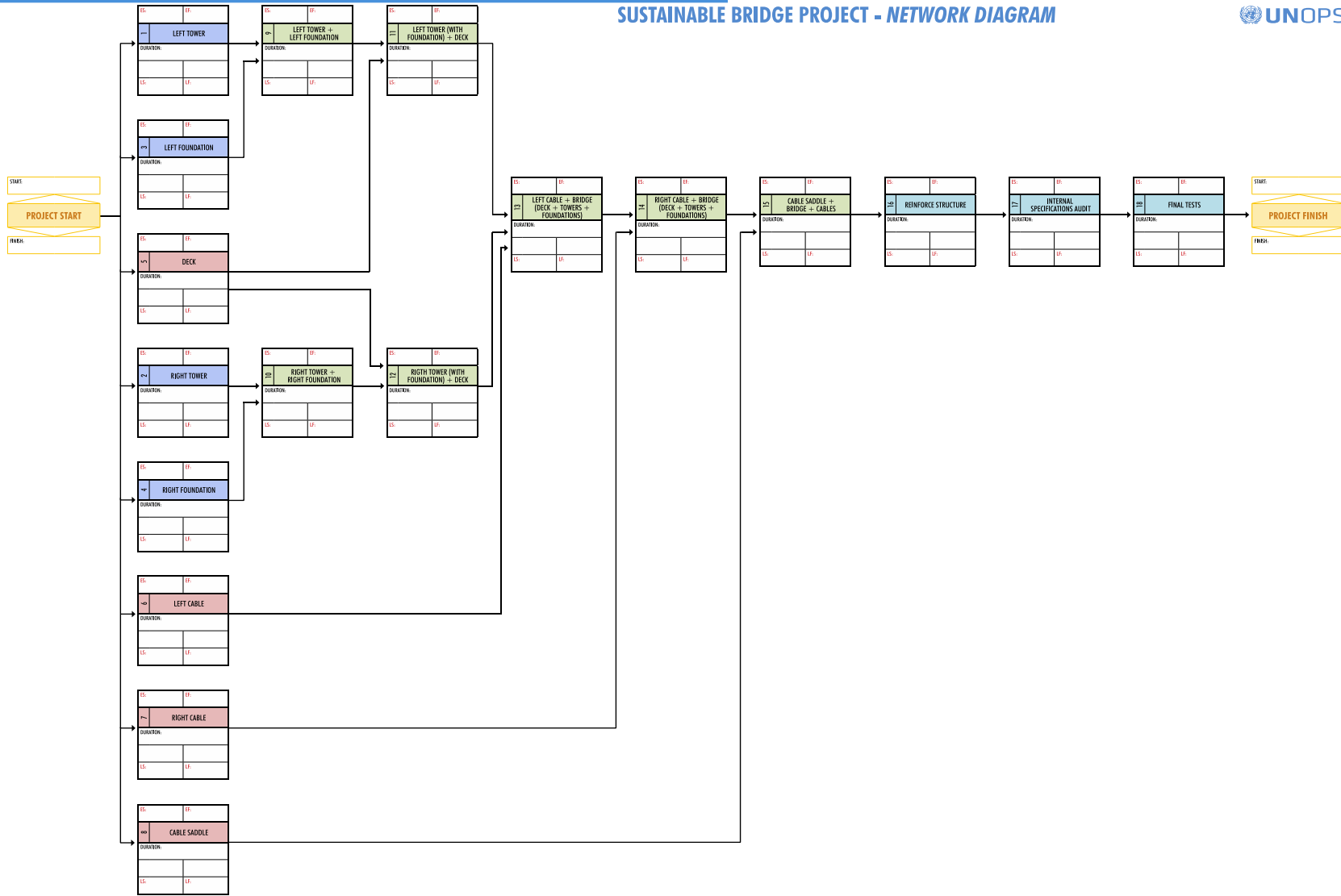
Exercise

- Using Post-It Notes, suggest a Network Diagram for the Project
 - Use the Proposed WBS you received as a starting point
 - Use only Finish to Start relationships
- 10 minutes



Proposed Network Diagram

SUSTAINABLE BRIDGE PROJECT - NETWORK DIAGRAM

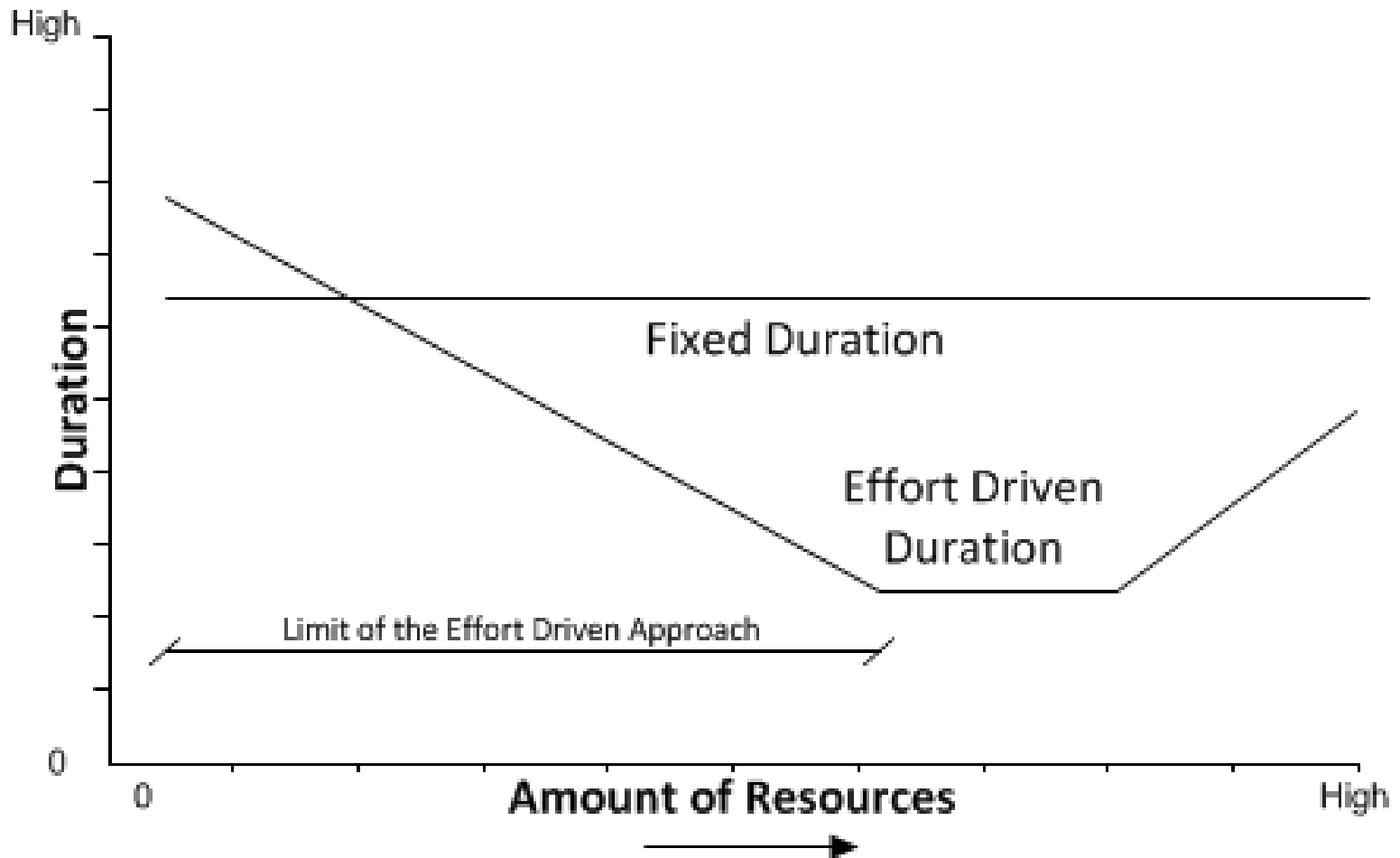


Duration and Resource Allocation

- Duration: Time you need to execute the task/package.
- Directly related to the resources you have to execute the task/package.




Duration and Resource Allocation



WBS Dictionary and Planning Pieces

- Distribute WBS Dictionary
- Distribute Planning Pieces



UNOPS

TOWER
LEFT TOWER

1/18

**SUSTAINABLE BRIDGE PROJECT
WBS DICTIONARY**

DURATION:




Optimistic	12 min
Most Likely	15 min
Pessimistic	20 min

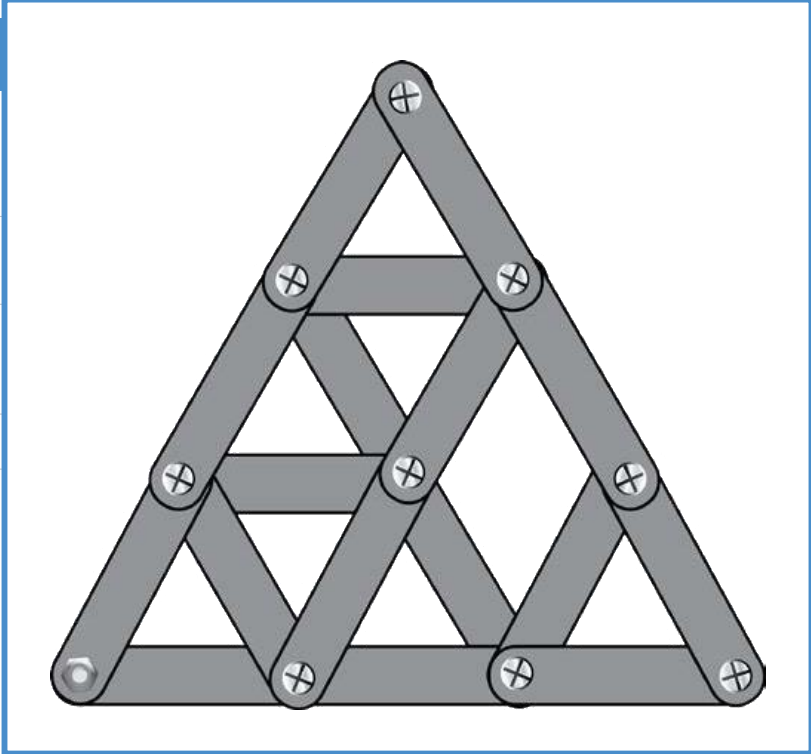
PREDECESSOR(S):
PROJECT START

SUCCESSOR(S):
9 - LEFT TOWER + LEFT FOUNDATION
TOWERS ASSEMBLED

AVAILABLE RESOURCES

Team members: 2 | pieces used: 37

PIECES INVENTORY		
type		quantity
BEAM		17
SCREW		10
NUT		10



WHITE PARTS AND STRUCTURES ARE A REFERENCE OF PREVIOUS STEPS.

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Exercise – Part 1

- Based on the team experience, WBS Dictionary and the use of planning materials, estimate the **duration** of each work package in minutes.
 - There is no right answer
 - The team can choose any duration they think is reasonable
- Add the duration on the WBS Chart Provided
- 5 min

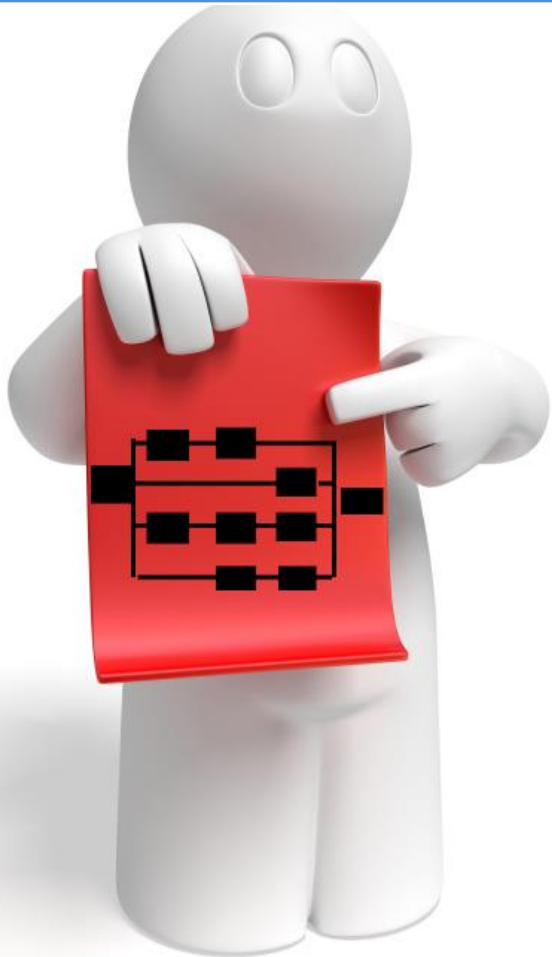


Exercise – Part 2

- Based on the team experience, WBS Dictionary and the use of the planning materials, estimate the **required resources** of each work package in minutes.
 - There is no right answer
 - The team can choose any team members
- Put the name of the team members on the WBS Chart Provided



Critical Path



- The critical path is the path with the tasks that directly affect the duration of the project.
- Any delays on the critical path activities will impact the project finish date.

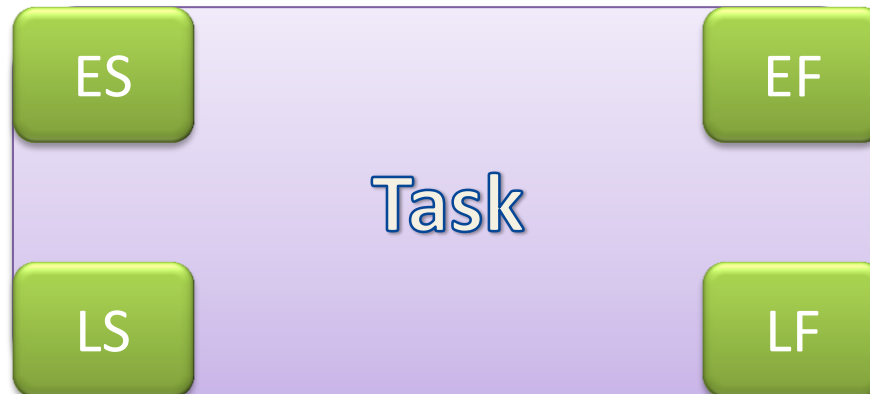
Critical Path Method (CPM)

Early Start
(ES)

Early
Finish (EF)

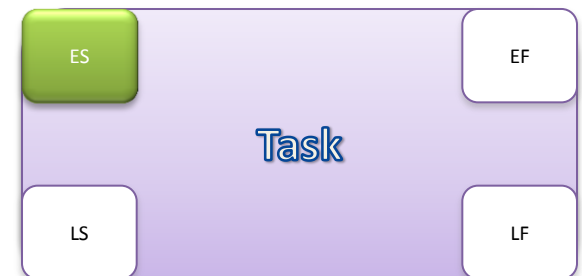
Late Start
(LS)

Late
Finish (LF)



Early Start (ES)

- The **Early Start** is the earliest date that a task could possibly begin, based on the early start dates of predecessor and successor tasks as well as other constraints.



Early Finish (EF)

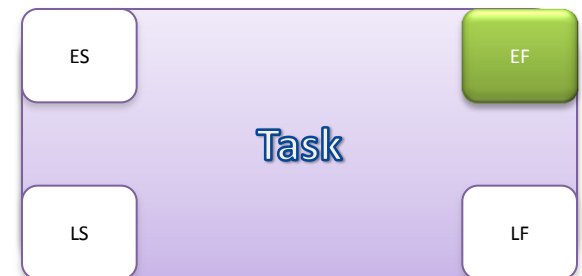
- The **Early Finish** is the earliest date that a task could possibly finish, based on early finish dates of predecessor tasks, other constraints, and any leveling delay.


$$\text{ES} + \text{D} = \text{EF}$$

EF = Early Finish

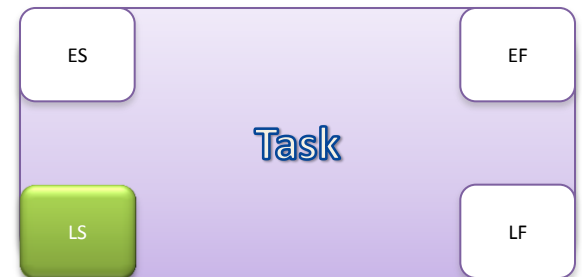
ES = Early Start

D = Duration



Late Start (LS)

- The **Late Start** field contains the latest date that a task can start without delaying the finish date of the project.



Late Finish (LF)

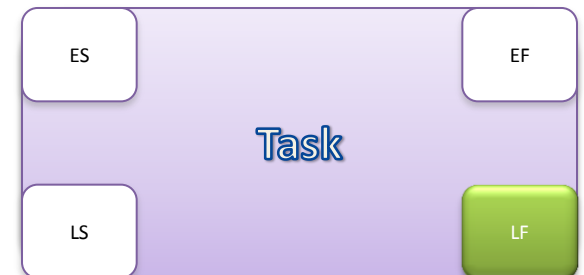
- The **Late Finish** field contains the latest date that a task can finish without delaying the finish date of the project.



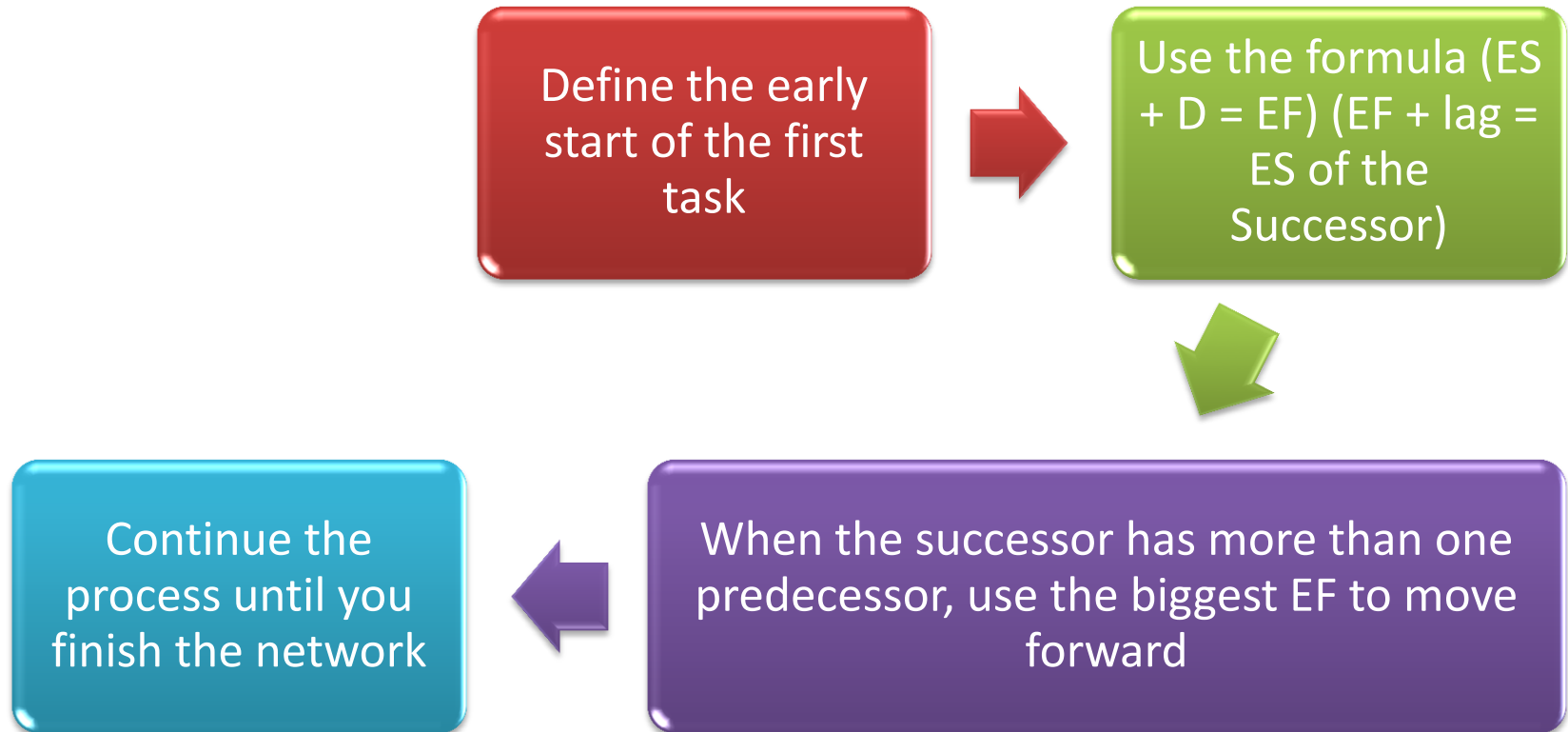
LF = Late Finish

LS = Late Start

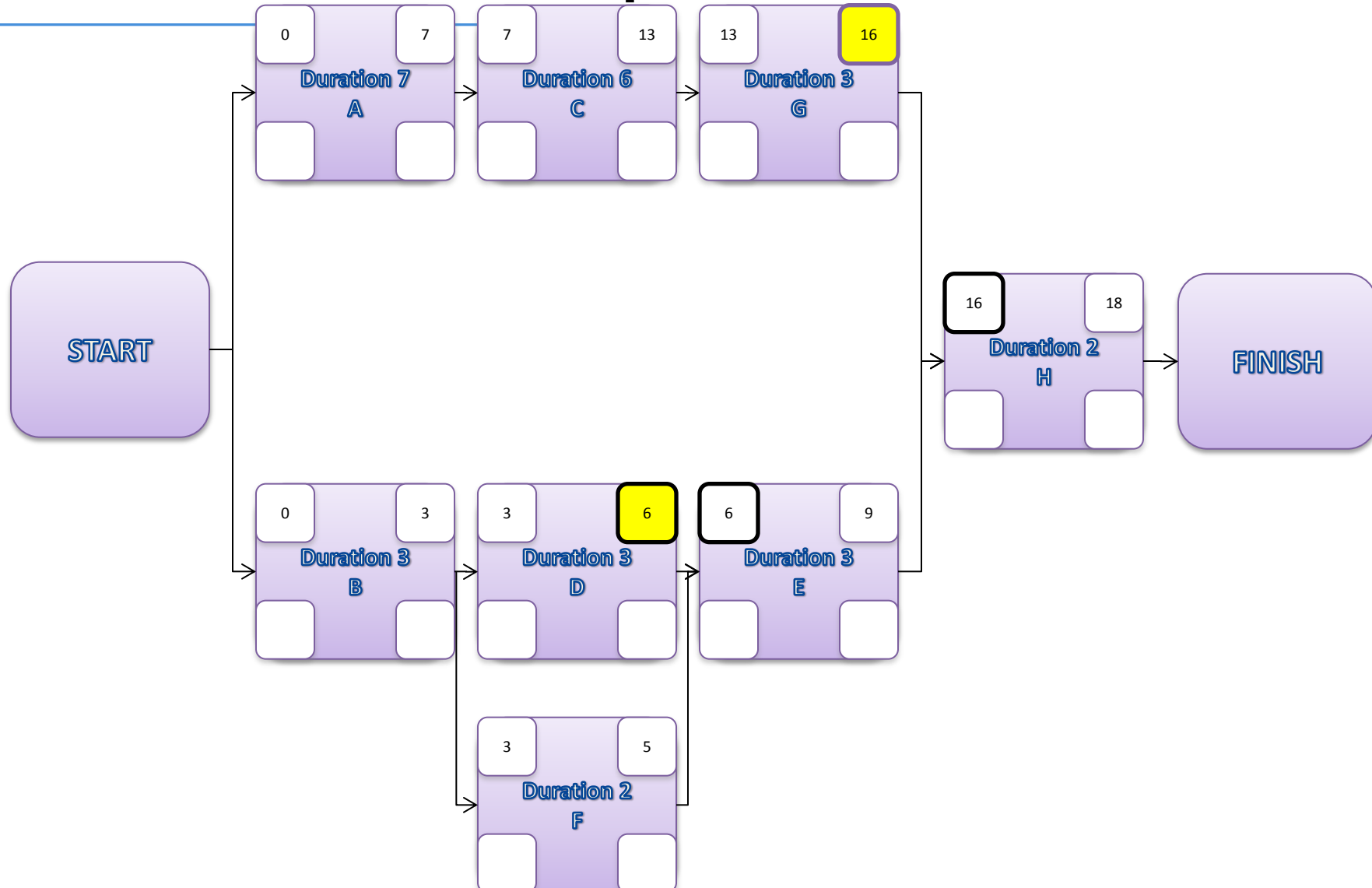
D = Duration



Forward Path



Forward Path – an Example



Backward Path

After finishing the Forward Path, copy the Late Finish (LF) of the last task to the Early Finish (EF) of the same task

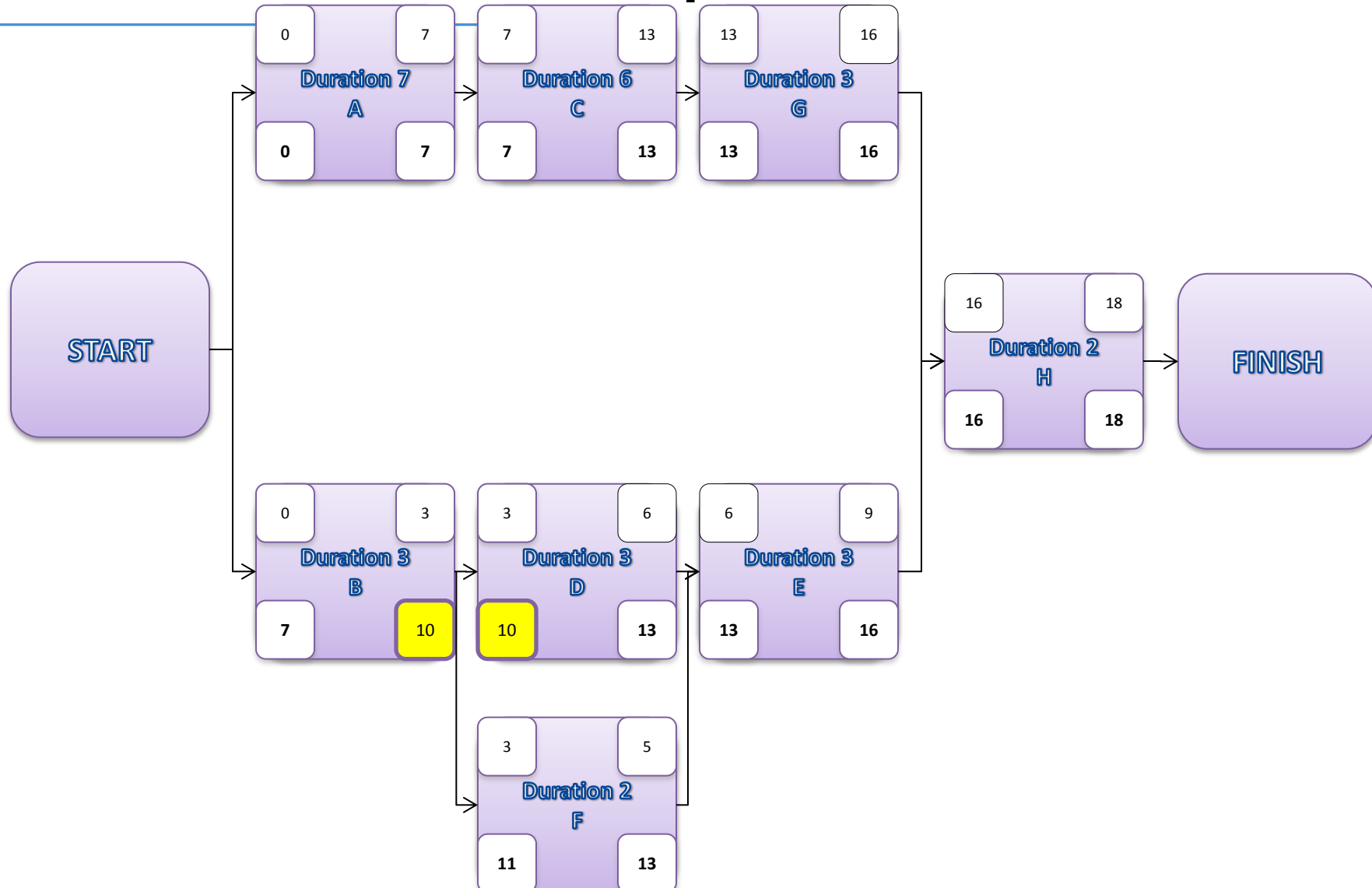


Use the formulas (LF - D = LS) and (LS - lag = LF of the predecessor)



Continue until you reach the first task of the network

Backward Path – an Example



Total Float (TF)

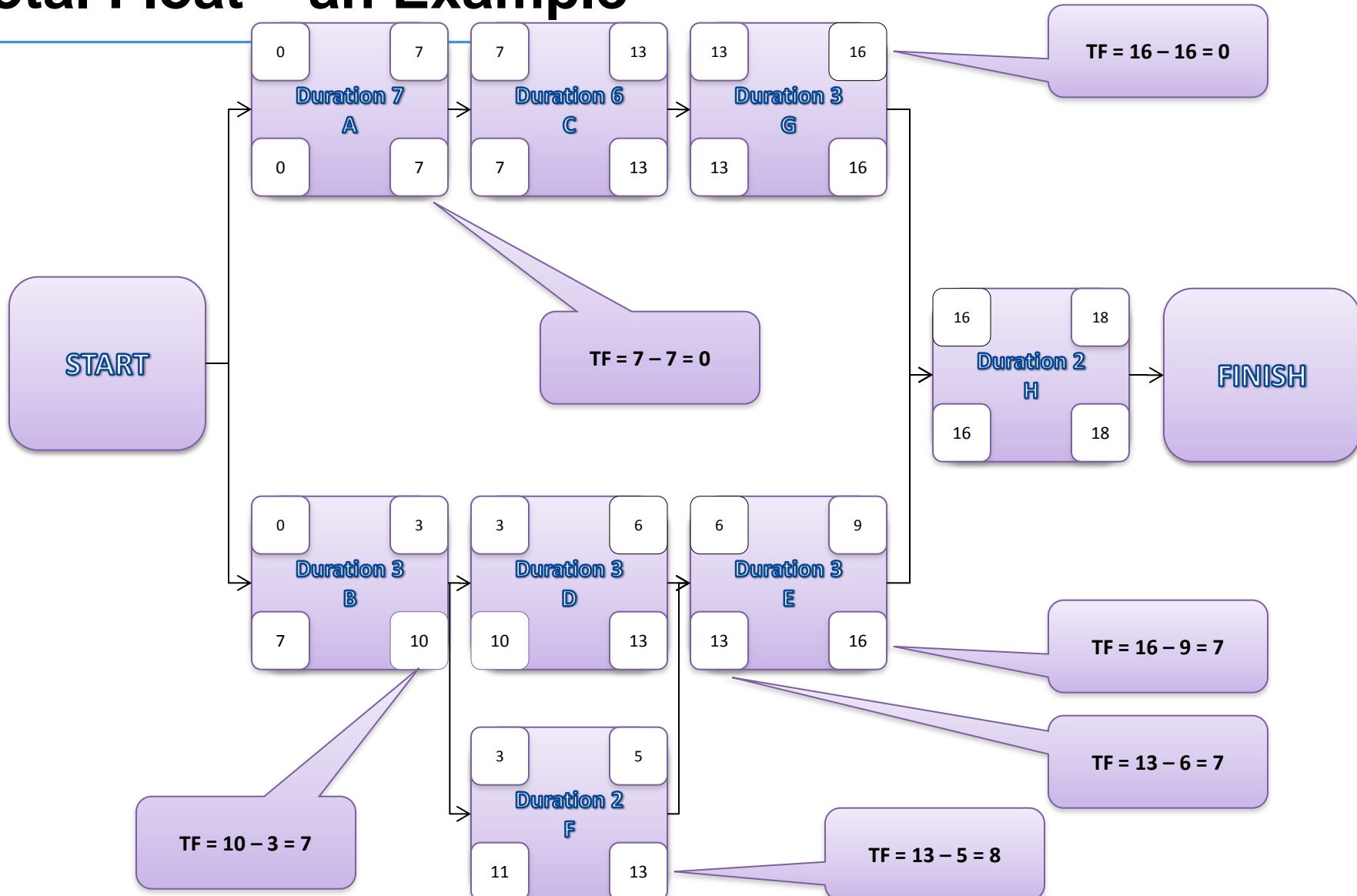
Float is the amount of time that a task can be delayed without delaying the project finish date

The use of the total float may delay non critical successor tasks

All critical tasks have zero float (in general)

$$TF = LS_n - ES_n = LF_n - LS_n$$

Total Float – an Example

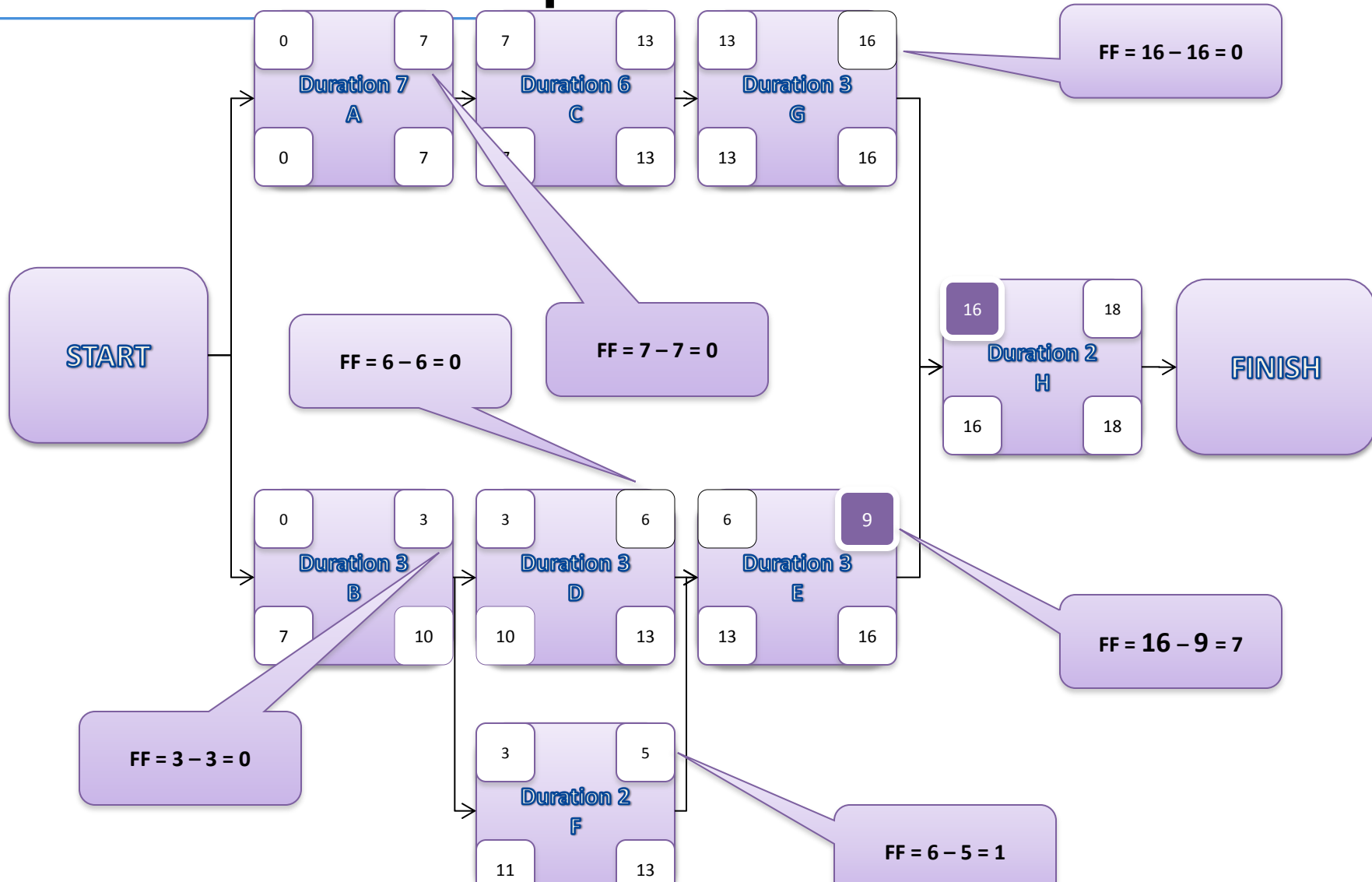


Free Float (FF)

The float that one task may have without delaying any of the successors

$$FF = ES_{n+1} - EF_n$$

Free Float – an Example



Critical Path



It's a path where any delay in any task will impact the project duration.

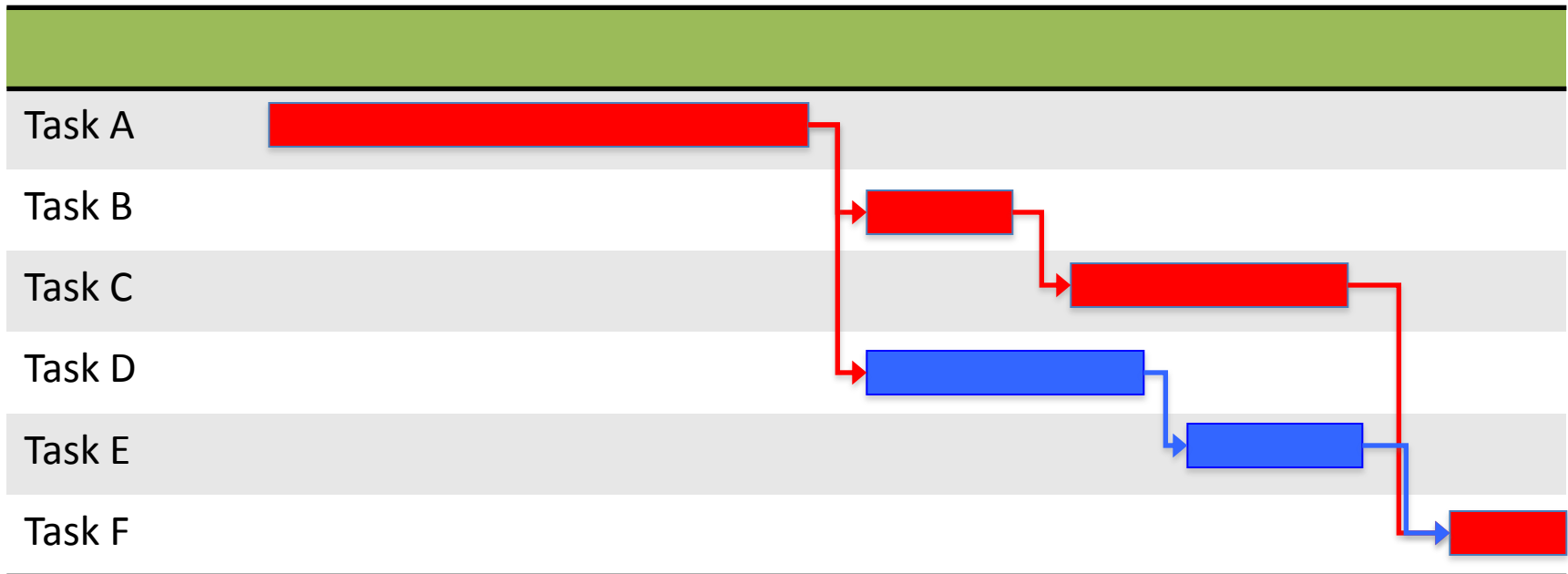
It's the longest path of all possible paths on a project.

There can be more than one critical path.

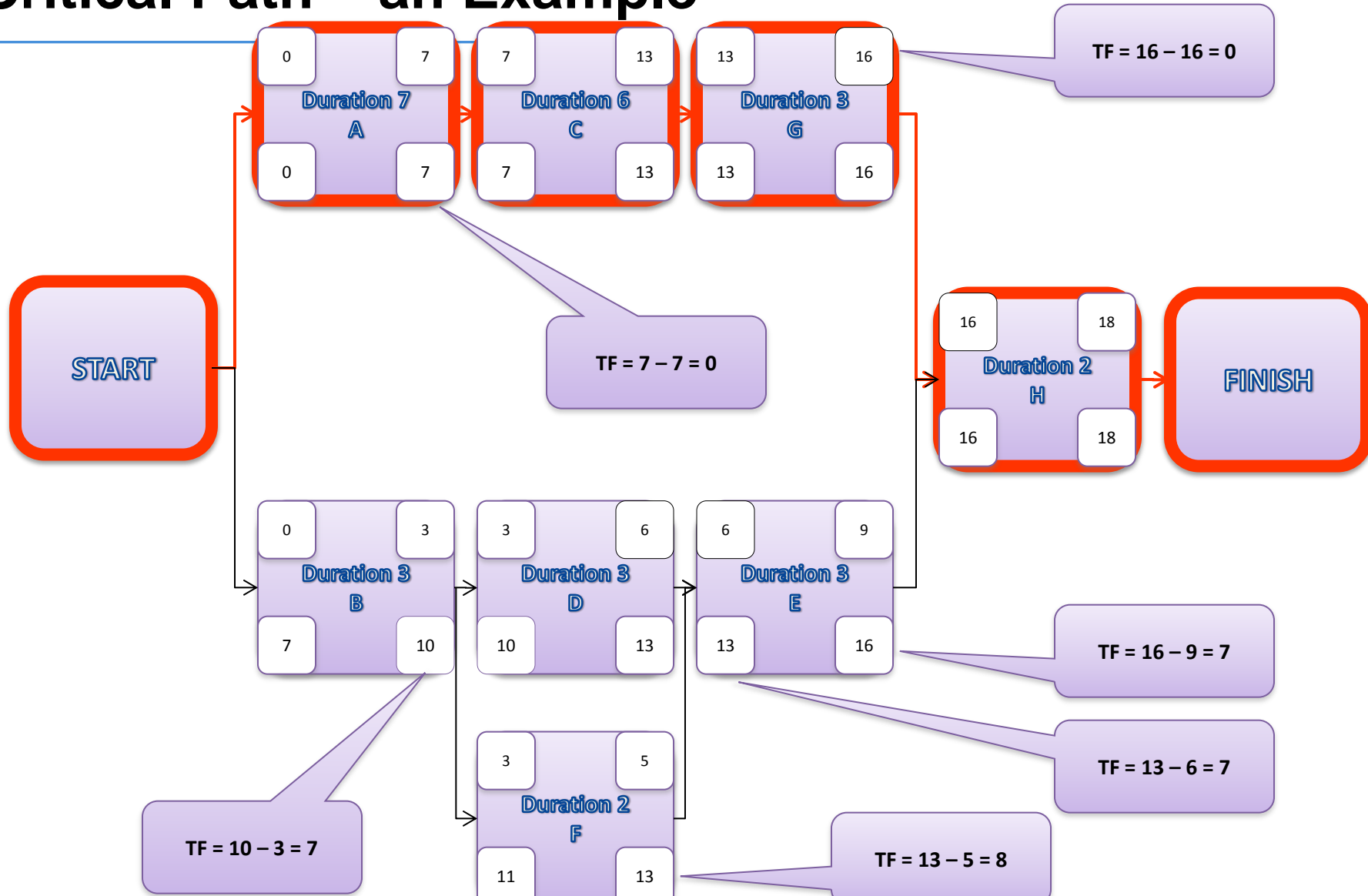
It's the path with no floats or with the smallest float.

It determines the shortest possible duration for the project.

Critical Path on a Gantt Chart – an Example



Critical Path – an Example

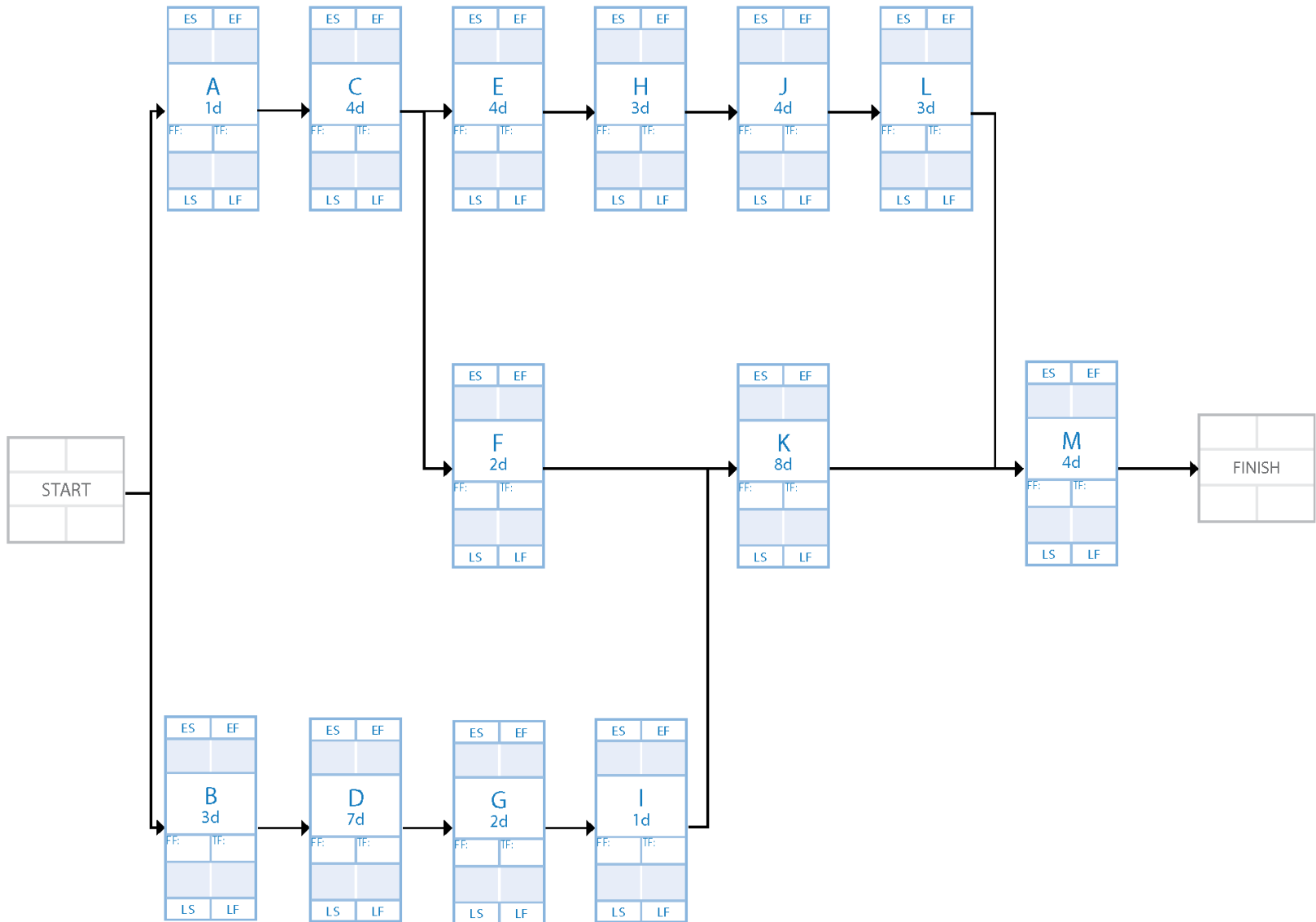


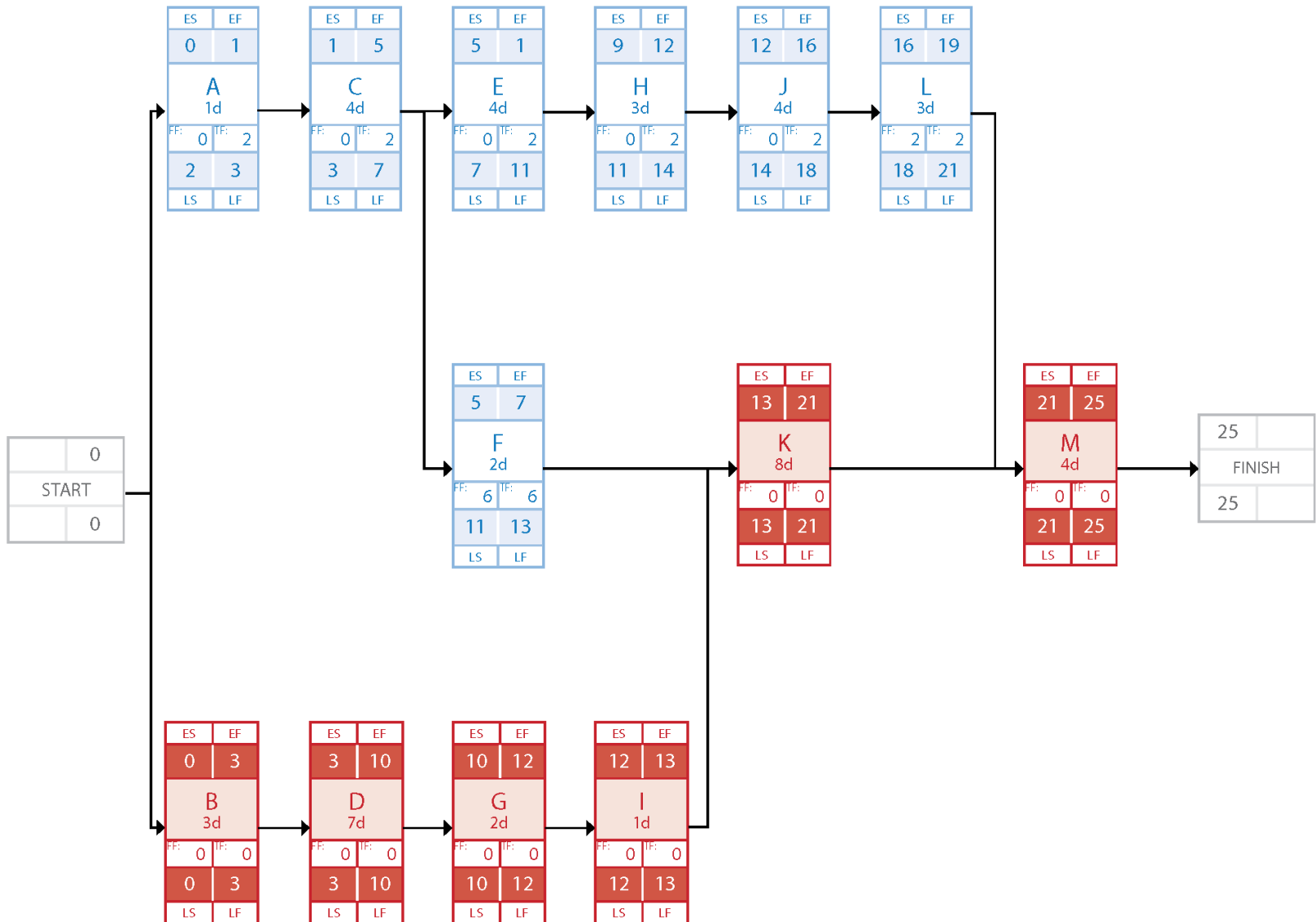
Critical Path Assumptions

All project tasks are executed based on a calendar.

Holidays and weekends are ignored.

When limited resources are considered, we then have *CCPM – Critical Chain Project Management*.

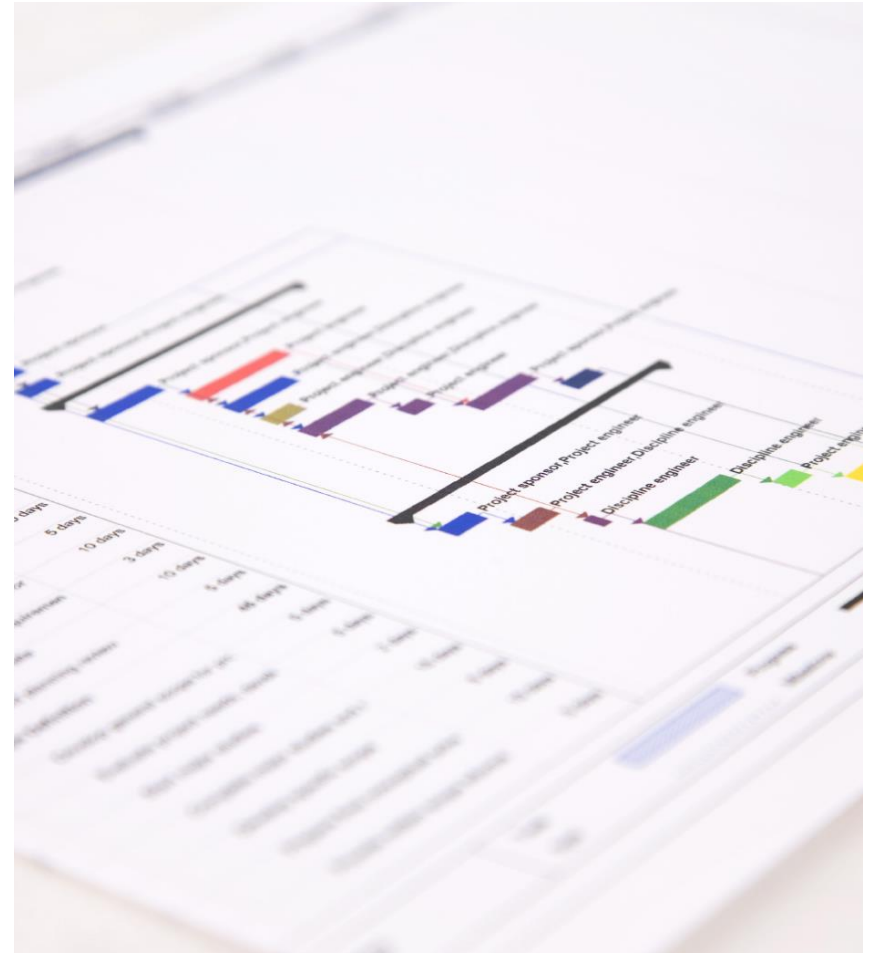




Exercise

Based on the provided Network Diagram, calculate

- Project Duration
- Critical Path



Calculating the Project Direct Cost

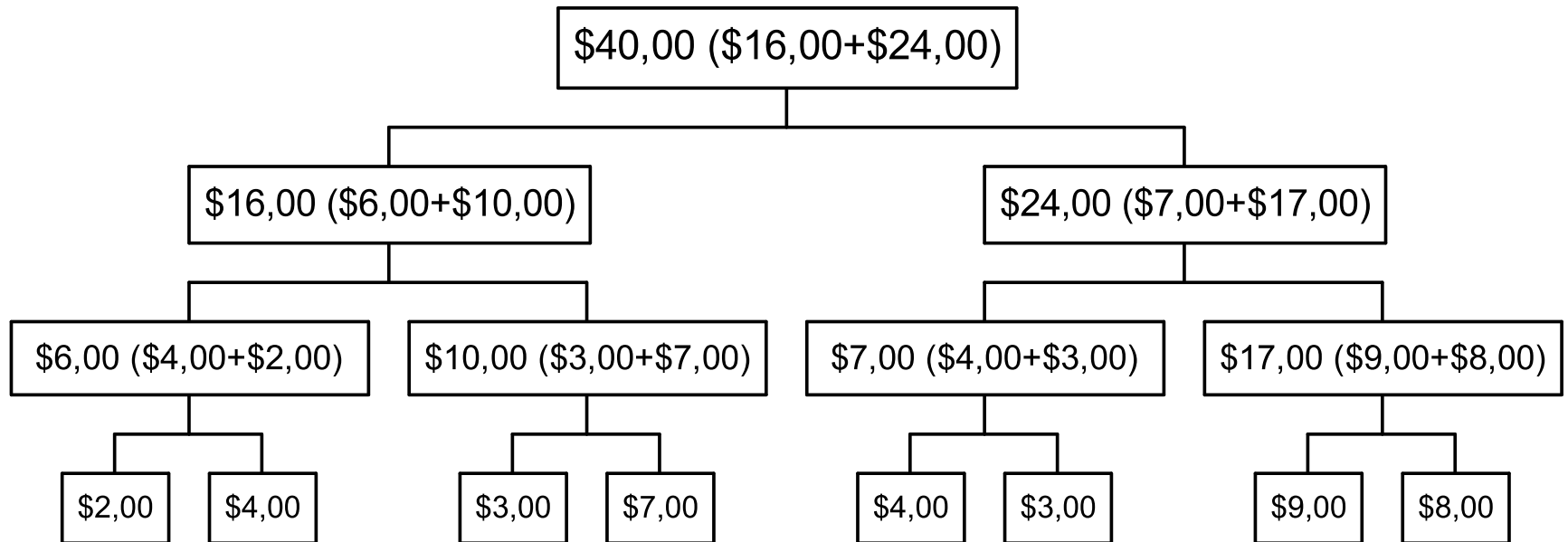
Directed related to
the project work

Calculate based on
the project scope
and allocated
resources

Poor scope leads
to poor cost
budgeting



Bottom-UP Estimating



Exercise

- Assembly Kits
 - K\$2.000,00
- Team member
 - K\$15,00 per minute per member
- Can not be over
 - K\$5.000,00
- Prepare your Project Cost

Personnel Costs					
WP	Name	Duration (min)	Team Member(s)	Team Member Cost (\$15/min)	
TOWER	1	Left Tower	2	\$	
	2	Right Tower	2	\$	
	3	Left Foundation	1	\$	
	4	Right Foundation	1	\$	
DECK AND CABLES	5	Deck	2	\$	
	6	Left Cable	1	\$	
	7	Right Cable	1	\$	
	8	Cable Saddle	1	\$	
CONNECTIONS	9	Left Tower + Left Foundation	2	\$	
	10	Right Tower + Right Foundation	2	\$	
	11	Left Tower (with Foundation) + Deck	2	\$	
	12	Right Tower (with Foundation) + Deck	2	\$	
	13	Left Cable + Bridge (Deck + Towers + Foundations)	2	\$	
	15	Right Cable + Bridge (Deck + Towers + Foundations)	2	\$	
	15	Cable Saddle + Bridge + Cables	2	\$	
FINAL ASSEMBLY	16	Reinforce Structure	4	\$	
	17	Internal Specifications Audit	2	\$	
	18	Final Tests	4	\$	
				PERSONNEL TOTAL	\$
Assembly Kit					\$
Reserves and Risk Provisions					\$
TOTAL COST					\$

Group BID

Based on your planning documents, propose a bid for your team using the form provided

TEAM BID

Team Name: _____

Name: _____

Name: _____

Name: _____

Name: _____

Name: _____

Name: _____

Name: _____

Duration: _____ min

Cost: _____

Quality requirements

1. Solid construction
2. Exact design
3. All parts can not be bent or twisted
4. Teams members are expected to complete only the assigned tasks
5. Resources can not be shared between work packages and teams
6. Materials are to be used for their specific work packages
7. Work area must be kept organized
8. Duration must be below 50 minutes and the cost should be below \$1,000

[] Our team is aware of the quality requirements

Signature: _____

Execution

Execution

Clean all
the tables

Wait for
the Clock

Good
luck!

Results

Results

- Excel Spreadsheet

Discussion