



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			J						
							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

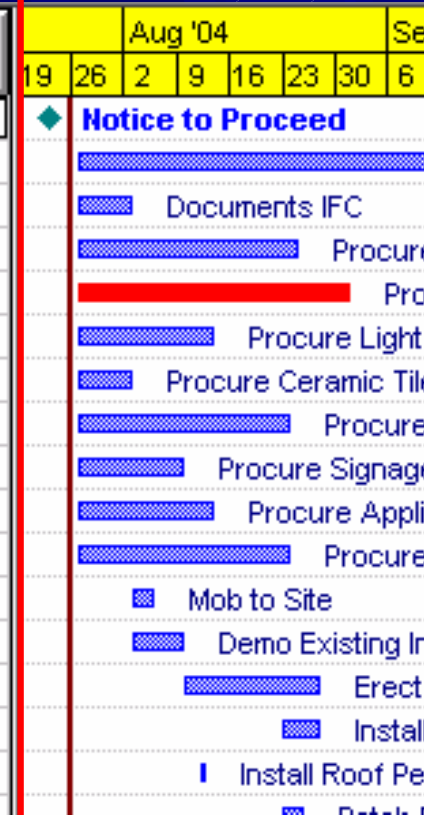
Sanity Report Summary

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.

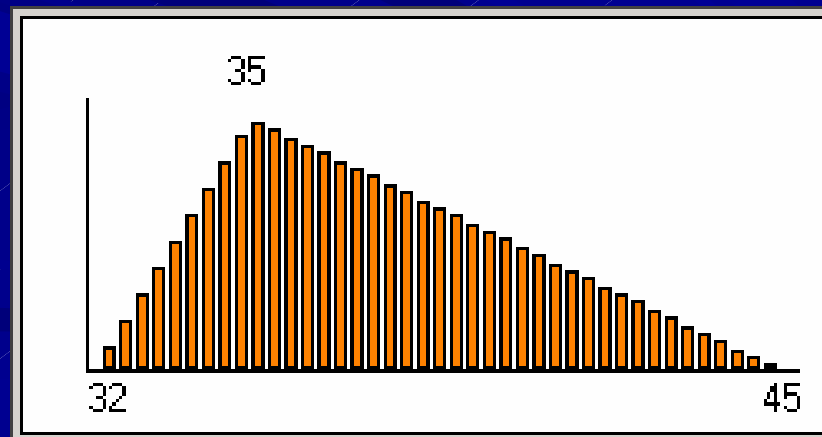
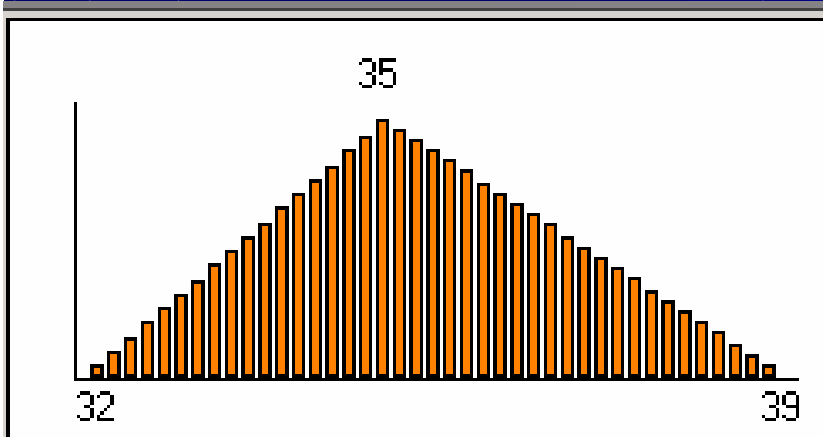
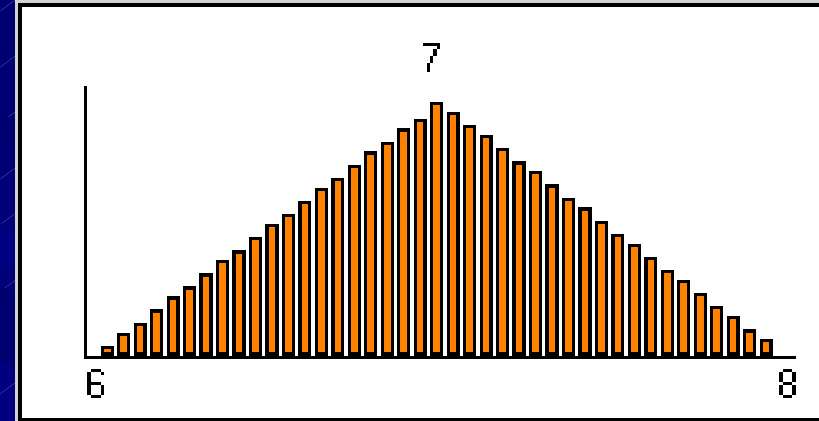
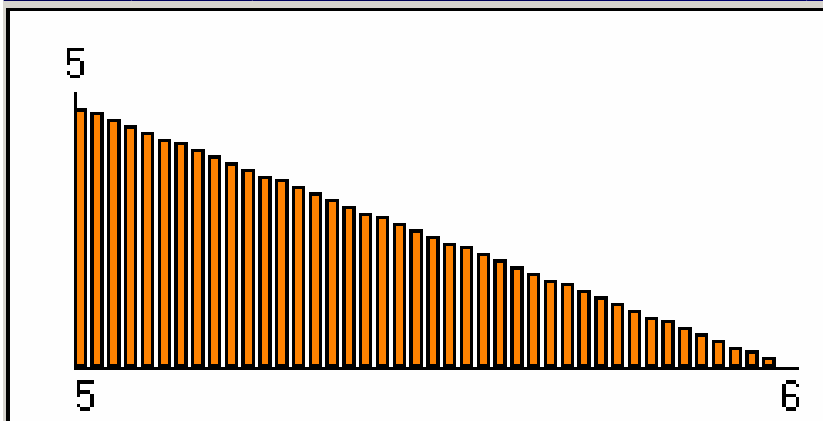
Baseline Schedule with 3 Durations

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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1050	Demo Existing Interior	5	5	5	6	Triangle(5,5,6)
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)

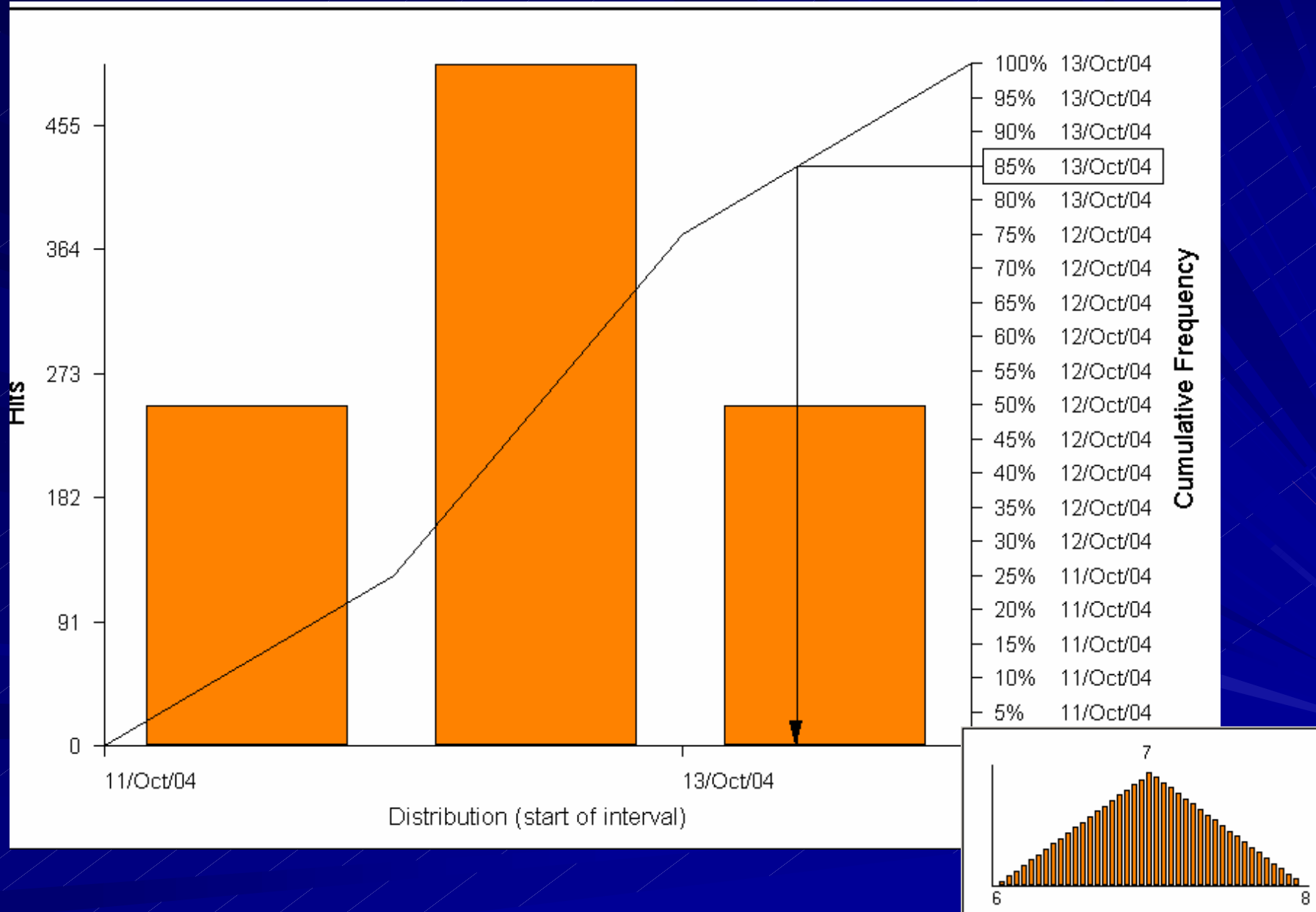


Min and Max set to specific numbers or a percentage (10-20%) of Most Likely or Original Duration

Distribution Triangle for Individual Activities

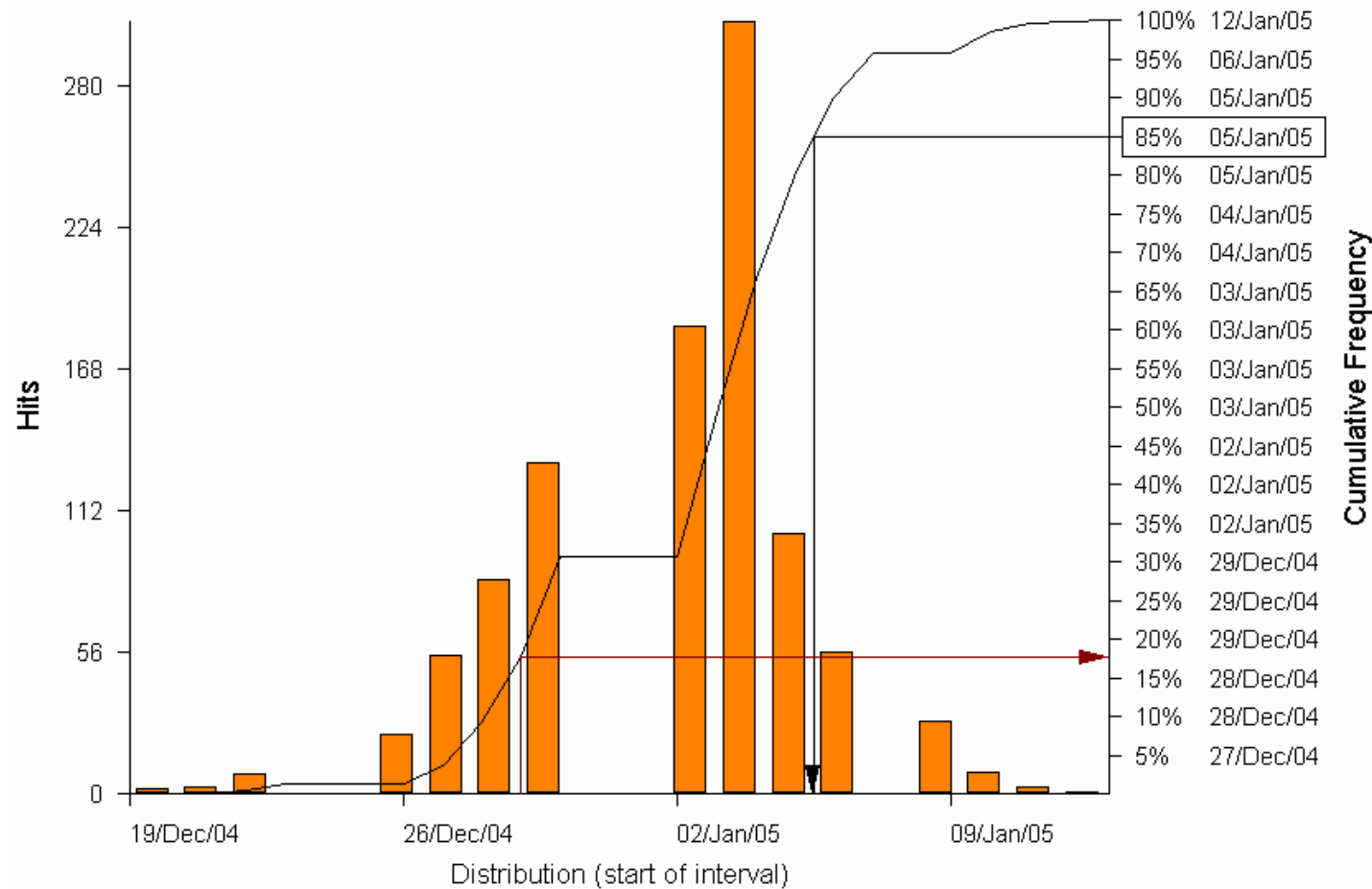


Distribution Triangle for Individual Activities



Finish Date Analysis

Entire Plan : Finish Date



Analysis

Simulation: Latin Hypercube
Iterations: 1000

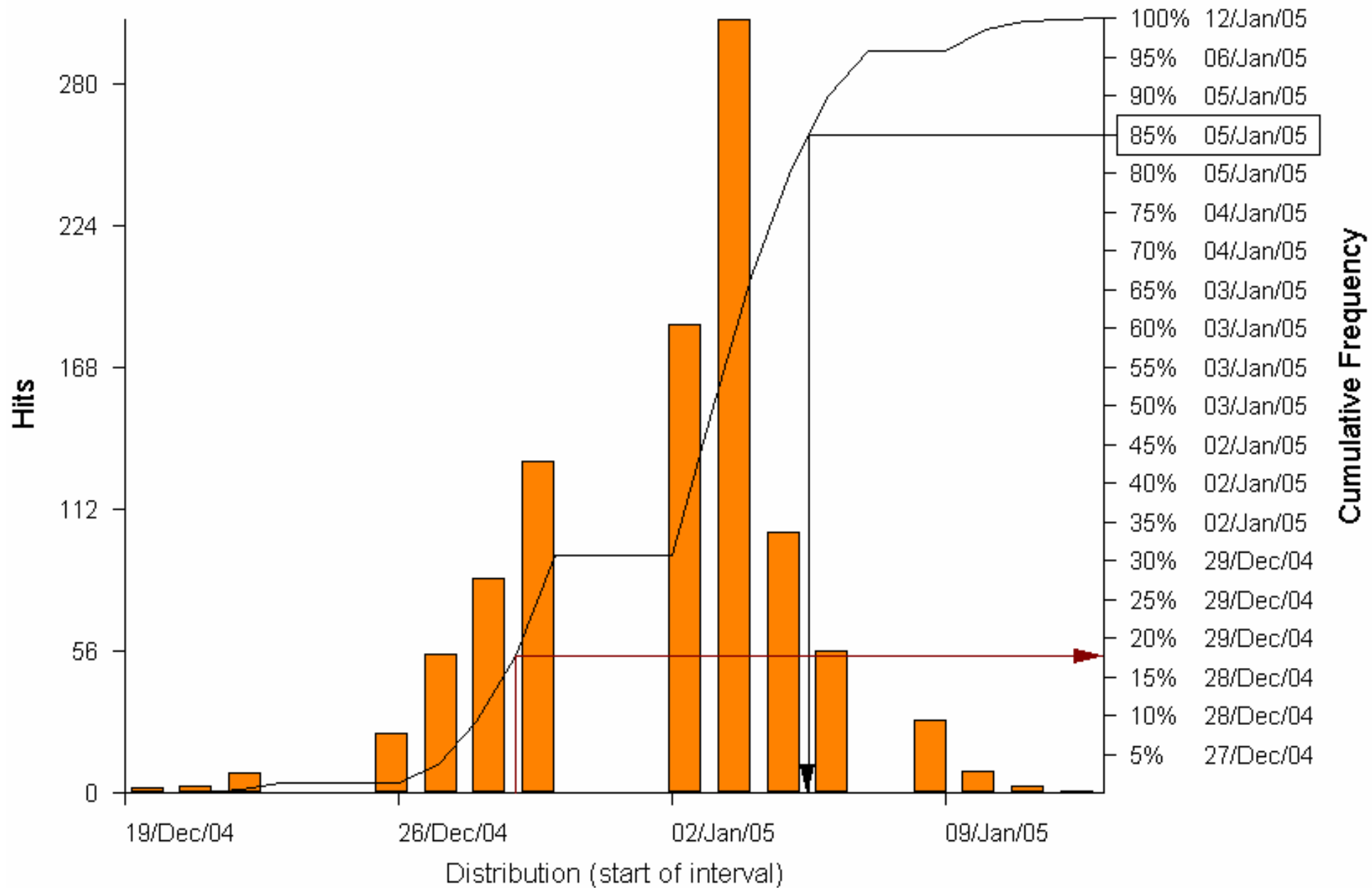
Convergence

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

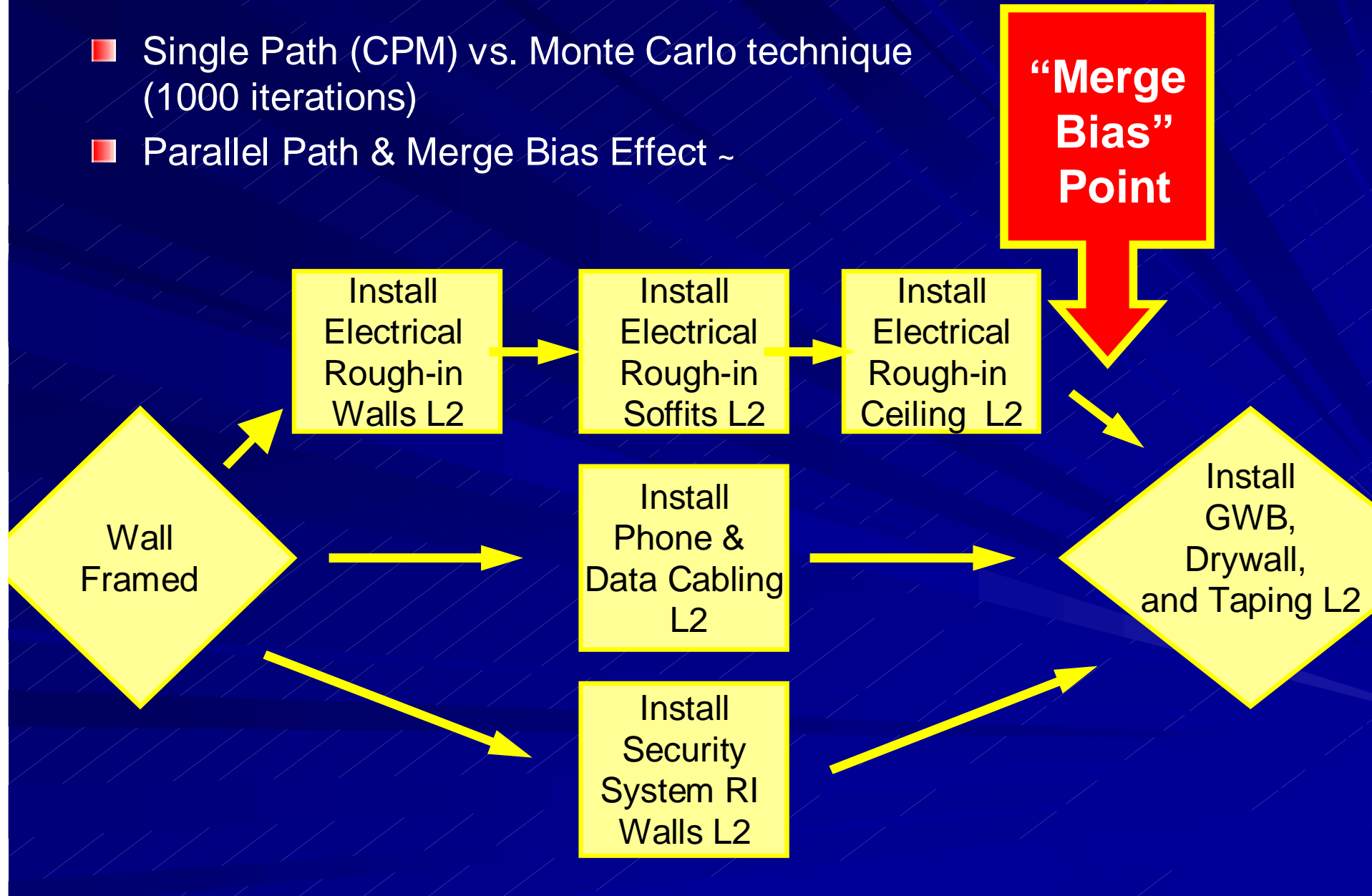
Minimum: 19/Dec/04
Maximum: 12/Jan/05
Mean: 01/Jan/05
Max Hits: 306
Std Deviation: 3.730

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



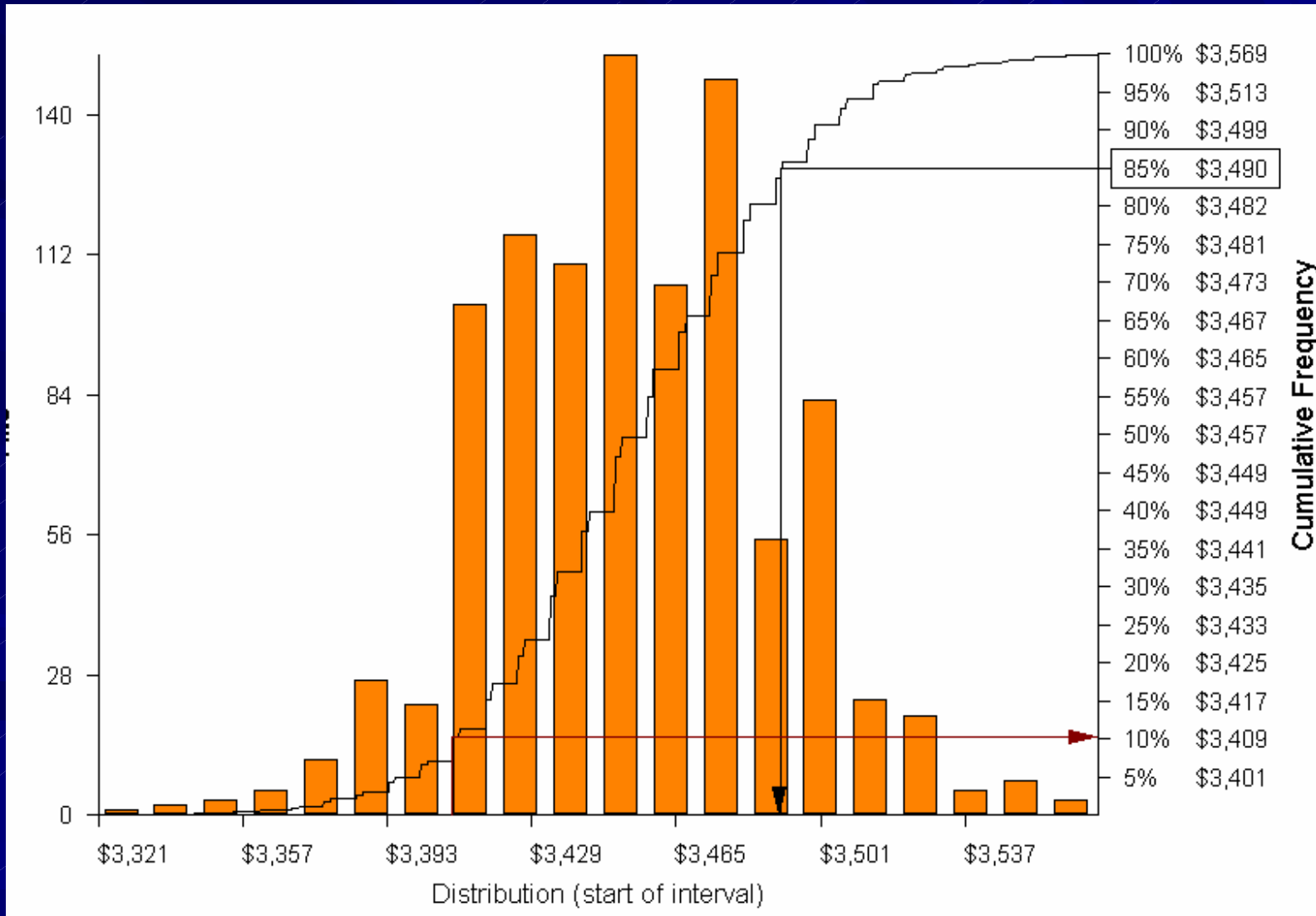
Why Did the Finish Date Change?

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



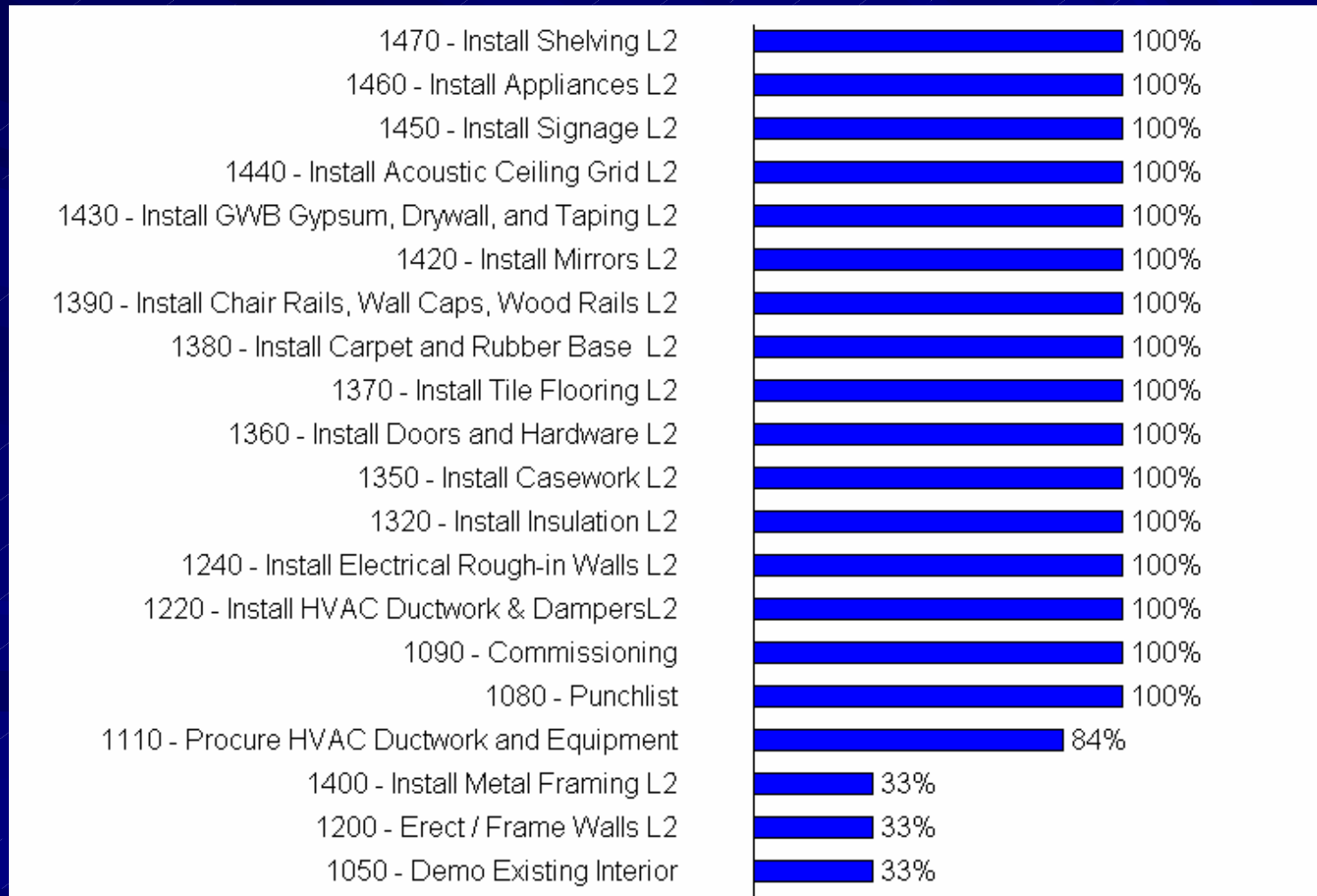
Cost Risk

- Can be view by activity or entire project ~



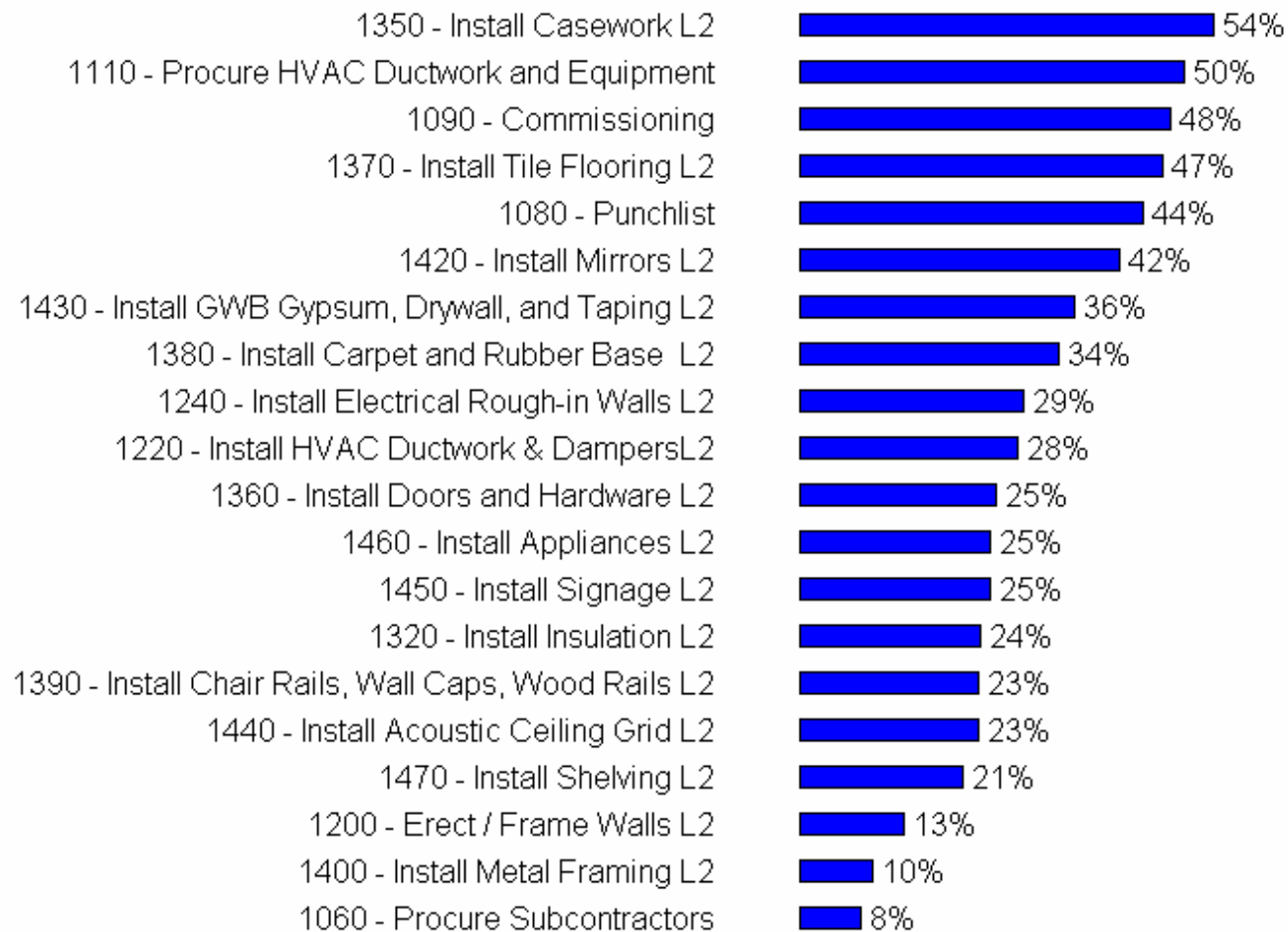
Tornado Graphs – Criticality Index

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



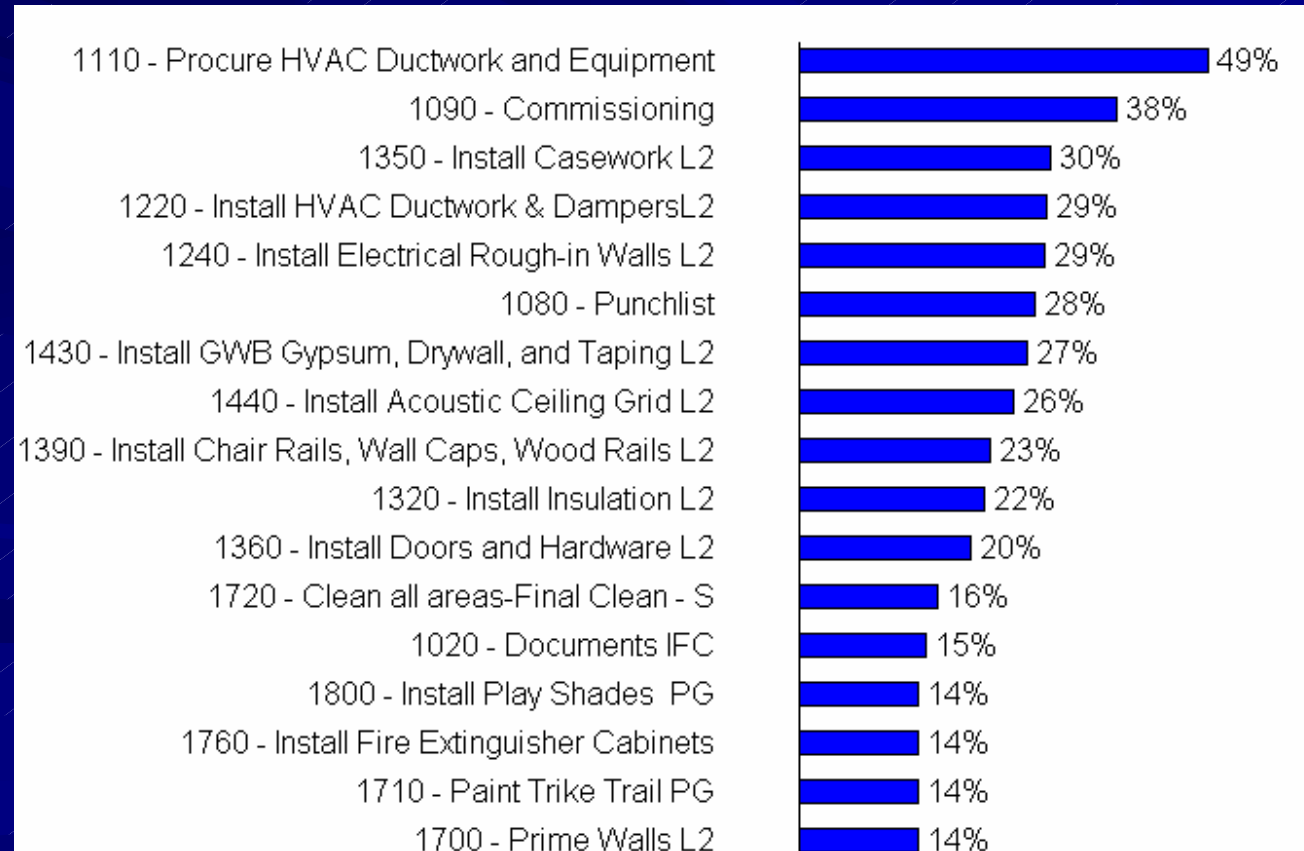
Schedule Sensitivity Index

- 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.