2. The Human Relationship to Advanced Planning, the Man-Machine Interface

In Chapter 8 of *Planning Product Flow* we discuss at some length the challenges of implementing advanced planning systems. While this chapter and the case studies in Chapter 7 certainly illustrate the importance of good planning tools, we don't really discuss why computer tools are so important.

In addition to the fairly obvious capabilities of information systems to pull together the information needed to support planning, there are some complementary capabilities to humans and computers that we don't think about very often. The figure below shows something of why "opposites attract" in successful marriages of man and machine for planning.

Topic 2; Figure 1: Humans and computers are complementary

Humans are good at:

- Making subtle choices
- Pattern recognition
- Adapting to new environments
- Understanding the larger business context

Computer algorithms are good at:

- Computing product flow
- Displaying data
- Repetition (they don't get tired or bored)
- Optimizing by fixed criteria in a confined problem space

Projecting flow, and other numbers grinds. At the heart of planning is the need to project forward what is going to happen in the future based on what is known about the present. If a truck is in transit to distribution center A and will arrive tomorrow with X products to deliver, and we have Z orders to ship tomorrow, and we have I inventory currently at the distribution center, we can have a pretty darned good idea what inventories are going to be at that distribution center by the close of business tomorrow. We don't know with certainty because the truck may be late (or even be stolen), but we have a high degree of confidence.

Product flow planning is full of this kind of arithmetic, and every planning tool, from PC spreadsheets to ERP systems to mathematical optimizers easily do this kind of computation. Planners are vastly more productive when they have convenient tools to perform these simple calculations for them, because they can focus on making choices, on making decisions that often are difficult because they involve guesses about the future or unknowns about the present.

Pattern display and recognition. One of the great advances during the initial Apple McIntosh™, PC Windows™, Unix™ workstation era of the late 1980's was the broad availability of GUIs, graphical user interfaces. Those GUIs were actually good for displaying graphics, not just screens with lots of icons and pretty formatting. Planning on PCs/workstations, or PCs/workstations hooked to central servers, meant that it was relatively easy to build planning tools that would display data to planners through very sophisticated graphics, and even allow planners to interact with those graphics and change plans graphically. The old saying that "a picture is worth a thousand words" is absolutely true. Humans grasp information very rapidly that is well displayed graphically.

We can recall developing one application that had very nice displays of production schedules and inventories by product, showing at a glance what was going on with that product across its planning horizon. We remember one old planner who was part of the design team commenting that: "Graphics are for management; planners look at numbers." A year later he was doing live planning on that graphics screen, flipping from product to product at about 2 seconds per product, visually evaluating from the graphic whether he was going to have to make any manual interventions in the schedule. Good graphics simply work.

One unfortunate aspect of "thin client" computing with just a web browser on the user's workstation is that it is considerably more difficult (and often slow) to make really nice graphics available. It can be done, but most planning tools today make do with fairly simple, static displays (although there are exceptional ones).

Repetition versus context. We will discuss the last two complements together. As we discuss in the book, product flow planning is really re-planning. It is done over and over, perhaps a full cycle every day. Good systems handle most of the drudgery, and they don't get tired of looking for product/location combinations that are about to run out of inventory, and all the other details that are truly unnatural for humans to keep worrying about. But if business takes an unusual turn, say a sustained product shortage and need for allocation to customers (in a business where this is rare and you don't have predefined processes for allocating product), a human planner will try to respond reasonably to the situation. A computer algorithm not designed for allocation conditions will do something inappropriate.

Good optimization algorithms can suggest plans that truly make the best use of resources (under the range of conditions for which they were designed). When well implemented, so that they solve quickly, allow human users to make edits to parts of the suggested plan, and then resolve around those edits – the interaction of human and computer can be uniquely effective in delivering the strongest of both computer and human capabilities.