

# PERT Analysis Using MS Project



Scott Brunton, PMP MASc MBA

Senior Consultant

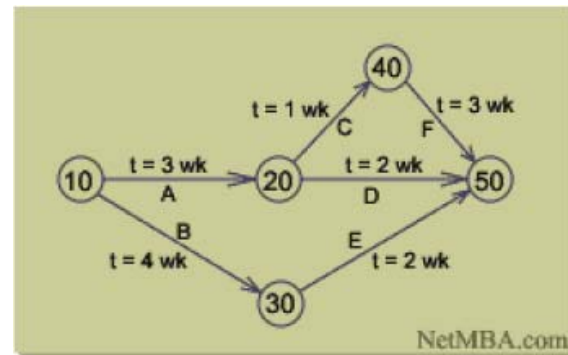
[sbrunton@lewisandfowler.com](mailto:sbrunton@lewisandfowler.com)

# Critical Path Method

- Pre-cursor to PERT
- Developed By Dupont In 1957
- Novel, Yet Simplistic, Approach to Project Network Modeling Requirements
- Based on 'Fixed Estimates' for Task Durations

# Program Evaluation & Review Technique

- Developed by Booz-Allen Hamilton in 1958
  - Lockheed Missile Systems – Prime Contractor
- Polaris Mobile Submarine-Launched Ballistic Missile Program
  - Special Projects Office Contract with US Navy
- Acknowledges ‘Randomness’ Surrounding Task Duration Estimation



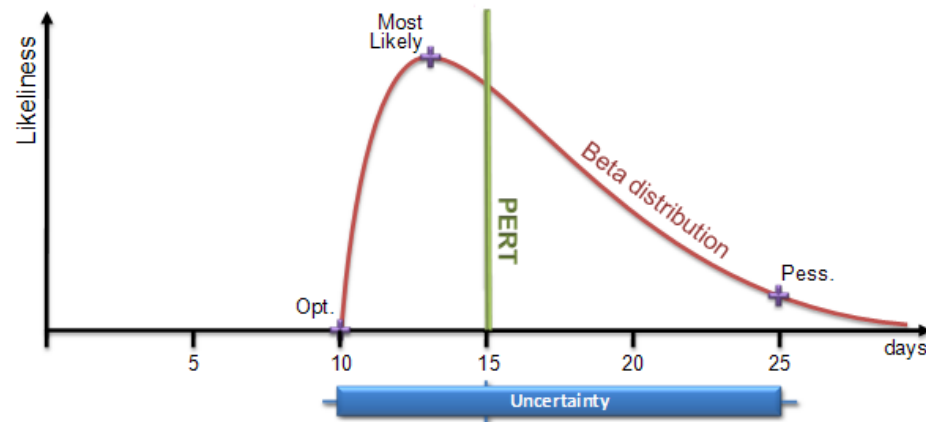
## Outcome – Three-Point Estimate

- Studied Bias and Reliability of Task Duration Estimates Collected by Variety of Methods
- Correlated Actual Durations with Estimates and 'Curve-fit' Results
- Expected Duration

$$Expected = \frac{(Optimistic + 4 * MostLikely + Pessimistic)}{6}$$

# Outcome – Three-Point Estimate

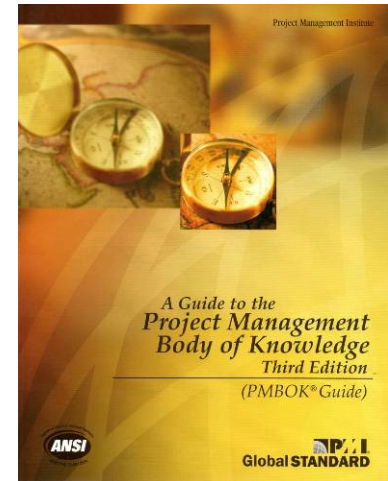
- Underlying Probability Distribution
  - Beta Distribution



- Expected Variance

$$\text{Variance} = \left[ \frac{(\textit{Pessimistic} - \textit{Optimistic})}{6} \right]^2$$

- Project Time Management
  - Activity Duration Estimation
    - Knowledge Area 6.4
- Risk Identification
  - Information Gathering Techniques
    - Knowledge Area 11.2.2.2



There Are No Facts About The Future

# Obtaining Credible Estimates

- Overcome Bias that Estimates are Optimistic
- Methods
  - Expert Judgment
  - Analogous Estimation
  - Parametric Estimation
  - Three-Point Estimation
  - Reserve Analysis



# Delphi Method of Estimation

- Experts Provide Estimates Anonymously
- Reduces Bias Injected by Influential Participant
- Results are Summarized by Independent Facilitator and Re-distributed to Panel
- After a Few Rounds, Estimates Will Converge on Consensus Answer

# Parkinson's Law

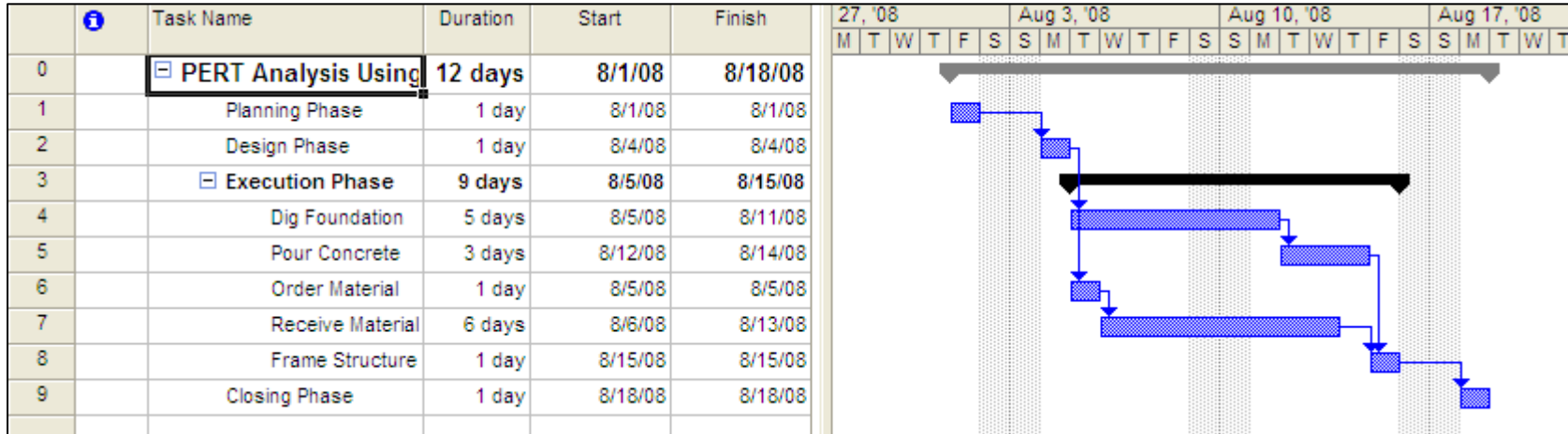
An Activity Will Always Take  
As Long As The Time Assigned To It.

# Psychology Of Soliciting Estimates

- Type 1 Estimators – Optimistic Inclination
  - Ask for Optimistic Estimate first
    - ... Then Pessimistic Estimate
    - ... Then Most Likely Estimate
- Type 2 Estimators – Pessimistic Inclination
  - Ask for Pessimistic Estimate first
    - ... then Optimistic Estimate
    - ... then Most Likely Estimate

# Demonstration

- Single-Point Estimate
- PERT Using Native MS Project Toolbar
- PERT Using Calculated Fields



# What If The Toolbar Isn't Available?

- Use 'ComAddinsDialog' Command To Reveal PERT Toolbar



- Microsoft Knowledgebase
  - <http://office.microsoft.com/en-us/project/HA101636871033.aspx?pid=CH101759951033>

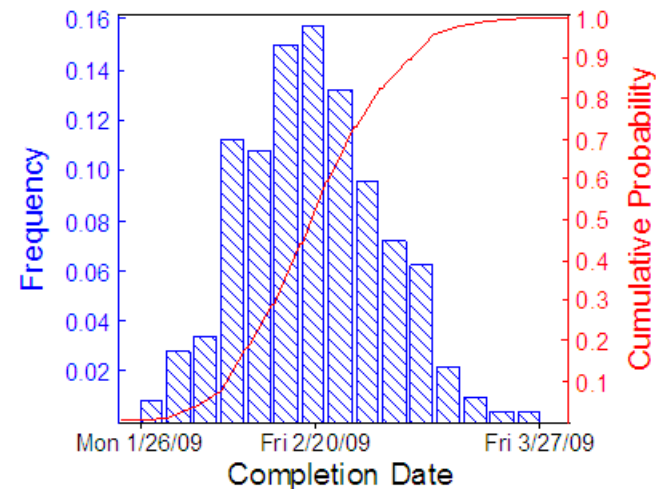
# Limitations of PERT

- Assumes Task Durations are Accurate and Independent
- Assumes Underlying Probability Distribution Of Estimates Can Be Represented By Beta
- Does Not Account For Quality of Estimates
- Influenced by Underlying Contractual Arrangements
- Static Single-Pass Calculation Of Critical Path Underestimates The Expected Project Duration
  - Neglects Effects of Near-Critical Tasks

# Probabilistic Simulation of Task Durations

## ■ Monte Carlo Simulation

- Statistical Method Using Random Sampling of Configurable Probability Distribution Curves
- Apply Random Variation to Each Task Duration
- Results Accumulate over Repeated Simulations
- Third Party Add-in
  - Deltek – Risk+



# References

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  - Harold Kerzner © 1998, ISBN 0-442-02551-3
- Field Guide to Project Management
  - David I Cleland © 1998, ISBN 0-471-29206-0
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  - James P Lewis © 1995, ISBN 0-8144-7835-2
- Project Management for Business & Engineering, 2<sup>nd</sup> Ed.
  - John M. Nicholas © 2004, ISBN 0-7506-7824-0
- Wikipedia - <http://en.wikipedia.org/wiki/PERT>

# Questions

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