
Traveling the Critical Path

Observations & A-musings of an Itinerant Project Management Practitioner^{1, 2}

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Most of my civilian career was involved in Project Management: planning, scheduling, monitoring and evaluation – specifically the application of the Critical Path Method (CPM) and several directly-related tools & techniques. [I first learned about the PERT/Critical Path Method (CPM) in 1961 as a civilian U.S. Navy Management Intern.] So, I thought it might be useful to provide today’s practitioners with a quick summary of the **Critical Path Method’s** beginnings, and some innovative applications since those early days.

The first point I want to make is that Project Management is not new! For thousands of years, numerous large-scale projects conceived by mankind’s ingenuity have been constructed in the service of past and present civilizations, and are still evident everywhere around the world; as well as hidden – *and occasionally rediscovered* -- under its soil and oceans.

Most of these structures and artifacts could not possibly have been created without systematic program planning and project management! However, we can only speculate how those early engineers and project managers accomplished what they did – even if perhaps not as efficiently as today -- as we know practically nothing about how they planned and implemented them. Furthermore, *even with the technology we have now, we cannot replicate some of these edifices!*

But today’s ‘Best Practice’ tools to plan, schedule and monitor projects efficiently were forged only relatively recently -- during the 20th Century -- first by (or for) the U.S. military, then subsequently honed for diverse use, world-wide! The top three are:–

1. **Work Breakdown Structure,**
2. **Gantt/Bar with Milestone Charts, and**
3. **Critical Path Method.**

¹ This is a truncated version of a more extensive presentation TRAVELING THE CRITICAL PATH & EXTRACTING EARNED VALUE, I gave at a Symposium of the international Project Management Institute, Philippines Chapter, Metro Manila, June 2017. The full presentation is contained in my book Project Management PRAXIS (available from Amazon).

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- The first was the **Work Breakdown Structure (WBS)** -- developed at the beginning of the 20th Century -- in **1907** -- by US Army **Major George W. Goethels to plan the scope of work to construct the Panama Canal.**
- About the same time (1903) **Henry Gantt** -- an American mechanical engineer working with **Frederick Taylor** -- developed quantitative spreadsheet '**Balance & Process Charts**' (BPCs) to improve efficiency and effectiveness in factory work production. Later, Gantt upgraded his 'balance' charts in graphic **bar chart form**; and these new "**Gantt Charts**" quickly gained prominence as the eponymous **benchmark methodology** for planning and managing large scale engineering projects. For example, during the 1930's, **Gantt charts** were used by **Henry Kaiser to plan and manage highway construction, and large-scale dams**, while **Henry Ford & George Sorensen applied flowcharts to establish automobile assembly-line production techniques.**
- Still later -- during WWII (1939-1945) -- Kaiser revolutionized shipbuilding **with mobile 'Rosie-the Riveter' work crews** to concurrently mass-produce 'Liberty Ships' in different dry docks. Ford & Sorensen created **a mile-long assembly-line plant** to churn out aircraft **with in-place 'Rosie-the Riveter' teams**; and **George Fouch** of the Goodyear Tire Company **optimized scheduling of repetitive activities and processes** for wartime aircraft and materiel production with a Gantt variant -- the "**Line-of-Balance**" (**LOB**) technique.
- **But the biggest advance in project management methodologies occurred in the aftermath of World War II** -- during the 1950's & 60's -- when a contentious "**Cold War**" between the Soviet Union and U.S. allies precipitated a nuclear arms race.

Two more major tools for developing and managing complex weapons projects emerged:

PERT/Critical Path Method (CPM)
and
Earned Value Method (EVM)³

The initial innovation for scheduling & managing projects was PERT/CPM – as it was then known – that significantly changed the paradigm for planning, scheduling and monitoring to what we use today and became the synonymous 'Icon' for Project Management.

³ Which I discussed at length in last month's article: Smith, K. F. (2022). MONITORING & ANALYZING PROJECT COSTS: PMBOK+PLUS Tools & Templates to Facilitate Financial Analysis, *PM World Journal*, Vol. XI, Issue VI, June. <https://pmworldlibrary.net/wp-content/uploads/2022/05/pmwj118-Jun2022-Smith-monitoring-analyzing-project-costs-pmbokplus.pdf>

My Genesis

When some of my kids came to visit me in Honolulu a few years ago, I took them to Pearl Harbor – site of the US Navy’s Arizona Memorial straddling the sunken battleship, USS Arizona. Wandering around other WWII and Cold War-related US Navy exhibits on display at Pearl Harbor, we saw and climbed aboard a submarine on display – the ‘*Bowfin*’ -- a small, diesel-fueled WW II model, rather than a nuclear one.

However, nearby, *I was startled to encounter a relic of the first big project I worked on!*

Polaris -- aka the **Fleet Ballistic Missile (FBM)** -- was a thousand-mile range solid-fueled Inter-Continental Ballistic Missile (ICBM) with a nuclear warhead, carried aboard nuclear submarines and could be launched surreptitiously while the submarine was still submerged.

After recovering from the shock of seeing Polaris missiles in Pearl Harbor’s open-air museum, I realized **my program and project management experiences** – that began with the *PERT/Critical Path Method era* -- under Admiral “Red” Raborn and Admiral “Hymie” Rickover -- were now also ‘*HISTORIC!*’

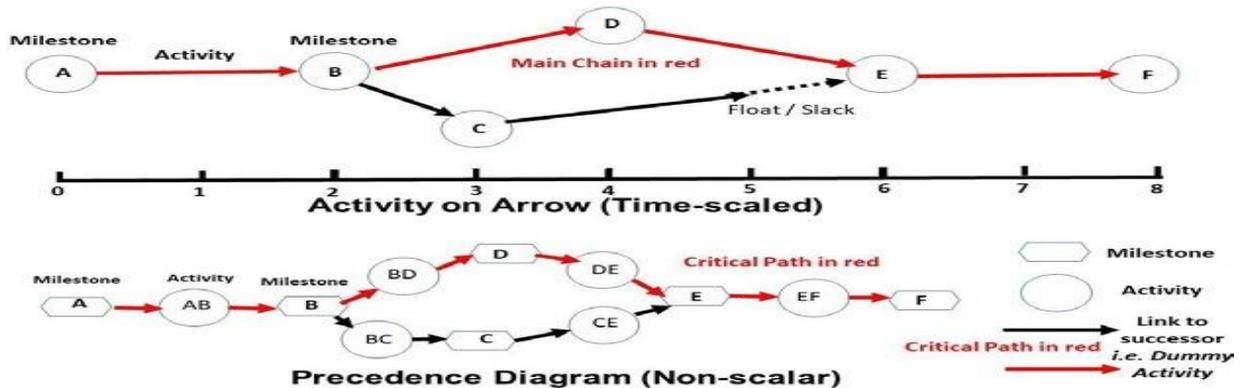
Actually, the Critical Path Method evolved from two contemporaneous efforts -- one Private ‘FOR PROFIT,’ and the other Public ‘NON-PROFIT.’

In 1957, **Morgan Walker** and **John Mauchly** of the **DuPont Company** -- with assistance from **Jim Kelley** of **Remington Rand (RR)** -- were already adapting Gantt’s bar chart methodology for a computerized **Project Planning and Scheduling (PPS)** system to *optimize time/cost relationships* in chemical plant construction. Bars were converted to arrows and linked to depict what they called logical “**i-j**” relations -- *what we refer to today as “predecessor-successor” relationships* -- to create a **time-scaled “activity-on-arrow” Network** with definitive time and cost estimates. They called the longest series of activities the ‘**main chain.**’ Although the scheduling aspect was successful **manually**, computerization was very inefficient, and the PPS system was unable to optimize for cost.

Concurrently, **Lockheed** -- the Navy’s prime contractor -- developed a *similar approach* to plan, manage, monitor and control the Polaris project. However, unlike DuPont’s extant project, Polaris missile development was still in the Research & Development (R&D) stage. Although the step-by-step *R&D Process* was well-defined, *schedule & cost estimates for a specific non-existent project were highly unreliable.* Thus, *DuPont’s PPS -- with its time-scaled arrow diagram -- wasn’t completely applicable.* Rather than a time-scaled network, Lockheed’s ‘work-around’ solution was to draft Polaris’s *Activities, ‘Events’* (i.e. *Milestones*) and their **interrelations** as a series of “**Nodes**” in a *non-scalar “Precedence Diagram.”* [Subsequently called a *Precedence Diagramming Method (PDM), or Activity-on-Node (AON).*] Essentially, the PDM was a

schematic flowchart (without loops) but in this format, *the arrows were not activities*; merely *linkages* between the Milestones and Activities.

Figure 1
Time-scaled AOA vs Non-scalar PDM



To cope with the schedule uncertainties inherent in R&D, **Edwin Booz and Lockheed’s team** of engineers also *devised a statistically-probabilistic formula*, based on the standard deviation concept, with a weighted three-time estimate [*i.e. best case, 4 x most likely time, and worst case*] range for each activity. They designated the longest time sequence of activities through the **PDM Network** the ‘**CRITICAL PATH**’ -- *essentially DuPont’s PPS ‘Main Chain.’* That soon became formalized as the **PROGRAM EVALUATION & REVIEW TECHNIQUE (PERT)**.

In racing against the Russians, *early deployment* of strategic nuclear deterrent capability & retaliation *was a top priority of the U.S.* Consequently, everything about the Polaris Project – its development, functioning, support and deployment -- **was unprecedented**. In January 1957, **Gordon Pehrson** -- *a senior Navy civilian* – insisted on the Navy Department establishing a **common integrated planning and evaluation system** to manage Polaris as *a Research & Development (R&D) Project - on a Production Line!* **The result was the Critical Path Method.**

The Defense Department’s top priority in the nuclear arms race was to complete the Polaris project as soon as possible (ASAP), so managerial attention at every level was focused on reducing lead times. Although not insignificant, **cost management was a much lower priority,** so close attention on that was deferred until later – when it surfaced with the emergence of **PERT/Cost,** and ultimately **Earned Value.**

The PERT PDM Network was used to establish linkages with other Program and Project Breakdown Structure (PPBS) components, and Critical Path schedules within each component were the prime focus for monitoring and controlling the overall project.

By these combined approaches, the first successful Polaris A1 missile was launched four years later on July 20, 1960, and *more than two years ahead of the original anticipated schedule!*

The legacy of Critical Path’s logical methodology is still the ‘Best Practice’ available for planning & scheduling both *PROFIT* and *NON-PROFIT* projects, but it is highly unlikely that in today’s budget-conscious environment project managers will be afforded the same degree of freedom in its application.

My Project Management Odyssey

I started -- as a civilian -- with the US Navy’s year-long **Management Intern Program** in Washington D.C in June 1961; **one year after Polaris had attained its initial objective**. So while PERT/CPM was still the prime focus for follow-through modifications, **logistics management** for delivery roll-out scheduling – *at 16 per submarine* -- had already moved on to the aforementioned ***Line-of-Balance technology***.

Based on the success of Polaris being completed over 2 years ahead of its expected schedule – and the coincidence (if not Cause & Effect) of **PERT/CPM** – Secretary of Defense **McNamara** ‘**Projectized**’ the U.S. military’s overall “**Vision & Mission**” by **TOP-DOWN EXECUTIVE MANAGEMENT DECREE**. He **quickly required** that henceforth **PERT/CPM** &/or **PPS** be applied to supplement **traditional Bar/Gantt Charts and Milestones** in planning, scheduling and monitoring **ALL large scale, large budget Military defense contract projects**.

Other government agencies – notably the **National Aeronautics and Space Agency (NASA)** that was engaged in a “Space Race” and since October 1957 had been playing ‘catch up’ with the Soviet Union’s spectacular launching of ‘*Sputnik*’ (the world’s first artificial satellite) -- quickly followed suit.

Coming into the Navy’s **Bureau of Weapons (BUWEPS)** as a civilian Navy Management Intern (NMI) during 1961-62, I got deeper immersion in -- and experience with -- **PERT/Critical Path**; first in theory in the classroom, and subsequently on-the-job with the **Polaris Project** under the **Special Projects Office**. With over 3,000 contractors and subcontractors sending in weekly progress reports by phone and cable, for us to update every Friday to the Special Projects ‘Plans & Programs Office’ in Washington (where I was interning). Activity and Milestone data were collected by conventional means. We would frantically spend a day processing the data (mostly manually) to identify the on-going activity (or activities) status and critical path, in preparation for the Monday Morning Briefing.

Although the Polaris Project was computerized to some extent, it was not very efficient or effective for analyzing data in a timely manner. *The data was initially computed manually and would be formalized in the computer -- for the record -- during the following weeks.*

The Special Projects office had a dedicated complex computer for data processing – I think it was an IBM 7090 but I’m not sure, as I wasn’t privy to it *as only IT specialists had access to the system, located in a large air-conditioned laboratory-type room.* I don’t know what scheduling & monitoring tools the various contractors were using on their job sites, but at the Headquarters level, we had a high-level **precedence network** -- manually prepared and maintained with activity and milestone accomplishments posted on it. Fortunately – since the network was a non-scalar Precedence Diagram – it wasn’t necessary to redraft it, but simply to monitor and update the status with colored markers compared to a vertical “snake” timeline.

Post-Polaris

After my first year as a rotating intern -- including the stint in the Special Projects Office (SPO) - - I was assigned to the **Navy Management Office (NMO)** as a **general management analyst**. There I was a team member doing special studies, and **was able to apply Critical Path** and various other analytical techniques to several other on-going Navy operations and issues, **as well as Line-of-Balance** to monitor and assess the status of factory production runs by contractors.

A couple of years later I was selected to be a **management systems specialist** and the Navy’s representative to the interagency **PERT Orientation & Training Center (POTC)** managed by the Defense Department. Several of us traveled across the US spreading the Critical Path gospel - - primarily to military installations and Defense contractors plants -- inculcating the skills of project managers and staff. As word of the efficacy of PERT/CPM spread, we also consulted with other government agencies -- on request -- to assist in applying CPM to their projects. Subsequently PERT/CPM & PPS merged into what became known as the **Critical Path Method (CPM)**.

I’ve been a disciple ever since!

My career in project and program management continued to evolve “**5D**” – i.e. in **Five Different Dimensions**. As a **CPM instructor** and **consultant** and later a **Foreign Service Officer** for USAID in the State Department I had

1. **different roles in different organizations,**
2. **with projects in different sectors**
3. **directed to achieving different objectives**
4. **for different countries,**
5. **working with people (and personalities) from different cultures.**

In turn, I became a “4D”

1. **Project Management Advisor,**
2. **Project Evaluator,**
3. **Project Manager,** and

4. Project Management Trainer.

Then, after I retired from USAID, I became “5D” again

1. an **Adjunct Faculty, & Researcher in Program and Project Management;**
2. and now – once more a **Trainer, Facilitator and Consultant.**

In retrospect, although emphasis on “PERT” *per se* has lessened -- Critical Path networks linked to Gantt/bar charts and milestones have predominated throughout these past 50-odd years as “Best Practices” for planning, scheduling, monitoring and evaluating all kinds of projects; although the means and *techniques* for applying them have evolved into more sophisticated forms.

Project Management Tools & Techniques

Although PPS & PERT/CPM systems were inherently logical, in those early days of the “BC era” – *i.e. before widespread availability of computers* – long after I left the Navy project behind, **preparing and processing data by computer was still so laborious and time consuming, that much of the critical path data analysis and graphics were initially produced manually, and verified later – for recording and retention by computer printouts!!**

Unfortunately, “PR” notwithstanding, in the early days many organizations had poor initial experiences with PERT/CPM networking — particularly for implementation — and subsequently shunned it. **The key practical difficulty with the manual approach was simply inability to update progress, and produce timely graphics** — especially if a time-scaled network was desired. Changes on the job often occurred faster and more frequently than the turn-around time at the drafting shop. **While analysts could *compute* the impact of the changes with the new data, management was almost always faced with an outdated obsolescent (and sometimes obsolete) critical path network.**

One device we used early on was **Bob Youker’s ‘Plan-a-log’** kit in a suitcase. It consisted of a set of extruded aluminum tracks that could be extended indefinitely, with numerous plastic ‘beam riders’ of various lengths for activities, and milestone clips – like small combs – that cut across several tracks. A team could then physically construct a project network, and the effect of a time change in an activity was instantly revealed. I remember seeing the excitement build in New Hampshire’s Portsmouth Naval Yard where a submarine was under construction, as different tradesmen worked together to create their inter-related work schedule and see the effect on downstream activity float. The same process was repeated in other Yards at Groton Connecticut, Philadelphia and San Francisco.

For a while, large magnetic wallboards were in vogue to display CPM Networks; and we used them quite a lot to **plan military operations**. At **Langley Air Force Base near Virginia Beach, HQ of Tactical Air Command**, our team spent several days plotting the sequence of activities to

support a **program in Vietnam**. When we had finished, the Project Operations Manager in charge – a General -- came down to inspect it, nodded his approval, and told us to bring it upstairs to the conference room for a briefing. Everything went well as we maneuvered the board through the hallway and up the stairs. Unfortunately, as we entered the room, the board hit the door frame and was instantly demagnetized; dropping at our feet the activities and milestones – which had been carefully-prepositioned over the past few days! It took another day to reconstruct the network; after which we took a slide photograph with a camera for display by projector, and acquired a Polaroid camera with instant picture capability to reproduce, and provide to the participants!

Apart from the traditional uses of Critical Path for scheduling and monitoring project implementation, while with the Pert Orientation & Training Center, I extended its application to two additional stages –

1. Post-project Litigation, and 2. Contingency Planning.

Post-Project Litigation. In 1963 I worked as a short-term consultant with a team of engineers and attorneys from the U.S. State Department’s Agency for International Development (AID) to review a contract claim. Working with AID’s engineers, **I manually reconstructed the project from the project’s bar charts into a CPM format.** Then -- from the periodic progress report data -- we were able to simulate implementation and pinpoint where variances had occurred, and attribute responsibility more rationally. I then appeared as an ‘expert witness’ in the claims court.

Following that successful application, a year later, the USAID engineering office asked POTC for my assistance for a much larger contract claim in another part of the world on a different sector project – a telecommunications project with a series of line-of-site towers and relay transmission equipment sheds between several countries. Again, only traditional bar/Gantt charting had been used to plan and monitor the schedule. But this time the project was a **repetitive process** type, with various work crews leap-frogging from one job site to the next – essentially a made-to-order **Line-of-Balance** application *post facto* analysis. So once more, I meticulously reconstructed the project plan and process from their bar charts into a Critical Path base plan -- calculating *backwards* from the final delivery deadline to establish the ‘latest time’ LOB schedule for the key milestones of the number of repetitions required.

The team was then able to compare the contractor’s actual implementation from the progress reports with the LOB feasibility schedule to validate their claims, determine damages as well as attribute responsibility for liability.

Contingency Planning. After the Great 9.2 Alaskan Earthquake & Tsunami in March 1964, the President’s Office of Emergency Planning (OEP) wanted to know whether Critical Path could be used to improve emergency response preparation. I spent a few days with them and we developed a generic response plan that identified key activities, milestones, sequence constraints, and resources typically required to mobilize and respond to a disaster, then estimated lead times to acquire and/or pre-position them in various places for timely response.

In 1994/95 – based on their after-action experience with the 1989 Exxon accident in Valdez, also in Alaska -- I conducted a similar pre-planning exercise with US Coastguard HQ officers to facilitate responding to an Oil Spill.

In 1966 USAID hired me as a civilian **'at large'** management information systems specialist **with a mandate to introduce CPM – Agency-wide -- and readily available to assist individual managers apply CPM & LOB** and related project management tools & techniques to a wide variety of sector projects – i.e. agriculture, irrigation, land reform, education, health, refugee housing and resettlement, as well as infrastructure, and port-clearance operations. I continued as a Foreign Service Officer project manager and evaluator, with tours of duty in the Philippines, Korea, and Indonesia, as well as Washington, intermittently helping other missions around the world.

In February 1973, **US Prisoners of War (POWs)** were released by Hanoi after the Vietnam War and brought to Clark Air Base in the Philippines. **I used Critical Path networking to identify and sequence the essential tasks for receiving, rehabilitating, debriefing and repatriating them.** The network was the focal plan for allocating responsibility to various elements of the “Organizational Breakdown Structure” so nothing would be overlooked -- or alternately redundantly mismanaged -- as well as coordinating predecessor / successor “handoffs” so things wouldn't slip through the cracks from neglect.

From 1976-1978 – although not even a “talking doctor” then, and knew little or nothing about “Health” *per se* I was the project manager for a **Health Project** in Korea, and in 1978-1979 the acting portfolio manager of USAID/Indonesia's multi-million-dollar **Health portfolio** with related programs and projects. [*Thus emphasizing the point that as long as you have technical specialists on the job, project management activities are to facilitate and support the specialists; separate and distinct from the project's technical subject matter.*]

As I indicated earlier, PERT/CPM was the major management innovation of the sixties. Because it was intrinsically logical, Critical Path networking "took off" -- rapidly becoming the icon of technocratic management efficiency and effectiveness -- both in the U.S. and abroad, and particularly in the construction industry. Critical Path charts also started appearing in TV programs as executive office backdrops!

In addition to weapons systems development, applications appeared in programs and projects monitoring activities as varied as planning weddings, political reelection campaigns, movie-making, computer installation and office redesign & relocations, analyzing contract claims and preparing legal briefs, military operations, and "out of this world" programs by the U.S. National Aeronautics & Space Agency (NASA); as well as down to earth economic and social development projects in the Third World.

Many early applications did a great job in the planning stage — where the network was the end product — **but bogged down during implementation** where the network was supposed to be an operating support system for management. Unable to perform this role effectively in many manual operations — and even some high-cost main-frame computerized ones — **PERT/CPM soon suffered from a lack of top management interest and follow-through support.** As support dwindled, operational results also declined.

Nevertheless, CPM networking was still used extensively *by* management if not *for* management. Key CPM concepts — such as "*network*", "*critical path*" *Float*" and "*slack*" — were frequently given lip service and/or used as "window dressing" in proposals and presentations, or to hang on the wall to impress visitors, even if infrequently applied for planning & managing projects.

With the rapid proliferation of Critical Path applications in the late 60's, in 1969 **the Project Management Institute (PMI)** was founded as a nonprofit organization **to determine what else** — *i.e. beyond Critical Path* — comprised the work of project management, and promote the concept of Project Management as a stand-alone "Profession" irrespective of engineering or other technical discipline to which it was being applied.

My one **big disappointment with MS Project and Primavera** was that subsequent versions of their software **only developed Activity Precedence diagrams and Gantt/bar charts separately, rather than time-scaled 'activity on arrow' diagrams.** For a while, another software company produced an excellent add-on to MS project — *Project Partner* -- that drew excellent time-scaled arrow diagrams, but Project Partner fell by the wayside when newer MS Project versions evolved.

I also experienced considerable difficulty with Primavera **linking several sub-project components**, for a World Bank-funded Ugandan Forestry Rehabilitation & Related Industry project in 1989; as well as **integrating some seventeen sub-project components** into a master network with MS Project for monitoring a World Bank "Calub Gas" Oil & Gas Exploration Project during 1996 in Ethiopia. In both situations, there was no capacity to "roll up" and summarize, or "drill down" to activities at lower levels. Instead, I had to laboriously create a series of "sub-nets" or "fragnets" (Primavera) and use their critical paths with highlighted & coded milestones for reference in the master summary.

Based on my experiences and frustrations with the existing software, in 1997 I wrote my own guide -- "*Smithereens*" -- to supplement **MS Project-4** and enhance the program's versatility for my students by **explaining in detail** some common functions with which I -- *and many of my co-workers and students* — had had difficulty; but which all too often were glossed over in standard manuals; thereby leaving us to struggle (sometimes for hours) to figure out what is essentially a fairly simple "routine" designed by geeky software programmers.

PMI advocates cumulative costing of activities for successor milestones as the best practice; and indeed, I have found it so in teaching Earned Value. However, I had another **unfortunate**

experience with the Ethiopian World Bank Oil & Gas Exploration Project -- and *temporarily lost our \$75 million budget* -- using MS Project for costing!

The **MS Project protocol** multiplies the cost for each activity unit of time by the total activity duration. So far so good. However, the duration for a milestone is 0, so relating the activity cost to the milestone gave me a truly zero-based budget! After we realized why, we recovered our budget by the laborious work-around of adding one-time unit to each milestone, and subtracting one time unit from each of the immediate predecessor activities.

Furthermore, **many organizations are unwilling – or unable – to use MS Project for accounting** as they already have a well-developed computerized accounting system, compete with cost codes. So, as a fallback, when necessary, I use Excel worksheets for the budgetary aspects.

As software was improved enabling micro-users to do their own thing, printers also evolved, and **printing precedence diagram networks and bar charts became another problem**. At first, with dot-matrix printers with linked and folded pads of paper with holes on each side to print on – I could cope by printing precedence diagram networks and bar charts **sideways**. However, with the advent of printers that wrote on sheets of A4 bond paper, the chart end product was a mess – dozens of pages that had to be taped together with manual mark ups to connect the activities between sheets, due to the disconnect enforced by the margins around each page! **An XY plotter with colored ink-pens does a great job however.**

After I retired from USAID, I returned to academe part-time while continuing project management activity as a free-lance consultant & trainer. On a humorous note, I recall giving a presentation to a Chinese audience in Beijing, and knowing no Chinese I relied on a local interpreter to simultaneously translate what I was saying. However, at one point I realized from the facial expressions of the participants that what I was explaining about critical path was not getting across. Fortunately, my ADB project officer -- a Chinese-American -- was with me and intervened. **It turned out the interpreter was translating “Critical Path” as “Difficult Road!”**

The Top Three Lessons Learned -- from My Personal Project Experience

- 1. Project & program managers do not need to be specialists in the sector technology** as long as they have technical sector subject matter specialists to rely on for implementation. **The PM’s job is to facilitate the technical specialists in their work.**
- 2. Don’t put all your activities in one CPM network when managing large projects!** A large network is too cumbersome, and -- with too many details presented to higher levels -- fosters micro-management.

3. CPM Networks -- or Gantt/bar charts based on the critical path methodology -- are undoubtedly the best practice for scheduling. However, they do not guarantee the project will be successful!

Not incidentally, *with the help of my kids, and grandkids*, I developed “**Critical Path: The Project Implementation Game**” – a competitive board game for 4 or 5 players -- as a major component of my seminar/workshops on project management, to reinforce the essential concepts of the Critical Path Method.

To summarize; 20th Century Critical Path Tools & Techniques have been *PERVASIVE* since their inception; *INCLUSIVE* in that they are appropriate to both Public and Private Sector (Profit and Non-Profit) Entities, as well as *DIVERSE* -- as exemplified by some of my experiences related here -- and should be conscientiously applied until something better comes along.

IN CONCLUSION:

EVERY PROCESS IS A POTENTIAL PROJECT!

About the Author



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Initially a US Civil Service Management Intern, then a management analyst & systems specialist with the US Defense Department, Ken subsequently had a career as a senior foreign service officer -- management & evaluation specialist, project manager, and in-house facilitator/trainer -- with the US Agency for International Development (USAID). Ken assisted host country governments in many countries to plan, monitor and evaluate projects in various technical sectors; working ‘hands-on’ with their officers as well as other USAID personnel, contractors and NGOs. Intermittently, he was also a team leader &/or team member to conduct project, program & and country-level portfolio analyses and evaluations.

Concurrently, Ken had an active dual career as Air Force ready-reservist in Asia (Japan, Korea, Vietnam, Thailand, Indonesia, Philippines) as well as the Washington D.C. area; was Chairman of a Congressional Services Academy Advisory Board (SAAB); and had additional duties as an Air Force Academy Liaison Officer. He retired as a ‘bird’ colonel. After retirement from USAID, Ken was a project management consultant for ADB, the World Bank, UNDP and USAID.

He earned his DPA (Doctor of Public Administration) from the George Mason University (GMU) in Virginia, his MS from Massachusetts Institute of Technology (MIT Systems Analysis Fellow, Center for Advanced Engineering Study), and BA & MA degrees in Government & International Relations from the University of Connecticut (UCONN). A long-time member of the Project Management Institute (PMI) and IPMA-USA, Ken is a Certified Project Management Professional (PMP®) and a member of the PMI®-Honolulu and Philippines Chapters.

Ken’s book -- **Project Management PRAXIS** (available from Amazon) -- includes many innovative project management tools & techniques; and describes a “**Toolkit**” of related templates available directly from him at kenfsmith@aol.com on proof of purchase of PRAXIS.

To view other works by Ken Smith, visit his author showcase in the PM World Library at <https://pmworldlibrary.net/authors/dr-kenneth-smith/>