

March 26, 2003

Calpine's Innovative Approach to EPC Schedule Development



Assessing Business Challenges

Early 1999 Program

- 12 Projects
- \$350 - \$500 mm each
- 26 months in duration

Calpine Construct vs. EPC

The executed contracts contained language directing the contracted parties to integrate their project schedules.



Assessing Business Challenges

This contractual requirement was initially considered adequate to protect the owners interest.

Early Schedule Complications

- Separate schedules
- Little if any, integration
- Duplications, missing scope

Without strict guidelines and standards, it became readily apparent that no true schedule integration could occur.



Assessing Business Challenges

3rd Quarter 1999 program expansion

- 50 additional projects
- Over a year period
- Capital program exceeding 20 billion

With the expansion of the program it was now more important to give the parties strict guidelines and standards to “integrate” their schedules.

Many issues had to be considered, in order to structure an effective program....and quick.



Assessing Business Challenges

Raising the Bar for Project Controls

Adding TRUE VALUE

Obtaining Management Support, internally as well as externally

The ability to execute



Assessing Business Challenge

Creation of "CSPASMS"

Considerations included:

- Staffing
- Rate of Execution
- Areas of Risk for the type of work

Really it was nothing more than a low fat version of standard Cost & Schedule Control Systems Criteria, much like what Uncle Sam likes.....



Assessing Business Challenges

Schedule Objectives

- Effective
- Accurate
- Timely
- Reasonable
- Informative
- Independent



Assessing Business Challenges

What we heard internally

- We're not going there.....
- this is a Lump Sum world - we don't need earned value....
- The contractors and engineers won't let us get that far into their business
- Way too complicated - let's not make a science project out of it
- We've never done it that way before

Once we secured Internal Management approval and committed support... it was time to implement



Assessing Business Challenges

We sent out proposed contract language to our engineering and construction partners and solicited feedback...



Assessing Business Challenges

Response from Contractors and Engineers ranged from “thank you we needed a guideline” to.....

- Outright refusal
- Change orders for anywhere from \$80k to \$350k
- The old “It’s a Lump Sum...”
- Too complicated
- We’ve never done it this way before
- We use internal systems to do this



Assessing Business Challenges

The road trip to sell to external management



Assessing Business Challenges

Finally we got them to try

- Some willingly
- Some reluctantly
- Others told to sign up or move on



Assessing Business Challenges

They continued to fail

- Struggled in the details
 - good civil works
 - Weak to OK mechanical
 - Miserable electrical / I&C
 - Missing or wrong scope
- No clear transition from Area to System's
- Integration from E to C lacked P



Assessing Business Challenges

We built tools and set up training

- Spreadsheets vs. schedule software
- Building block templates

Activity builder

Duration validation

Man hour loading

Commodity distribution

Teambuilding / Partnering

- Lead by example
- Buy In from all Participants
- Demonstrate Time to market value

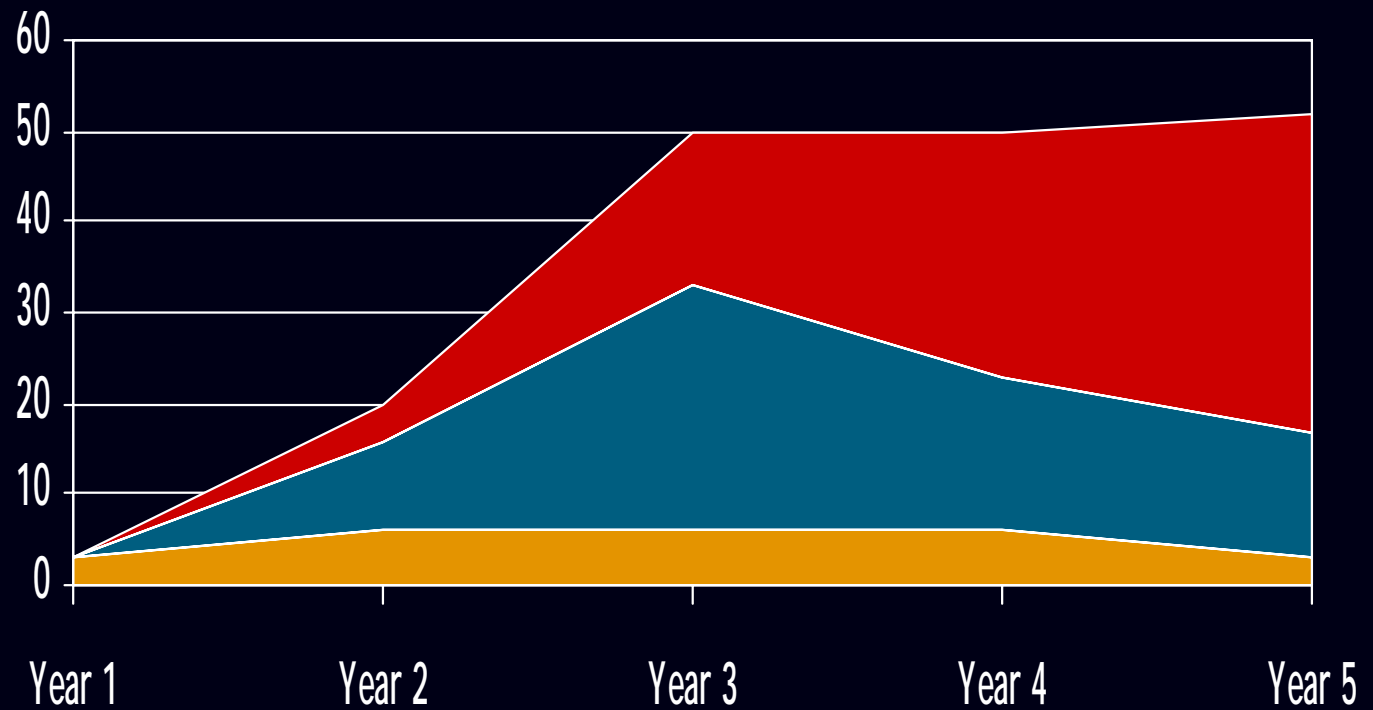


Assessing Business Challenges

In the last quarter of 2000 the program expanded again adding another 50 projects to the same 5 year timeframe.



Assessing Business Challenges



Original Program 3rd Qtr of 1999 4th Qtr of 2000

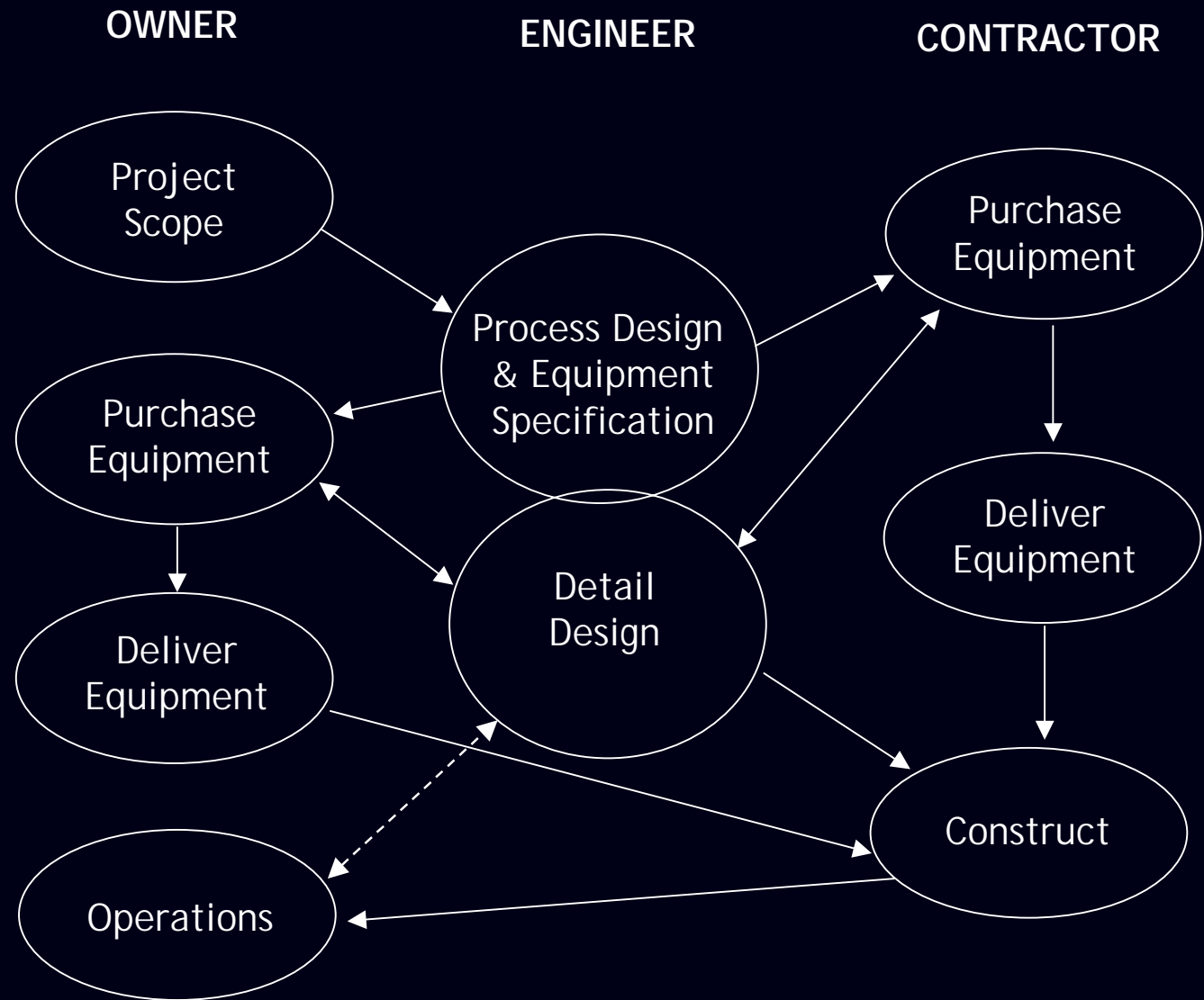


Assessing Business Challenges

The first hurdle
— The Procurement Cycle



The Molecule chart.....



Assessing Business Challenges

Full Schedule Integration



Building the Schedule

Approach to Activity (Standard) Coding

- Process for Task Definition
- Estimating of Task Durations
- Development of Standard Logic
- Identification of Required Resources

Bring it all Together (Tool Set)



The Tools

More than just a Database

- An application that assists in:
 - Coordination of Scope Definition inputs
 - Development of Standard Logic
 - Generating the Schedule

More than just a Spreadsheet

- A customized workbook that:
 - Records the Nouns of Scope Definition
 - Standardizes Steps as Verb definitions and durations
 - Identifies Scope responsibility
 - More intuitive than a logic diagram or chart

The entire effort ends up in the Primavera Project Planner as a baseline schedule.



The Tools

Schedule Integration Matrix Database

Working with the Matrix Worksheet (MS Excel):



Select Source

C:\Documents and Settings\guyg\Desktop\Matrix\Matrix v1.05.xls

Open Source

Load dB

Working with the Master Logic Schedule (P3 3.x):



Push STEPS into LOGC Sched.

Working with the Primavera Schedule (P3 3.x):



Retrieve Relationships from LOGC Schedule

Review Relationships

Review Tasks

Load BPES Schedule

Get seed tasks for Resources

Load Resources to BPES



The Tools

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X		
1	rows	RESP	PREFX	CPC	DESC	Count	4	9	5	13	16	13	0	0	0	0	0	0	1	1	4	1	4	
2	cols	1	CP	O	Owner																			
3		2	EN	E	Engineer																			
4		3	CN	C	Constructor																			
5																								
6					Column # =>		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
7					Calpine Phase (CPA) =>		304	304	304	304	304	304	304		304		304	304	304	304	305	304	304	304
8					Calpine Acctg Cat (CPF) =>																			
9					Default Duration =>		0	10	10	10	15	5	10		10		5	10	5	10	15	5	10	
10																								
11							A - PROCESS DESIGN										B - SOILS DESIGN							
12							AZ	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	AA	B0	B1	B2	B3	C0	
13	SEG	Area	SYS	Train	Pkg	Task Description	ISSUE	DEVELOP	LAYOUT	REVIEV	DESIGN	FNL ISS	PREL SYS DESC	ASS	PREL P&ID	XXXX	RVV	FNL P&ID	LOCATE	SAMPLE	EVALUATE	IFC	LOADS / MOMENTS	
15	CATEGORY ITEMS																							
16	PROCESS / OTHER																							
17	00	BOP	BOP	0	BOP00	HEAT BALANCE	1																	
18	01	BOP	BOP	0	BOP01	WATER BALANCE	1																	
19	02	BOP	BOP	0	BOP02	PERMITS	1																	
20	03	BOP	BOP	0	BOP03	NTP/LMTP	1																	
21	04	BOP	BOP	0	BOP04	DESIGN CRITERIA		2		1	2	2												
22	05	BOP	BOP	0	BOP05	PROCESS FLOW DIAGRAMS		2		1	2	2												
23	06	BOP	BOP	0	BOP06	ELECT EQUIP LIST		2		1	2	2												
24	07	BOP	BOP	0	BOP07	MECH EQUIP LIST		2		1	2	2												
25	08	BOP	BOP	0	BOP08	VALVE SPEC'S/LIST		2		1	2	2												
26	09	BOP	BOP	0	BOP09	LINE LIST		2		1	2	2												
27	10	BOP	BOP	0	BOP10	PIPE SPEC'S		2			2	2												
28	11	BOP	BOP	0	BOP11	HANGER SPEC'S																		
29	12	BOP	BOP	0	BOP12	INSTRUMENT SPEC'S																		
30	13	BOP	BOP	0	BOP13	CABLE SCHEDULE		2		1	2	2												
31	14	BOP	BOP	0	BOP14	CTL VLV DATA SHEETS		2		1	2	2												
32	15	BOP	BOP	0	BOP15	INSTR DATA SHEETS		2		1	2	2												
33	16	BOP	BOP	0	BOP16	GENL ARR - SITE			2	1	2	2												
34																								
35	SITE PREPARATIO																							

Managing the Schedule

Establish Project Team Calendar

- Determine Month End Progress Date
 - Engineering firms typically update based on accounting calendars
 - Construction contractors usually update weekly.
 - Project objectives satisfy other customers
- Define Updating Deadlines
 - Allow for timely submittals



Managing the Schedule

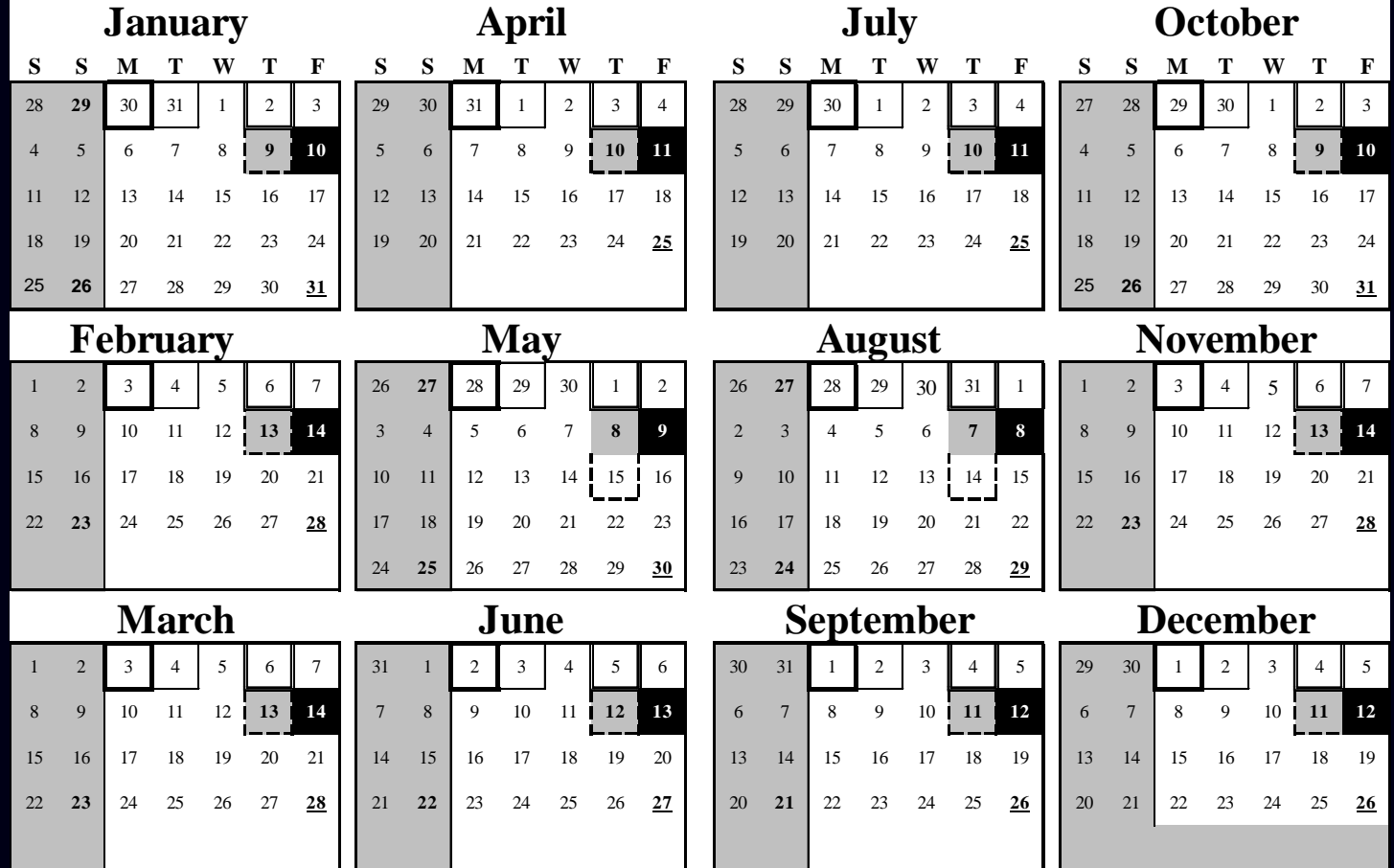
Project Team Calendar (continued)

- Establish Onsite or On-Line Team Reviews
 - While Onsite (face to face) reviews cost more, they are effective for critical or higher priority issues
 - On-Line reviews cost less and are generally adequate for non-critical lower priority issues
- Commit to Reporting Cycle
 - Effective planning and timing of reports
 - Important to management



Managing the Schedule

2003 - PROJECT CALENDAR



X = Progress Data Date
 X = Month End for Actuals and Status Due @ Noon MT
 X = Calpine Return CPES @ Noon MT
 X = Online Critical Path Meeting @ 9:00 AM (MT)

X = Monthly Reports Due to CPN and Monthly Meeting
 X = CPN Monthly Report Due
 = Monthly Meeting



Managing the Schedule

Gather inputs for updates

- Dedicated E-mail Address
 - Used as a back up system for data storage
 - Escape hardware and software problems
 - Avoid personnel issues
- Uniform Data Storage
 - Expedites data mining process
 - Allows seamless transitions when re-aligning project control personnel



Managing the Schedule

Merge into Master Schedule

- Standardized Processing Procedures
Create consistent work flows
- Support Software Tools
Third party tools that reduce processing time
Provides more time for analysis



Managing the Schedule

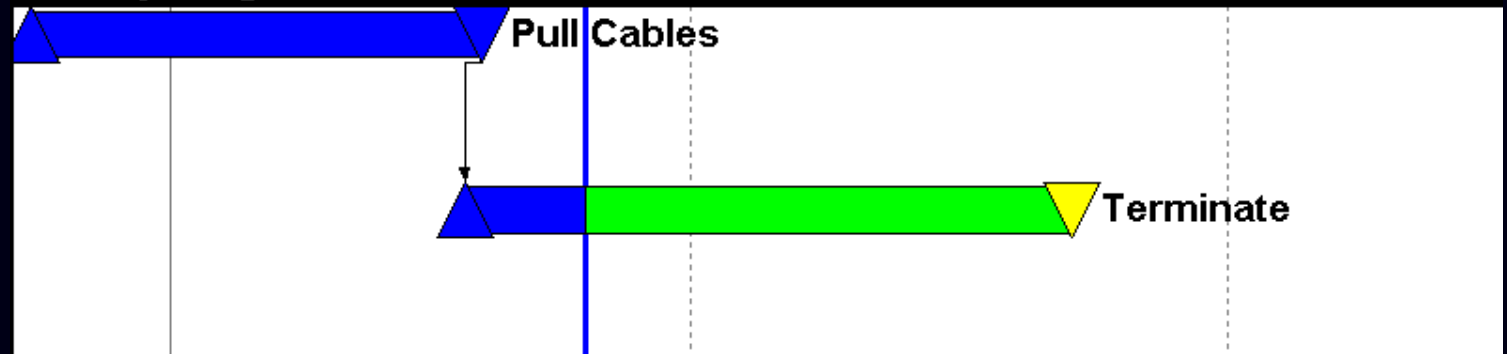
Collaborate with Team

- Maintain Major Milestone Dates
 - Represent the start or finish of major events
 - Frequently reviewed to analyze schedule variances
- House Keeping on Logic
 - Activities that do not progress as planned contain out-of-sequence logic
 - Collectively review and make changes to logic strings that do not represent the current work plan

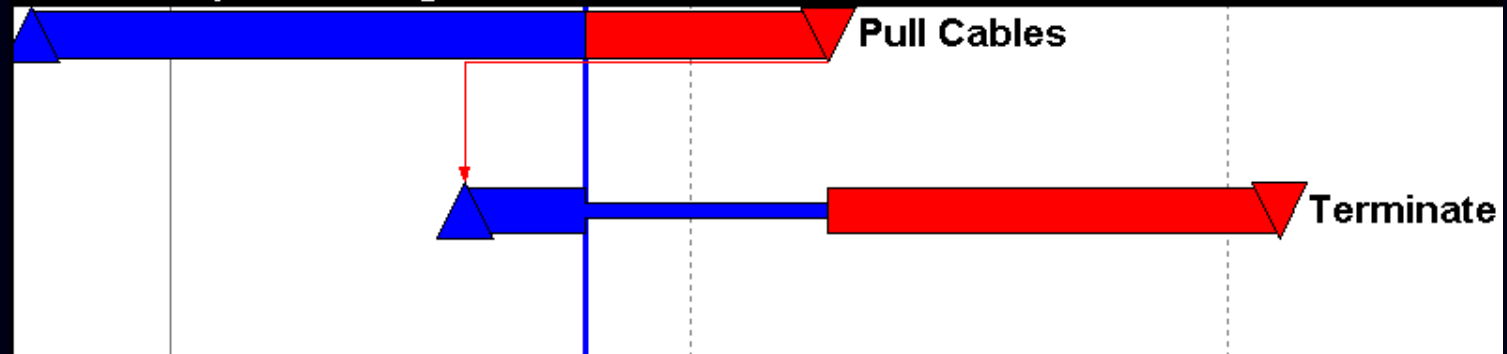


Managing the Schedule

Orderly Progress



Out of Sequence Progress



Managing the Schedule

Collaborate with Team – (continued)

- Maintain integrity of schedule logic
Ensure that the schedule flows properly
- Short Interval Schedule
Active part of master schedule
Weekly on-site reviews



Managing the Schedule

Analyze



Managing the Schedule

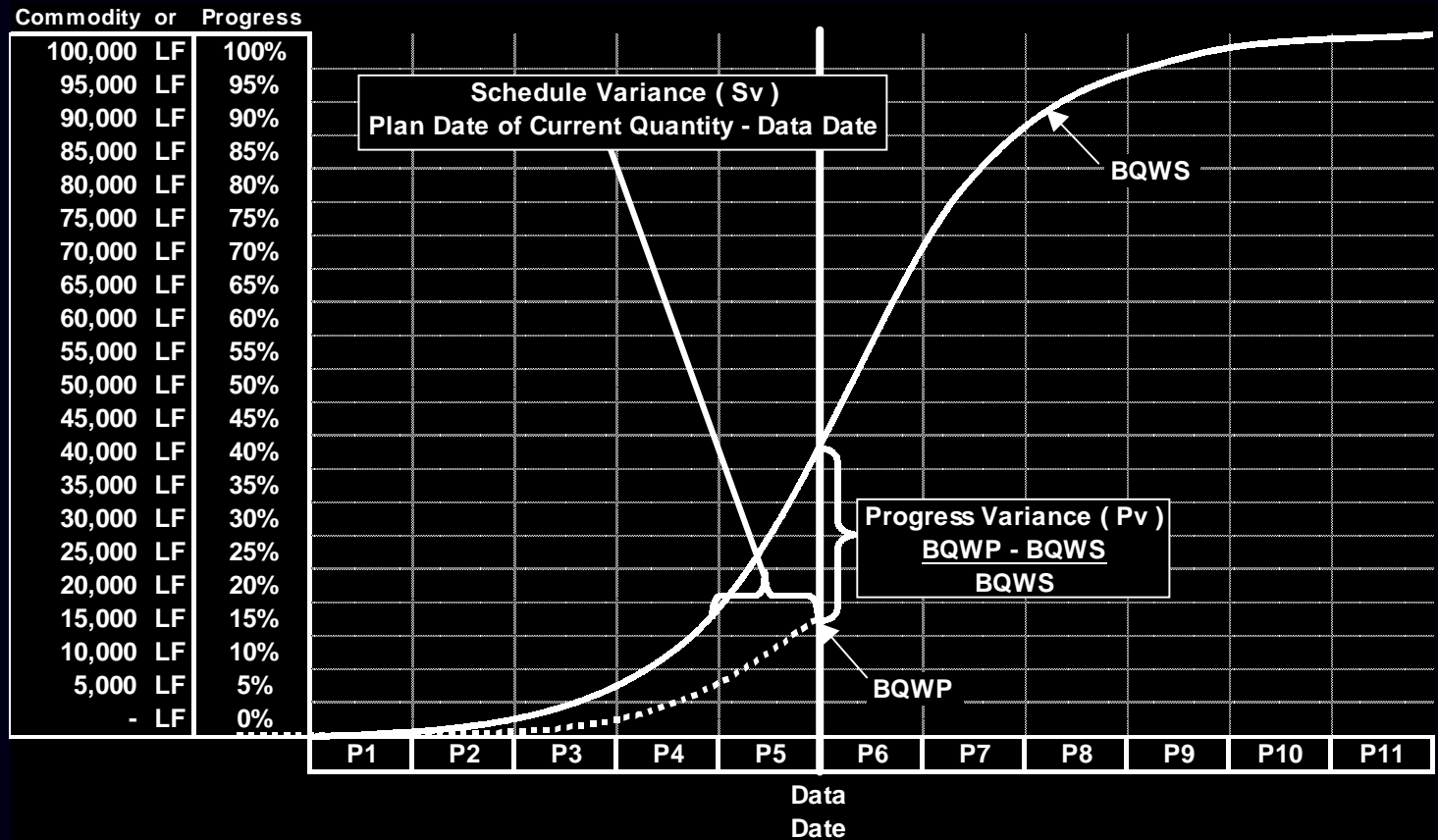
Budgeted Quantity of Work Scheduled (BQWS) is the time-phased value of work to be completed (plan).

Budgeted Quantity of Work Performed (BQWP) is the time-phased value of work that has been completed.

- Schedule Variance – Is the difference between BQWS and BQWP as measured in Schedule Duration.
- Progress Variance – Is the difference between BQWS and BQWP measured in the appropriate quantity.



Managing the Schedule



Managing the Schedule

- Change Control
 - Document and control changes to the project baseline
 - Incorporate approved changes in a timely manner
- Implement Corrective or Recovery Plan Based on the Result of the Schedule Variance
- Develop Revised Progress Plans Based on Progress Variance



Managing the Schedule

Report

- Standardized Layouts and Reports

Summary Level Schedule

Commissioning Schedule

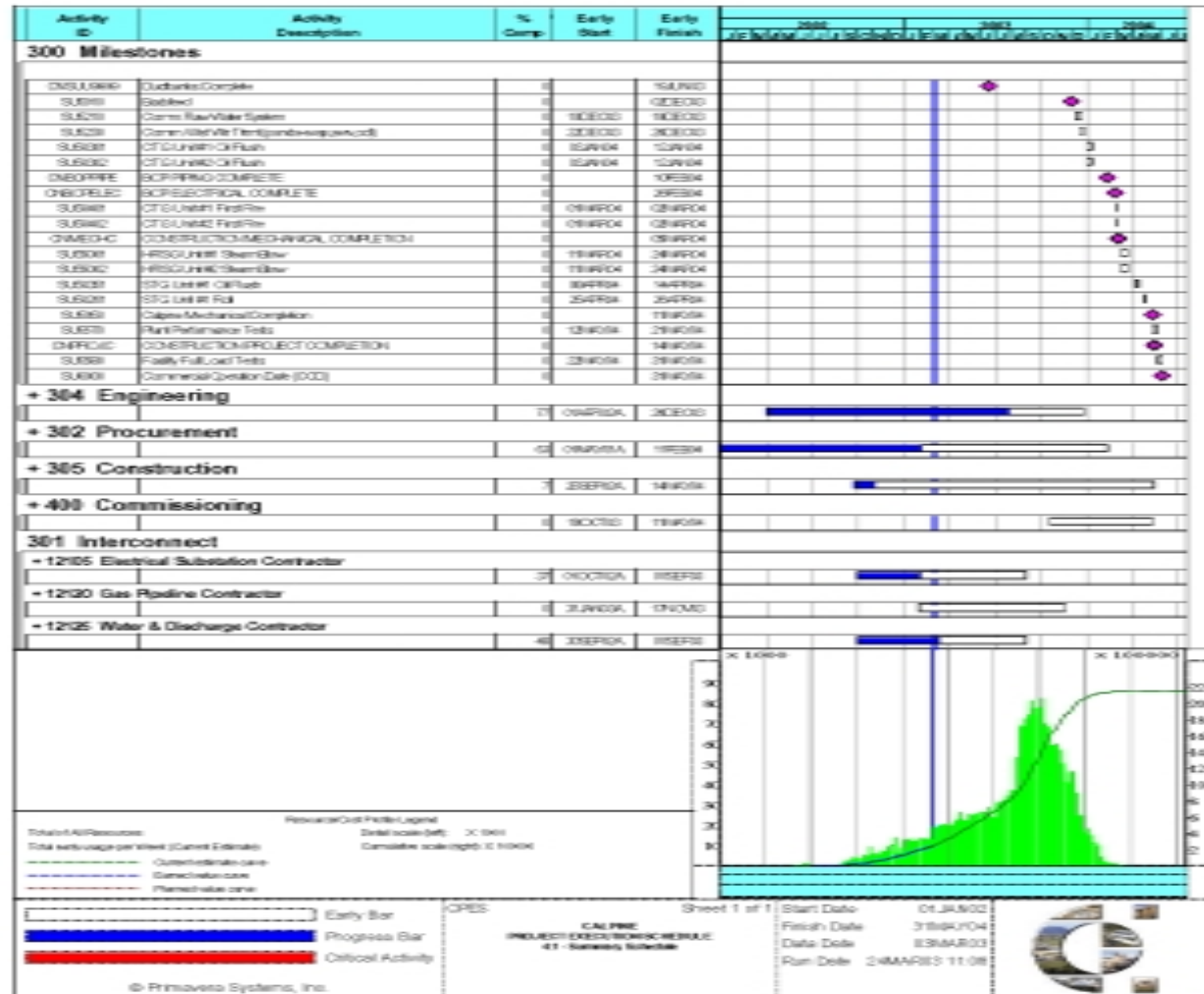
Longest Path

Integrated Schedule

Progress Curves



Managing the Schedule



Closing Remarks

Now, the world is a beautiful
place.....

What does all this give us

- Effective snapshots
- Historical views



