

The Roles of Functional and Cross-functional Planning in Managing the Enterprise

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Introduction

In 2003, General Motor's GVDP Operations Planning & Scheduling group responded to an internal initiative to eliminate the use of a dedicated functional scheduling application to support design scheduling. The alternative selected by the organization was to incorporate a greater degree of functional related activity into the cross-functional component plans. The effort to merge functional schedules and cross-functional plans has highlighted the lack of understanding at GM of how these types of plans differ in terms of purpose, content and customers. Inspired by this GM initiative, the authors have elected to:

- Frame the basic concepts involved with functional and cross functional planning
- Review the planning environment at GM
- Briefly review problems that can arise from disregarding differences in plan types and planning levels

Our experience with GM has shown us that were mistaken in assuming that the differences between planning types and levels were self-evident. Our goal with this paper is to demonstrate the importance of helping project teams, and clients in general, to understand the differences between both planning types and levels of planning, and the problems that may arise in ignoring them.

What is Functional Planning?

In order to understand how best to manage functional planning activities, we need to understand what they are and what their primary objectives are. We also need to understand how they differ from cross-functional plans.

A functional plan essentially manages the work of a department that is concerned with performing the same type of work for all projects as well as performing non-project work. For project related work, the functional plan:

- ***Defines tasks at the level they can be assigned to an individual.***
Individuals in a functional organization must have a clear and unambiguous understanding of their work assignments.
- ***Produces clearly defined final outputs to other functional organizations.***
Clearly defined outputs helps ensure that needs of the program are satisfied, and the functional organization has a consistent checkpoint for measuring throughput of deliverables across the entire portfolio of programs.
- ***Tracks internal deliverables.***
Outputs that are never delivered to another functional activity or reported at the program level may nevertheless be important in order to move work *within* an organization.
- ***Includes a process for incorporating program requirements.***
A functional plan must “understand” when deliverables are required by a program, which deliverables are shared by multiple programs, and which program requirements are most restrictive at any particular time.

- ***Includes a process for managing competing priorities from multiple programs.***
Functional resources may often be strained to capacity when many programs compete for attention. Functional planning must incorporate processes that ensure the right program gets the right work done at the right time, and each program must also understand its position in the priority.
- ***May be impacted by non-project related work.***
Functional planning may be impacted by internal departmental activity such as training, process improvement initiatives, or other internal “projects”.
- ***Includes change work***
Functional plans must also devote resources to managing changes to existing work products. For example, product designs are often revised as a result of new cost initiatives, test results or redesign of nearby components.
- ***Includes a process for assessing plan status***
Functional planners must have clearly defined processes for statusing work as complete. This is particularly important in the case of external deliverables.

In short, functional planning supports the work, costs, and resources of a particular department. This plan is often managed within the context of an overall program plan, but must also consider competing priorities from multiple programs, as well as internal initiatives and priorities such as process improvements and training requirements.

What is Cross-functional Planning?

Cross-functional planning brings together the activities of various functional groups in support of a single project. In the automotive industry, these projects are product development programs, whether the product is an entire vehicle or a sub-system or component.

Whereas functional planning focuses on moving work through the organization, cross-functional planning focuses on moving work from functional organization to functional organization. Given this objective, cross-functional planning will focus on managing the external outputs of a function - the key hand-offs between functions. Cross-functional planning can be summarized as follows:

- ***Work carried out by a single functional organization can be represented as a single activity.*** The internal deliverables of a functional plan or schedule are not appropriate within the cross-functional plan. They are not the primary focus of the plan, which is to move work between departments. In cases where multiple deliverables are produced, additional activities may be included. For example, three major iterations of a product design may each be tracked, even though the work is performed by a single organization.
- ***Completion of an activity represents a hand-off to another organization***
This hand-off is required for the downstream functional group to either begin work, continue work or complete work. For example, the product design is required to begin developing the part tools.
- ***Includes a process for establishing program requirements***
The requirements passed down to a functional plan must meet the needs of the program, but it must also represent any initial trade-offs made among different functional groups. This allows the functional groups to share the risk inherent in any program plan by distributing any available float time equitably among the deliverable-producing functional group and the deliverable-using functional group.

- ***Focuses on planned activity***

Whereas the functional plan considers change work, the cross-functional focuses on planned work. Taking the example of a product design, the cross-functional plan would track the initial product design only and ignore the ongoing revisions. The timing impact of those revisions will of course manifest themselves in longer tooling times.

- ***Includes a process for assessing the impact of plan status***

Understanding the status of activity progress is key to both functional and cross-functional planning. For cross-functional plan, however, the focus is on understanding the impact to downstream activities in order, for example, to develop recovery plans. Where practical, cross-function plans should interface to functional schedules to obtain activity status.

Cross-functional	Functional
Project oriented	Department oriented
Manages deliverables	Manages activities
Focus on requirements and risk	Focus on throughput and resources
Uses critical path scheduling	Uses date management and database techniques
Focuses on planned activity	Includes change work
Focus on moving work between departments	Focus on moving work through a department

Figure 1. Functional and Cross Functional Planning Comparison.

Levels of Planning

Cross-functional and functional planning activities can be broadly categorized as occurring at two levels – program and component. At the program level, plan activities represent a summary. At the component level, activities are expanded out against the product scope. For example, production tooling may be represented as a single activity at the program level, but will appear as a separate activity for each production tool at the component level. Vehicle level activities that are not performed against the product scope will not appear in the component plans, other than as reference points. Interactions between the plan types are shown in Figure 2.

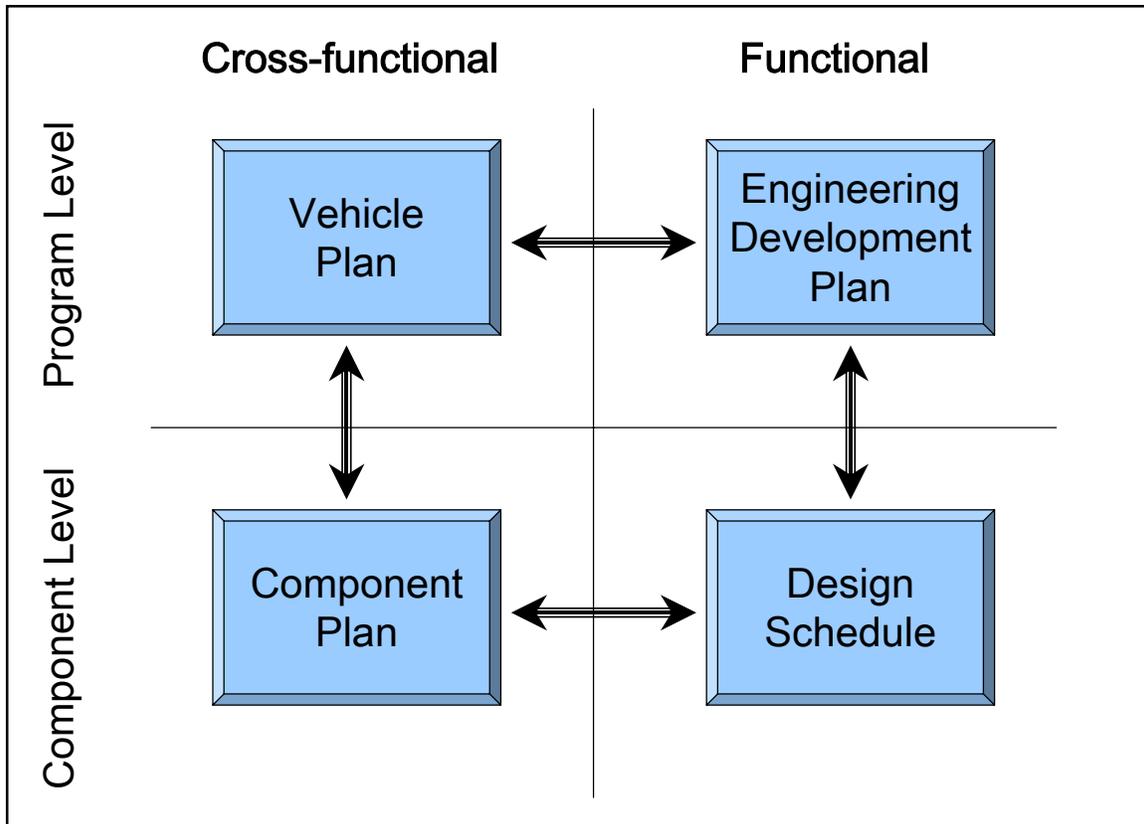


Figure 2: Levels of Planning

Functional Plans versus Functional Schedules

In this paper, the authors make a distinction between different types of functional planning activities. This is particularly important in a product development project executed by a matrixed organization. Some clarification is required.

A *functional plan* describes the activity of a given functional area for a given project. For example, if the overall project is to develop and launch a new vehicle (a vehicle program)¹, then the functional plans might include:

- Purchasing/Sourcing Plan
- Engineering Development Plan
- Manufacturing Launch Plan
- Marketing/Sales Plan
- Quality Management Plan

Activities in a functional plan are summarized to the program level. In addition to describing how a function will support the overall program, functional plans also serve as a framework for functional schedules. Functional plans may also be created for internal department projects, not related to a specific vehicle program.

¹ Henceforth, the terms “program” or “vehicle program” will be used to refer to a project to develop and launch a vehicle, the principal example used through out this paper.

A *functional schedule* represents the work of a given functional area across many programs. The summarized activities in the functional plan are broken down to discrete work elements, allowing for resource management. Functional schedules are used to manage workload, enable functional metrics, and support functional and other plan types. In our example of a vehicle program, functional schedules may include:

- Surface Release Schedule
- Sourcing Schedules
- Design Schedules
- Tooling Schedules
- Test Property Build Schedules

Managing the Relationship of the Program Plan to Functional Plans

The program level plan includes those events that are required to provide the organization with a clear understanding of the program scope, timing and deliverables. It includes key events such as the launch date, and transition dates between project phases. It must, however, also serve to manage interfaces between functional plans.

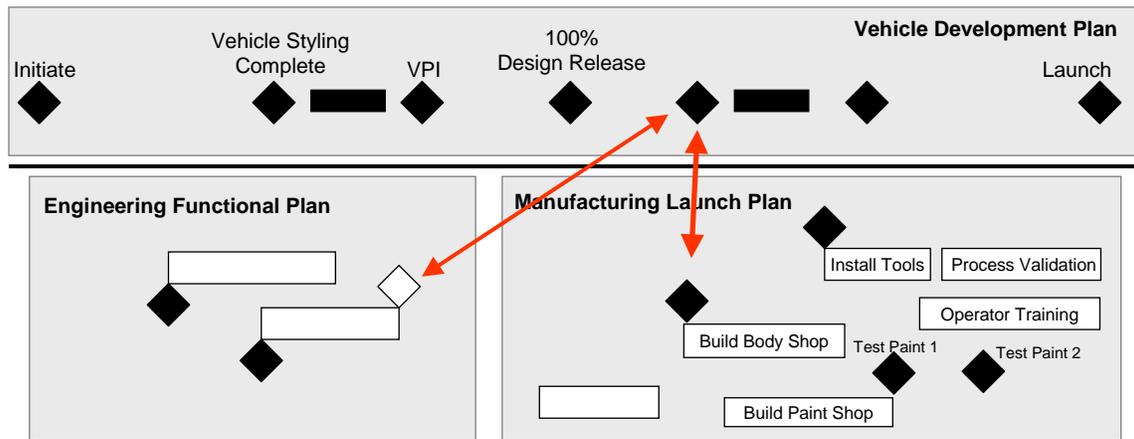


Figure 3: Managing Functional Plan Interfaces

For example, Figure 3 describes a simplified relationship between the engineering functional plan and the manufacturing launch plan. The engineering plan contains product and process development activities, including the development of the assembly process and workflow, materials handling, and even workspace allocation. All of these are critical to developing a successful body assembly facility (the “body shop”). The vehicle program plan does not need to track the functional activities, but rather it needs to manage the interfaces between them.

The requirement to begin building or retrofitting an assembly facility will dictate a requirement date for the development of a manufacturing process. In order to ensure that the interface is realistic, it is important that functional plans and the vehicle program plan be developed together. Both the program teams and the functional representatives should be well aware of their interface points and should focus on negotiating realistic hand-off dates. These dates are then reflected in the vehicle program plan and both functional plans are measured to this agreement. Managing the interface of the two functional plans through the cross-functional vehicle plan ensures that both satisfy the program requirements.

Managing the Relationship of Functional Plans to Functional Schedules

Much as the overall program plan is used to direct the development of component level cross-functional plans², the functional plans serve as the basis for development of functional schedules within the context of the overall program plans.

The functional plan lays out the department's strategy for the particular program. Any new initiatives, such as the use of a new Computer Aided Design tool, are comprehended. Resource allocation is laid out at a high level, and blocks of time are established for the various departmental activities.

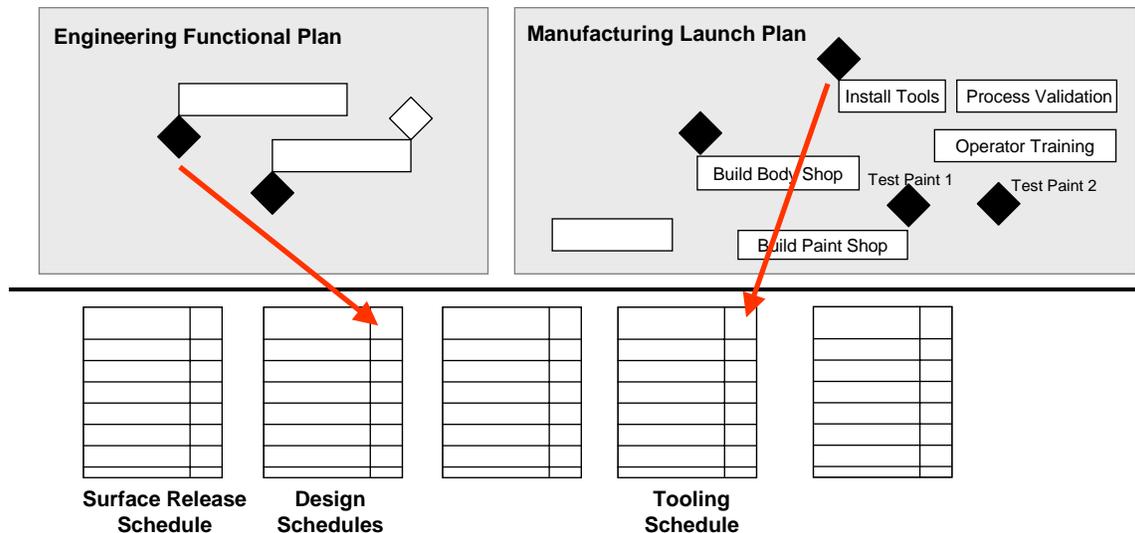


Figure 4: Managing Functional Schedules

The functional plan directs the development of the functional schedule for the program. Any adjustments in work processes must be comprehended in the functional schedule in a way that allows the data to be viewed and consolidated across programs. Summarized activities are expanded to represent the detail scope of work, and resource allocations are translated into specific resource assignments.

Managing the Relationship of Cross-functional Component Plans to Functional Schedules

Component level plans managed by Product Development Teams (PDT) at automotive OEMs, often called "PDT Plans", represent the plan to engineer a particular subsystem of an overall vehicle. The effort involves coordinating requirement development, styling, design, process development, validation, and manufacturing activities.

The functional plan directs the development of functional schedules in terms of department strategy, and by ensuring integration with the cross-functional vehicle plan. The PDT Plan serves a similar purpose in ensuring that the functional schedule supports the cross-functional development plan for the component and subsystem. The PDT Plan performs different roles during the planning versus execution phases of a program. During the planning stages it is used to integrate product based functional schedules by refining requirements by commodity and by providing an end-to-end view of sub-system and component development. The end result is an integrated plan by commodity.

² While the integration of various levels of cross-functional plans is an interesting topic in itself, it is not a subject of this paper.

Once execution begins, the PDT Plan is used to assess functional schedule performance to plan, identify potential risk areas, and to renegotiate agreements as needed. Activity tracking and forecasting is performed within the functional schedules. CPM tools and techniques are not as important but are still useful for projecting downstream impacts to the baseline plan.

Cross-Functional Planning and Functional Scheduling at General Motors

At GM, cross-functional PDT Plans are used in coordination with various functional schedules to plan and track program activity at the component level:

- Sourcing schedule
- Design schedule
- Build and test schedule
- Tooling schedules

Integration between the PDT plans and functional schedules has been performed at various levels of sophistication:

- Since product engineering is the primary stakeholder in new product development, the PDT Plan has served as a functional schedule for engineering activities. At various times, design solution, statement of requirement and peer review activities have been extracted from the PDT Plans and reported in the manner of a functional schedule.
- Tooling schedules from GM's internal die stamping division, MFD, have been manually interpreted to provide PDT Plan updates. Efforts to link the tooling schedule and PDT Plan data and provide targeted reports fell apart when MFD decided to stop providing the information.
- Integration with a pair of purchasing schedules has been attempted. The process, as defined, provides for requirements to be fed to purchasing and status reported to the PDT Plans and would support electronic integration.
- Program part content is captured at the part number level in both the design schedule and the PDT Plans. PDT plans are used to negotiate and define required completion dates, which are electronically communicated to the design schedule. Forecast and actual status dates are managed in the design schedule and electronically communicated to the PDT Plans. Impacts to downstream activities and revisions to requirements are managed through the cross-functional PDT Plans.

Plan Integration

Integrating cross-functional plans with functional schedules at the component level requires a method to identify and associate elements of the product scope between the two datasets. The method selected for integrating PDT Plans with design schedules requires that detail part number information be maintained in both applications. Coordinating part content between the two systems can be a considerable challenge, as product content shifts through the course of a program.

Other methods of associating product content have been used in implementing an interface between PDT Plans and Purchasing schedules. One involved tying the elements of each system to a vehicle-partitioning schema that generically describes the content of a vehicle. This approach is limited by the quality of the partitioning structure. Another alternative is to link the two databases directly. Content elements in one of the systems are assigned directly to their counterparts in the other. This approach assumes a one to one or one to many type of relationship. It is not immune to product content shifts, as the partitioning approach might be.

A Step Backwards?

GM recently moved to migrate design scheduling from a functional scheduling activity and incorporate it into the cross-functional PDT plans. This decision was driven in large part by the complexity of managing part information in two separate applications. Component Planning Analysts were tasked with aligning separate feeds of part information into the two databases, and interpreting them into design scope and plan scope. Efforts to automate the interpretation of part information only served to highlight the inherent complexity.

This move can be seen as a natural extension of a previous decision – to combine the design scheduling and PDT planning roles. Previously, dedicated resources tightly tied to the functional organization were responsible for design scheduling. Cross-functional planning was facilitated by Planning resources who brought an independent viewpoint and focused on the handoffs between functional organizations. While this move serves to reduce analyst workload, it creates a less sophisticated planning environment and reduces the likelihood that timing issues will be identified and addressed before they impact the program.

Mixing Functional Schedules and Cross-Functional Plans

Our last point of discussion involves problems that may arise in managing functional activities within a cross functional plan, or the reverse. Functional schedule activities must be clearly defined so as to unambiguously refer to a specific engineer or small team working together. In a cross-functional plan, activities often represent *summaries* of multiple functional activities that bear similar or identical names. One may think of the cross-functional activity as representing the *type* of work performed by the team in a given window of time, whereas the functional activity represents *specific* work performed.

Similarly, the work product of a functional activity must be clearly defined – a product design for part number 123, or the design of conveyor tooling C276h7. Managing functional and cross-functional plans within the same timing plans assumes that included activities apply equally to all related parts. However, this is rarely true.

Figure 5 demonstrates these points. In the example, the cross-functional plan represents the design and tooling of a door system. The left hand and right hand doors are mirror images of one another. Even though they require separate tools to produce, they are managed by the same supplier, coordinated by the same engineer, and generally worked on somewhat concurrently. This is sufficient cause for the cross-functional plan to summarize them into one activity. The important deliverable for the cross-functional plan is the availability of both right and left hand doors to the next activity – say validation. The same is true for design.

If one were to only track the RH and LH tooling activities in the cross-functional (i.e. no separate functional plans) one would lose the slight stagger between tooling start and end dates. This may be important to the functional manager who needs to juggle work schedules and where several days can be significant. Performance metrics, in this scenario, are also skewed. Using only the

cross-functional activity makes it appear as though the typical duration is longer than it truly is, perhaps resulting in unnecessary measures to reduce tooling or design durations.

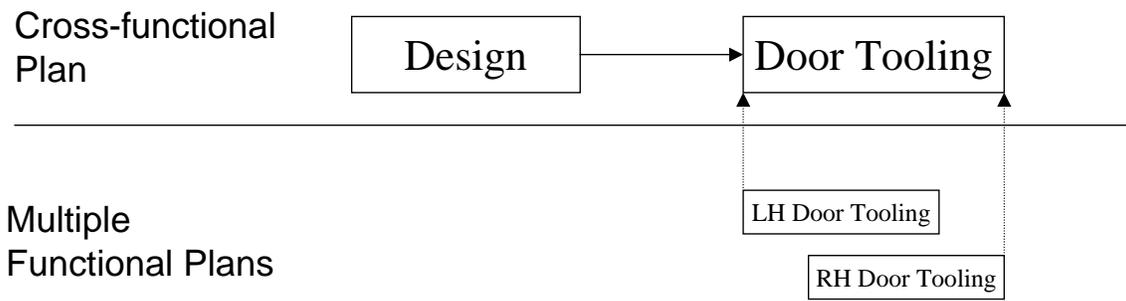


Figure 5: Mixing Plan Types

Conclusion

Project management is a deceptively simple activity. On the surface, it seems straightforward enough to put a plan to paper (usually just a schedule) and move on. But as we've seen in this paper, it is just as easy to over-complicate the planning activity by not having a grounded understanding of the planning needs at various levels of the performing organization.

In this paper we've examined 1) the differences between functional planning and cross-functional planning and 2) the various levels of planning within each. We've also 3) reviewed how interfaces are managed between the various plan types and planning levels. Finally we looked at 4) how GM only partially comprehends the distinctions between the plan types and 5) what can happen when plan types are inappropriately intermixed.

In summary:

- Cross-functional planning brings together the activities of various functional groups in support of a single project. Cross-functional plans can exist at the overall project (program) level or at the component level.
- A functional plan manages the work of a department across multiple projects and also incorporates non-project work. As above, functional plans can exist at the overall project (program) level, but also at the component level.
- Mixing plan types and levels can result in plans that are misleading, inaccurate, and may cause extra and unnecessary work. They can result in ambiguous activity definitions, confusing deliverables and unclear interface requirements.

Proper integration of the various planning activities can only be successful when the roles and purposes of each are properly understood. The sophistication level of the planning systems is dependent on the complexity of the programs, and the structure of the organizations performing the work. Knowing and understanding this can help avoid the pitfalls that keep prevent the development of clear and effective project management processes.