Special time, cost scheduling and resource allocation technique

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Conventional scheduling techniques

Traditional: CPM and MPM technology Advantage: easy to use, can be calculated Disadvantage: does not handle

- The uncertainties of activity times
- Resource management is not
- Poorly structured task difficult to solve

PM problems USA national survey 1998

•	Projects only 44% completed within the time. On
	average, the projects are held 222% longer than I
	originally intended.

The budget will exceed 89% of them.

70% of projects do not reach the intended technical content

30% of the projects are stopped before completion

Special schedulin techniques

• PERT, Monte Carlo simulation Along with time and cost planning, cost planning tasks, "Time-cost trade-off" Resource allocation (time-constrained, resourcelimited) Critical Chain CCPM 1997

PERT

- Program Evaluation and Review Technique
 1958 Polaris missile system
- The activity times follow a beta distribution



PERT /kiinduló adatok

• Given for all activities Pessimistic value "b" optimistic value, "the" most likely value "m" The expected value of the activity time t, and the standard deviation s

 $t = \left(\frac{a+4m+b}{6}\right) \qquad \qquad s^2 = \left(\frac{b-a}{6}\right)^2$

Assumptions

followed by a beta distribution activity times the activity times are independent Calculating the mean and standard deviation simplified formula The amount of the expected value of the expected value of the activities on the critical path execution time activities in the amount of lead time variance, the variance of the critical path The number of activities on the critical path "practical" big enough lead time to eloszlásfüggénýrée feltehessük to follow a normal distribution. (The central limit theorems used items, although the theoretical conditions do not exist.)

PERT / assumptions

• A critical piece only way to consider The expected value of the expected turnaround time is a critical piece of road length, The expected value of the critical path length of a normal distribution, the critical path length of the sum of the expected value of the activities in the road. (Central Limit Theorem)





Results 1.

Pathes (length of the roads is normally distributed) A-D-E, The expected value of length: 43.5; Variance 2.9 B-C-D-E The value of the expected length: 42.3 Variance: 4.2

Assumptions

1. Activity time follows beta distribution

The time activities for natural-looking condition that the pessimistic and optimistic time to be positive in the unimodal distribution. For technical side, we can assume that the continuous distribution. In this respect, the beta distribution is fair and respects the same as the normal distribution assumption is not appropriate. Beta distribution has four parameters, so by the time the triple estimate fourth condition is usually used as the simplified calculation.

Monte Carlo Simulation

• Simple user perspective Each path takes into account not only the longest Activities can be dependent of each other

Time and cost together

- "Time-cost trade-off" Költségtervezési feladat
- Kelley J.E. és Walker M.R. 1959
- Fulkerson R.D. 1961





































Critical chain

• 1958 CPM, MPM

- 1997 Eliyahu M. Goldratt "Theory of Constraints" Critical Chain
- Why? What is the goal ?

principles

- activity time estimates with big safety (Mean Time + - 2 standard deviation = 95%)
- Let estimation of the activity time be the average (50%)
- Student syndrome, Parkinson's Law
- M(x+z)=M(x)+M(y)
- D²(x+z)=D²(x)+D²(y) (if those are independent)

Expected value

- The expected value of the random variable is the sum of the expected value of the variables M(path in the net)=
- =M(activity1+activity2)=M(activity1)+M(activity2)













