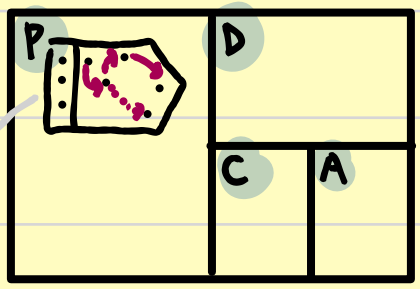
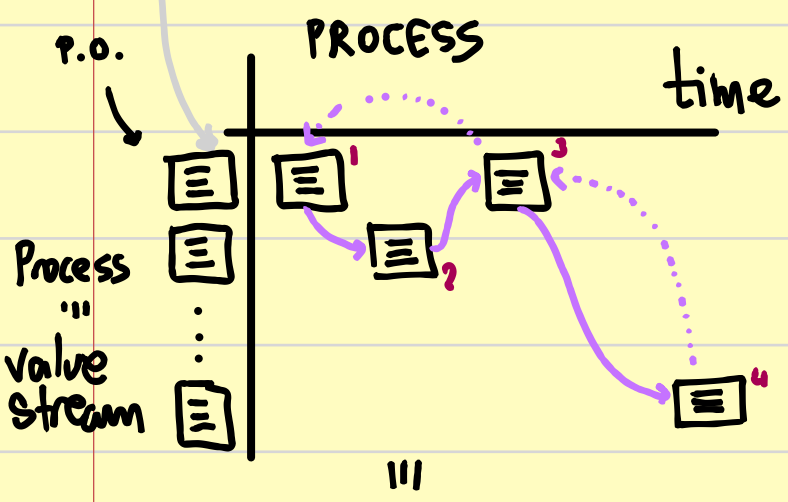
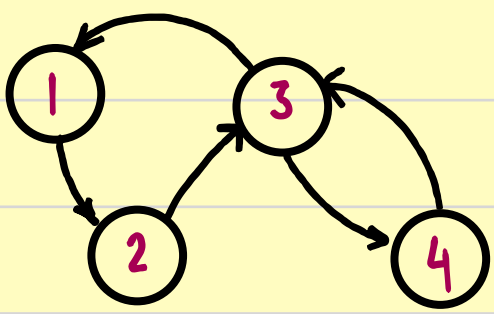
20220407_Project_Management_MV6

(CPD)nA Process





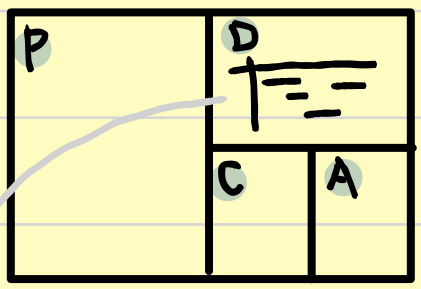
NETWORK

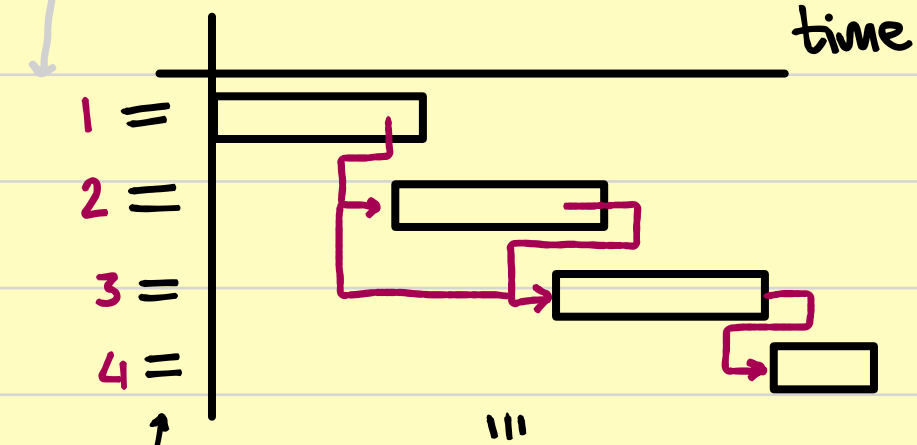


NODES : Process Owners

EDGES : Material & Information Flow

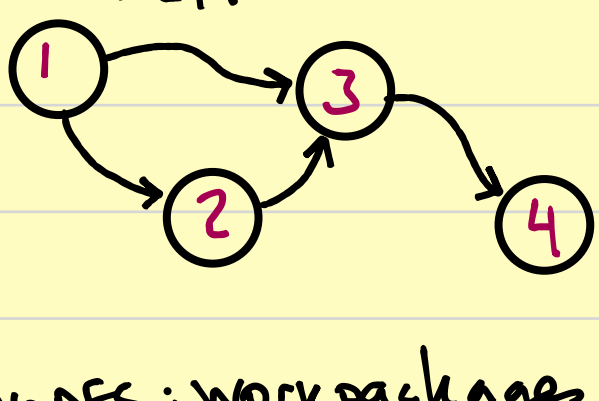
(DCP)nA Project





WORK PACKAGES

NETWORK



NODES : workpackages

EDGES : Dependencies

Tools need be understood to be able to compare and quantify networks.

The faster information or material flows in the network, the more effective and efficient it shall be.

kpi. Average Path Length

The better people exchange information (within groups) the better this information is processed in the network.

Clustering Coefficient

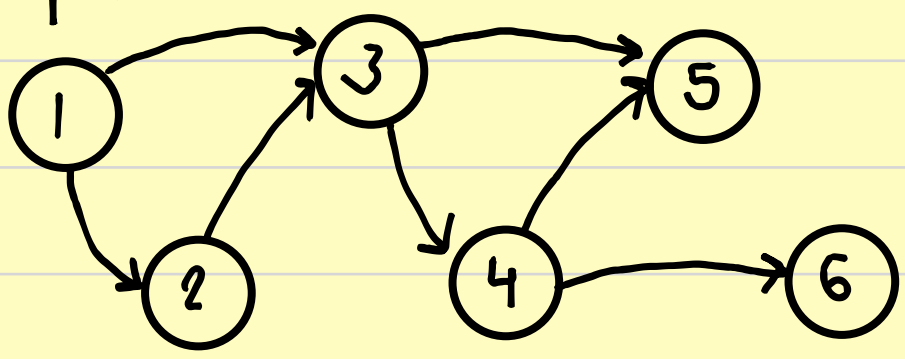
group

A network is defined (mathematically) by a set of nodes and a set of edges.
This group of sets is called "Graph" (G).

N nodes
E edges

$G:(N\ U\ E)$

Example:



$N: \{1, 2, 3, 4, 5, 6\}$

$E: \{(1\to2), (1\to3), (2\to3), (3\to4), (4\to5), (3-5), (4\to6)\}$

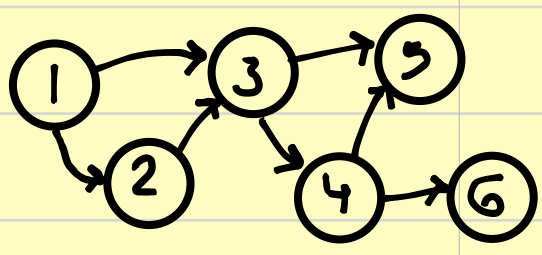
Average Path Length.

Average distance between nodes in the network.

$$APL = \frac{1}{N(N-1)} \cdot \sum_{i=1}^{N}\sum_{j=1}^{N} d_{ij}$$

$N(N-1) \equiv$ Maximum Number of relationships in the network

$\sum\sum d_{ij} \equiv$ Sum of all paths between nodes.



$$APL = \frac{1}{6\cdot5}\left[\begin{matrix}1\\ \\ 2\\ \\ 3\end{matrix}\right.\left[\begin{matrix} d_{12} & d_{13} & d_{14} & d_{15} & d_{16} \\ 1 & 1 & 2 & 2 & 3 \end{matrix}\right] + \left[\begin{matrix} d_{21} & d_{23} & d_{24} & d_{25} & d_{26} \\ 1 & 1 & 2 & 2 & 3 \end{matrix}\right] + \left[\begin{matrix} d_{31} & d_{32} & d_{34} & d_{35} & d_{36} \\ 1 & 1 & 1 & 1 & 2 \end{matrix}\right] +$$

$$+\overset{4}{\left[\begin{matrix} d_{41} & d_{42} & d_{43} & d_{45} & d_{46} \\ 2 & + 2 & + 1 & + 1 & + 1 \end{matrix}\right]} +$$

$$+\overset{5}{\left[\begin{matrix} d_{51} & d_{52} & d_{53} & d_{54} & d_{56} \\ 2 & + 2 & + 1 & + 1 & + 2 \end{matrix}\right]} +$$

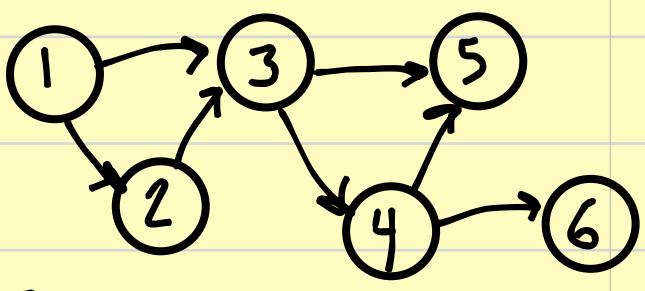
$$+\overset{6}{\left[\begin{matrix} d_{61} & d_{62} & d_{63} & d_{64} & d_{65} \\ 3 & + 3 & + 2 & + 1 & + 2 \end{matrix}\right]} = \dots$$

When we compare two Processes/Projects, the one with the shortest APL should perform better.

$$CC = \frac{1}{N} \cdot \sum_{i=1}^{N} \frac{2 \cdot L_i}{K_i (K_i - 1)}$$

L_i : Number of relationships between the neighbours of node ..i..

K_i : Number of neighbours of node ..i..



L_1 #relations btw neighbours node 1

$$CC = \frac{1}{6} \cdot \left[\overset{1}{\left[\frac{2 \cdot 1}{2 \cdot (2-1)} \right]} + \overset{2}{\left[\frac{2 \cdot 1}{2 \cdot (2-1)} \right]} + \right.$$

K_1 : #neighbours of node 1

$$+ \overset{3}{\left[\frac{2 \cdot 2}{4 \cdot (4-1)} \right]} + \overset{4}{\left[\frac{2 \cdot 1}{3 \cdot (3-1)} \right]} +$$

$$\left. + \overset{5}{\left[\frac{2 \cdot 1}{2 \cdot (2-1)} \right]} + \overset{6}{\left[\frac{2 \cdot 0}{\quad} \right]} \right] = \dots$$

The higher the clustering coefficient, the better the communication between the elements of the process/project.

Exercise:

WP	Description	Predecessors	Duration
1	Lease the site	—	1
2	Arrange furnishing	1	5
3	Hire workers	1	1
4	Install furnishing	3	2
5	Arrange Phones	1	1
6	Install Phones	4, 5	1
7	Move into office	2, 6, 4	2

- Prepare the Project Plan as Gannt Diagram and as Graph
- Calculate APL and CC of the project.