

























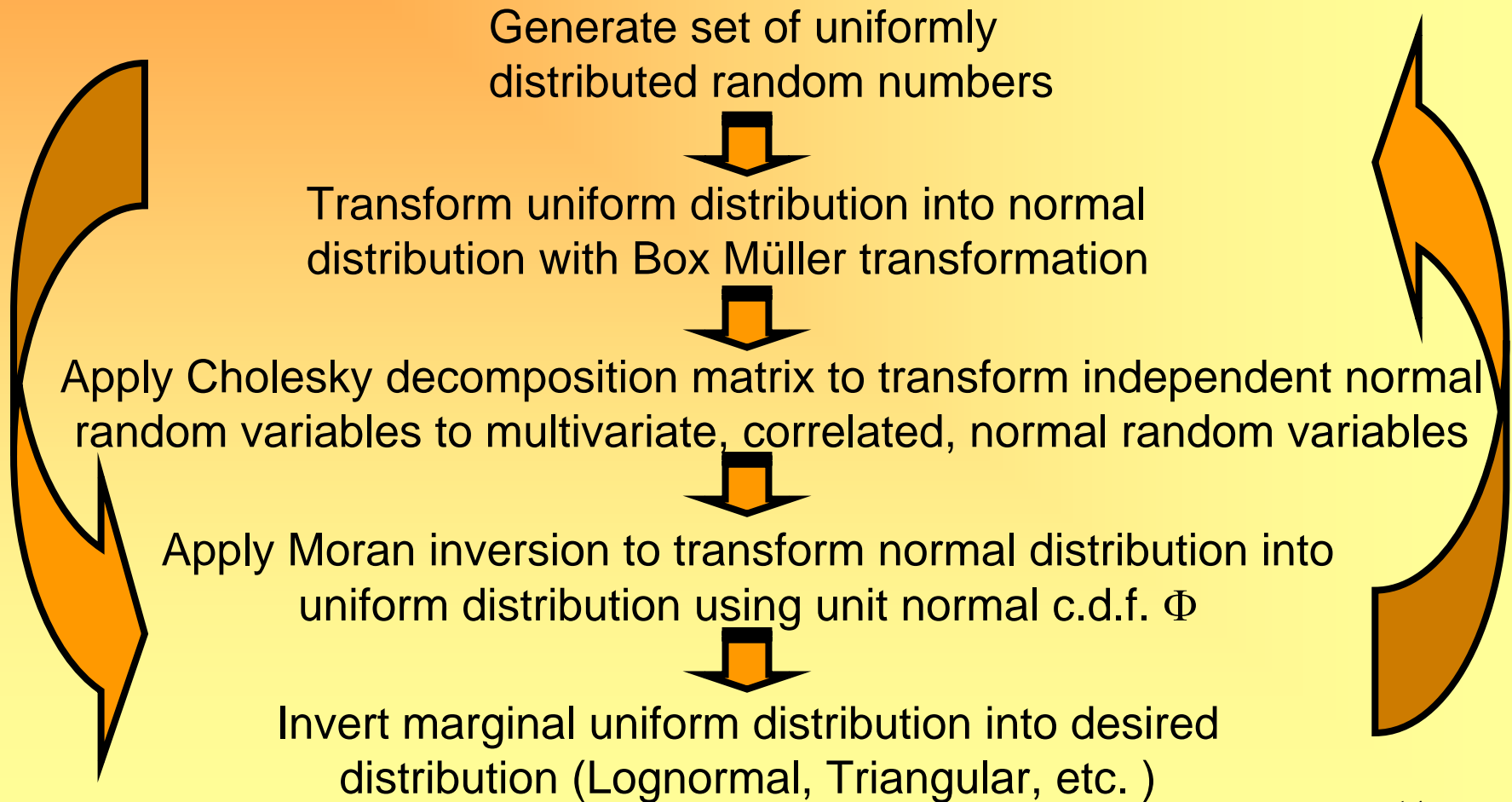






-For each composite software element sub tree starting at deepest levels

-For n iterations





# WBS Rollup Simulation Cholesky Decomposition

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- Automatically computes correlation of WBS elements based on depth in tree (D)

Default correlation (r) at WBS level m

$$r = \frac{m-1}{D-1} \quad \text{where: } 1 < m \leq D$$

D = number of  
WBS levels

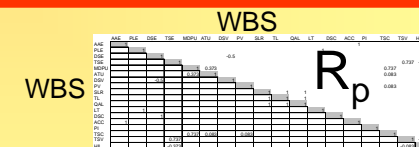
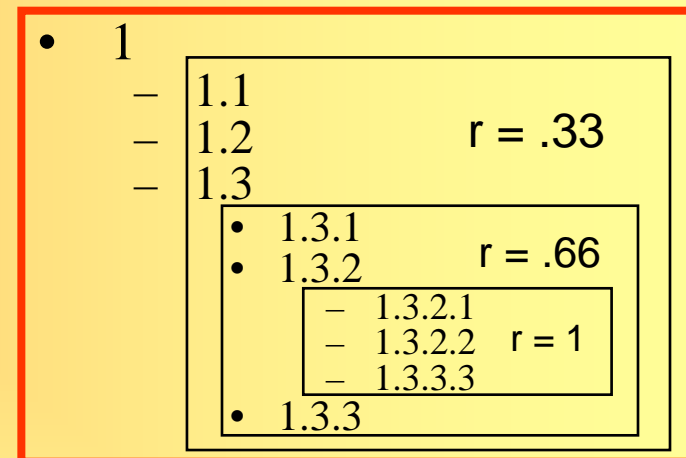
Auto generated  
correlation matrix

$$R_p = L_p L_p^T$$

Multivariate correlated  
normal random variables

$$Y_p = X L_p^T$$

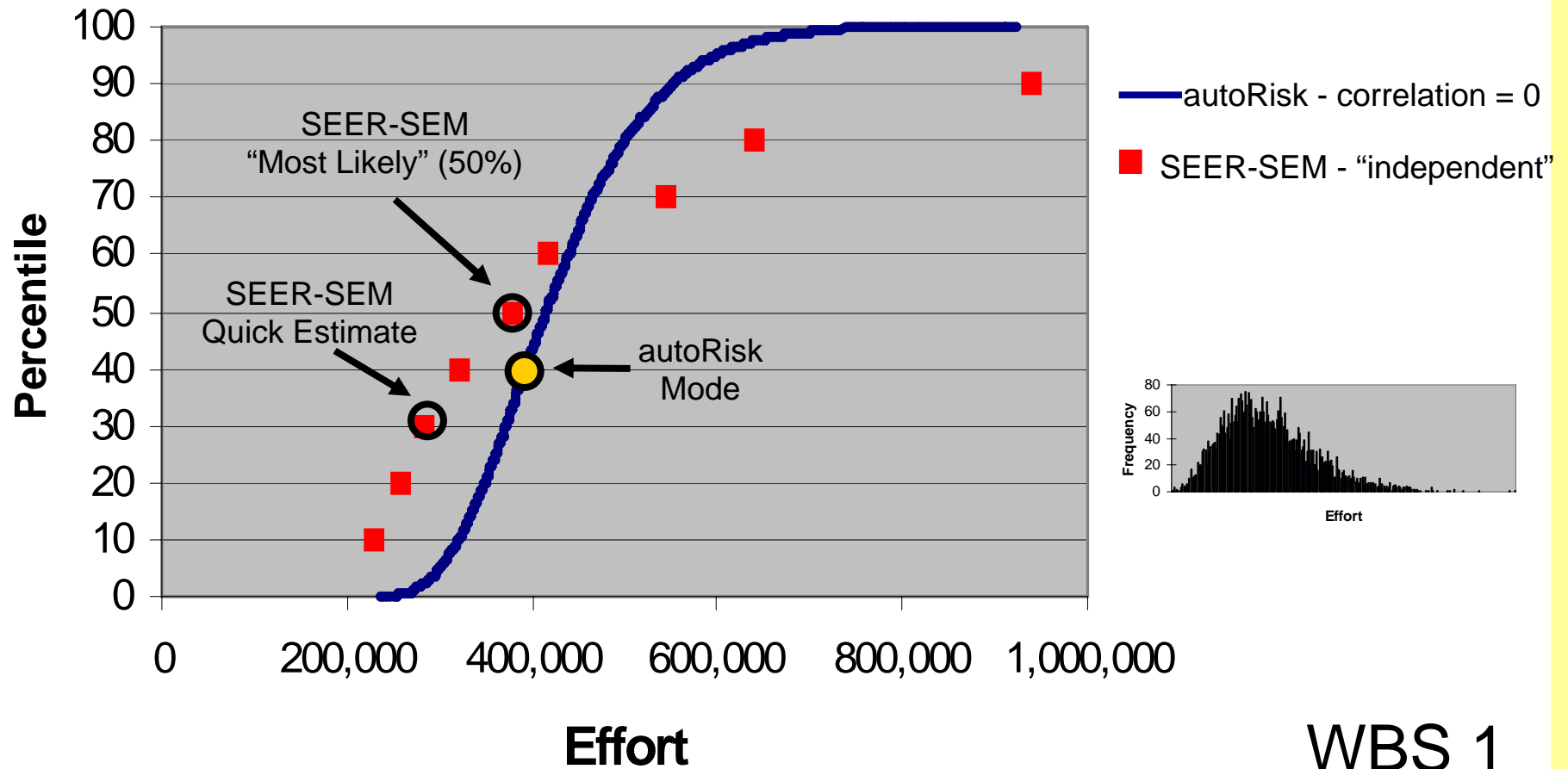
Where: X = independent normal  
random variables





# WBS Effort Rollup

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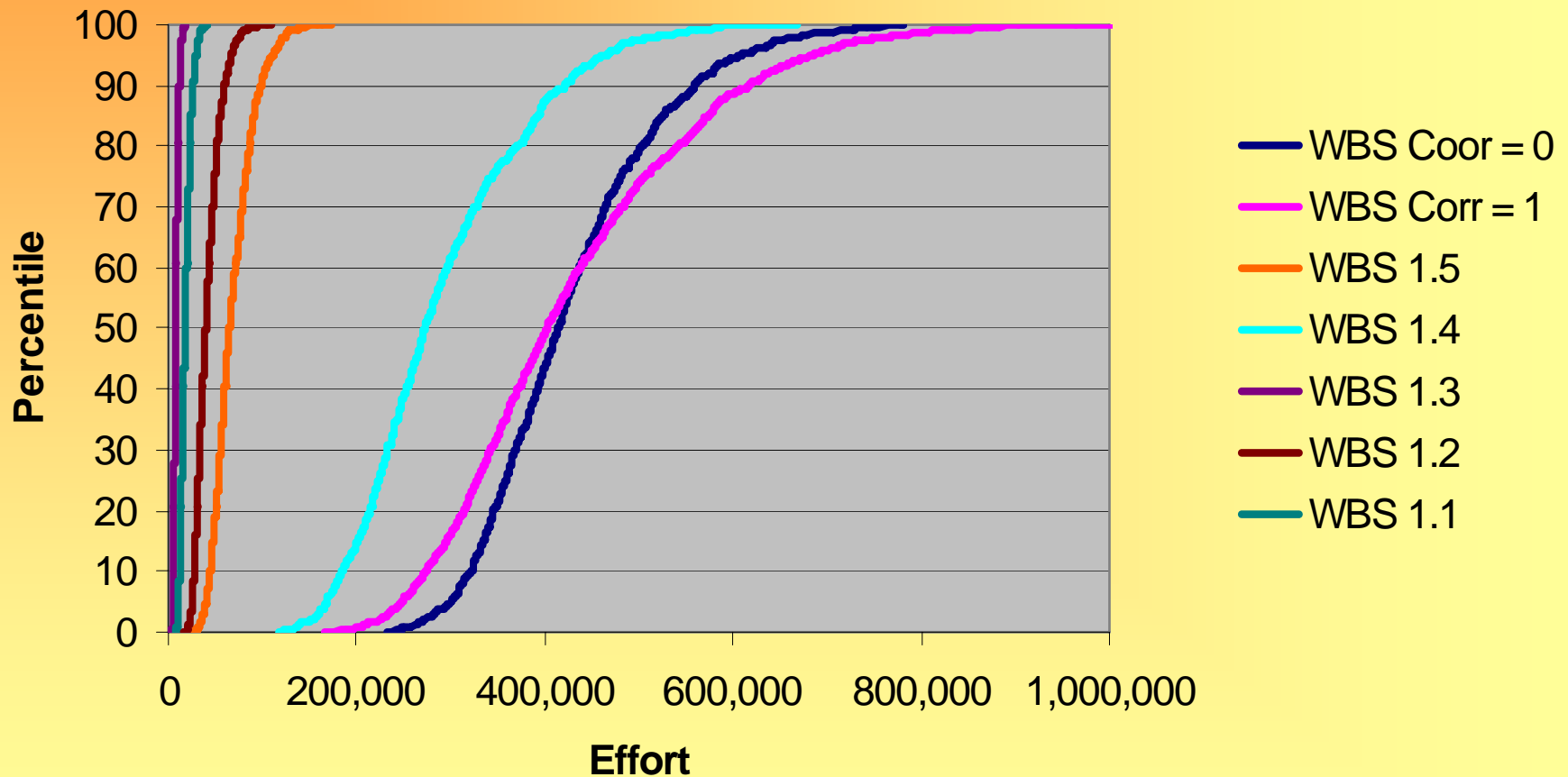






# WBS Rollup Simulation Correlation Effects

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# autoRisk GUI

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The screenshot shows the AutoRisk GUI interface. At the top, there is a menu bar with 'File', 'Export', 'Graph', 'Options', and 'Help'. Below the menu bar, there is a 'start' button and two input fields: 'Project' (C:\Program Files\SEER\SEM7-0\Test1.PRJ) and 'Working Directory' (C:\Program Files\SEER\SEM7-0). To the right, there is an 'Iterations' slider set to 1000. Below these fields, there are checkboxes for 'Display Rollup' (checked), 'Display ESLOC' (unchecked), and 'Sim-SEER' (unchecked). There are also sliders for 'Low Percentile' (set to 10), 'High Percentile' (set to 90), and 'Max WBS Correlation' (set to 0). A 'Recompute' button is located between the 'Low Percentile' and 'High Percentile' sliders. The main area of the GUI is a table with the following data:

Outline Number	WBS Element Description	Low Percentile Effort (Hours)	Low Percentile Schedule (Months)	Mode Effort (Hours)	Mode Schedule (Months)	High Percentile Effort (Hrs)	High Percentile Schedule (Months)
1	Test1	322,626	33.88	399,076	38.30	559,307	44.5
1.1	CSCI1	11,819	13.51	16,088	15.28	26,241	17.64
1.2	CSCI2	27,354	17.87	36,506	20.08	59,918	23.21
1.3	CSCI3	5,222	10.29	6,998	11.58	11,482	13.38
1.4	CSCI4	185,539	33.83	251,984	38.26	421,000	44.44
1.5	CSCI5	44,624	21.02	59,718	23.68	98,569	27.43

At the bottom of the GUI, there is a status bar with the text 'Complete' and a small input field containing the number '0'.



- autoRisk provides a tailorable risk assessment framework for automatic simulation of estimate distributions
  - Integrated with widely accepted software cost modeling COTS application (SEER-SEM)
  - User tailorable
    - Simulation boundaries
    - Correlation definition and assignment



- Investigate/Develop interfaces to other COTS and open source software cost estimation tools
  - Developing user defined model import/definition
  - Developing COCOMO II implementation



# Questions/Comments



- [1] **An Approximate Method for Sampling Correlated Random Variables from Partially-Specified Distributions**  
Philip M. Lurie, Matthew S. Goldberg  
*Management Science*, Vol. 44, No. 2 (Feb., 1998), pp. 203-218
  
- [2] **Lecture Notes on Monte Carlo Methods (Simple Sampling of Gaussians)**  
Jonathan Goodman  
*Courant Institute of Mathematical Sciences, NYU*, Fall Semester (Aug., 2005),  
Chapter 2
  
- [3] **Calculation of the normal distribution function**  
P.A.P. Moran  
*Biometrika* (1980), 67, 3 pp. 675-6



# How to Contact OPS

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