

CONSTRUCTION SCHEDULING

steps to effective time management

- Examine the Contract
- List Major Contractual Obligations
- Divide Project into Major Work Areas
- Building Technology Implies Sequence
- Find Productivity, Duration, Cost
- Calculate Initial Schedule
- Schedule Adjustments
- Resource Evaluation
- Time / Cost Trade-off
- Total Project Cash Flow
- Include All Important Procurement

bar charts

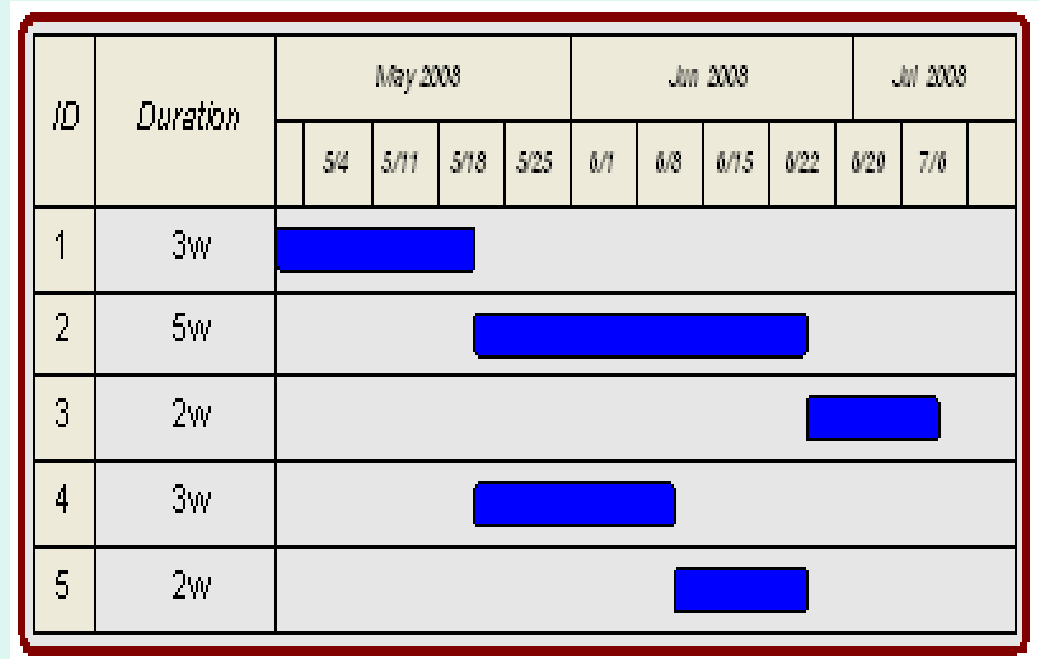
- The Gantt chart or bar chart used today was developed in the early 1900's from a several different charts used by Mr. Gantt to communicate between management and employees about what work was to be accomplished on a given day

bar charts

- The bar chart is a two dimensional chart.
- The x-axis of the chart shows the project timeline.
- The y-axis of the chart is a list of specific activities that must be accomplished to complete the project.
- These activities are typically listed in order of earliest start on the project.
- The content of the bar chart are bars that show the planned (and/or actual) start and end times for each task.
- most bar charts show a pattern of bars that begin in the upper left of the chart and proceed to bars that complete the project displayed in the bottom right of the chart.

bar charts

Activity	Duration (work-weeks)	Prior Activity
1	3	None
2	5	1
3	2	2
4	3	1
5	2	4



Project Network Diagrams

- Network diagrams show the precedence relationships among activities
- It's easier to understand these relationships graphically
- Network diagrams help to understand the flow of work in a project
- Network diagrams are a useful tool for project planning and control, as well as for scheduling
- One (perhaps exaggerated) claim is that the network represents $\frac{3}{4}$ of the planning process

Two Versions of Network Diagrams

Activity-on-Arrow (AOA) networks

- also called Arrow Diagramming Method (ADM)
- simpler for projects with many dependencies
- emphasizes events; milestones can be easily flagged
- sometimes requires dummy activities

Two Versions of Network Diagrams

- Activity-on-Node (AON) networks
 - also called Precedence Diagramming Method (PDM)
 - easier to draw for simple projects
 - emphasizes activities
 - no dummy activities

Activities vs. Events

- ***Activity*** – a chunk of work that is part of the project; an activity may be broken down into multiple subactivities
- ***Event*** – a significant point in time during the project, such as a milestone event; an event could be the time at which an activity is completed or the time at which related concurrent activities have all completed
- ***Dummy Activity*** – an artificial activity with zero time duration that only shows a precedence relationship among activities

Activity on Arrow (AOA)

- The two elements of Arrow Diagramming are arrows and nodes. One arrow is created for each activity to be accomplished.
- The tail of the arrow is the start of the activity.
- The head of the arrow is the end of the activity.
- While there is no requirement to do so, the length of the arrow is often scaled to be proportional to the duration of the activity.

Activity on Arrow (AOA)

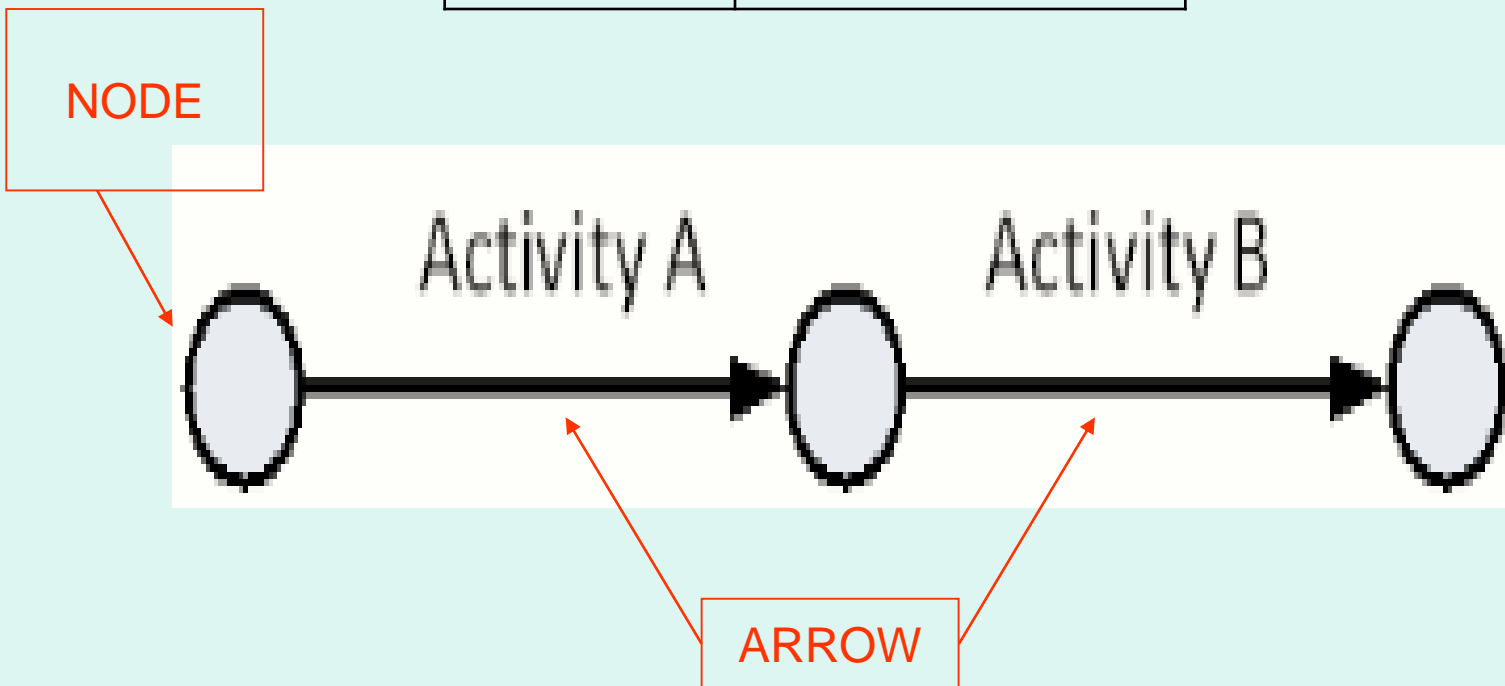
- At the tail, or start, and head, or end, of the activity arrows are nodes.
- Nodes are used to graphically show where activities end and begin in sequence.
- The starting node for a given activity is referred to as the activity's "i-node."
- The ending node for a given activity is called the activity's "j-node."

Activity on Arrow (AOA)

- Nodes are used to illustrate when activities precede or follow other activities.
- Nodes are placed at the start and end of each activity arrow.
- Since projects are defined by a specific start and end, there should be a single starting “i-node” and a single ending “j-node” for each project.
- The set of all activities, starting from the first activities’ i-node and ending with the last activities’ j-node is called a “network.”

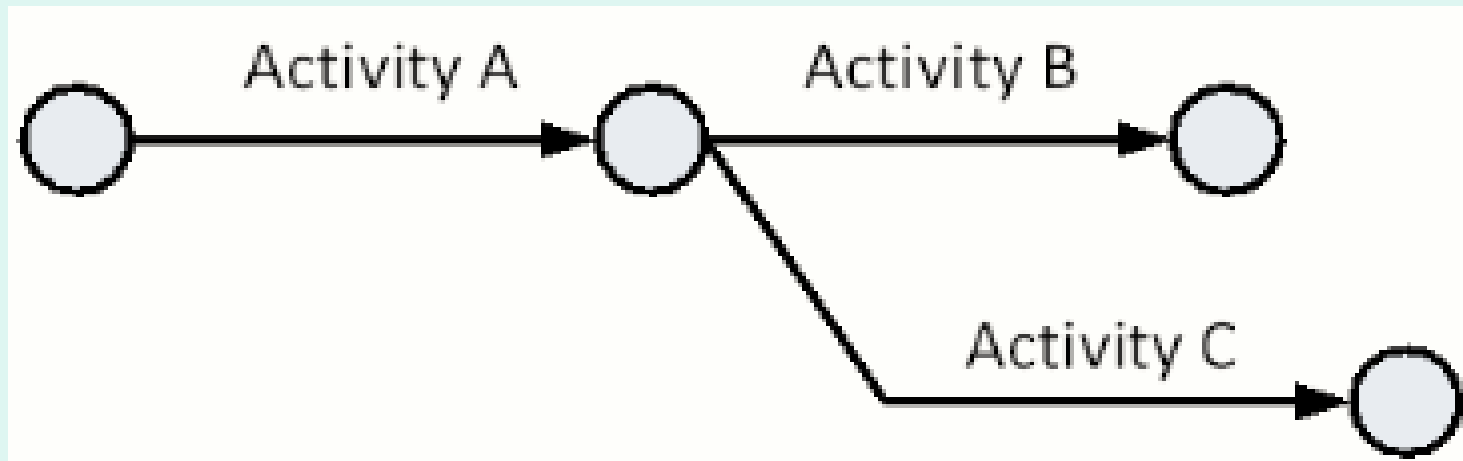
example one

Activity	Predecessors
A	None
B	A



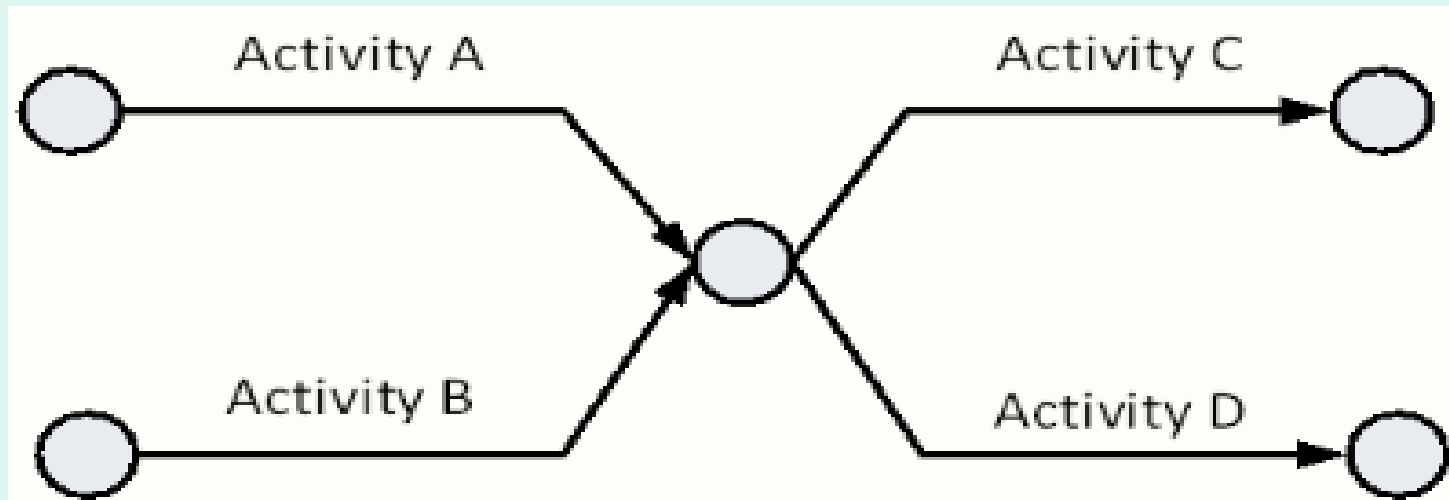
example two

Activity	Predecessors
A	None
B	A
C	A

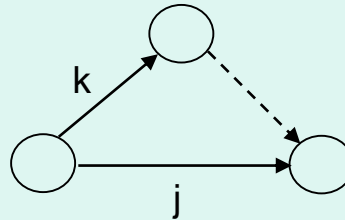
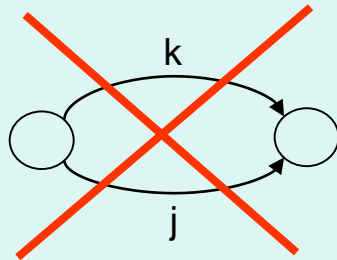
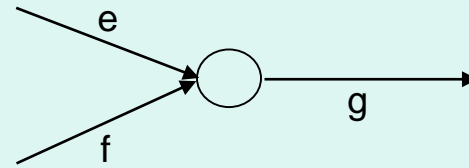
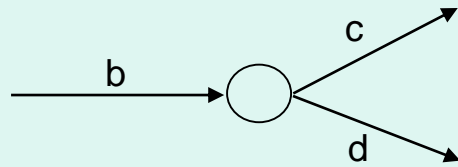


example three

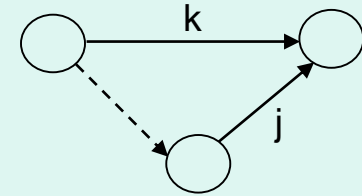
Activity	Predecessors
A	None
B	None
C	A, B
D	A, B



Activity-on-Arrow (AOA) Networks

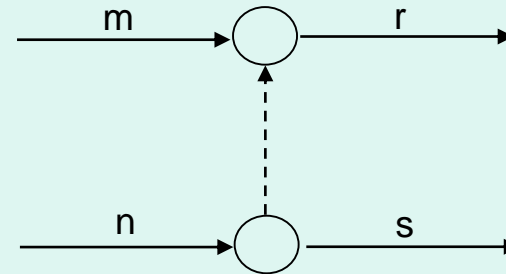


or



Dashed lines are called *dummy activities*

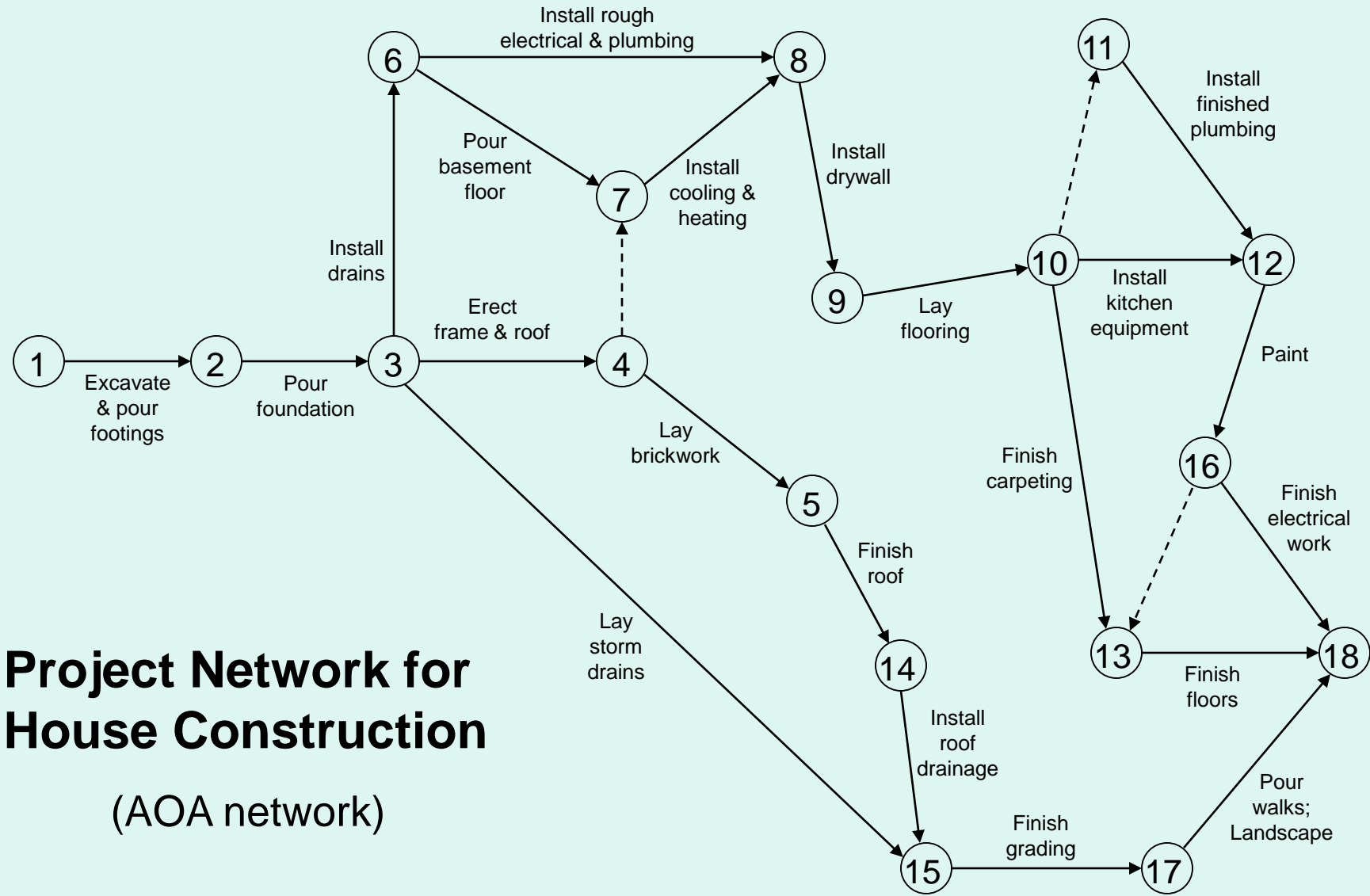
<u>Activity</u>	<u>Predecessor</u>
m	—
n	—
r	m, n
s	n



examples for you to try

Activity	Predecessors Activity
A	None
B	A
C	A
D	B, C

Activity	Predecessors Activity
A	None
B	None
C	A
D	A, B



Project Network for House Construction

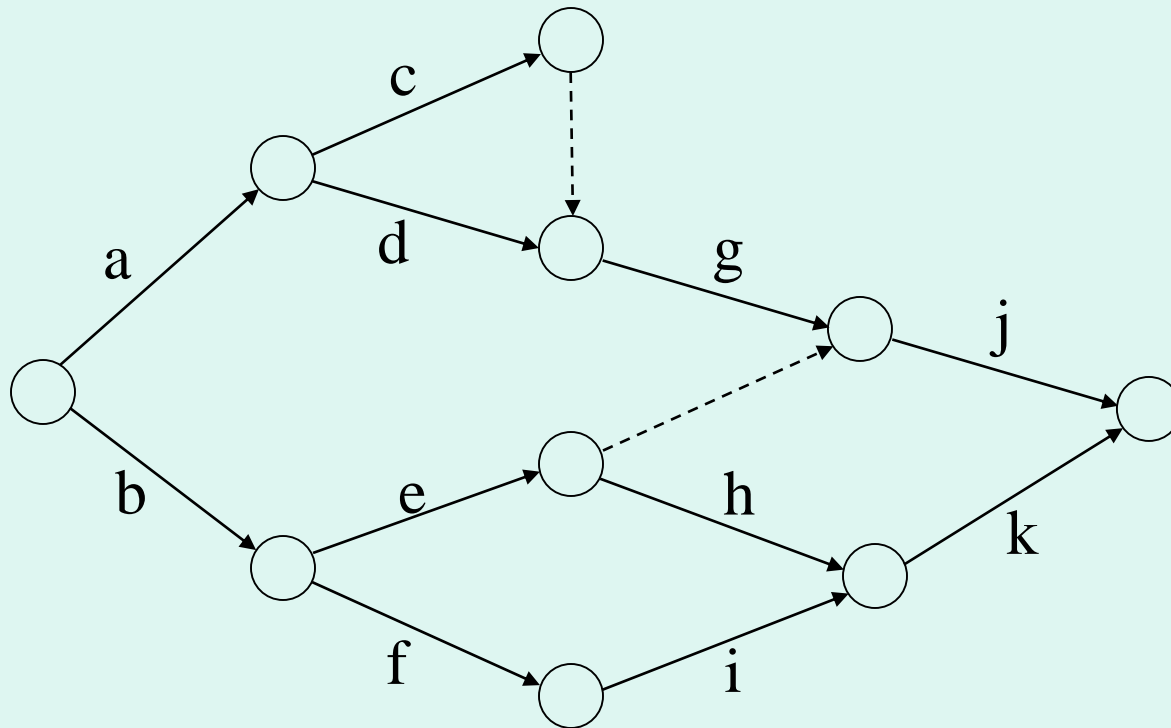
(AOA network)

Project Network Example

<u>Actv.</u>	<u>Pred.</u>	<u>Actv.</u>	<u>Pred.</u>
a	--	g	c,d
b	--	h	e
c	a	i	f
d	a	j	e,g
e	b	k	h,i
f	b		

Draw AOA networks

Activity-on-Arrow (AOA or ADM) Network (Final Network)



Project Network Example

A project has the following activities and precedence relationships:

<u>Actv.</u>	<u>Pred.</u>	<u>Actv.</u>	<u>Pred.</u>
a	--	f	c,e
b	a	g	b
c	a	h	b,d
d	a	i	b,d
e	b	j	f,g,h

Draw AOA

Activity on Arrow (Final Network)

