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The Evolution and Demise of Activity Float

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Abstract

During the past 50 years the Critical Path Method has matured from its very limited abilities into a sophisticated, comprehensive, and complex process. Some of the original concepts are no longer valid, Activity Float being one of them.

The term 'Float' originated with the first application of the network concept by James Kelley and Morgan Walker. This application was severely limited due to the computing capability at that time. It was also of a very short time duration and had only one resource and calendar. In this unique application, Activity Float had a rational basis.

However, in today's contemporary world of complex projects with diverse performers and stakeholders and where the resulting work plan schedule is based on numerous resources, date constraints, multiple calendars, 3 types of logical relationships with overlap or delay values, the determination of Activity Float is not realistic or of value.

In fact, its 'theoretical' calculation and the display of it is counter-productive as illustrated by the 'student-paper-syndrome', and/or 'Parkinson's Law' of extending actual performance to the time [float] available.

Introduction

Float: A BANKRUPT BELIEF !
Activity Float is a MYTH !

During the past 50 years the Critical Path Method has matured from its very limited abilities into a sophisticated, comprehensive, and complex process. Some of the original concepts are no longer valid, Activity Float being one of them.

The time has come to realize and recognize that the original paradigm of a Critical Time Path and the ability to ‘float’ activities without impact or delay is no longer a valid concept or premise. The real scheduling environment of today is very significantly changed from our past concepts and practices. To understand this the historical background, the evolution of how, why, and when float is used, and its utility in contemporary scheduling practices is reviewed. The conclusion is that focusing on and believing that activity float is useful once the planned schedule is confirmed is a pitfall or booby trap and a deceptive misdirection of the management team’s efforts to manage the planned completion of the work activities.

Historical Context.

Industrial Engineering always had an objective of improving operations and profit by coordination and better utilization/efficiency of resources. Harry Gantt and William F. Taylor are best known as pioneers in this field.

In 1957 James Kelly [Industrial Engineer} and Morgan Walker [Mathematician] prepared a list of equations in which they used formulas of dependent work items [aka activities] to mathematically model the flow of work [they called them 'chains']. Because an extensive list of equations was difficult for others to comprehend they made them into a graphic model where each work item was represented by an arrow indicating direction and dependencies. Hence, the 'Arrow Diagram' was born with work-items shown as activity arrows connected at nodes [aka AOA, Activity on Arrow]. This became known as the Arrow Diagram Method, ADM.

Activity Attributes.

In Kelley-Walker's application there was only one resource, millwrights. No constraints were considered [i.e. calendars, imposed dates] or restraints other than the logical relationship of finish-to-start of the work item activities and the dependency of one chain of activities to another chain at some juncture.

Each activity had only one variable, time. I.e. A1-t1, A2-t2, A3-t3….

Activity Path Float.

The term 'Float' originated with the first application of the network concept by James Kelley and Morgan Walker. This application was severely limited due to the computing capability at that time [actually the 1st electronic computere, ENIAC].. It was also of a very short time duration and had only one resource and one calendar [or maybe none as the application was 7/24]. In this unique application, Activity Float had a rational basis.

Because the total work plan was open-ended, the Mathematical Analysis could compute the total duration of the work plan. It also showed which sequence or path of activities was longest in total time. [later known as the 'Critical Path' thanks to the U.S.Navy]. Then it also showed which paths were not controlling and these were said to have 'slack'.

Evolution.

As technology in data processing became more encompassing, more attributes or variables were added to both individual activities [resources, calendars, lead and lags] and the work plan [constraint dates such as fixed milestones events, start-not-earlier-than, finish-not-later-than.]

The effect of this multivariable enhancement was to segment activity performance time-wise according to the availability of resources and/or work calendars, and imposed time frames due to constraint dates.

Critical Sequence versus Critical Path.

Now instead of a continuous time path from which path float could be derived, there was embedded in the network analysis some sequence of activities that might be, if not impacted by constraint dates, actually controlling the earliest completion of the work plan.

Unfortunately, this sequence' is for all practical purposes, invisible. As with many such 'invisible' things, we believe they exist but proving them is the province of the types of the Einstein's, et al. Gravity is a good example; we know it exists, can test its presence, but cannot see it, albeit we can feel it as manifested in 'G-forces'.

Fast Forward -> 21st Century Float.

In today's contemporary world of complex projects with diverse performers, sub-contractors, and stakeholders and where the resulting work plan schedule is based on numerous resources, date constraints, multiple calendars, 3 types of logical relationships with overlap or delay values, the determination of Activity Float is not realistic or of value.

If the 'controlling sequence' is invisible, how can we compute float in relation to it ? Well, actually we don't need to.

Once the schedule for the work plan is developed and accepted as 'the plan' which all participants will use to manage their performance, the concept of 'float' is moot.

In fact the continued belief in float is ill-founded and can be harmful to work performance and coordination as the Student Syndrome and Parkinson's Law will become reality. [Murphy's band of merry mischief-makers are not unknown either.]

Project managers and Contractors today rarely have full control of the resources needed to complete a project. Consequently they have to depend on accepted schedules to coordinate and manage their responsibilities and the performers and sub-contractors thereof.

Conclusion and Recommendation.

Due to contemporary scheduling processes and practices, the concept of activity float, path float, or project float, is irrelevant at best and counter-productive at worse. Concern about an misleading 'computer' generated value diverts attention from the real measure of success, the timely performance of activities by all participants.

"Total Float is too often not a reliable or accurate measure for schedule evaluation. As Total Float is used to identify critical path, the reliability of the critical path is also suspect. Float is mathematically or hypothetically there but [quite often] no longer a meaningful measure of impact on the project" –Abbi Basu

Since 'float' is an irrelevant value, it is recommended that it be removed from the network analysis program reports once the work plan and schedule have been reviewed, accepted, and made a part of the contract.

Now, please see the two appendices below:

Appendix 1

Understanding Activity Float and Float Paths

PRE- Current Era = Pure Vanilla Computer Solutions [also known as 'Mathematical Analysis]

- Only Finish-Start logic – Arrow Diagramming Method - Activity-on-Arrow
- No Calendar, times only or Single Calendar
- No End Date or only a single date
- No Resources
- Single time units [i.e.days]

R E S U L T S: Critical Path = activity sequence path with least 'Total' Float [-. 0, +]

POST Enhancements of Computer Solutions

- Multiple Calendars
- **RESOURCE Allocation Scheduling** [using float]
  - Forward 1975->
  - Reverse 2002 ->
- Multiple interim 'milestone' dates
- Precedence Diagramming Complex logic
  - Activity-on-Node AON
  - Start-start
  - Finish-Finish
- Lead and Lag durations on dependency arrows
- Optional time units: days, weeks, months
- Split performance of activities [interruptible]
- Varying resource levels within a Schedule Activity

- Multiple resources per Schedule Activity

RESULTS:

Critical sequence of activities is not visible due to time interruptions by different calendars, resource delays or restraints, lead or lag values, and interim constraint dates.

Hence, the values of 'Total Float' do not now represent work periods that work can be delayed to cure schedule problems on other disjointed paths even for activities that show the same TF value.
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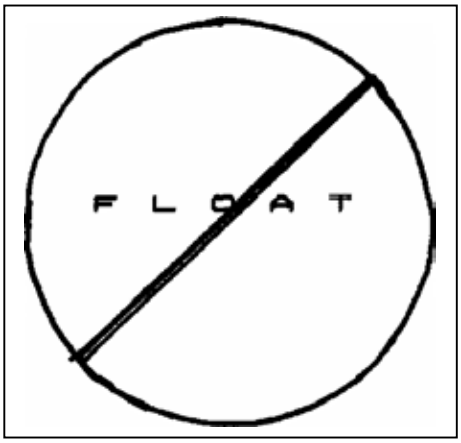
Appendix 2

FLOAT: A BANKRUPT BELIEF !

**If we're debating ownership,
we're debating the wrong topic !**



Concern over float, other than completion of the Project, tells something about the validity of the schedule [or non-schedule].

Good scheduling will use most of the available float.

Resource Allocation puts it ahead of the activity, and reverse scheduling takes away float following an activity.

After 25% of the Project duration, most float will have been consumed by slippage (by those who were told they had float).

Float is a Myth !

About the Author:

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Author

Earl Glenwright, PSP, has a career spanning 40+ years in construction project scheduling. Earl is certified as a Planning and Scheduling Professional [PSP] by the Association for the Advancement of Cost Engineering International [AACEi]. He is currently active with the PMI-College of Scheduling, and the AACEi Planning and Scheduling Committee. He frequently gives presentations at their annual conferences. Earl has both a BS in Civil Engineering and a MBA degree and is a Registered Professional Engineer. Earl's career has included multi-year positions in several countries including Brasil and Saudi Arabia, and shorter tours in Sudan and Gabon. He currently lives in Gabon and Colorado. Prior to 1988 he was employed by the [US] Bureau of Reclamation and the [US] Army Corps of Engineers. After retiring in 1988 he has been a free-lance consultant for both contractor's construction scheduling and small business Enterprise Project Management. Presently he is assisting the State Dept in their construction of a New Embassy Compound in Gabon. His experience includes large and very large [super-mega] construction projects, very small projects such as construction planning, and scheduling for home construction by his Habitat for Humanity affiliate. Through his extensive scheduling experience he has been recognized as a Subject Matter Expert [SME], a Master Scheduler, and an Expert Advisor. Earl has been active in the Project Management Institute for 30+years. He has presented "Time & Cost" training at PMI's annual seminar-symposia, and was a member of the initial PMBoK Guide Project Team, the 2000 update team, and the project team that prepared the 3rd edition. Earl has recently presented 'workshop/seminars' for Bulgarian project scheduling and controls persons which covers the 3 phases of scheduling: framework preparation/planning, schedule development, and schedule management and control. The work books are dual language English and Bulgarian. Earl can be contacted at etg_cos@yahoo.com.