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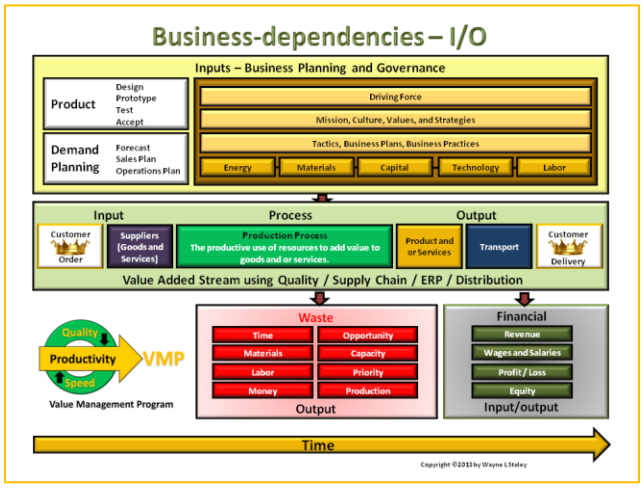

The Evolution of Production Planning and Hot Lists

This month I am returning to the shop floor and information systems, the essence of Affinity Systems LLC, to provide a comparative historic perspective. Today, manufacturing uses highly sophisticated computer based production planning and control systems to manage and synchronize business operations, from demand planning through completed order arrival at the customer. We look at how people performed important tasks in the dark ages before computers, and then measure progress.

We are traveling backwards in time, to 1970, arriving at a furniture company located in the north woods of Wisconsin.

Each year the sales department laboriously prepared a manual sales forecast, entering the monthly requirements on a sixteen-column spreadsheet. The finance department used the spreadsheet for budget planning, and once approved, management released the plan to the production supervisor. In ERP terminology, it is independent demand, the highest level on the Bill of Material structure.

The supervisor reviewed the forecast and restructured it into product categories, then into dependent finished goods numbers (SKU's). Required quantities were calculated and summarized into monthly buckets controlled by production capacity. These data became the production plan, and the source for calculating the gross requirements for all parts and raw materials needed to manufacture the plan.

The supervisor took the spreadsheet and walked through the warehouse, netting on-hand inventory quantities against the gross requirements, developing a shortage list.

Returning to the office, the supervisor subtracted outstanding work and purchase orders from the net requirement. If different, the supervisor increased, reduced, canceled, or re-timed orders to arrive prior to the need. The result of these efforts was a time phased weekly production and purchasing schedule forming the base plan for the year. If events proceeded per plan, raw or work-in-process (WIP) inventory balances would be zero at the end of the year. If the independent product sold per plan, finished goods inventory would also be zero.

This seemingly primitive technique precisely calculated absolute requirements, and the calculations are the same as those driving every ERP system, simple or complex, although not as fine in terms of time, or as inclusive in terms of functionality.

From the beginning of the concept, uncontrollable variables broke the scheduled plan, resulting in inventories and late shipments. The process, not the relational formula, was prone to errors. It takes time to construct a spreadsheet, perform the calculations, physically net inventory quantities, and prepare the paperwork.

The supervisor could not win. Change always overpowered the plan. Overselling meant shortages of needed product. Underselling created a surplus of the wrong product and a misuse of capacity needed for actual demand. While manual methods worked for the initial plan, it completely broke down when re-planning. There were not enough calculators, people or time to keep up with changes. Engineering change notices created chaos. Machine breakdowns and employee issues further compounded the problem. The focus of the eight o'clock production meeting was coordinating output and reconciling different hot lists.

The system failed to synchronize the production process. When workers attempted to pull the parts needed for specific orders, they nearly always mismatched. Shortages triggered a hot list for late production, overlaying and superseding the formal shop schedules. Expeditors chased through the shop demanding new completion dates from supervisors. They updated assembly schedules based on these promises. The system was chaotic but functional. The long lead-times and high inventories were global situations experienced by virtually every manufacturing company. After the tremendous effort expended on the initial planning, the formal systems collapsed and reverted to informal expediting systems.

To protect his schedule, our superintendent later embedded safety stock into the formula. The need to plan and re-plan capability made replenishment formulas popular. These include economic order quantities (EOQ), parts period balancing and safety stock calculations using service factors. Formulas decouple requirements for parts from demand, resulting in mismatches and high inventories. Production must match parts to the next level requirements, rolling up through final assembly. This compensated for planning errors and made parts available when required. It also drove up inventory and changed the basic premise from one to one production to planned inventory. Final assembly production resulted in leftover inventory, netted in the next planning cycle. Driven by order and inventory requirements, the system caused non-productive inventory to compete with customer orders for production capacity. High labor costs and low inventory turns blew apart the initial budget.

When introduced, computer based Relational Requirements Planning (RRP) was revolutionary. The method reestablished the direct relationship between independent and dependent demand. RRP grew into Material Requirements (MRP) by extending the calculation to include inventory, production and purchase planning, and some financial applications. By extending the relational calculation to include lead-time management, formulas for lot sizing, labor calculations, capacity, distribution, and financial planning, the system morphed into Enterprise Resource Planning (ERP).

The computer had profound effects on our shop supervisor. Plans could be quickly calculated and recalculated as conditions changed. While the computer changed the playing field with timely re-planning, it did not translate into correct planning. Any relational calculation demands nearly perfect inputs such as units of measure, bills of materials (quantities per assembly and completeness), and accurate demand (orders) and inventories.

A life-changing event finally freed our superintendent. He retired and spent his time fishing for muskies in the lake near the plant. His only worries were weather and if the fish were biting.

MRP was the child of a vertically integrated world with requirements based on relational calculations instead of formula derived order points. It was a "blue-collar" method replacing the supposedly intellectual arithmetic and "professional" techniques. In the end, contemporary ERP systems incorporate a great deal of sophisticated mathematical formulas and techniques.

In the last fifty years, in spite of great technological advances, core lessons learned go unheeded.

Some companies are still using old or fragmented systems that are incapable of properly calculating dependent requirements due to disconnect between demand and production. The cause was/is frequently a lack of the internal discipline required to establish and maintain accurate records. Other systems lack functionality, such as mobile technology integration, or are no longer capable of meeting the needs of the business. Engineering change management is still haphazard, and obsolete inventory results from mismanaged processes. Companies still use formulas for planning because of long lead-times due to outsourcing. The system developed for a vertical production world must work in the horizontal environment of global supply chains. Meshed into unstable anti-solutions, some ERP and Supply Chain Management programs perform neither function well.

Additionally, some companies lack the discipline to make ERP work effectively, and still use hot lists to manage production. The lists are very sophisticated, looking like normal systems outputs, but on close inspection, are conceptually little different from those once used in the furniture factory. In these environments, schedules often degenerate into the Alice in Wonderland mode, where expeditors run increasingly faster but make no progress. A hot list implies the ERP system is broken, or unable to manage the business variables. Companies may be paying enormous amounts of money to perform the simple, ineffective principles of the past.

Hot lists are symptoms of systems failure. Do you have hot lists on the shop floor? Are you sure? Ask the questions, get the facts, and answer honestly. If it is yes, find out why and fix or replace the broken system.

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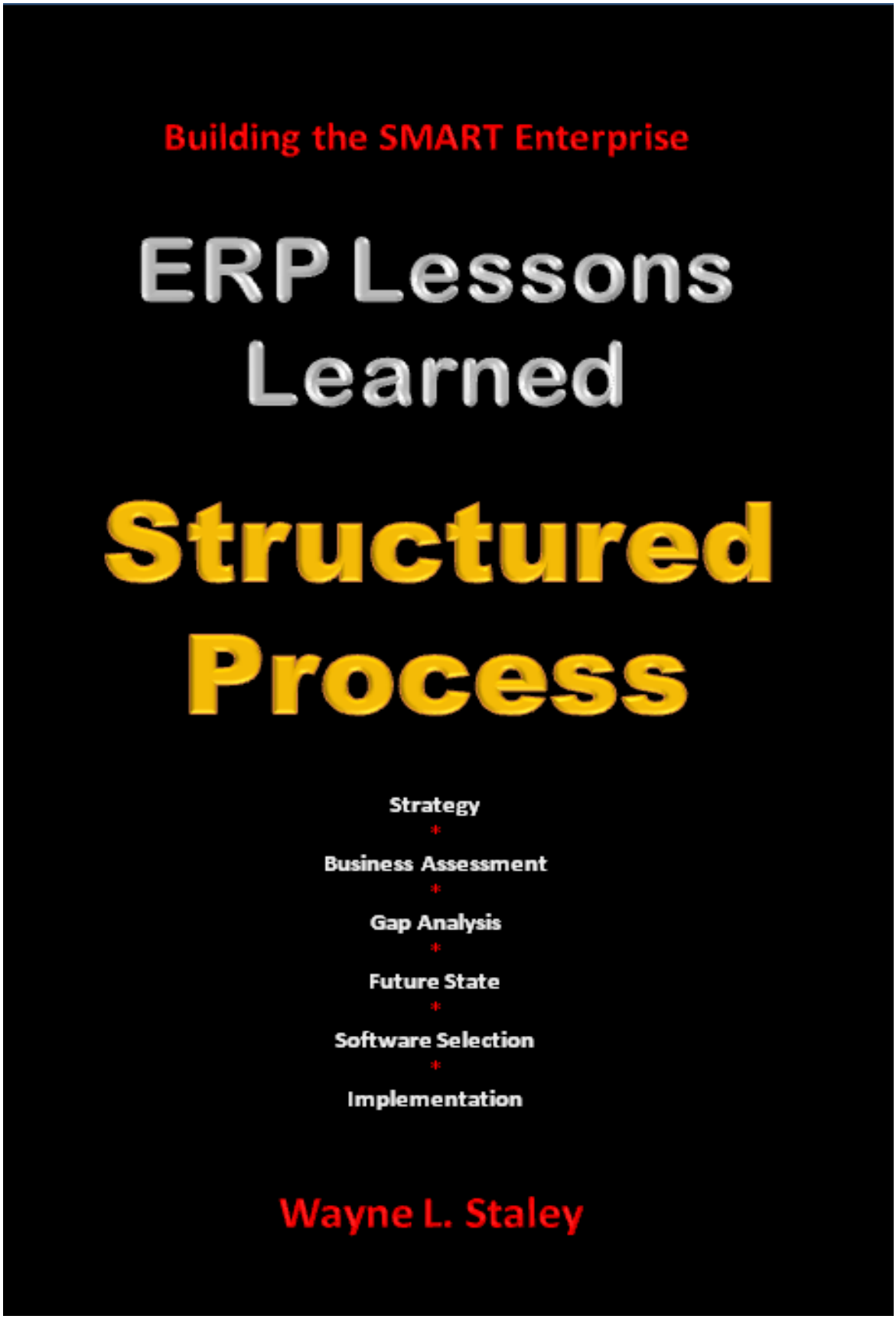
Building the SMART Enterprise
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