



Risk Analysis

By
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Risk Analysis

- End Date Analysis
- Cost Analysis
- Critical Activities ~

Risk Analysis

- Single Path (CPM) vs. Monte Carlo technique (1000 iterations)
- CPM - **Does not take uncertainty into account**
- 3 Durations (min, most likely ,max)
- Each iteration has it's own critical path
- Traditional CPM shows only 1 critical path
- “S-Curve” presents likelihood of finish dates
- Pertmaster – 3rd Party software that analyzes schedules

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Imported Baseline Schedule

Name	Description	Rem Duration	Min Dur	Likely Dur	Max Dur	Duration Function	Aug '04							Sep '04				Oct '04				Nov '04				Dec '04								
							19	26	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27				
1000	Notice to Proceed	0					◆ Notice to Proceed																											
1030	Procure Misc Eq and Materials	35	32	35	39	Triangle(32,35,39)	▬ Procure Misc Eq and Materials																											
1020	Documents IFC	5	5	5	6	Triangle(5,5,6)	▬ Documents IFC																											
1060	Procure Subcontractors	21	19	21	23	Triangle(19,21,23)	▬ Procure Subcontractors																											
1110	Procure HVAC Ductwork and Equipment	26	23	26	29	Triangle(23,26,29)	▬ Procure HVAC Ductwork and Equipment																											
1680	Procure Light Fixtures	14	13	14	15	Triangle(13,14,15)	▬ Procure Light Fixtures																											
1730	Procure Ceramic Tile	5	5	5	6	Triangle(5,5,6)	▬ Procure Ceramic Tile																											
1750	Procure / Fab Casework and Shelving	20	18	20	22	Triangle(18,20,22)	▬ Procure / Fab Casework and Shelving																											
1770	Procure Signage	10	9	10	11	Triangle(9,10,11)	▬ Procure Signage																											
1780	Procure Appliances	14	13	14	15	Triangle(13,14,15)	▬ Procure Appliances																											
1790	Procure Playground Eq. and Shed	20	18	20	22	Triangle(18,20,22)	▬ Procure Playground Eq. and Shed																											
1040	Mob to Site	3	3	3	3	Triangle(3,3,3)	▬ Mob to Site																											
1050	Demo Existing Interior	5	5	5	6	Triangle(5,5,6)	▬ Demo Existing Interior																											
1200	Erect / Frame Walls L2	14	13	14	15	Triangle(13,14,15)	▬ Erect / Frame Walls L2																											
1400	Install Metal Framing L2	5	5	5	6	Triangle(5,5,6)	▬ Install Metal Framing L2																											
1640	Install Roof Penetration RF	1	1	1	1	Triangle(1,1,1)	▬ Install Roof Penetration RF																											
1650	Patch Roof and Install Pads RF	3	3	3	3	Triangle(3,3,3)	▬ Patch Roof and Install Pads RF																											
1530	Install Door Jams	3	3	3	3	Triangle(3,3,3)	▬ Install Door Jams																											
1590	Install Soffit Framing L2	7	6	7	8	Triangle(6,7,8)	▬ Install Soffit Framing L2																											
1220	Install HVAC Ductwork & DampersL2	10	9	10	11	Triangle(9,10,11)	▬ Install HVAC Ductwork & DampersL2																											
1240	Install Electrical Rough-in Walls L2	11	10	11	12	Triangle(10,11,12)	▬ Install Electrical Rough-in Walls L2																											
1260	Install Phone & Data Cabling L2	5	5	5	6	Triangle(5,5,6)	▬ Install Phone & Data Cabling L2																											
1560	Install Electrical Rough-in Soffits L2	4	4	4	4	Triangle(4,4,4)	▬ Install Electrical Rough-in Soffits L2																											
1570	Install Electrical Rough-in Ceiling L2	4	4	4	4	Triangle(4,4,4)	▬ Install Electrical Rough-in Ceiling L2																											
1300	Install Sprinkler System L2	5	5	5	6	Triangle(5,5,6)	▬ Install Sprinkler System L2																											
1520	Install HVAC Exhaust Fans & Relief Hoods	4	4	4	4	Triangle(4,4,4)	▬ Install HVAC Exhaust Fans & Relief Hoods RF																											
1270	Install Security System RI Walls L2	6	5	6	7	Triangle(5,6,7)	▬ Install Security System RI Walls L2																											
1280	Install Plumbing Rough-in Walls L2	5	5	5	6	Triangle(5,5,6)	▬ Install Plumbing Rough-in Walls L2																											
1550	Install Phone & Data Trim	2	2	2	2	Triangle(2,2,2)	▬ Install Phone & Data Trim																											
1500	Install Concrete PG	4	4	4	4	Triangle(4,4,4)	▬ Install Concrete PG																											
1540	Install Security System Trim L2	2	2	2	2	Triangle(2,2,2)	▬ Install Security System Trim L2																											
1330	Install Relites and Glass Panels L2	5	5	5	6	Triangle(5,5,6)	▬ Install Relites and Glass Panels L2																											
1600	Install Plumbing Overhead L2	5	5	5	6	Triangle(5,5,6)	▬ Install Plumbing Overhead L2																											
1440	Install Acoustic Ceiling Grid L2	5	5	5	6	Triangle(5,5,6)	▬ Install Acoustic Ceiling Grid L2																											
1510	Install EPDM Rubber Playground Surface F	5	5	5	6	Triangle(5,5,6)	▬ Install EPDM Rubber Playground Surface PG																											
1580	Install Electrical Trim L2	4	4	4	4	Triangle(4,4,4)	▬ Install Electrical Trim L2																											
1610	Install Plumbing Trim L2	1	1	1	1	Triangle(1,1,1)	▬ Install Plumbing Trim L2																											
1120	Wall Cover Inspection	1	1	1	1	Triangle(1,1,1)	▬ Wall Cover Inspection																											
1250	Install Light Fixtures L2	5	5	5	6	Triangle(5,5,6)	▬ Install Light Fixtures L2																											
1310	Install Fire Alarm Smoke Detectors L2	4	4	4	4	Triangle(4,4,4)	▬ Install Fire Alarm Smoke Detectors L2																											
1320	Install Insulation L2	5	5	5	6	Triangle(5,5,6)	▬ Install Insulation L2																											
1480	Install Playground Equipment PG	5	5	5	6	Triangle(5,5,6)	▬ Install Playground Equipment PG																											

Sanity Check to Baseline Schedule

- Verify Schedule Integrity / Mechanics

Sanity Check Report

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Project Title	CSI
Project Name	D:\0SIS\CSNBASE.pln

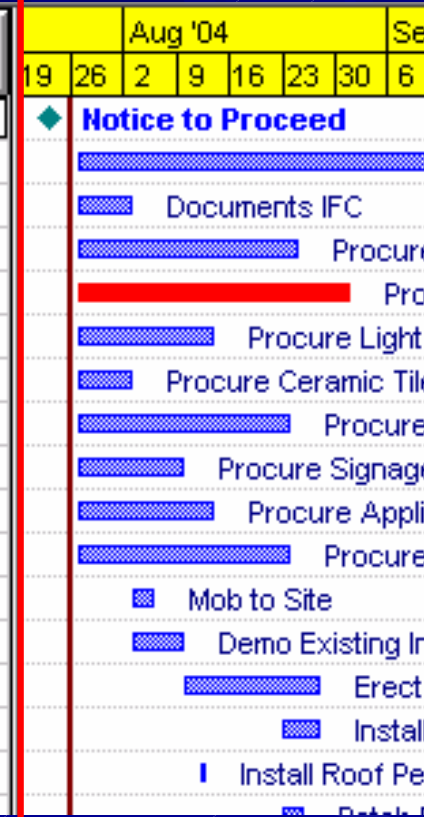
Sanity Report Summary

A breakdown of the problems encountered in the project.

Section	Number of Problems
Constraints	No problems found.
Open-ended Tasks (start and finish tasks)	1
Out of sequence updates (broken logic)	No problems found.
Links with lags longer than 0 units	18
Negative lags	4
Positive lags on Finish to Start links	14
Start To Finish links	No problems found.
Lags between tasks with different calendars	No problems found.
FF to a Milestone	No problems found.
SS from a Milestone	No problems found.
Start Milestones driving Summary completion date	No problems found.
Links To/From Summary Tasks	No problems found.

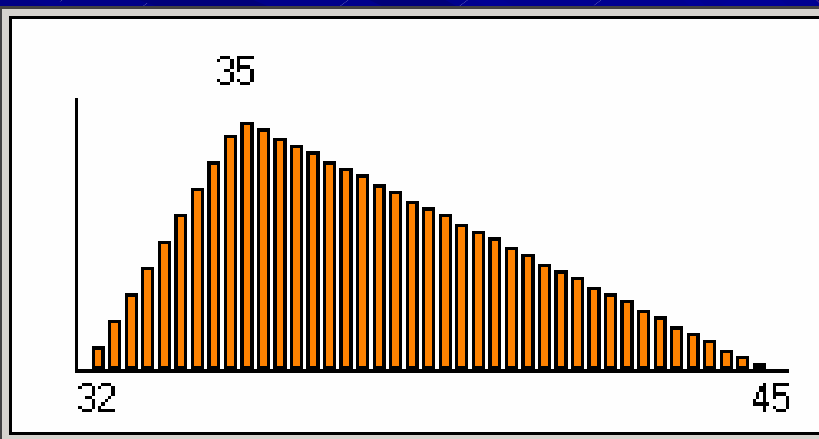
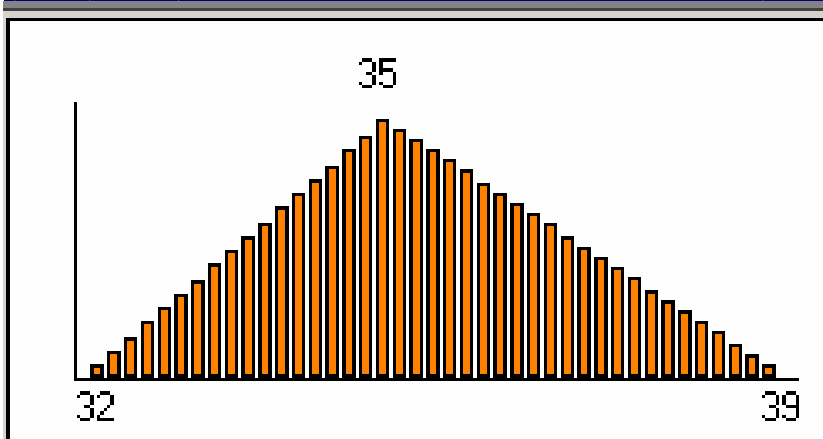
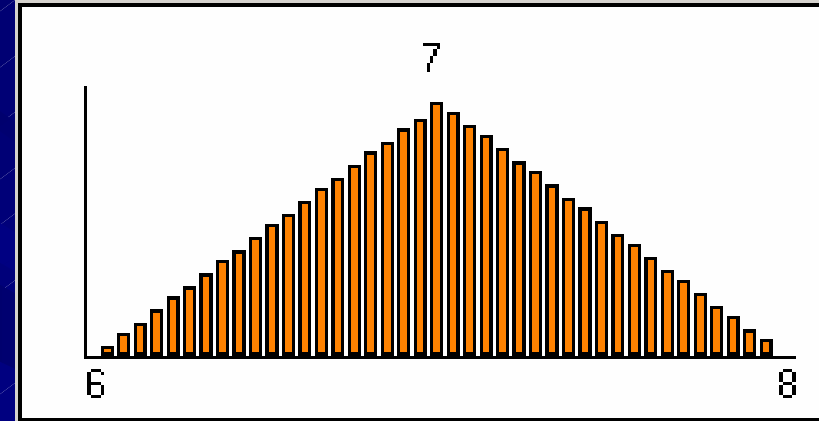
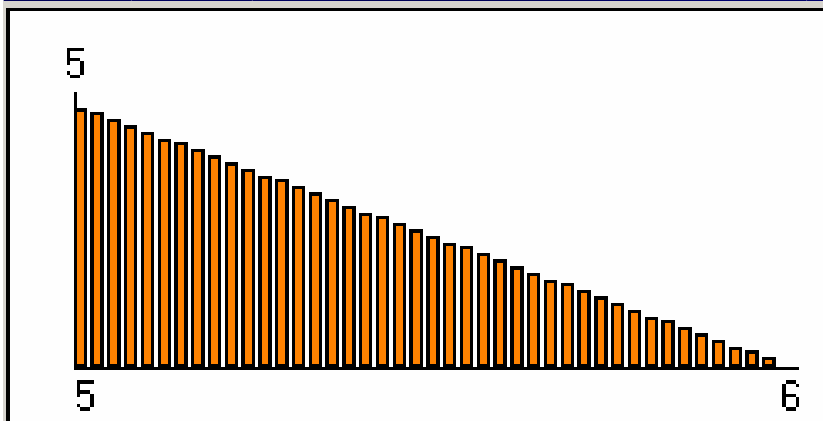
Baseline Schedule with 3 Durations

Name	Description	Rem Duration	Min Dur	Likely Dur	Max Dur	Duration Function
1000	Notice to Proceed	0				
1030	Procure Misc Eq and Materials	35	32	35	39	Triangle(32,35,39)
1020	Documents IFC	5	5	5	6	Triangle(5,5,6)
1060	Procure Subcontractors	21	19	21	23	Triangle(19,21,23)
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1200	Erect / Frame Walls L2	14	13	14	15	Triangle(13,14,15)
1400	Install Metal Framing L2	5	5	5	6	Triangle(5,5,6)
1640	Install Roof Penetration RF	1	1	1	1	Triangle(1,1,1)
1650	Install Roof Penetration RF	1	1	1	1	Triangle(1,1,1)

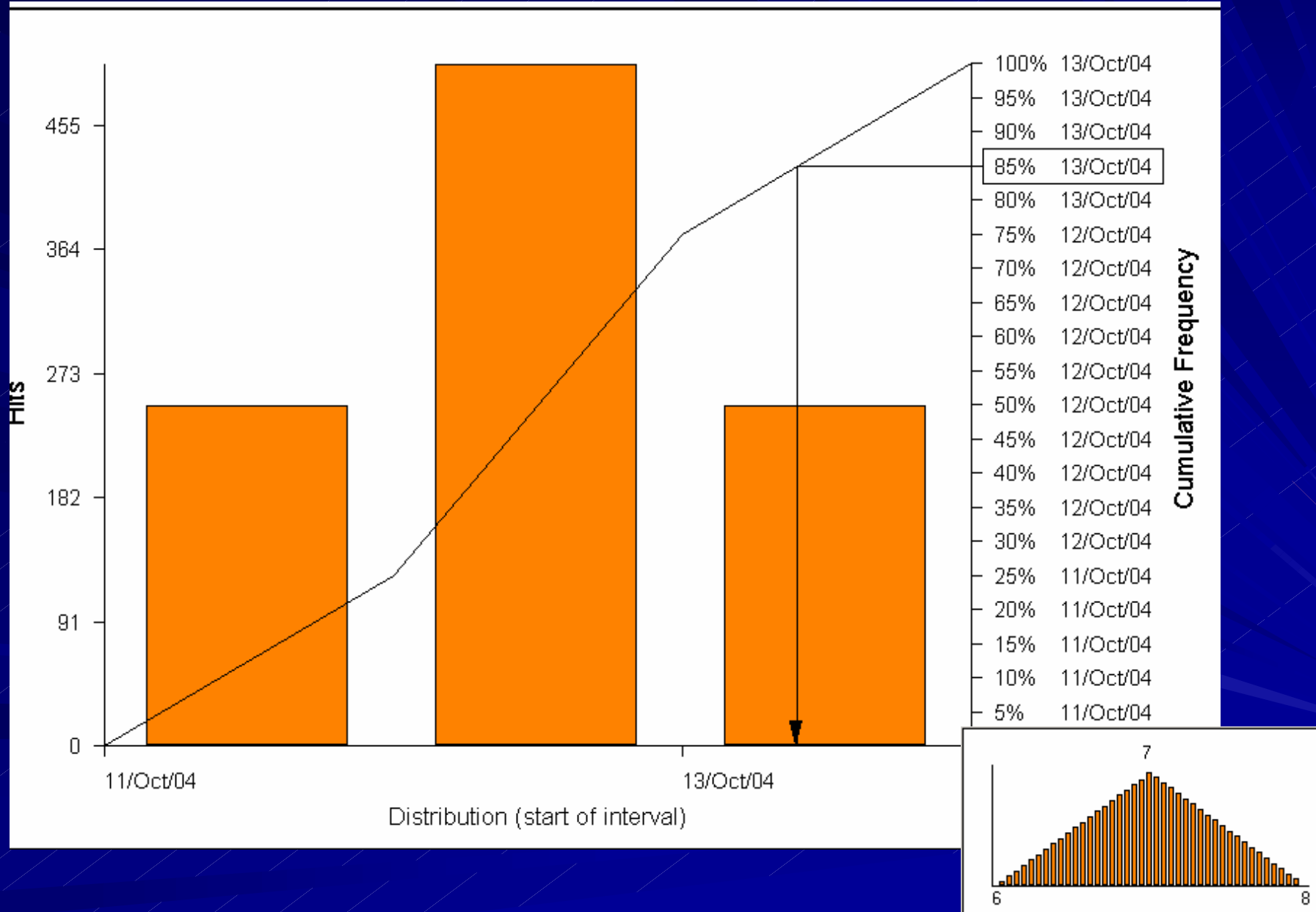


Min and Max set to specific numbers or a percentage (10-20%) of Most Likely or Original Duration

Distribution Triangle for Individual Activities

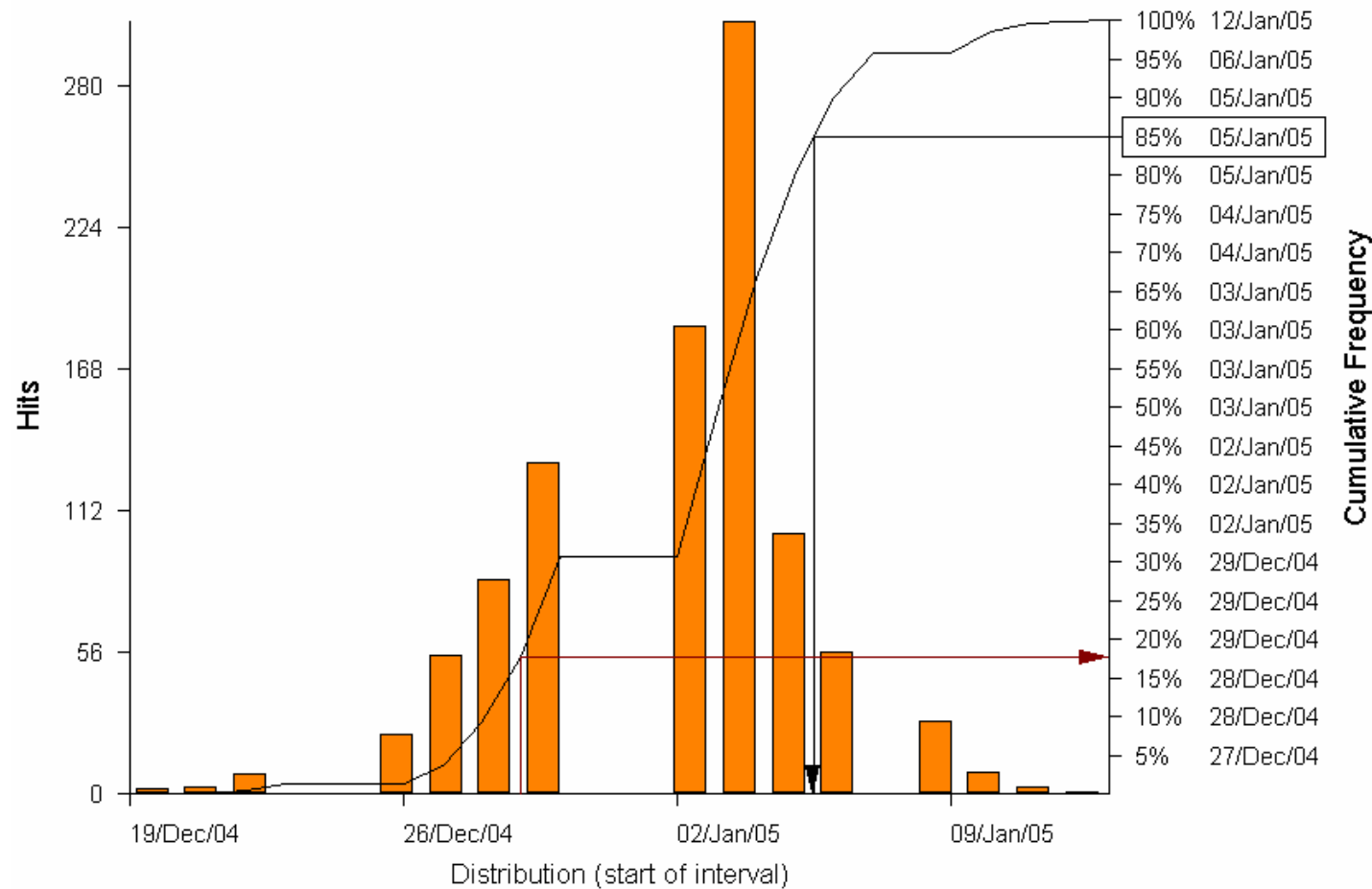


Distribution Triangle for Individual Activities



Finish Date Analysis

Entire Plan : Finish Date



Analysis

Simulation: Latin Hypercube
Iterations: 1000

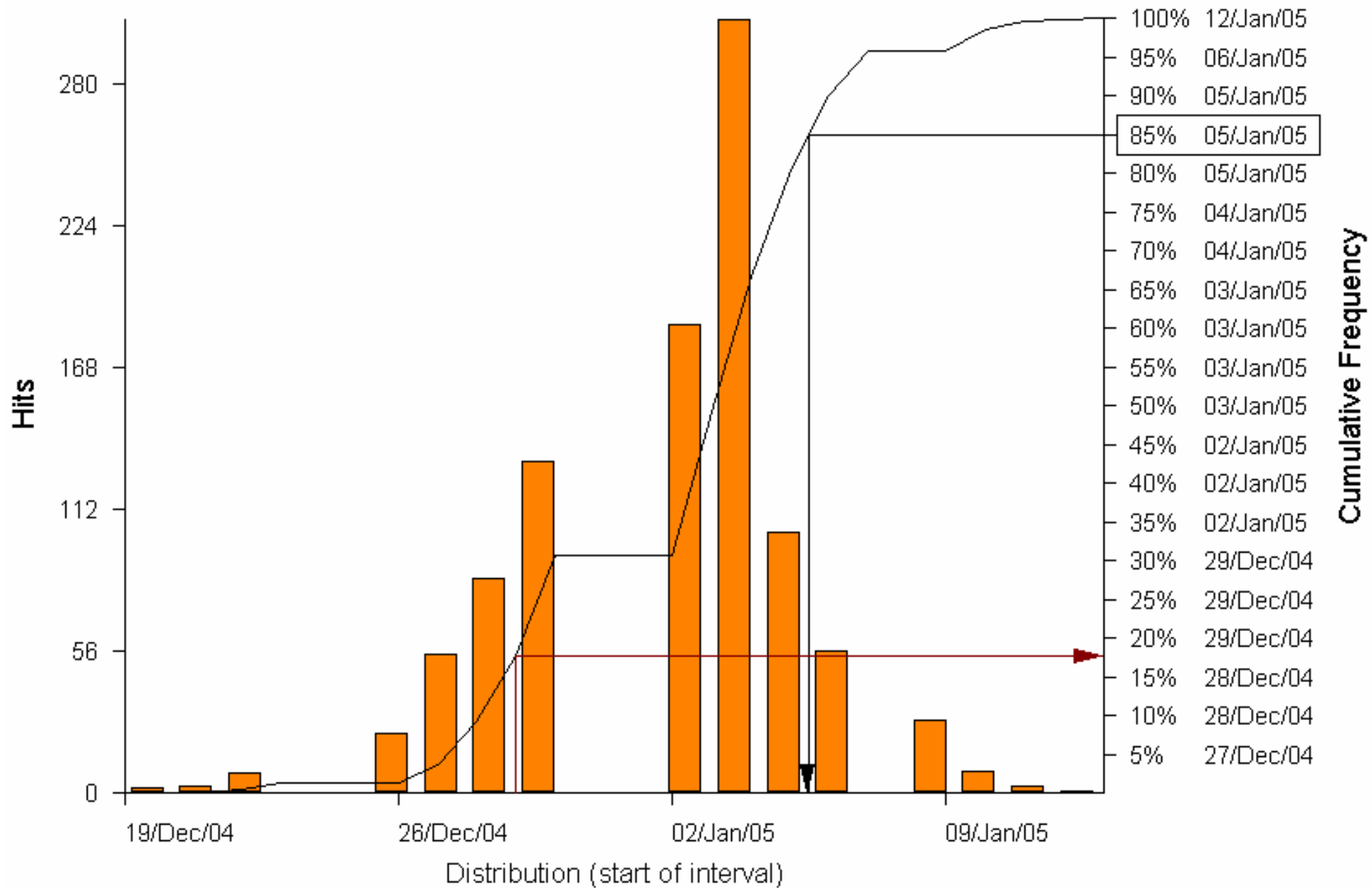
Convergence

Plan Finish Date:
Converged in 200 iterations
(variation < 1% over 100 iterations)
Total Plan Cost:
Converged in 200 iterations
(variation < 1% over 100 iterations)

Statistics

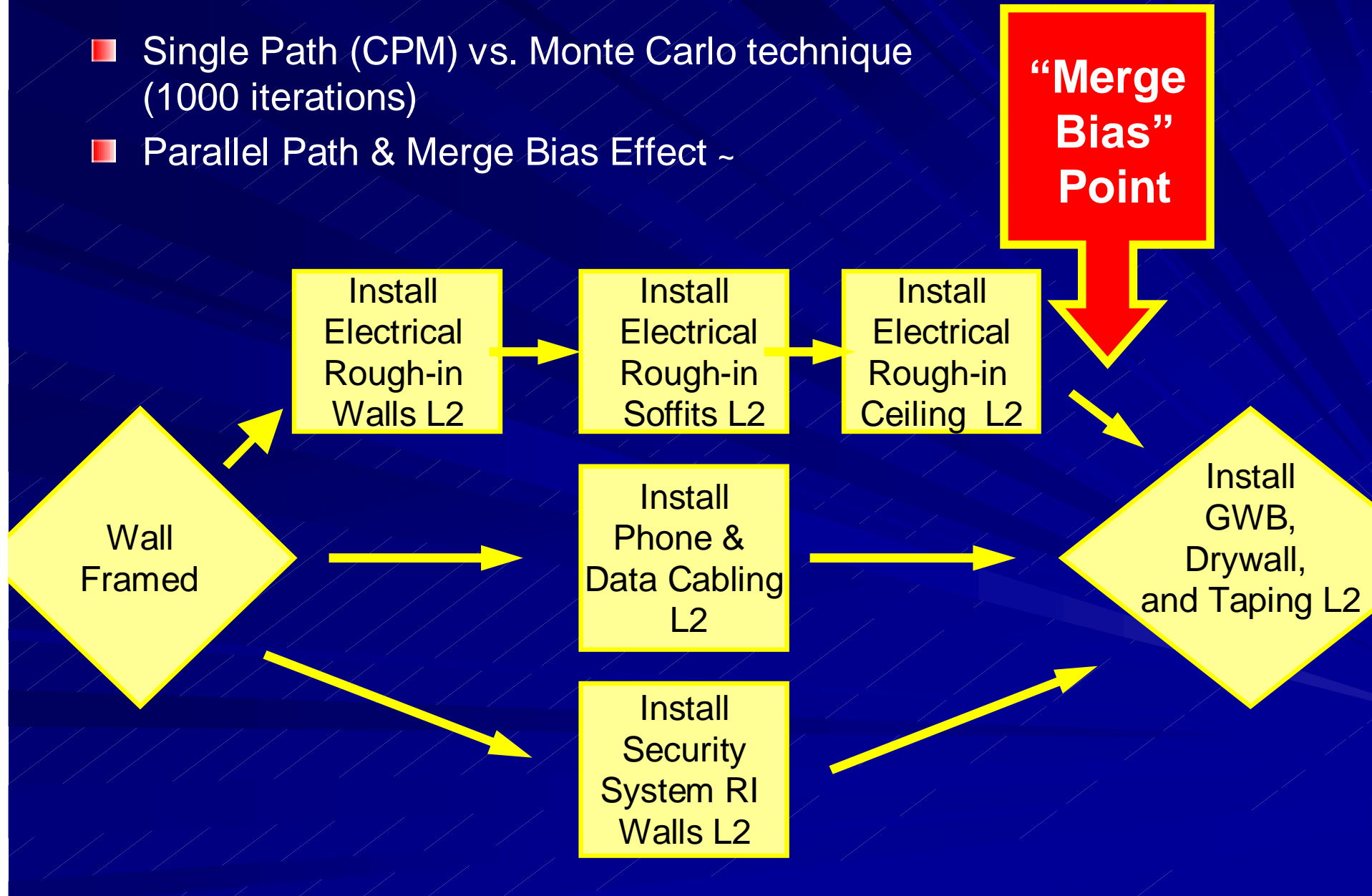
Minimum: 19/Dec/04
Maximum: 12/Jan/05
Mean: 01/Jan/05
Max Hits: 306
Std Deviation: 3.730

Selected Confidence
85%: 05/Jan/05
Deterministic Finish: 28/Dec/04
Probability: 18%



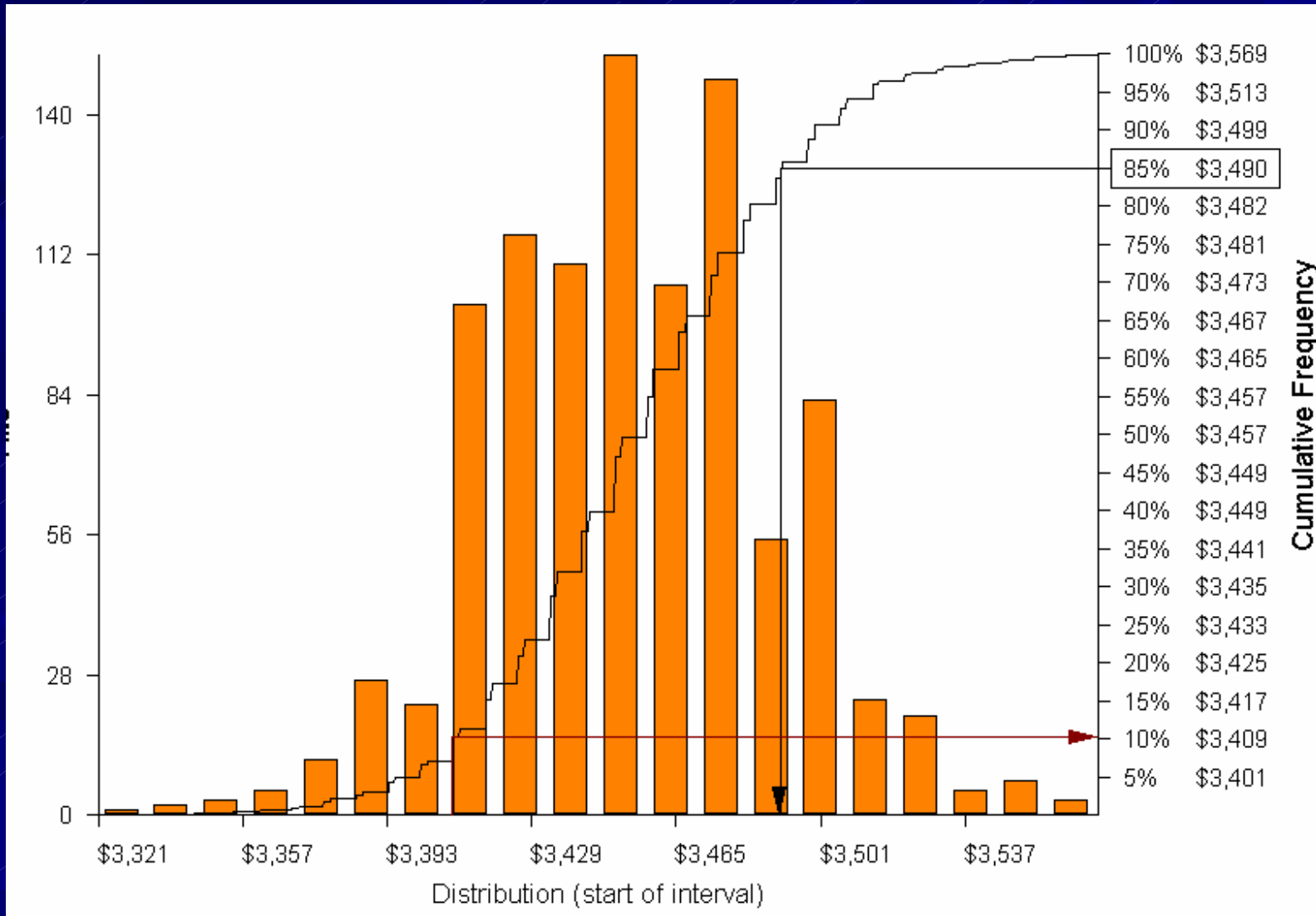
Why Did the Finish Date Change?

- Single Path (CPM) vs. Monte Carlo technique (1000 iterations)
- Parallel Path & Merge Bias Effect ~



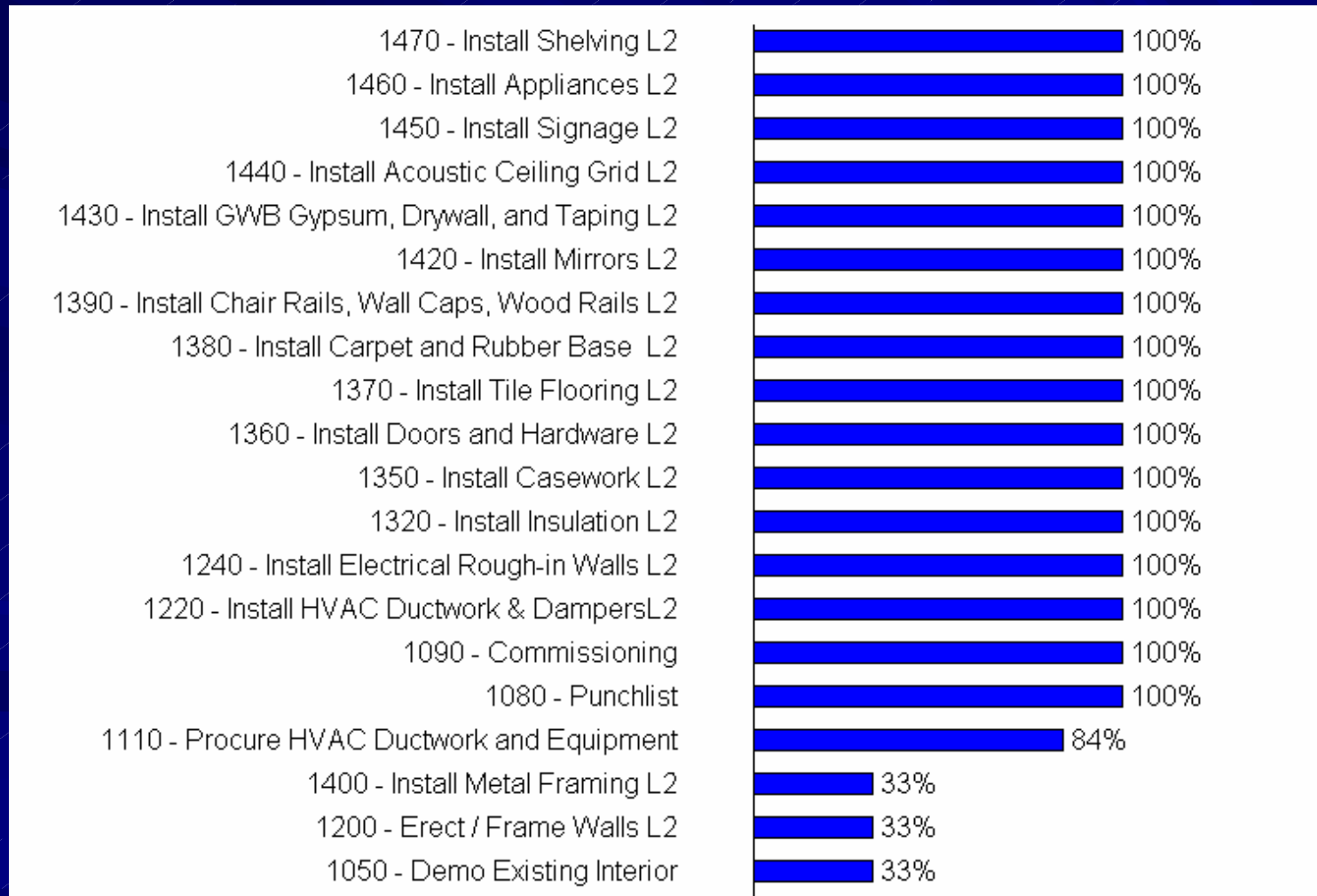
Cost Risk

- Can be view by activity or entire project ~



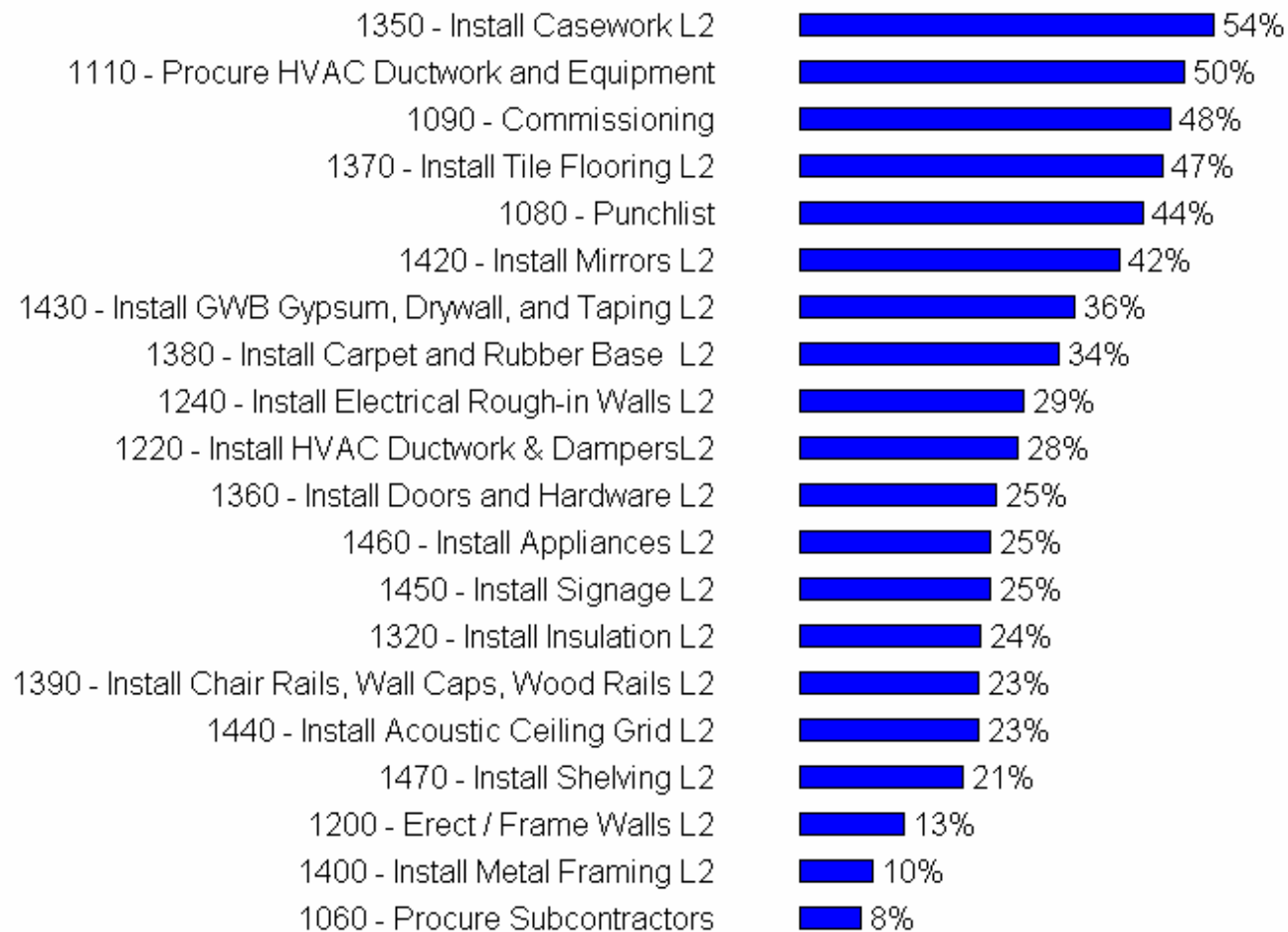
Tornado Graphs – Criticality Index

- During the risk analysis iterations, the number of times an activity was critical is recorded ~



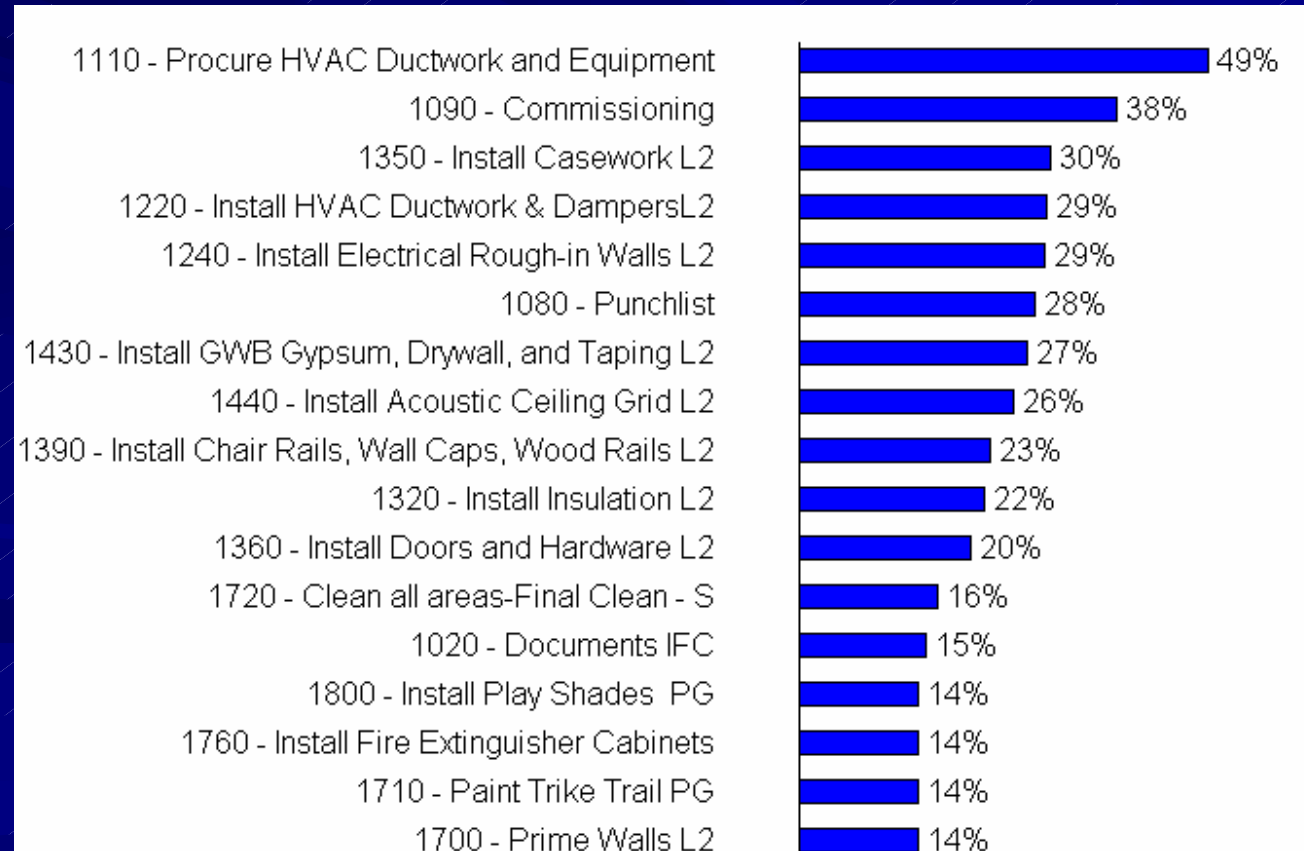
Schedule Sensitivity Index

- The SSI identifies and ranks the tasks most likely to influence the project duration / finish ~



Duration Sensitivity

- Correlation between the duration of a task and the duration of the project.
- The task with the highest duration sensitivity is the task that is most likely to increase the project duration ~.





The End

Presentation by Carol Bolstad

Scheduling and Information Services, Inc.

www.1sis.com

SIS can perform Risk Analysis on your schedule.