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"The Last Planner"

by
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Introduction

Better planning improves productivity by reducing delays, getting the work done in the best constructability sequence, matching manpower to available work, coordinating multiple interdependent activities, etc. The relationship is obvious and very powerful. One of the very most effective things you can do to improve productivity is to improve planning.

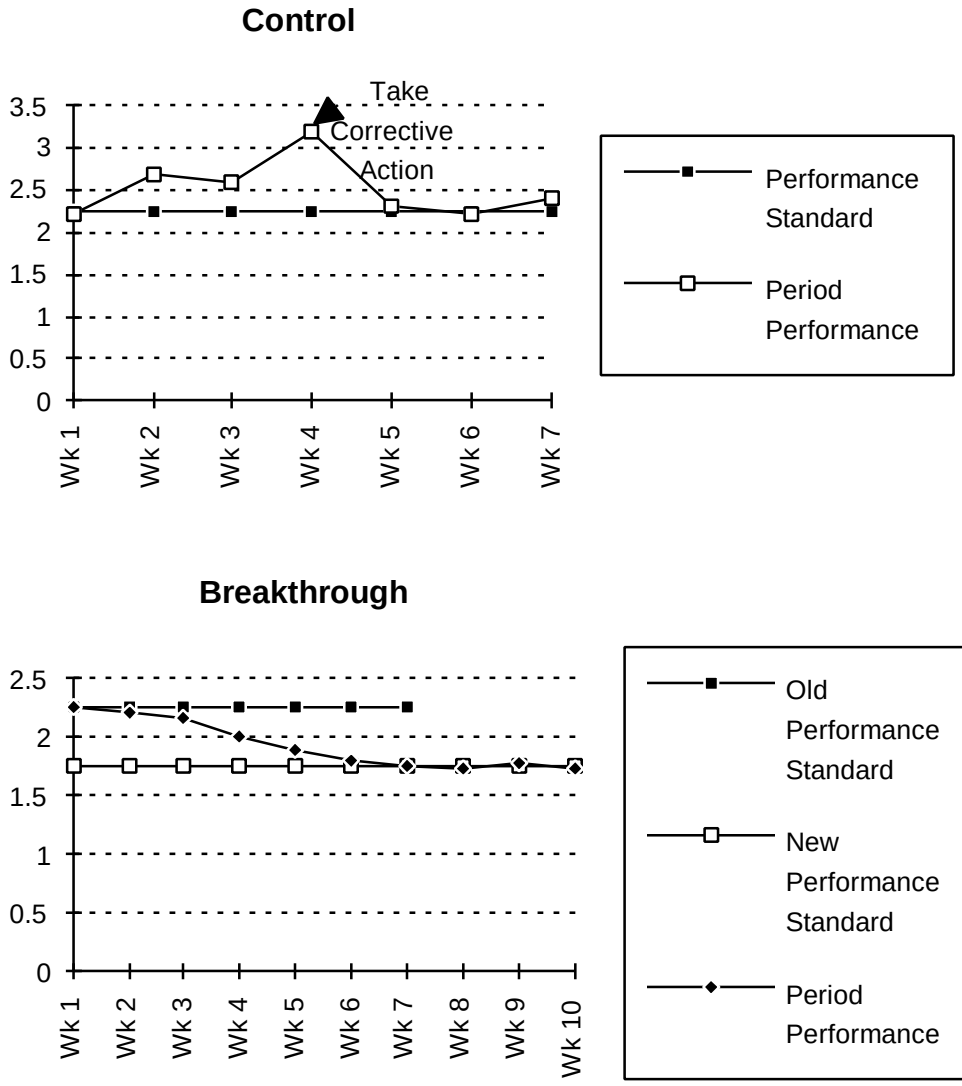
So, what are you doing to improve planning? How well is it working? Are you doing a better job of planning now than a week, month or year ago? I would like to hear your response to these questions, but will first share some thoughts of my own about how to think about planning in a way that leads to improvement.

Improvement of planning must overcome several obstacles common in the construction industry: 1) Management focus is on control (preventing bad change) and neglects breakthrough (causing good change). 2) Planning is not conceived as a system, but is understood in terms of the skills and talents of individuals who have planning responsibilities. 3) Planning is understood in terms of scheduling, and crew level planning is neglected. 4) Planning system performance is not measured. 5) Planning failures are not analyzed to identify and act on root causes.

Breakthrough vs. Control

Contractors tend to focus control on contractual commitments and factors immediately related to profitability, such as cost. Unfortunately, that often amounts to measuring yourself against how well you have performed in the past, and does not challenge you to improve, unless you have explicitly set such goals in your budgets and schedules.

In 1964, Joseph Juran published a book called Managerial Breakthrough, in which he proposed that management has only two tasks: preventing bad change and causing good change. Preventing bad change was called "control" and causing good change was called "breakthrough".

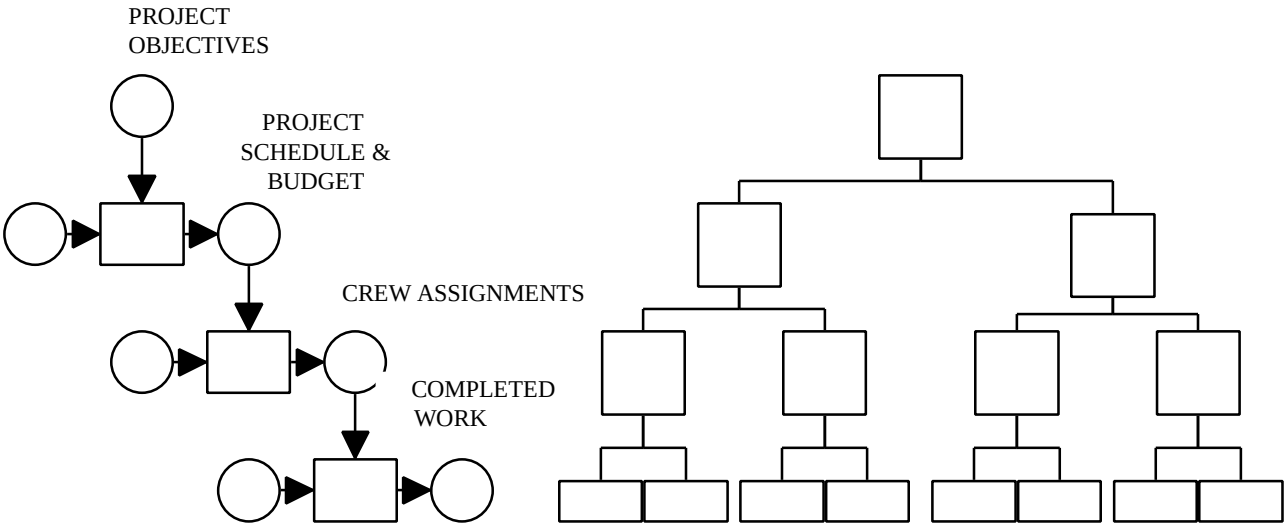


Juran claims that breakthrough and control are very different processes, and require very different kinds of information. I suspect that construction industry managers have a lot more information available to them for the purpose of control than they have for causing breakthrough.

The Planning System

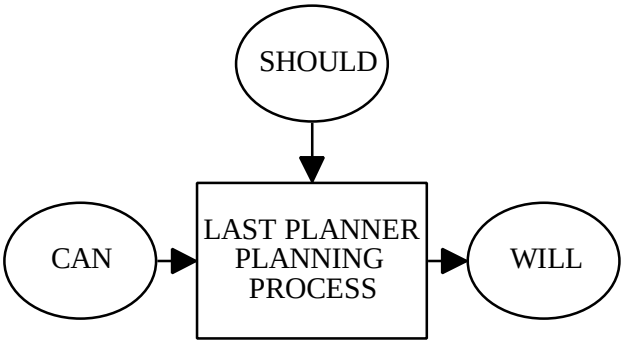
Aside from the simplest and smallest jobs, construction requires planning done by different people, at different places within the organization, and at different times during the life of a project. Planning high in the organization tends to focus on global objectives and constraints, governing the entire project. These objectives drive lower level planning processes that specify means for achieving those ends. Ultimately, someone (individual or group) decides what physical, specific work will be done tomorrow. I call that type of plans "assignments". They are unique because they drive direct work rather than the

production of other plans. The person or group that produces assignments I call the "Last Planner".

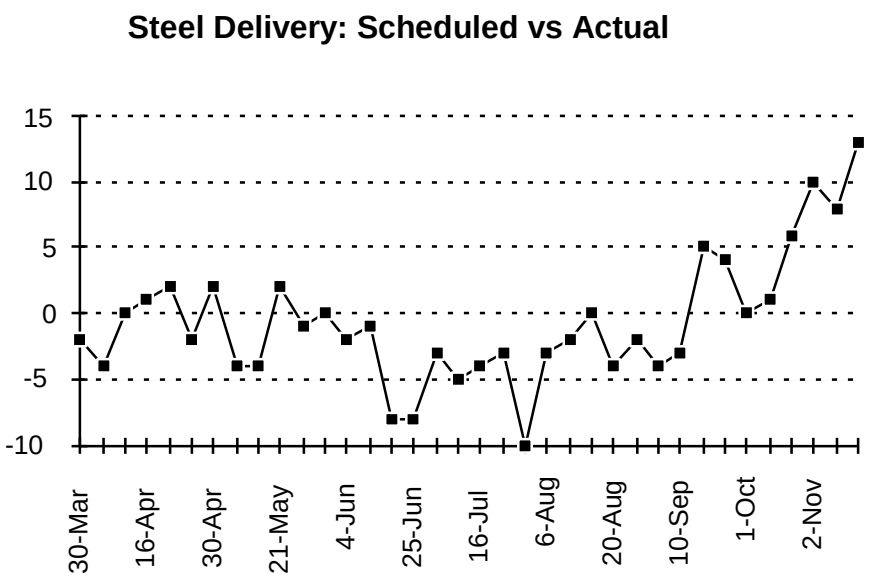


Crew Level Planning

The term "assignments" stresses the communication of requirements from Last Planner to crew. But these products of crew level planning are also commitments to the rest of the organization. They say what WILL be done, and (hopefully) are the result of a planning process that best matches WILL with SHOULD within the constraints of CAN.



Unfortunately, Last Planner performance is sometimes evaluated as if there could be no possible difference between SHOULD and CAN. "What will we do next week? Whatever is on the schedule." Supervisors consider it their job to keep pressure on subordinates to produce despite obstacles. Granted that it is necessary to overcome obstacles, that does not excuse creating them or leaving them in place. Erratic delivery of resources to job sites and unpredictable completion of prerequisite work invalidates the equation of WILL with SHOULD, and shortly results in the abandonment of crew level planning.



The chart above shows the delivery of structural steel relative to schedule over a 9 month period. The contractor waited until he had three weeks' worth of steel on the ground before committing men and materials. Three weeks was not a large enough buffer to accommodate the variation in delivery, which ranged from 3 weeks early to 4 weeks late in the first 4 months.

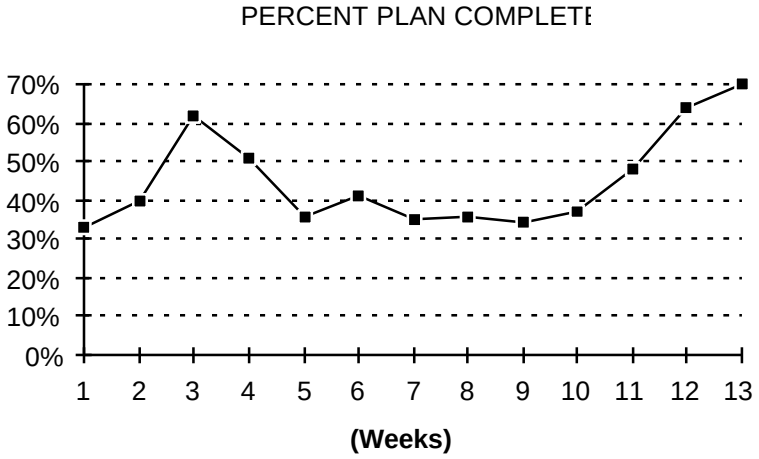
Measuring Planning System Performance

The key performance dimension of a planning system at the crew level is its output quality; i.e., the quality of plans produced by the Last Planner. The following are some of the critical quality characteristics of a Weekly Work Plan:

-The right sequence of work is selected.
-The right amount of work is selected.
-The work selected is practical.

The "right sequence" is that sequence consistent with project schedules, execution strategies, and constructability. The "right amount" is that amount the planners judge their crews capable of completing after review of budget unit rates and after examining the specific work to be done, and "practical" means that all prerequisite work is in place and all resources are available.

The quality of a foreman's weekly work plan may be reviewed by a superintendent prior to issue, but such in-process inspection does not routinely produce measurement data, even when corrections are necessary. Planning system performance is more easily measured indirectly, through the results of plan execution.



Percent Plan Complete (PPC) is the number of planned activities completed divided by the total number of planned activities, expressed as a percentage. PPC becomes the standard against which control is exercised at the crew level, being derivative from an extremely complex set of directives: project schedules, execution strategies, budget unit rates, etc. Assuming quality plans, higher PPC corresponds to doing more of the right work with given resources, i.e., to higher productivity and progress. In fact, on one recent project, foremen with PPC > 50% were 25 points (e.g., had a performance factor of 1.25 vs 1.00) more productive than those with PPC < 50%.

Too often, crew level planning systems have either failed to address the real planning function at all (e.g., by simply targeting the activities upcoming in the next two weeks on the project schedule) or have assumed that the proper objective for crew level planning was only to get foremen to "think ahead", and so failed to provide precise criteria for the output of the planning process, able to be measured for conformance of actual to plan.

Do you know the PPC of your projects and crews?

Improving Planning System Performance

If your percent plan complete (PPC) is less than 100%, do you know why planned work was not done?

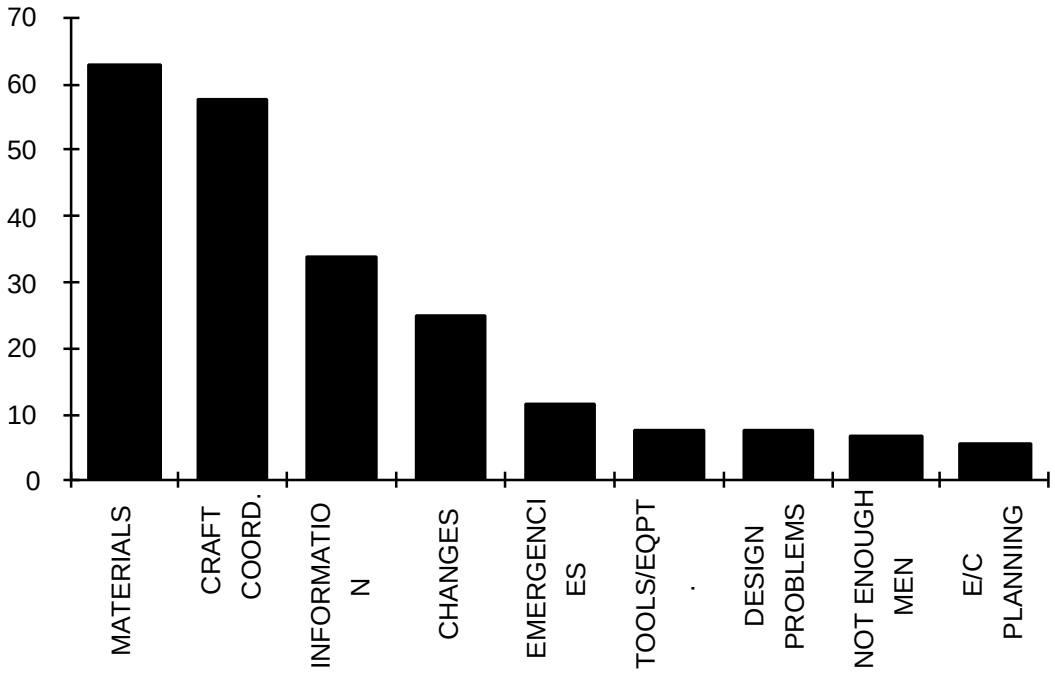
Percent Plan Complete measures the extent to which the craft supervisor's commitment (WILL) was realized. Analysis of non-conformances can then lead back to root causes, so improvement can be made in future performance. Measuring performance at the Last Planner level does not mean you only make changes at that level. Root causes of poor plan quality or failure to execute planned work may be found at any organizational level, process or function. PPC analysis can become a powerful focal point for your entire breakthrough initiatives.

The first thing needed is identification of reasons why planned work was not done, preferably by foremen or craftsmen responsible for plan execution. Reasons could include:

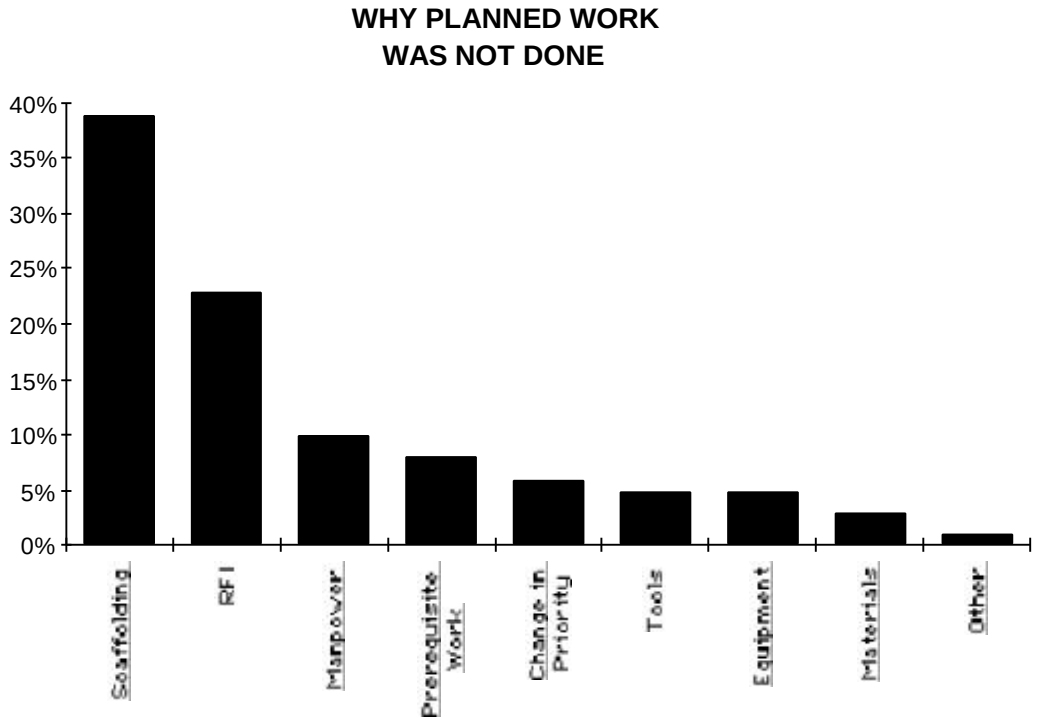
* Faulty directives or information provided to the Last Planner; e.g., the information system incorrectly indicated that material was available or that prerequisite work was complete.
* Failure in Last Planner planning; e.g., too much work was planned.
* Failure in coordination of shared resources; e.g., lack of a crane or scaffolding.
* Change in priority; e.g., crew (part or whole) reassigned temporarily to a "hot" area.
* Design error or vendor error discovered in the attempt to carry out a planned activity, etc

This provides the data needed for analysis and improvement of PPC, and consequently for improving project performance.

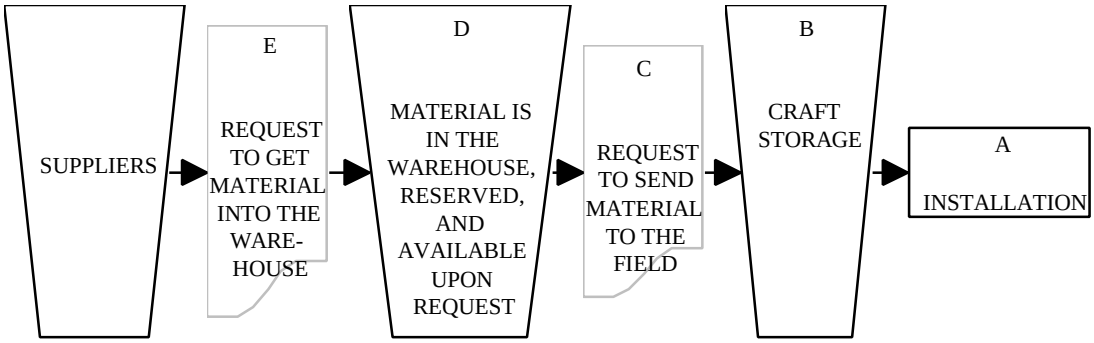
REASONS WHY PLANNED WORK IS NOT DONE



The chart above shows the survey responses of union electricians in Alameda County, when asked to identify the most frequent obstacles to completing planned work. Materials, craft coordination (prerequisite work), and information were the three most frequent causes, suggesting that the most bang for the buck could be had from improving plan quality.



This chart shows the reasons for not completing planned work indicated by piping foremen on their weekly progress reports. Early charts on this project showed materials to be much more of a problem, but material flow was redesigned to provide workable backlog from which foremen could select planned work.

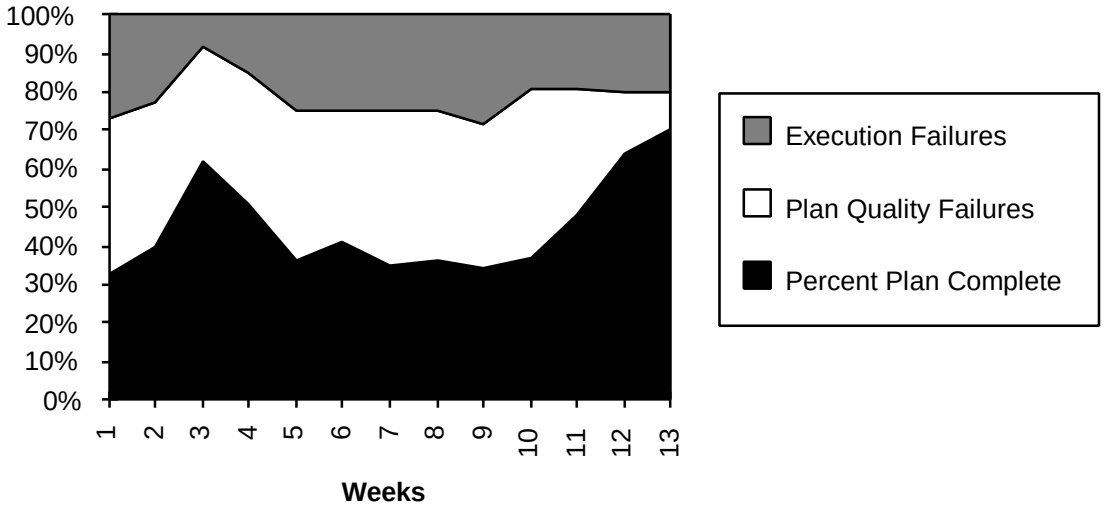


Piping supervision was given access by computer terminal to listings of piping drawings, with the typical progressing milestones displayed: fabrication, erection, connection, trim, punch. From schedules, models and marked up drawings, the supervisors decided what and how much work needed to be done 4 weeks in the future and marked the selected milestones with an "E". The same database was accessible by materials management, who took "E's" as a directive to get the associated materials into the warehouse within two weeks. Materials managers first allocated existing inventory to the priorities, then purchased/expedited missing materials. Once an item was materially sound, the appropriate milestone was marked by materials management with a "D", indicating to

piping supervisors that the material required to do that work was in the warehouse, reserved for that use, and ready for issue to the field. The week before they needed to work that material, piping supervisors placed a "C" in the appropriate milestone nodes, thus telling the warehouse to send it to field storage, at which time it was marked a "B". Piping foremen selected work to be done next week from "B's", marking those selected as "A". When a milestone was marked with a letter, the man-hours budgeted for that work were automatically summed for each drawing and for the total items selected, so the planner could know if the right amount of work had been selected.

The consequence of this approach to planning is that people only commit to doing work that can be done. Work is selected for material-soundness, available materials are allocated to plan priorities, and expediting is directed to support plan priorities that are very specific. Secondary benefits include elimination of separate progress reports and material requisitions.

The contractor estimated a 10% improvement in productivity simply from reducing material delays, with additional savings from better utilization of construction equipment and support crafts. The NECA survey mentioned earlier was distributed to all electricians in the Alameda County local. They represent much smaller and simpler projects, and still estimated 4.2% of paid labor time lost to material delays. Maintaining workable backlog from which to select planned work is one feature of planning system design that improves productivity.



Analysis of reasons why planned work was not done can lead you anywhere in the organization in your search for root causes. As you reduce failures, whether rooted in plan quality or plan execution, Percent Plan Complete increases, assuring improvement in productivity, quality, timeliness, safety and other dimensions of project performance.

Conclusion

So, what are you doing to improve planning? How well is it working? Are you doing a better job of planning now than a week, month or year ago? I look forward to hearing what you have to say.