



maximize project value

2003 Primavera User Conference

Real World Outage Planning and Control

presented by

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w/ Professional Project Management Services

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Session Rules

- Ask questions when confused.
- Only one person can talk at a time.
- Everyone participates.
- No such thing as a dumb question.



Here's What We're Going to Tell You!

Define your work in detail

Estimate resources and durations

Assign work to individuals not groups

Track hours and cost

Work every minute that is available

Your Job is Not Simple!

1st you're going to plan how you're going to develop your plan

Then, you have to plan the outage

Manage and control the work

Report the status to your boss

Most importantly, you have to manage peoples expectations

Defining Phase Objectives / Goals

You have to know the real objectives for this season's outage.

- Absolute shortest time?
- Absolute lowest cost?
- Maximum production?
- Best economic advantage to the plant?

Outage Economics 101

Every system has an economic value.

Every project can be accelerated.

Nominally, the marginal daily profit of a system is the maximum acceleration cost you should be willing to expend for a day of acceleration.

Maximize Benefits

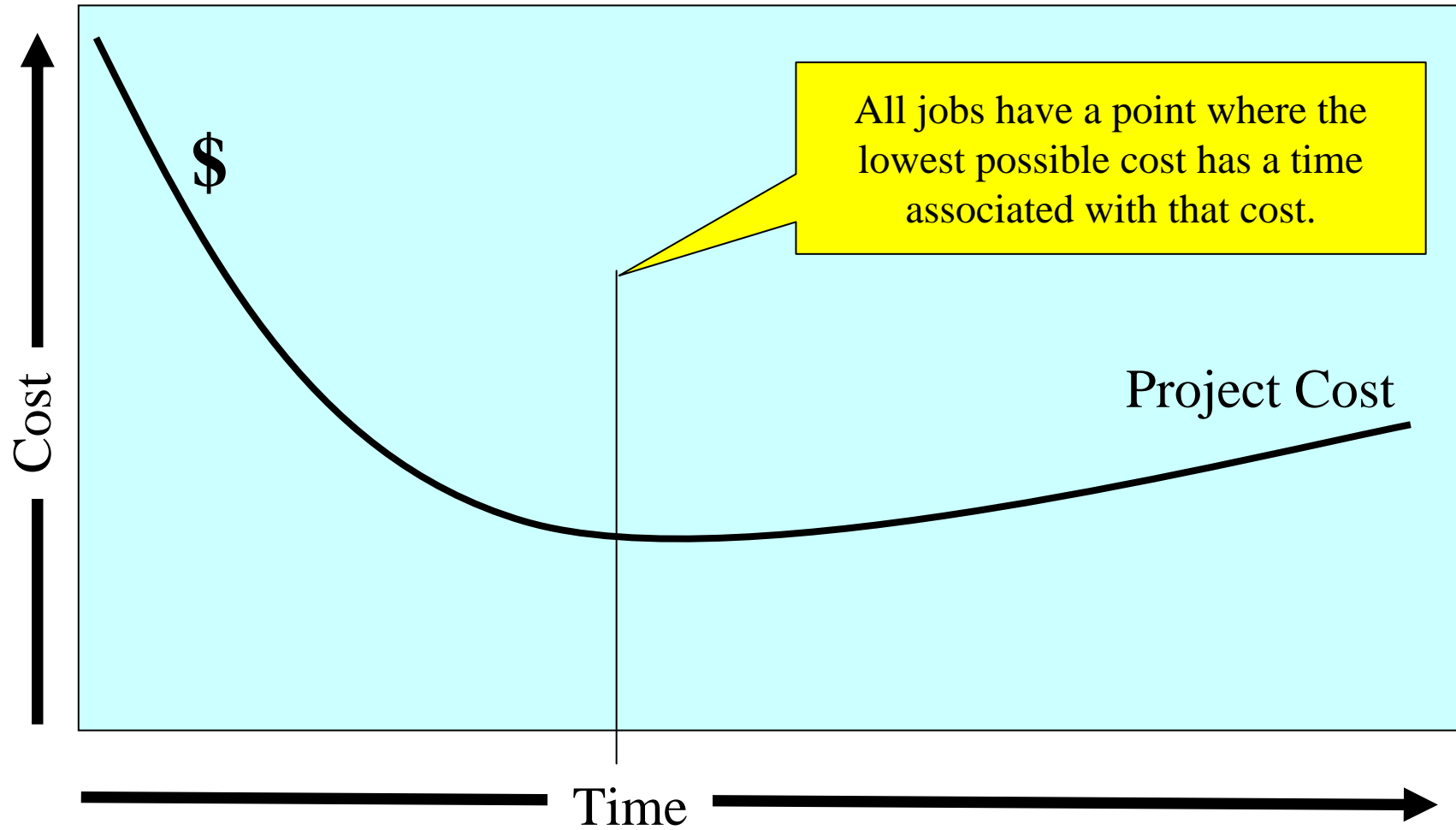
Time vs. money

Faster projects increase cost of work.

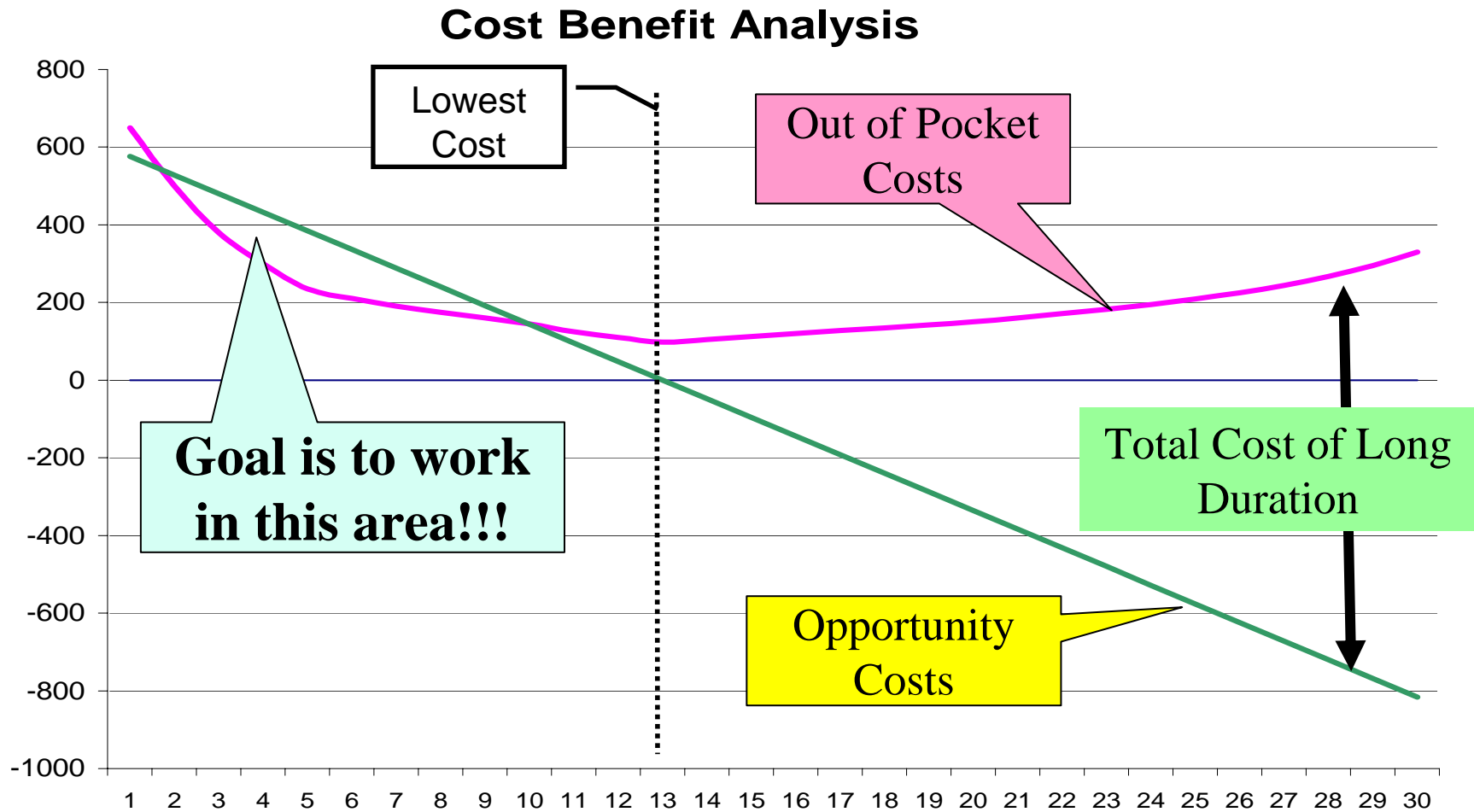
Faster projects decreases lost production revenues.

You must find the equilibrium between the speed and the additional cost.

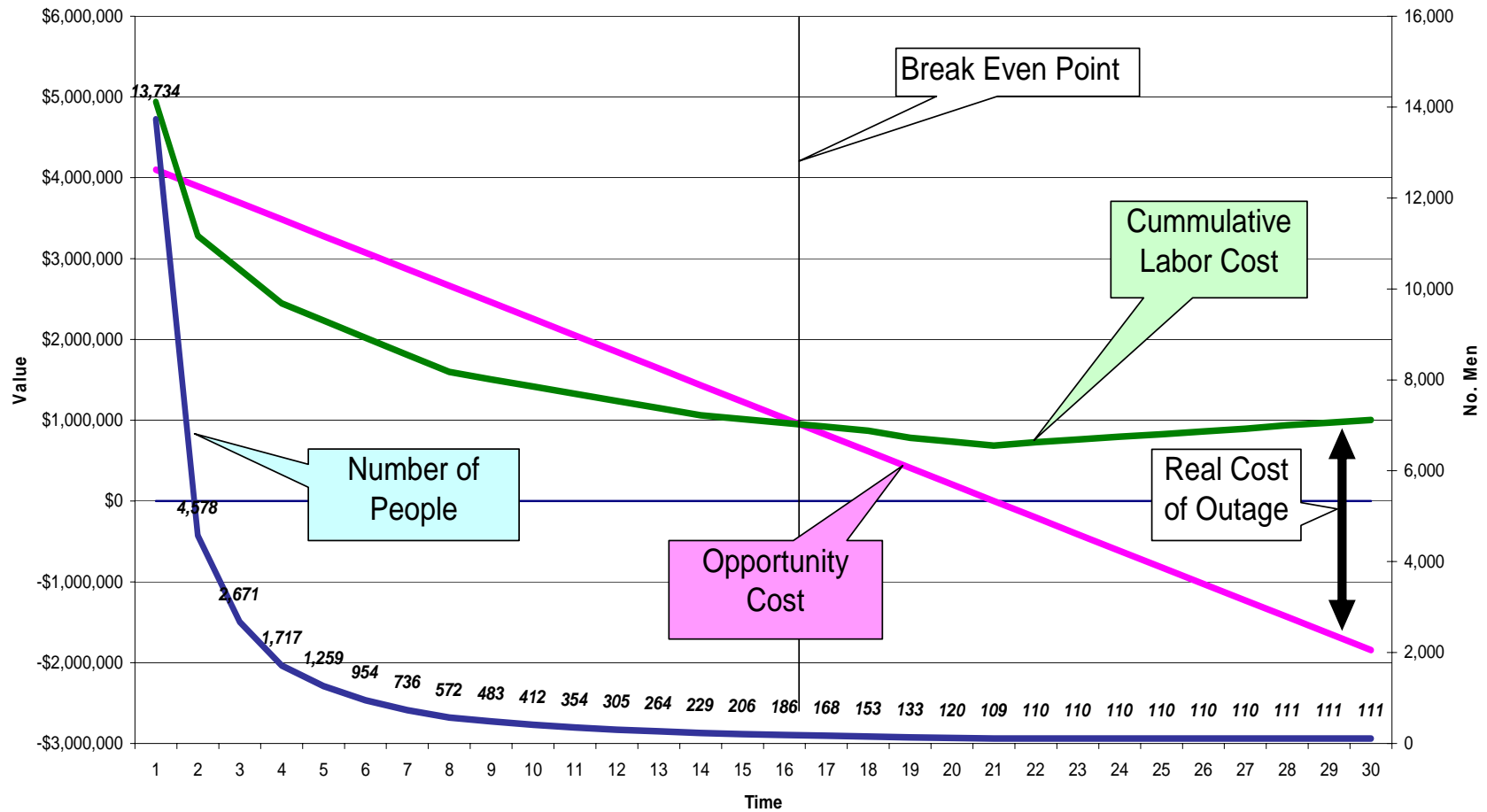
Construction Cost vs. Time



Long Outages Cost More



Real Life Example





Shorten Outage by Eliminating Work

There are three work phases to every outage:

- Work that can be done pre-outage
- Work that can only be done during the outage
- And work that can be done post-outage

Eliminating any work that can be done in a non-outage situation is critical.

Simplify Scope Definition w/ Excel

WBS for Construction of a Small Building					OBS / Responsibility
1	Foundations				
	1.1	Clear Site			
	1.2	Excavate for Foundations			
	1.3	Pour Concrete			
		1.3.1	Piers		
			1.31.1	Survey locations for piers	<i>A-1 Surveying</i>
			1.3.1.2	Drill piers - place steel - pour	<i>Real Deep Drilling Co.</i>
			1.3.1.3	Tie steel cages for piers	<i>Bob's Re-Bar Service</i>
		1.3.2	Footings		
		1.3.3	Slab		

Estimating

For every task-identified estimate:

- Resources required
- Equipment
- Materials

For every task, **estimate** the duration

Duration = Work / Productivity

You can not estimate durations without making assumptions about which resources will be available and their productivity – period!

$$\frac{\text{Work To Be Performed}}{\text{Productivity Rate}} = \text{Duration}$$

$$\text{Productivity per Man} \times \text{No. of Men} = \text{Productivity Rate}$$

Scope / Productivity = Duration

Task or Activity
Name

Date estimate
was made

Schedule ID
Number

Task :	Remove Brick From Kiln		4/18/2002		Task No.	001
Scope :	Remove brick from kiln; approximately 58' of brick from the burning zone. Diameter = 12' x 3.142857 x 58 = 2187 sf of brick to be demo'd - includes removal through loading wasted bricks into dump trucks for disposal.				Quantity :	2,187.0 SF
					Productivity :	550.0 SF / Day
					Duration :	4.0 Days
					Work Day :	10.0 Hours

Detailed scope
information

Qty / Productivity /
Duration Basis

Labor – The Biggest Variable

Crew make-up

Days / hours

Crew costs

LABOR Qty	Description	Days	Hours	Rate	Total	Unit Cost
1	Foreman	4	40.00	28.75	1,150.00	0.53
	Machinist	4		22.50		
	Welder	4		26.00		
6	Laborers	4	240.00	16.00	3,840.00	1.76
		4				
		4				
		4				
		4				
7	Totals.....		280.00	17.82	4,990.00	2.28
LABOR BURDEN			Total Labor \$\$	Burden Rate	Total	Unit Cost
Burden = Taxes, Fringes, Insurance, HOOH, etc.			4,990.00	43.50%	2,170.65	0.99

Sequence the Activities

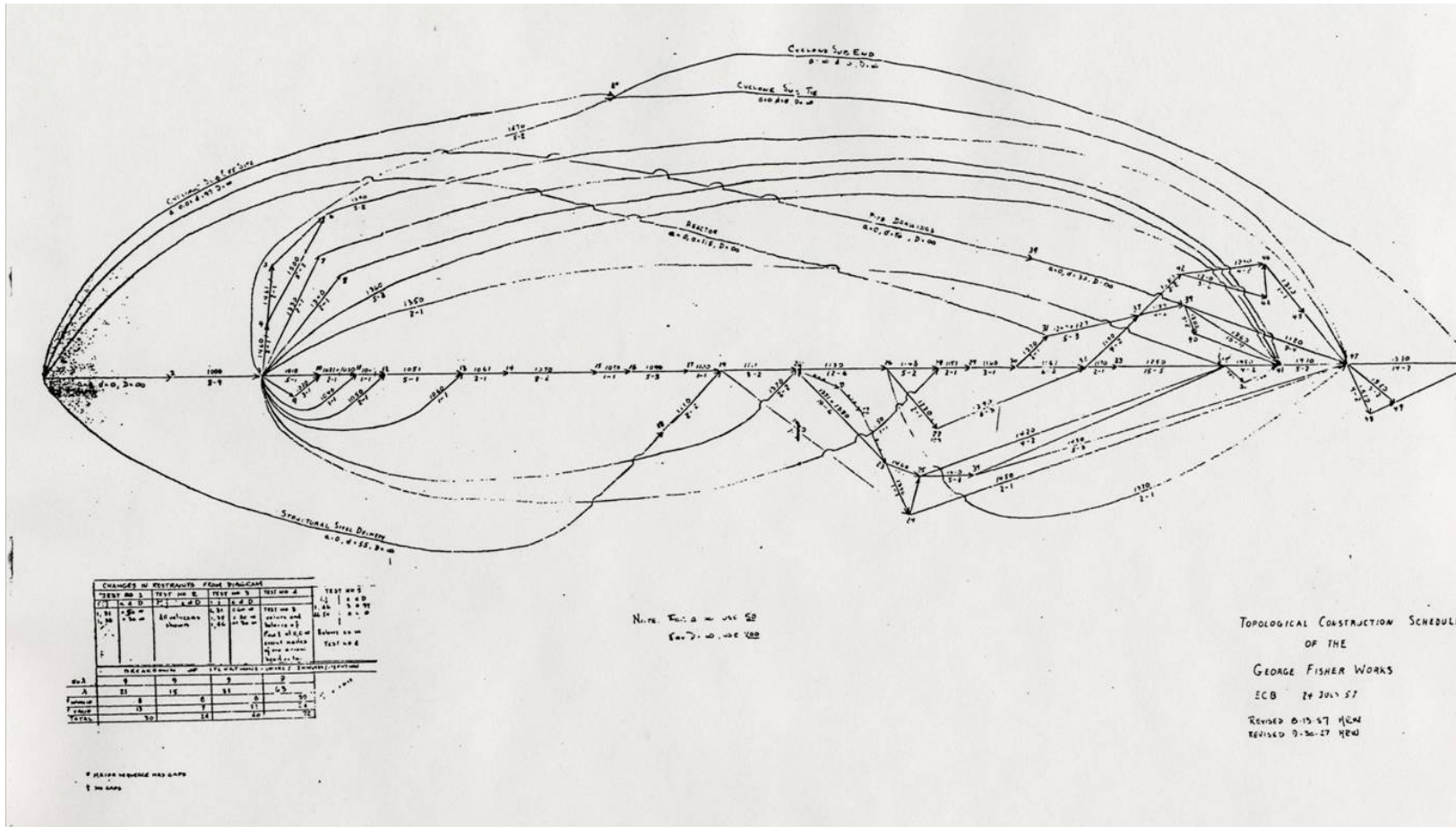
Place the activities in the most logical sequence

- Only consideration is physical constraint
- Don't worry about who will do the work
- Don't worry about rolling crews, etc.

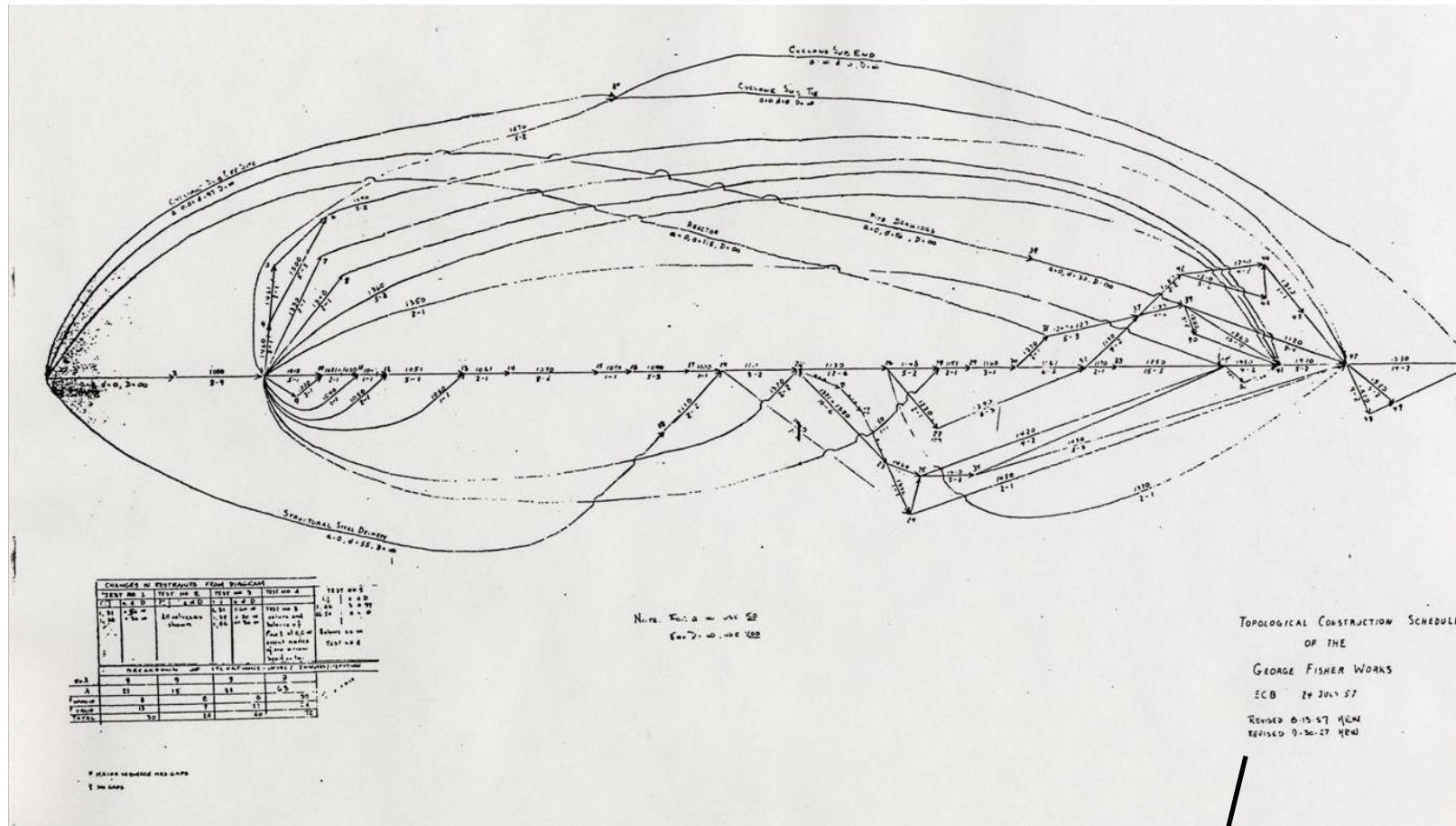
CPM Schedule

If you are not scheduling using a CPM
schedule – you're not scheduling

Does Anyone Know What This Is?



Topological Construction Schedule



24 July 1957

Sequencing

The right sequence is much more
important than the planned dates



If You Have a Good Sequence!

A schedule with good logic has a very good chance of working properly, even if all of the estimated durations are wrong.

If You Have a Bad Sequence!

A schedule with bad logic has virtually no chance of working correctly, no matter the accuracy of duration estimates!

Some Simple Rules

Every activity (except the first and last)
MUST have a predecessor and
successor activity – period.

Keep Activities Small

Activities need to be broken into small enough portions that they can be sequenced in relation to other tasks and areas of the project easily.

Accountability

Activities need to be broken into small enough pieces so that only one person is responsible for the activity.



Critical Resources and Resource Leveling

Critical resources are not craftsman or equipment.

You can get more with a phone call and money!

Critical Resources

SUPERVISORS

The most critical resource is the number of responsible people that can be assigned and held accountable to complete tasks



Assign Every Task to a Responsible Person Accountable for Its Completion

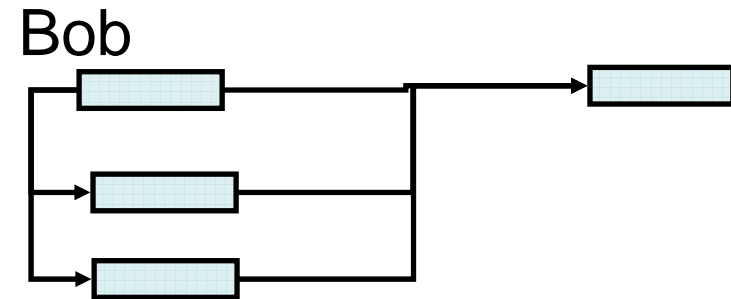
When you run out of names, you've reached the limit of what will get done in that day.

On most outages, a lead person or foreman can not oversee more than about three tasks per day.

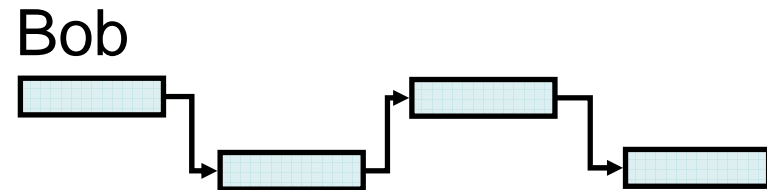
Resource Leveling

Reassign activities to uniformly spread the work for each lead person over the outage and eliminate non-work periods and over subscribed periods.

Don't Stack Activities

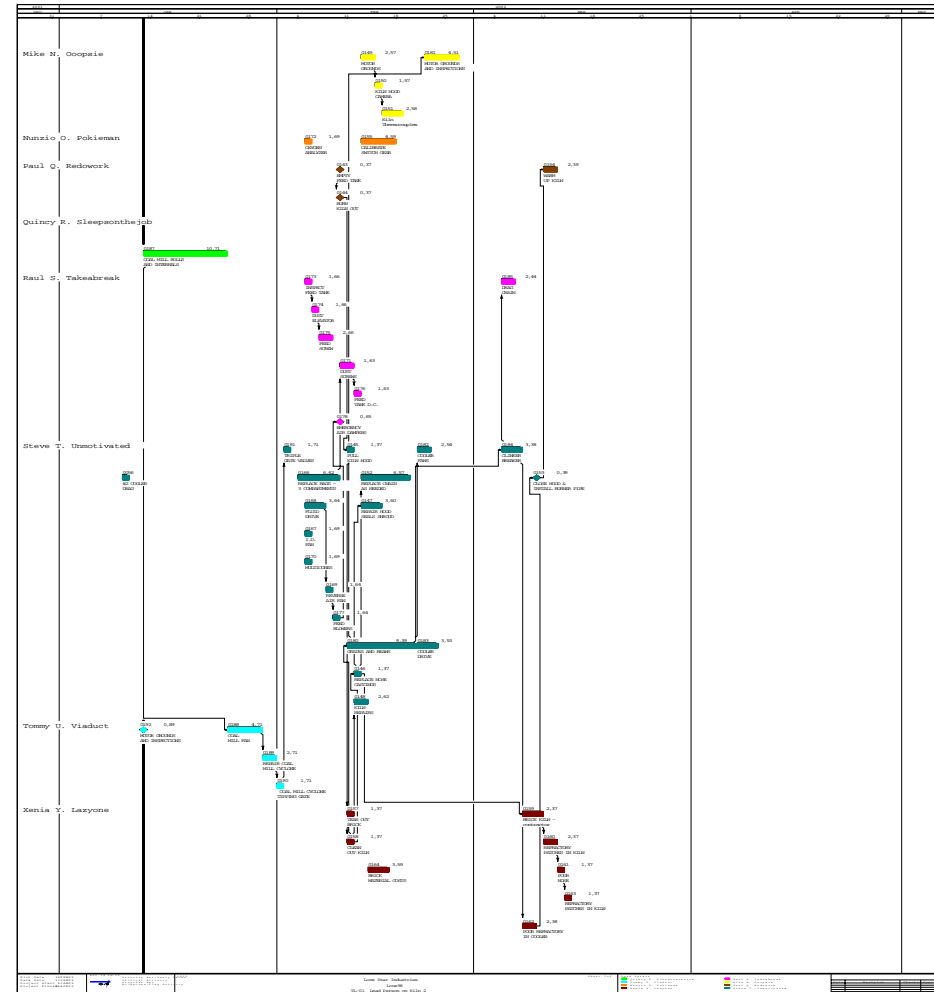


Do String Activities



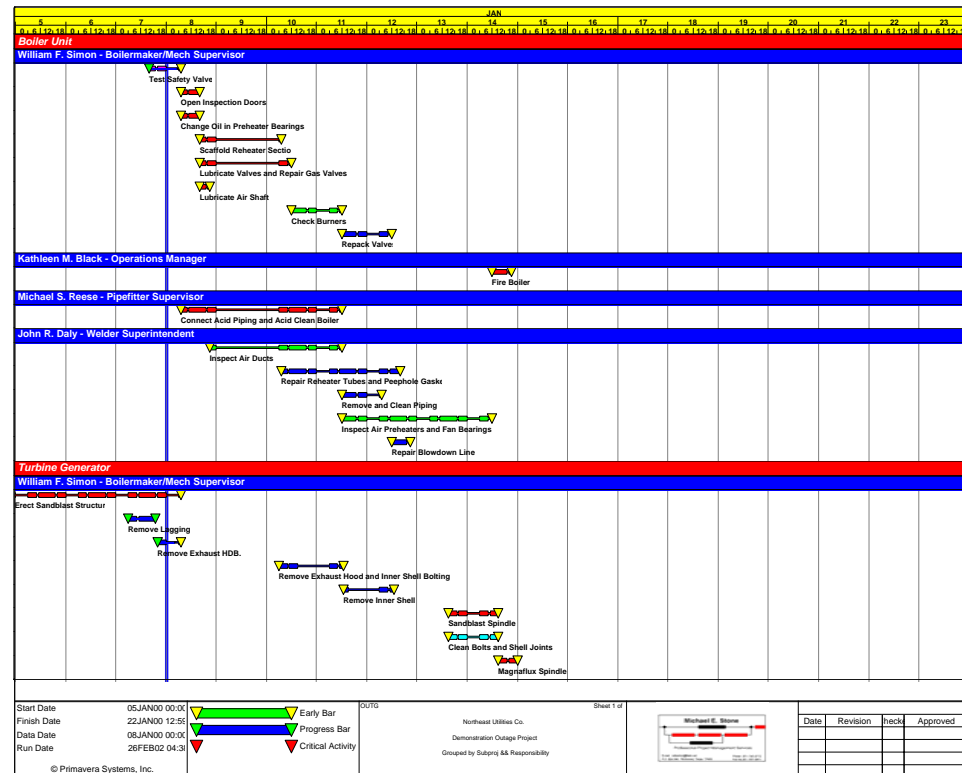
Band by Person

Band by person
 Color by person
 Look for blank
 space or for
 stacked activities



Band by Person (cont.)

Band by person
 Color by person
 Look for blank space or for stacked activities



Work All of the Time!

168 hours in a week
Most projects, even
accelerated
projects, use less
than 40% of the
available time.

5x8's	40 hrs	24%
5x10's	50 hrs	30%
6x12's	72 hrs	43%
7x12's	84 hrs	50%

Night Shift Syndrome

Poor productivity

Caused by least skilled workforce

Caused by poor supervision

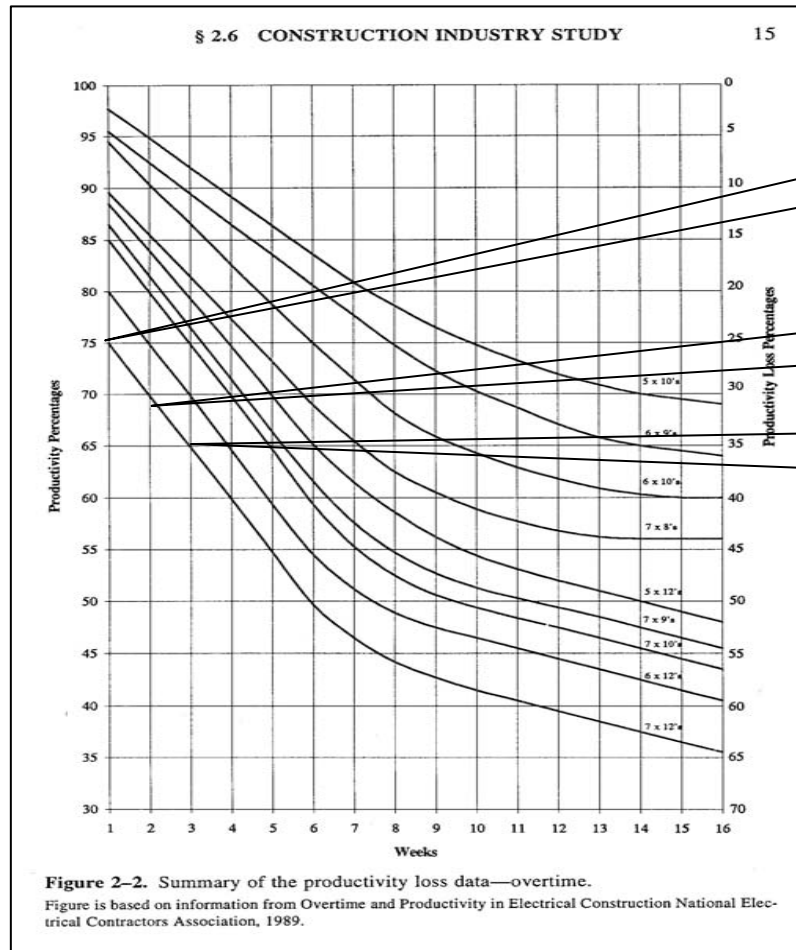
Night Shift Solutions

Solve by assigning more senior supervisors and craftsmen to night shifts

Be prepared to pay a shift differential

Project managers have to work nights, too!

Anticipate Productivity Loss



Only 75% productivity 1st week of 7x12's

Only 70% productivity 2nd week of 7x12's

Only 65% productivity 3rd week of 7x12's

7x12's will produce less than hours of productive work by week 6

Anticipate Non-Work Periods

Don't plan outages that will go through major holidays

If you must, anticipate loss in productivity or a loss in attendance

Also high probability of non-delivery by suppliers

Plan on multiple shifts

Increase critical resources

Means more supervision –

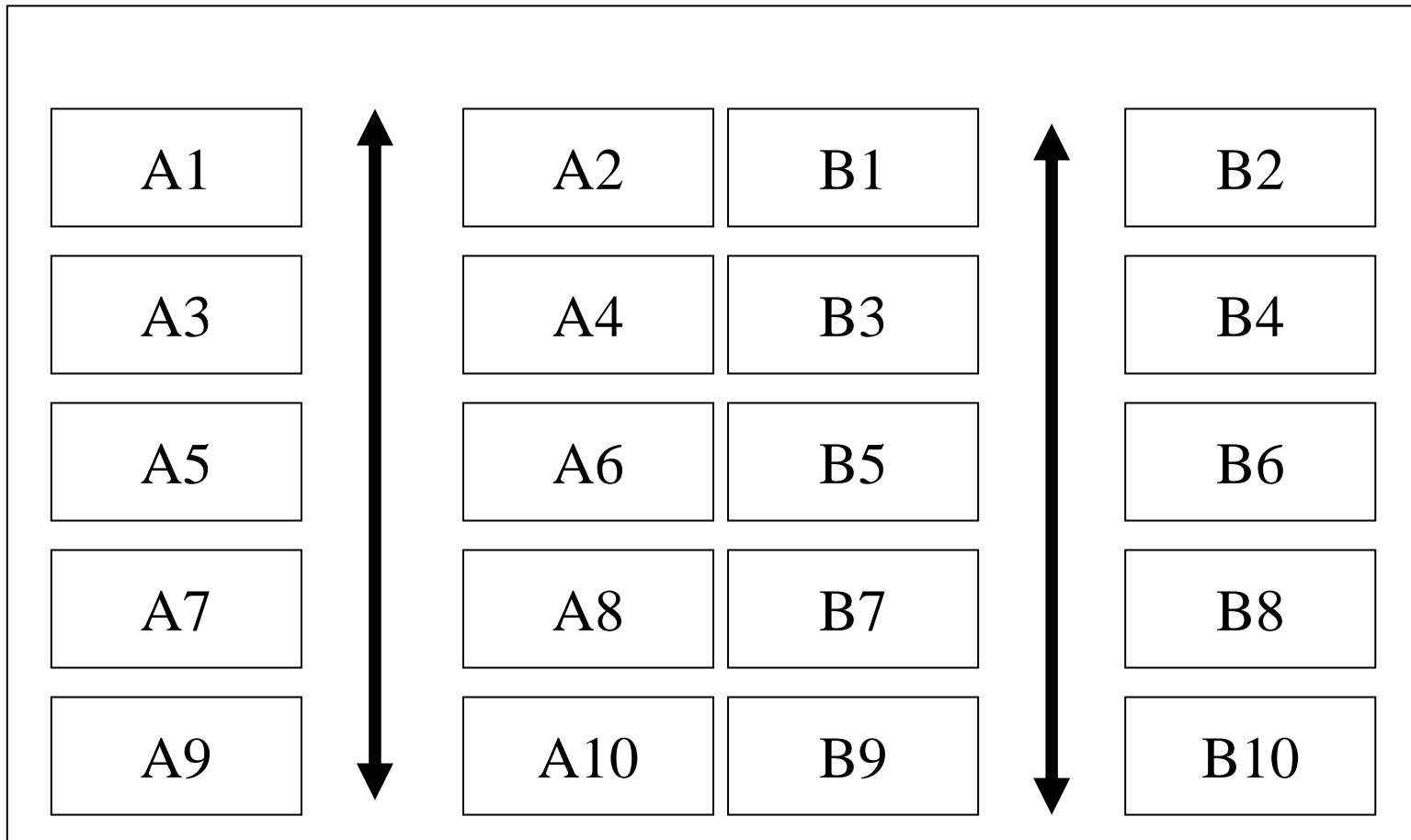
- Assistant project managers
- Superintendents
- Foreman
- Lead craftsmen

Bag and Tag

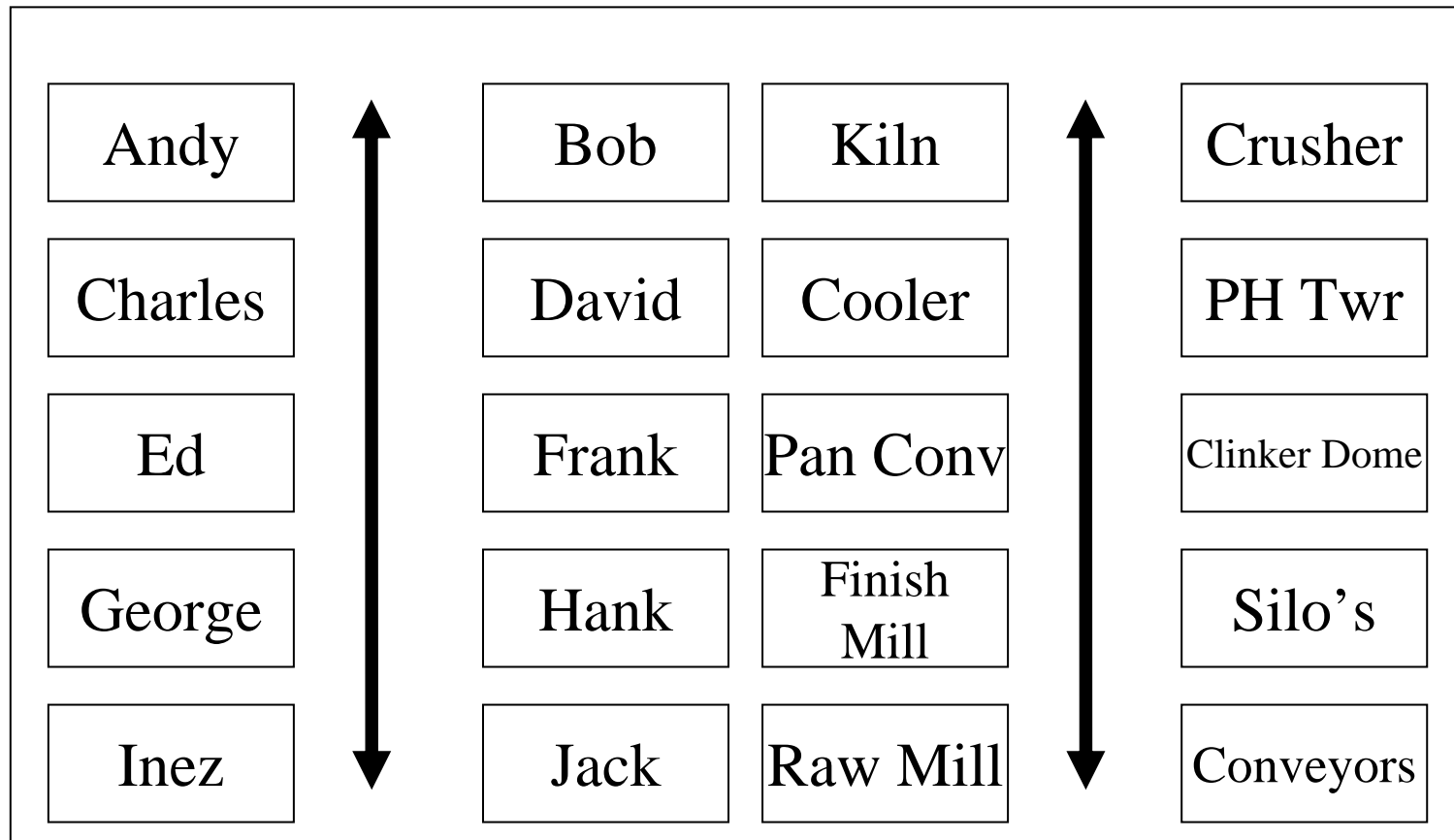
Pre-package nuts/bolts/gaskets for particular tasks – minimize time looking for parts

- Palletize parts
- Use bins
- Piles as a last resort

Organize Laydown Areas by Task



Organize Laydown Area by Foreman or by Equipment / System



Walkdowns

Prior to finalizing schedule and duration estimates, have each responsible person walk down their list of items.

Negotiations with Lead People

After walkdowns have been completed,
get 100% buy-in from each person.

“I can depend upon you to complete
your tasks in the assigned time—
correct?”



Negotiations with Lead People (cont.)

If there is any hesitation, negotiate to supply more resources, lengthen the duration, or make other changes – **before** you finalize the plan.

Do not go into the outage without 100% buy-in from every lead person for his/her portion of the work.

Resource and Cost Loading

Only two resources are necessary to measure status and progress

- Cash value
- Hours

Everything else is just extra – keep it simple.

Earned Value

If you're not measuring progress and performance using earned value – you're not measuring progress or performance.

Cash allows earned value measurements on the dollar values

- Can be skewed by major equipment deliveries
- Can be skewed by materials / erection equipment
- Project managers often don't have control over the price of materials, etc.

Earned Value (cont.)

Hours allows earned value measurements on the actual effort plus provides a basis for job population counts.

Project managers have control over

- Labor
- Amount of labor available
- Application of labor



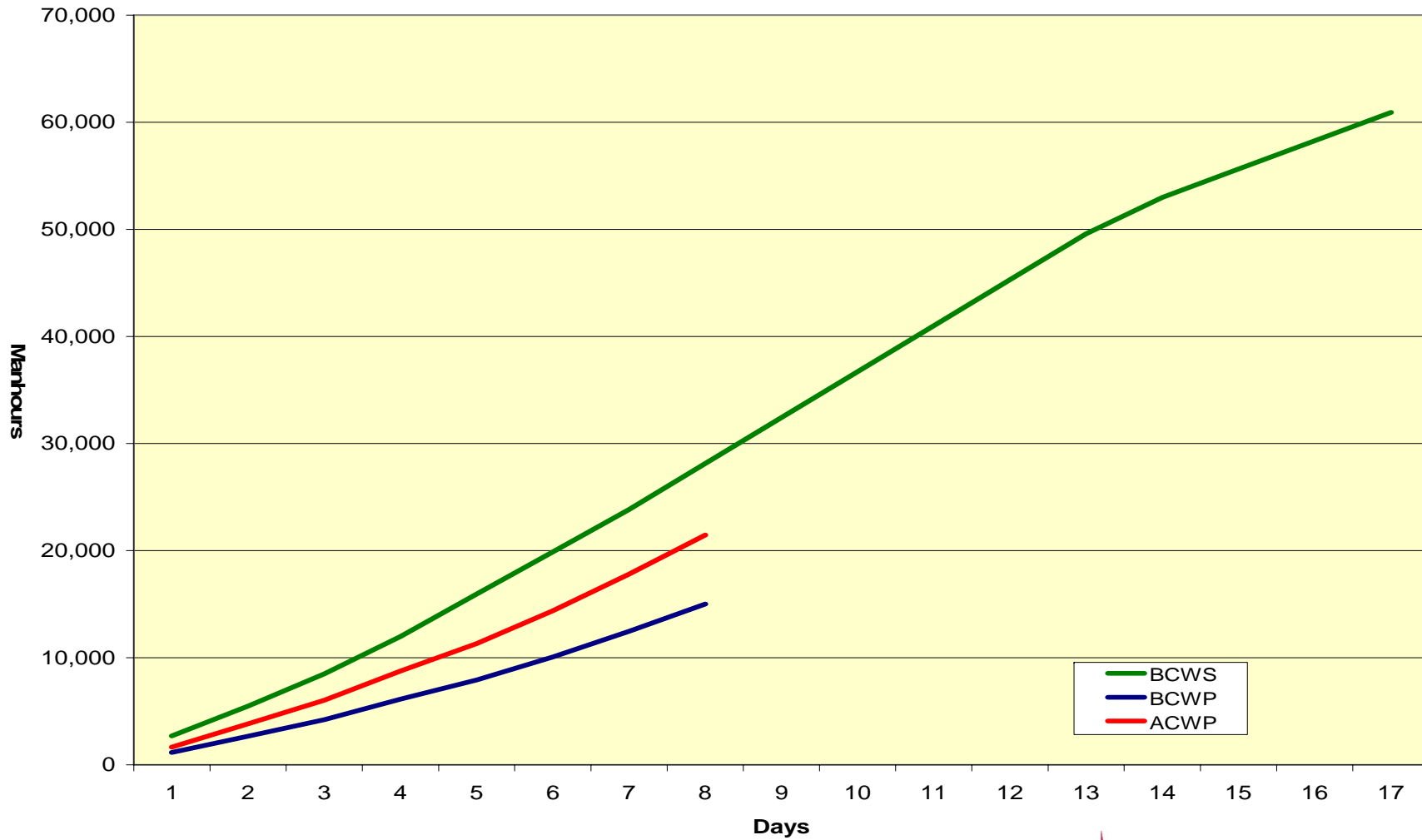
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Performance Measurement and Reporting

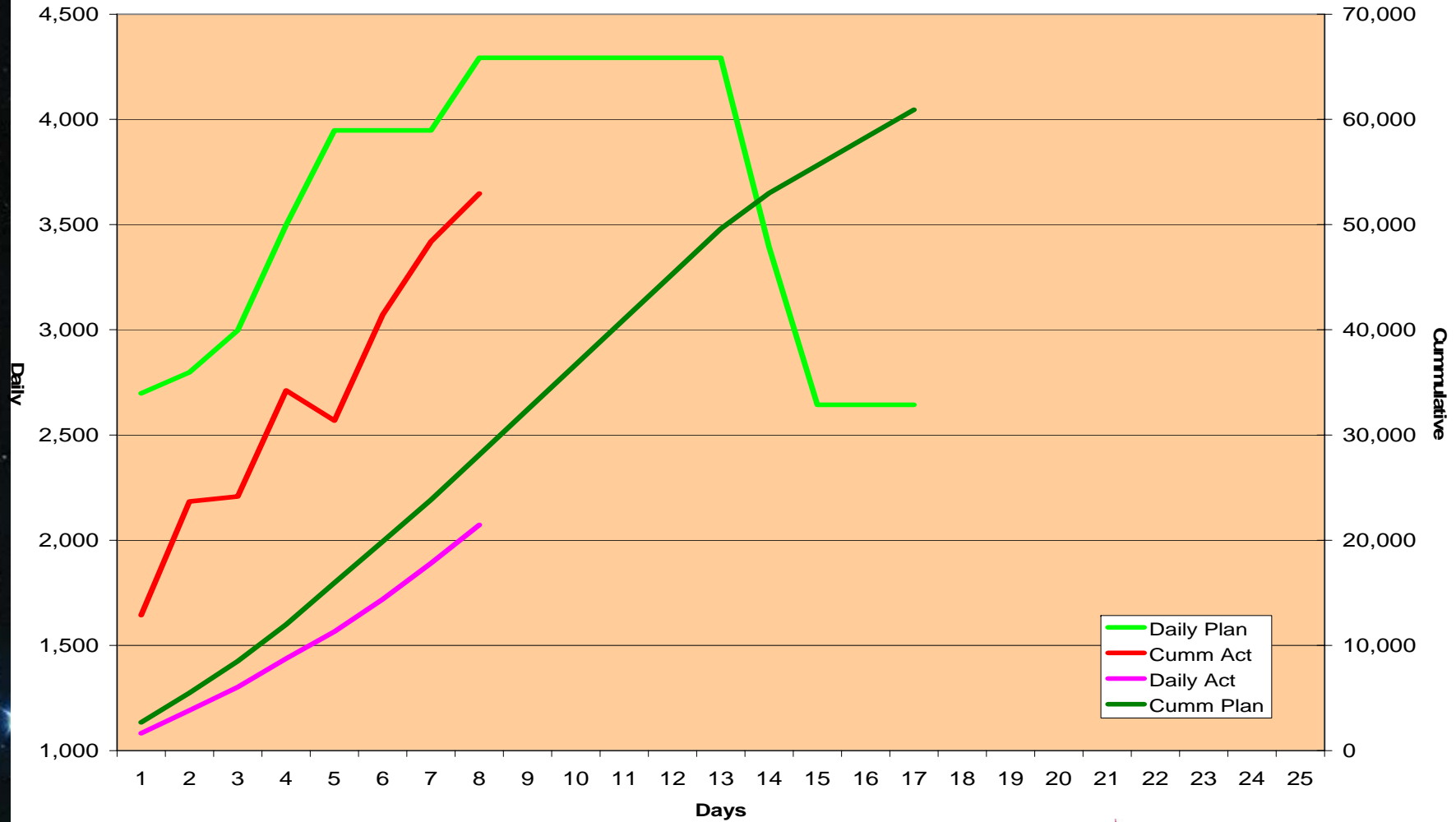
If it seems to complicated, simplify it to fit your projects.

Remember, during an outage updates and progress reporting must be done daily or even with every shift change.

Earned Value



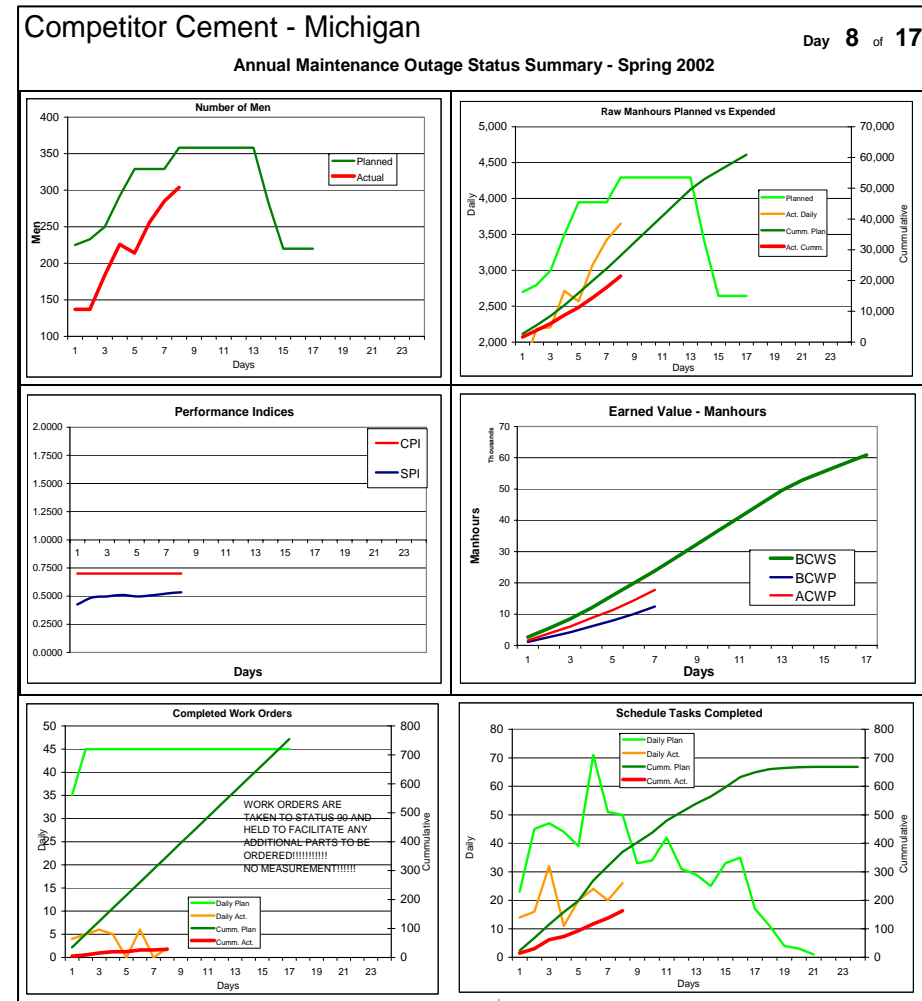
Hours – Daily and Cumulative



One Page Status Summaries

Consider multiple
small graphs all
using the same
time scale

Allows reviewer
to get the big
picture quickly





Here's What We Told You!

Define the work

Plan your work

Assign every task to someone

Perform walkdowns in advance



Here's What We Told You! (cont.)

Negotiate for 100% buy-in
Measure – report by person
Organize parts / materials logically



Two Most Important Points

Most critical resource is supervision
Work all of the time that is available



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Questions?