From Asymmetry to Transparency in Project Planning

An approach to collaborative project planning

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Abstract

Even with the best of intentions it is difficult to achieve and communicate a common vision of the project plan. Collaboration in the project planning process is essential to optimizing the solution derived to execute the project. One of the key benefits of collaboration is the increased transparency, (symmetry of information) regarding the benefits and risks of various approaches to sequencing and executing project work.

Since its conception in 1950 by Flood and Dresher, the Prisoner's Dilemma has been used to demonstrate benefits and pitfalls of cooperation between two people in an environment of asymmetric knowledge. Rational players choose a suboptimal response in order to mitigate the risk of betrayal by the other player. This is the reductionist approach to project planning. The world is full of possible problems and failures: the risk that needs to be managed is the mitigation of potential problems. Even better are the benefits of win-win results.

The free person's solution stands in stark contrast to the prisoner's dilemma. The free person seeks to eliminate asymmetrical information to optimize the solution and thus maximize opportunities. Due to the complexity of modern projects and large numbers of parties involved, information related to project planning is typically asymmetrical and incomplete. There is a lack of comprehensive tools to synthesize information to benefit all the involved parties. The Graphical Path Method and software embodiments thereof enable a heretofore unobtainable transparency in the planning of project; activities, sequences, and resources: allowing all stakeholders to engage interactively in the creation of a comprehensible network diagram which graphically represents the intention of the group.

The many facets and faces of collaboration in planning.
Collaboration is a complex topic. The project leadership must blend soft skills, project governance, and technology together in order to achieve true collaboration. Owing to the multifaceted nature of enabling collaboration in project planning this paper traverses many different intellectual disciplines and knowledge areas in order to offer a perspective on how to achieve collaboration and transparency in project planning.

Benefits of collaborative planning vs. silo scheduling.
Asymmetry of information is when one party knows something another party does not. Symmetric knowledge is when all parties share the same information. In order for all parties to share the same information a process of communication must take place. Communication has the following elements; encode message, send message, receive message, decode message, feedback.[The Speech Chain, Denes, Pinson Page 5][2] The world of project planning has been struggling for years to find better ways to accomplish true "communication" of project elements such as activities, dates, durations, priorities, and interdependencies in the project work to be completed. Collaboration in up front project planning is the antithesis of silo planning.

If you plan in a silo, you plan alone. History is replete with examples of the disastrous results achieved by silo planning. One of the most notorious examples is the Mars Climate Orbiter mission.

The Mars Climate Orbiter mission was launched on December 11th, 1998. The mission was designed to collect weather information from Mars. As the spacecraft was entering orbit around Mars on September 23rd, 1999 it was destroyed. The orbiter had entered the atmosphere at a much lower orbit than planned and could not tolerate the atmospheric pressures. Years of scientific work, the hopes of scientists from around the world, and $149,000,000 were lost: because of a simple failure to collaborate.

By November 10th, 1999 the Mishap Investigation Board had issued their Phase I report[4]. They determined the root cause of the disaster was "A failure to use metric units in the coding of a ground software file "Small Forces" used in trajectory models. There were two separate groups involved in this element of the orbiter. One created the thruster software and the other loaded the file with information to instruct the thrusters. The spacecraft guidance system was expecting instructions for firing the thrusters to be delivered in Newton's, which is the metric measurement for force. The file was loaded with information in pound force in English units, 4.45 Newton's for each pound force. The resulting trajectory destroyed the spacecraft.

One can imagine that getting the two groups responsible for this interface point to collaborate might well have averted this ignominious outcome. Projects do not typically fail in such a memorable and cataclysmic way. However, the deleterious effects of silos during project planning are seen throughout the world of project management. What gets in the way of breaking down these silos and creating successful collaboration during project planning?

A Formidable Phalanx of Impediments to Collaborative Planning
There are numerous key drivers to non-collaboration/cooperation in project planning. Egos can get in the way as each person caught in an egotistic battle to have his or her ideas accepted without regard to others insights. It could be that an architect has a vision for the project which is not supported by the project budget, but is unwilling to amend his vision. Sometimes politics can intrude on the process of planning. Perhaps a politician has announced a date for the opening of a memorial without consulting those responsible for building the memorial. Often the contract itself makes transparency and collaboration unlikely because transparency may eliminate the negotiating leverage of one of the parties to the contract.

Recognizing potential inhibitors to collaboration and cooperation is a good first step towards encouraging collaboration in the project planning process. It is a helpful exercise to step outside of the project and see if there are any structural inhibitors to collaboration which could be easily resolved. Many studies have been done on the emergence of cooperation and they offer real clues and some direction to those looking to encourage cooperation and collaboration. Axelrod discusses cooperation in a prisoner's dilemma setting in his book "the Evolution of Cooperation". Through a series of experiments he was able to determine that a process of "Tit for Tat" is the best outcome for those involved in asymmetric prisoner's dilemma. "Tit for Tat" in our application means that if someone is collaborative with you, you are collaborative back to them. However, if someone is non-collaborative with you then you are non-collaborative in return. Axelrod concludes that if you play this scenario out the non-

collaborators will always take over. But he does offer a solution to this situation: a social structure needs to be setup to allow an opportunity for the positively reinforcing synergy of cooperation to manifest itself in a series of interactions. (page 145)[1].

Those who wish to promote collaboration in project planning should pay heed to Axelrod and create a social structure at the inception of the project which promotes collaboration. As the PMI PMBOK 3rd edition states [page 46][6] "The Project team must create an environment in which stakeholders can contribute appropriately," promoting collaboration is a fundamental responsibility of the project management team.

Assuming we can be granted parole from the prisoner's dilemma of purposeful non-cooperation, what technical problems remain which obstruct truly collaborative planning? The best articulation of the current practice as described by O'Brien and Plotnick [CPM in Construction Management][5] and is worth quoting at length.

> "The project team has met and a pure logic network model of the contractor's "plan of execution" has been prepared. …Now the Scheduler is left with getting the plan information into the computer, getting the first rough draft of the schedule out of the computer, meeting with the project team for one more day to resolve any issues, and then preparing reports that will help the project manager and the entire team get the project out on time and under budget" [page 413] [5]

Notice that in the process described by O'Brien and Plotnick information is gathered, entered into a scheduling tool, and then reworked with the team. Lack of real time information is the core problem with this process. In order to maximize the benefit of planning the entire team needs to see, in real time, the consequences of individual stakeholders; estimated durations, dates, and, sequencing during the planning session. In the past, attempts to overcome this problem have involved a plotted time scale taped to the wall and a large number of sticky notes.

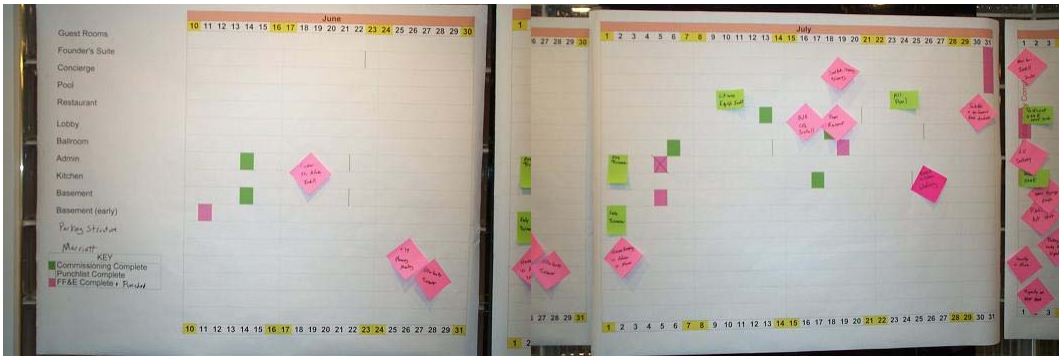

Figure 1. Sticky note planning session

The benefits of a "full wall planning session" have been documented over many years. The limitations are manifest to anyone who has participated in a session or, more importantly, tried to create a faithful representation of the collaborative session using traditional CPM software after the fact.

There is a tremendous amount of math involved in calculating a network schedule. Part of what makes even the simplest network diagram complex is dependent variables. Most particularly the visualization of the impact of independent variables on dependent variables in a network schedule is impossible with a static system such as sticky notes. Inability to visualize the impact of independent variables on dependent variables in the overall plan network limits the power of the collaborative session.

In a project plan, reflected on a time scale, and linked by logic, a small change in the duration or logic tie (independent variable) can have a multiplicity of effects down the logic tree (dependent variables). Without an intuitively obvious way of visualizing the impact of a change, the group will not be able to maintain a coherent vision of the current plan or cognate the consequences of a given change to the plan. Even if all parties have the intention of collaborating, successful collaboration is not possible without communication. The Graphical Path

Method (GPM®) offers the first opportunity to clearly communicate an evolving network diagram on a time scale thus enabling a higher level of collaboration during project planning.

The power of real time feedback

By providing real time updates to the network schedule GPM infinitely increases the time actually spent planning. This is analogous to the advent of real time computer terminals in the 1960's. Prior to this innovation, software developers would write their programs out, usually with pencil and paper on especially columned sheets of paper created for the particular programming language in question. Then the program would be typed out on a keyboard yielding punch cards. The punch cards would then be submitted to the computer center to be "run". The output from the run was printed on tractor fed, dot matrix, green bar paper. Many a programmer has waited hours for output only to find that a typographical or syntax error in the program had prevented the execution of the code. One computer scientist from the time said "Programming with cards did not teach you to programming, it taught you patience and proofreading" [Outliers Malcolm Gladwell page 44] [3]. With an interactive terminal, the hand written programming and punch cards were eliminated, and all the syntax and typographical errors were highlighted as they were entered.

Bill Joy, who is best known for rewriting UNIX with a small team of programmers in the 1970's is quoted as saying [Outliers Malcolm Gladwell page 45][3] "Do you know what the difference is between the computing cards and time-sharing? It's the difference between playing chess by mail and speed chess."

As O'Brien and Plotnick describe the planning process it is similar to the old "Programming with Cards" approach. By using GPM the transcription of the sticky notes to a CPM program is eliminated. Also, everyone involved in the planning session is able to see, in real time, the evolution of the network during the planning.

Role of the OODA Loop in Project Planning

Colonel John Boyd of the United States Air Force originally developed the OODA Loop (Observe, Orient, Decide, Act) to describe and help perfect the process of responding to an evolving situation. Each OODA sequence completes with an action and then immediately returns to observing the new situation which has been created by the last action. [Certain to Win page 65][7]

Figure 2 OODA Loop

The OODA loop perfectly describes the proper functioning of a collaborative project planning process. Each change to the network schedule should be observed by the group, and then the group should reorient themselves to the new situation, decide what to do next and then act on that planning decision. However, without the unique computational power of the Graphical Path Method (GPM) it is impossible to get the OODA dynamic in a planning session.

This is why one of the central beliefs of today's GPM practitioners is that "Seeing is Planning". If the collaborating group cannot see the plan evolving before their eyes they cannot successfully complete a single iteration of the OODA loop. There are several unique elements of GPM which facilitate collaborative interactive planning through an instantaneous feedback loop.

As is the case with new technology of all kinds, we learn about how to use the technology by using it, rather than just thinking or talking about it. Having been actively using GPM and its software embodiment NetPoint® for over two years, we have learned a great deal about how to best leverage GPM to eliminate asymmetry in the project planning process.

GPM offers the ability to create intuitive graphical links: finish to start, start to start, and finish to finish relationships between activities and other objects in the plan such as milestones and benchmarks. GPM also allows the real time calculation of floats, drifts, gaps, and the evolving critical path of the network. In addition when resources are added to a GPM plan the resource histogram dynamically reflects changes in the resource requirements.

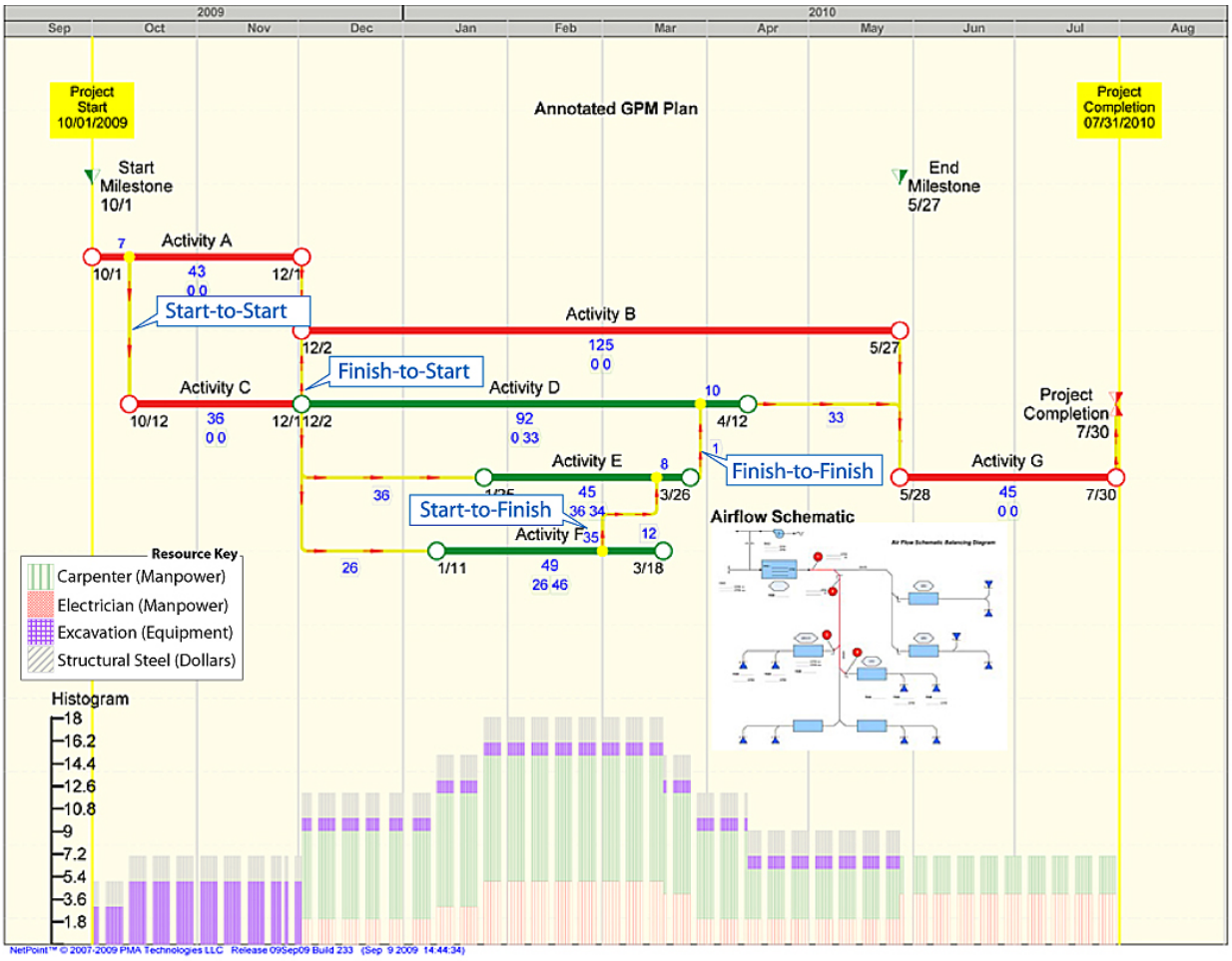

Figure 3 Annotated Graphical Path Method, Logic Diagram Method (LDM) diagram [8]

Getting the right people in the room, whether physical or virtual, is important to the collaboration process. Key stakeholders, the project team, and required subject matter experts (SME's) should be in attendance. This is an important element to a successful planning session because it baselines the entire project team on the project plan. It's best if all attendees have spent some time thinking about the project in advance of the meeting. It is ideal if all attendees have been briefed in advance on the relevant triple constraint issues, of cost, time, and scope, as well as other constraints related to the project.

There are a few aspects to the technology of a live GPM planning session which should be considered when running a planning session. Work should be saved on a regular basis because of the dynamic nature of a GPM collaboration session information lost may not be easily recaptured. One key advantage of sticky notes is that they don't crash!

An unexpected power outage or someone tripping over a cord could cost many hours of group work. NetPoint® has a built in disaster recovery system which takes a snapshot of the work every five minutes. However, best practice is: don't tempt fate.

Remember you can always click the undo button, so don't be afraid to try something; you can always undo it. It is hard to create a disaster while using NetPoint® the software is graphical and forgiving and you can click undo for the last 15 changes. The features also allows a group to try out what-if scenarios and to trace back their decision making process.

Using NetPoint®, users don't have to be overly concerned with perfection, the facilitator could maintain flow of conversation, taking a long time to perfect a description or duration will stall the conversation. Furthermore, it is not necessary to spend too much time drawing the exact dates the first time. You can easily adjust start, end, and duration after you have the activity on the canvas. NetPoint® is a visual drawing tool that also has all the rules and rigor of less intuitive planning and scheduling tools, so you don't need to sweat the details of floats and logical connections. Participants are free to discuss what looks and feels right, and the facilitator can always adjust to exactly what the group agrees. It is most important to capture a group's ideas in a way that everyone can understand on the time scaled canvas: links geometry and descriptions can be perfected later. The following are four easy steps to facilitate a successful collaboration session using NetPoint®.

(1) Set the Calendar for the project: the calendar should run a month or so before the start of the project and a couple of months after the anticipated end. This calendar can be changed at any time.

(2) Set the project start and end dates: select the desired start and end dates for the project. Don't be concerned about those dates hemming you in while planning as they can be adjusted at any time. To pick a start and end date just bring the cursor to a desired date and click the right mouse button. This will bring up a menu and you can select the "set this date as" field and then select project start or project end.

(3) Drop a few key milestones: There may be a few key dates like building enclosure, city council approval, substantial completion that you want to target in the plan. You can put some milestones on the screen as place markers for these dates.

(4) Begin adding activities and don't worry too much about hopping around and leaving activities untied. The schedule will evolve over time and as you near the end of the session unhooked activities will be transparent and addressable.

Through the unique combination of graphical clarity and algorithmic power, GPM offers, for the first time in the history of planning, the ability for all stakeholders to engage in the development of a mathematically grounded, visually represented, time scaled, network diagram. The elimination of "non-planning" time in the development of the network is one of key benefits of adopting GPM for project planning. Impediments to the transparent exchange of information reduce the symmetry of information used to create a project plan. A lack of symmetrical information exchange reduces in turn the ability to effectively collaborate and reduces the quality of the plan. Since projects have a defined start and end date they are most effectively planned on a time scale. Prior to the invention of software designed using GPM® it was not possible to collaboratively and interactively generate a time scaled network plan.

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