Selders ERP Consultancy

Het Activity Based Planning concept van sEc

Author : J. Selders ; © 2021 Selders ERP Consultancy

1.Introduction

With 'Infor ERP Visual, SELDERS ERP CONSULTANCY is introducing the concept of “Activity Based Planning” (ABP) into practice. 'Infor ERP Visual is the first standard ERP package where putting this control concept into practice has really become possible. The ABP planning concept, which will be explained in detail in the following chapters, works fundamentally differently from the MRPI / MRPII planning concept known since the 1960s. The basic principle is that this concept is not based on control based only on materials and their coherence in an end product, but that ABP maintains the coherence of and between the industrial activities that should lead to the realization of a product project or service. Through, among other things, the operating logic, the architecture in Infor ERP Visual, the preconditions and the purpose of this planning concept, ABP is able to largely overcome the drawbacks associated with working with MRPI / MRPII.

2. The IBM MRP concept.

ERP stands for Enterprise Resource Planning. ERP packages or systems are systems in which the handling of both the logistics flow of goods and the money flow of an industrial organization is coordinated in planning and control. The planning module of most ERP packages on the market today is based on the already mentioned MRPI / MRPII concept. MRPI stands for Material Requirements Planning and MRPII stands for Manufacturing Resource Planning. MRPI has its origins in the early 1960s. This planning concept originated from IBM, which in those years brought hardware (mainframe computers) to the market that at that time had insufficient capacity to run something like an integrated material and capacity planning.
This is how the so-called BOM processors came into being; computer programs that, on the basis of an Item Master file and a Multi-Levels Bill of Materials file, could calculate which material was needed for which end or intermediate product at what moment by taking all the lead times listed in the field “Lead Time” of Item Master from level to level to add up to a total turnaround time. Thus, it was fiction assumed that obtaining the materials at all levels of the multi-level bill of materials would also take the exact turnaround time stored in the computer. Once that total lead time had been recorded in an MRP plan, it could only be changed if a new planning run was to be run. In the days of the main frames, it was common to run the MRP program only once a week in so-called batch mode. In the BOM processor, only the relationships between the materials from level to level in the multi-level BOM were taken into account.
The capacity of people and machines was not taken into account because the computer power was not sufficient for that at the time. When the hardware developed further and more computing power became available at the same or lower price, MRPII, or Manufacturing Resource Planning, was created. With MRPII, a material plan is first created via the BOM processor, which is then submitted to a capacity file in the database. In the database, the assessment was thus made as to whether the already calculated material plan was feasible based on the content of the capacity file and when which processing group had to be activated at what point in time in order to be able to comply with the already determined material plan.
In the capacity file, it was (and still is today in most ERP systems) pretended that all capacities were sufficiently present and available at all times; the phenomenon of the so-called infinite capacity. Manufacturing Resource Planning therefore means that in this way the available capacities were matched to the need for materials from the MRP material requirements plan. Joseph Orlicky, member of the IBM team that

developed this concept in the late 1960s, wrote a book of this MRP mechanism in 1974/1975 which was subsequently adopted by APICS (American Production & Inventory Control Society) as the production control standard of the time.
For commercial reasons, all ERP package suppliers have conformed to this standard. Although the MRP concept is a control standard that only works in the discrete industry if it is only necessary to control the production in stock, this concept has also been used for the past 40 years to control the manufacture of discrete products on customer order, in engineer-to-order environments and in the project industry. Even in the process industry, this concept has been used for years, although it was already known at an early stage, in the 1970s, that this could absolutely not work for that type of industry due to the phenomenon of the as yet unknown by- and waste products at the time of the planning run.
MRP therefore requires that all products that participate in the planning run in the Item Master file and the Multiple Levels BOM file are known in advance with a fixed quantity, lead time and fixed relationship between component and semi-finished or finished product. The MRP standard has been so widespread over the past 40 years that it is safe to say that thousands of production managers, planners, buyers, salespeople, consultants, logistics experts and automation experts consider MRP the only correct standard.

3. There was no doubt about MRP.

Research has shown that most ERP implementations at industrial companies have not produced the expected and hoped-for result. American research has also shown that most processing groups in factories still do not achieve higher utilization rates than 50%. Likewise, components and sub-assemblies are still found to wait in the factory more than 95% of the time before being acted upon and still most manufacturing organizations, including those that are currently running well and profitably, have a delivery reliability that is on average does not go further than 30%.
Despite the fact that most ERP systems still do not deliver the results that can be expected, given the promised functionality, the prices of the software packages and the implementation efforts, the old MRP principle remains true and there is still something in the ERP world little to notice of the questioning of the MRP concept and the MRP principle.

4. The disadvantages of MRP

Working with MRPI / MRPII has major disadvantages for many industrial organizations, such as:

• The obligation to define each material and component in the Item Master file in order to be recognizable in the planning.
• Having to work with multi-level BOMs to determine the dependent requirements of lower levels in the planning.
• Having to work with fixed lead times for dependent requirements per item in Item Master in order to calculate a lead time in the planning;
• Only being able to work with materials in the planning;
• Not being able to “calculate” integrally with the availability of people, materials, capacity, tools, outsourcing and auxiliary materials, which often involves so-called infinite capacity;
• After a material plan has been determined by the MRP program, it is presented as a result to a separate shop floor scheduler for the capacity plan, which then has no or

insufficient integral feedback if the material plan turns out not to be appropriate;
• The obligation to work anonymously via the MPS mechanism with regard to the relationship between materials and capacities on the one hand (work orders) and customer orders on the other;
• During the MRP planning run, separate decoupled work orders are created at each level of the multi-level bill of materials for all production items that are required; these work orders have no relationship with each other after the planning run.
• During the MRP planning run, separate decoupled purchase order suggestions are created at each level of the multi-level BOM for all purchase items that are needed; these suggestions or the resulting purchase orders are no longer related to each other after the planning run.
• Not being able to properly check the availability of material and capacity upstream in the chain;
• Not being able to work with dynamic decoupling points and dynamic bottlenecks.

5. The harmful effects of MRP on business organizations.

These disadvantages have a major effect on the business operations of those industrial organizations that have implemented ERP in the past 20 years. In many large and small industrial companies, the implementation of ERP in itself has already led to many problems. Where the implementation of ERP was considered successful, research shows that in most cases, however, the ERP package did not deliver what was expected. Considering that most ERP packages only have a planning mechanism based on MRPI / MRPII, this is not surprising. In those industrial organizations where the ERP implementation on its own has been successful, this has generally led to better communication between the various parts of the company such as Sales, Production and Purchasing.
With the ERP system, these organizations generally also manage to better register the various matters related to the primary process. ERP has worked as a standardization mechanism in this. The quality of the planning and scheduling, and thus of integral control towards lower stocks, greater delivery reliability, shorter lead times, better throughput and greater Return On Investment, has not improved. In order to get that quality to a higher level, one precondition in the management of industrial organizations is an absolute necessity: insight into and management of bottlenecks and thus optimization of bottlenecks.

6. Optimization of Bottlenecks.

Optimization of bottlenecks generally ensures that the flow of goods on the factory floor will increase with only those work orders that are eligible for fulfillment according to the priority list of customer orders. Only those components are used that are strictly necessary for this. This mechanism almost always leads to a reduced need for stocks of components in the purchasing warehouse and a reduction in stocks on the production floor. This mechanism also leads to more reliable information when which customer order can be fulfilled.
In summary, this mechanism therefore leads to better utilization of capacity, improving flow, lowering stocks, shortening lead times, improving delivery reliability and thus increasing Return On Investment.
The latter has a positive effect on the profit of the company. Insight into and control of bottlenecks and thus optimization of bottleneck is completely impossible with MRPI / MRPII. In fact, where MRPI / MRPII is used as the basis of the planning, this

mechanism tends to generate bottlenecks rather than help solve them. Analyzes of bottleneck processing and capacity groups in an MRP environment generally produces a static picture due to the lack of insight and control information.
In such an environment it often appears that one particular machine or man / machine combination is the bottleneck. In an ABP system such as Infor ERP Visual , the possibilities are present both conceptually and functionally to perform actual bottleneck analyzes. Bottlenecks can be visualized; it can be made clear where they are and how “heavy” they weigh in relation to other processing and capacity groups and bottlenecks.
This often shows that bottlenecks are not static units but shift over time from one capacity group to another (or from one material to another). Bottlenecks are therefore not only limited to the own production floor, but can also be related to the supply of certain materials, the handling of components, sub- and final assemblies in the warehouse and at the goods receiving and shipping departments. According to the theory of Eli Goldratt (see the book “The Goal”), a bottleneck should be 100% loaded and all production capacity should be able to be used. 1 hour loss on the bottleneck, Goldratt argues, is 1 hour loss for the entire company that can never be recouped.
In an ABP system such as Infor ERP Visual , the prioritization of bottlenecks and thus the control is determined by only one factor: the priority list with customer orders. In an environment in which work is carried out completely or in partly on stock (and therefore on forecast), the forecast order is a special form of customer order for the ABP system; namely a customer order placed by the Sales department but for which the entire organization bears the economic responsibility. Bottleneck control with an ABP system such as Infor ERP Visual demands a special work discipline on the shop floor. Only operation and capacity groups may be active that, according to the customer order priority list, must actually be active.
It makes little sense to have those operation or capacity groups that come before or after a bottleneck, but have much more capacity than the bottleneck, do more work than the bottleneck can handle. In MRP systems this is common and almost always leads to stocks of work in progress that can no longer be disposed of and in which enormous amounts of money are often stored that cannot be put to good use.
Also, in such production environments, non-bottleneck operation and capacity groups often “steal” materials that are later found to be needed in operations and operation groups that did not initially form a bottleneck according to the customer order priority list.
The result is that a bottleneck still arises where it would not have been necessary. It should be clear from this that optimizing the use of bottlenecks means that certain production and warehouse employees sometimes have to “sit still” at non-bottleneck operation and capacity groups, while others, on the bottleneck operation and capacity groups, are hard at work.
This is a difficult fact because factory organizations are not used to consciously not deploying certain groups of employees from the MRP point of view. In an MRP system, there is sufficient stock of material for each operation and capacity group, so the production employee will take this in hand when the previous work is completed, regardless of whether this serves the priority list of customer orders or not. ABP prevents this, but also only if all employees of the production, warehouse, goods reception, issue and dispatch cooperate in this in a disciplined manner, supported by the management of the organization.

7. How does Activity Based Planning work?

7.1 Resource-types

For the disadvantages mentioned in the first chapter that the use of the MRP concept entails, 'Infor ERP Visual through the “Activity Based Planning” concept has an excellent solution. The 'concurrent scheduling' module is the translation of this ABP concept in 'Infor ERP Visual. The production organization that will work with 'Infor ERP Visual can do this by building activity models in the' Infor ERP Visual database. These activity models are related to the realization of a product or service or combination thereof. Such activity models (generally represented in the system by a network of value-adding activities) can be linked to people, materials, machines, outsourcing and tools. If desired, this can be entirely linked to a customer order. With these activity models it is possible to plan and schedule in the system.

Based on the link with the customer order, it will be clear at any point in the operation which people, materials, machines, outsourcing and tools have been or will be used for which customers. Based on the link with the customer order, it is then possible to always keep the customer informed of the progress during the operation.
The competitor scheduler, which is patented by LSA (US Patent No. 5,787,000), integrally takes into account 4 resource types:
• Material,
• People / machines,
• Tools and
• Outsourcing.
Any of these resource types can be part of an activity model.

7.2 Types of acitivity models

In Infor ERP Visual it is possible to work with 3 different types of activity models :
• Engineering Models;
• Quotation Models and
• Work Order Models.

7.2.1 Engineering Model

An Engineering Model is primarily the representation of the way in which a certain (unique) product or service is put together in successive steps of production activities. Per activity, not only the components, operations (people / machines), tools and outsourcing can be defined, but also the associated costs of each of those resource types.

7.2.2 Quotation Model

A Quotation Model is very similar to an Engineering Model and is often even derived from an Engineering Model. However, the purpose of a Quotation Model is that it serves as a basis for a quotation for a customer or any customer in terms of content, numbers, costs and delivery time.

7.2.3 Work Order Model

A Work Order Model can be derived from an Engineering Model as well as from a Quotation Model and with regard to the composition of resource types according to content, numbers, costs and delivery time, it can be adjusted to the then prevailing situation with which production will actually take place.

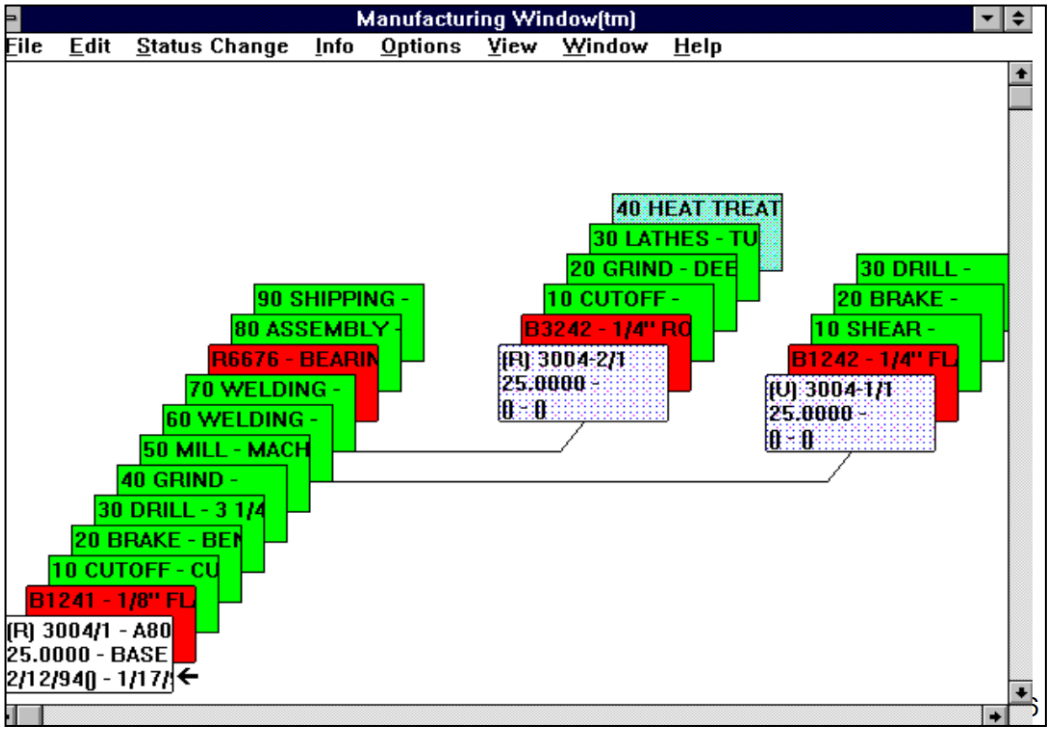

Figure 1 An example of a Work Order Model

7.3 The working of the 'concurrent scheduler'

Only activity models that represent work orders are included in the current (standard) factory plan. In the factory schedule, the activities of the work orders are scheduled according to the principle of backward scheduling: the desired delivery date of the work order is looked at and the various activities are recalculated back in time in terms of their start and end moments. If, according to this calculation, the first activity should have taken place in the past, this activity is "placed" on the date "today" and the principle of forward scheduling searches for integration of all activities in the schedule.

The special thing about the Activity Based Planning principle is that during the schedule run, the schedule program in Infor ERP Visual not only looks at which machines / people are available, but also when which materials, tools and outsourcing are available. This has consequences for the scheduling mechanism; there is no point in scheduling activities at a time or at a time frame when people, machines, materials, resources or outsourcing are not available.

The schedule program will not schedule an activity until all those preconditions of availability have been met. It is of course possible for a planner to "break through" this mechanism; a work order can therefore be placed in the plan for which, for example, certain materials are not yet available. If certain materials are not available,

it will be possible to order those materials in a make and / or purchase order via the activity model in the work order.
These materials are always only needed for certain processing steps of the work order; not all materials need to be present at the start of the work order. If the acquisition time of those materials is longer than the time remaining until the next processing step of the order, the delivery date of the work order is compromised. If the following processing steps no longer have any leeway, this work order will never be realized on time.
The schedule mechanism will then indicate the earliest possible date on which the order can be realized. If there is still some leeway or “slack” in the following processing steps, the schedule mechanism will first make use of this before indicating that the desired delivery date of the work order is in danger. The word “slack” deserves some explanation here. The definition of slack is the difference between the maximum capacity of an operation or capacity group and the already planned required capacity of that same operation or capacity group *at any time*.
This means that the leeway that is left (also called slack (discrete industry) or float (project and process industry)) can differ from moment to moment depending on the speed at which work in progress on a machining or capacity group there. is processed and new work in progress is offered.
“Leeway” is therefore not so much a property of an operation step of a work order, but a property of an operation or capacity group. At some point (at the time of the planning run) this property will be allocated to the work order operation step to determine whether all work order operation steps can be completed in the correct sequence within the boundaries of the desired work order delivery date.
This allocation of this property takes place according to the priority order of the work orders in the schedule. In an Assemble-To-Order, Make-To-Order or Engineer-To-Order environment, the work order will generally be linked to a customer order. In those situations, the desired delivery date is derived from the desired delivery date of the sales order.

7.4 Simulations.

Each order therefore has a desired delivery date. The moment a seller can get a large order, a production company wants to know what the consequences are for other orders, for the margins of other orders and whether the delivery date can be met. 'Infor ERP Visual makes all those effects visible through simulations. All simulation variants, in which Engineering Models, Quotation Models and Work Order Models can be included, can be stored separately in the planning under their “own” planning identifier and can be played through with the 'scheduler'. The best variant can be introduced later in the daily production by including these as work orders in the 'standard' plan in the form of Work Order Models.

7.5 Infor ERP Visual at the shop floor.

Under the motto a picture says more than 1000 words' Infor ERP Visual shows the user at a glance in graphical images both the material requirement for an order and the structure of materials in sub- and final assemblies related to the cohesion of production activities. In a manufacturing environment, the program shows, for example, the structure of a production line, how far the production of an order has progressed, which tasks of an order have already been performed and which still have to be performed.

The user knows the current costs of an order at any time. This makes pre-calculation and subsequent calculation superfluous because it is clear at any time what a product, project or work order has actually cost in terms of current costs (Activity Based Costing). The system also offers a user the option of calculating the total expected costs based on current costs. Not only our own staff but also clients can access the production line via the Internet to check the status of orders. Until the order is put into production, changes can be proposed via the Internet and checked for feasibility via the simulation options of the 'scheduler'.

8. Common Sense Throughput.

8.1 Performance Indicators

Dick Lilly, the former managing director of Lilly Software Associates (LSA) who sold Visual Manufacturing to Infor; (which is now the package supplier of Infor ERP Visual), is the inventor of the 'Common Sense Throughput' method - freely translated: 'the common sense production method'. This production method enables a user of Infor ERP Visual to achieve a higher return from the available production capacity with the same number of people and the same resources.
Common Sense Throughput is anchored in Infor ERP Visual in the form of a module that allows planners and managers to steer on the most important performance indicators associated with increasing the Return On Investment of an industrial organization, such as:

• low stocks;
• high delivery reliability;
• high utilization of bottleneck processing groups;
• high Turn Over Ratio.

'Common Sense Throughput' does this by 'looking' at bottlenecks and making information available, mainly in graphical form, how these can best be controlled.

8.2 Combating vacancy.

Every organization has one or more bottlenecks in its production. The bottleneck can be, for example, a machine that is constantly fully booked, a department with long delivery times or an engineering department that takes too long to create and build drawings. Such bottlenecks often lead to long queues in front of the bottleneck and to vacancy in processing groups and departments that come after the bottleneck and are not themselves a bottleneck.
American research has shown that in practice many production departments of companies have an average vacancy rate of 50%. So there is still a lot to improve in industrial organizations. A production company with a turnover of EUR 1 million per year will already save approximately EUR 100,000 per year if capacity utilization is improved by only 10%.
But not only these kinds of savings can be realized in such a way. Where production departments are only used for 50%, but where organizations are also struggling with a tight labor market in terms of recruiting well-qualified personnel, the use of Infor ERP Visual and the Throughput Module can mean an explosive increase in productivity without extra employing people.

Simply through better coordination of people, machines, materials, resources and outsourcing and therefore better utilization of what an industrial company had already invested in, namely people, machines and resources.

8.3 Bottlenecks become visible.

As already indicated, Infor ERP Visual makes bottlenecks visible in a production line and enables users to manage those bottlenecks. As soon as an order is posted, the production module scheduler automatically schedules the flow through the production bottlenecks with a minimum of idle time before and fast delivery afterwards. The scheduler makes it visible that, for example, it makes no sense to run extra shifts because it does not influence the bottleneck or bottlenecks in the production line, or that the bottleneck is shifting.

As a result, the extra capacity at the front of the production line further down the line can cause extra idle time. The scheduler also shows the margin on a specific product in the bottleneck. For example, if the user earns f 1 on product 'A' in the bottleneck and f 2 on product 'B', a user can, by the end of the day, make a higher return by only producing product 'B'. The production module shows such considerations.

8.4 Strategic planning support

Such a method as described above gives an industrial organization the opportunity to do strategic planning in a much more adequate way than was previously possible at all with systems based on the old MRPI / MRPII philosophy. By working with the Throughput Module housed in Infor ERP Visual for a certain period of time, an industrial organization gains insight into matters such as:

• the profitability or loss of products, customers or combinations thereof;
• the profitability or loss of incidental or structural additional work orders;
• the use of a particular price policy in a particular market;
• whether or not meaningful use of production on stock versus production on customer order;
• better substantiation of investment decisions for the expansion or relocation of production, warehouse and distribution functions;
• Better substantiation of investment decisions in which scarce human capacity is exchanged for more available machine capacity.

With such a method, an industrial organization provides itself with the ability to sustain a process of continuous improvement for both the short and long term.

9. Applications.

Infor ERP Visual was originally developed for customer order-driven production companies such as manufacturers of machines and tools, ships, cars, engines, car and bicycle parts, furniture, doors and kitchens, interiors, blinds, lamps, molds, scaffolding, etc., but is also applicable for industries that wish to run their organizations based on Activity Based Planning.
Also companies of aircraft and shipbuilding maintenance and project-oriented companies can handle the planning and scheduling mechanism in Infor ERP Visual very well because of this “Activity Based Planning” concept. Basically, all types of industries that are able to categorize their activities in models associated with the realization of their projects, products, services or combination thereof, can make

optimal use of 'Infor ERP Visual'. Most industrial organizations that create products, projects and services in the so-called discrete and project industry will be able to do this.

10. The meaning of ERP is changing due to ABP.

10.1 Attention shift from secondary to primary process.

The term ERP is given a completely different meaning by applying the ABP concept. Because industrial value-adding activities are assumed instead of just materials and their mutual relationships in the end product, attention shifts from the secondary to the primary industrial process in the preparation of the planning and the necessary basic data.

10.2 From Product Engineering to Production Engineering

In an environment where the MRP concept is still being used, it is, among other things, a necessity to surround the Item Master File and the Multiple Levels BOM file with a separate management mechanism that has no direct relationship with production. Product Engineering and Production Engineering are separated in this. In ERP packages, the functionality associated with this mechanism is known as Product Data Management (PDM).
MRP requires that all items and components are actually in the Item Master file and the Multi-Level BOM file in order to be able to use them in the MRP planning run. Those components that are not included therein cannot therefore be “planned” by MRP. In an MRP system it is therefore very important that all levels of the Multi-Level Bill of Materials are included therein down to the smallest component and that for each component and level it is clear when what is valid over time.
In MRP systems this is generally regulated by so-called effectivity indicators and version numbers (engineering change orders). With a system such as Infor ERP Visual that is based on the ABP concept, Product Engineering is integrated into Production Engineering. This means that the product developers of an industrial organization that has deployed Infor ERP Visual in such a way cannot design or modify products without involving production engineers and the people from the work preparation department.
However, for an ERP implementation based on an ABP system such as Infor ERP Visual, this means that a module such as PDM cannot be implemented as a separate project. PDM (if one wants to speak of this in an ABP environment) is an integral part of Production Engineering and therefore also an integral part of an ERP implementation based on Infor ERP Visual.

10.3 ABP forces you to think in integral processes

Not only in Product Engineering and Production Engineering is a shift from the secondary to the primary process taking place. This also applies to function areas such as Sales, Procurement, Planning, Warehouse, Goods Receipt, Goods Shipment. All these functions come much closer together in the industrial process and move much closer to the production floor.
The ABP concept is pre-eminently a concept that “forces” in the direction of thinking and acting in integrated processes because this concept is based on the assumption that the cohesion of activities to bring about one product, project or service will be

maintained until this actually happened. As already described in the previous chapters, the cohesion of activities and thus the structure of those activities is recorded in Engineering Models, Quotation Models and Work Order Models.
The materials, resources, operations and outsourcing required for the product, project or service are linked to this structure. From Sales to Planning, Procurement, Goods Receipt, Warehouse, Production and ultimately Goods Shipment, this relationship will be maintained and the various functional areas and departments will adapt their working methods to that relationship. If changes take place in that context or if changes take place in the data linked to that relationship, all departments affected by this will also have to be involved in the control and implementation of the change information.
All these departments and functional areas have become much more dependent on each other due to the use of the ABP concept and the different way in which the required information is made available. This also affects the way in which the work should be carried out in the various departments of an industrial company. The substantive characteristics of the aforementioned departments and functional areas may change as a result.

10.4 Available-To-Promise(ATP) becomes Capable-To-Promise(CTP).

A strong example of the change in characteristic is the way in which the Sales department will be able to make commitments to customers and prospects with an ABP system. In a standard ERP system based on MRPI / MRPII, the ATP functionality usually consists of nothing more than the possibility to check the available stock or future available stock in the finished product warehouse. In Multi-Site systems this is at most extended with the possibility to check every end product warehouse of every site.
With an ABP system such as Infor ERP Visual, this ATP function has been elevated to a true Capable-To-Promise (CTP). In Infor ERP Visual this goes much further than with the standard ERP systems based on MRPI / MRPII, because here too the structure of industrial activities of the various model types Engineering, Quotation or Work order can be used. The big advantage of this is that the seller can check upstream in the chain whether the requested product can be made in the requested quantity in terms of availability of components, people / machines, resources and outsourcing and when this can then be realized.
The seller will certainly want to be able to do this in those situations where no or insufficient end products are available in the available stock. In standard MRPI / MRPII systems such a check is by definition impossible. This also means that where a seller does have such functionality, he / she will also use it for obtaining orders. With a much greater degree of certainty, delivery data can be provided to customers and prospects where end products have not yet been assembled.
The seller has then become much more dependent on Production with regard to maintaining the delivery dates promised to the customer. The customer will address this to the seller, who will then try to maintain the planned delivery dates in close consultation with Production. This gives a salesperson a much greater and deeper insight into the actual production situation, the material status and the availability of desired capacities. The delivery data provided by him / her are much more reliable and comprehensive than in an MRP situation.
The safety margins used in an MRP situation when issuing a delivery date are not necessary here because the information used is much more accurate and detailed with regard to the check upstream in the chain. This will undoubtedly lead to greater

delivery reliability and a reduction in the number of “no” sales by the seller. Where the seller still sees scope in the production situation and the available or ordered materials, he / she will be able to bring in additional orders in consultation with the planner (s).
Not to be underestimated is the ability for the seller to have a much greater and deeper insight into the actual production situation, the material status and the availability of desired capacities not only in logistical terms, but also in financial terms.
Via a Quotation Model, for example, it is very easy to have all current costs associated with the requested quantity of end product, even and precisely if that end product has not yet been made, in a handy overview in order to be able to make a decision based on that it makes sense to make a commitment to the relevant customer.
In an MRPI / MRPII system this is completely impossible. The seller will never have access to the complete current cost structure of all related activities, materials, resources, people / machines and outsourcing in a situation that the end product has yet to be realized.

10.5 The stepless transition from strategic to operational planning.

A lot is also changing for planners by working with the ABP concept. In organizations where MRPI / MRPII is used, it is not uncommon to have officers such as MPSplanners and MRPplanners. In traditional ERP systems, it is common to distinguish between different planning and control layers: strategic planning, tactical planning, operational planning and execution.
In general, this also runs parallel to the period in time or the period over which the planning extends. Strategic planning runs in parallel with long-term planning, tactical planning with medium-term planning, operational planning with short-term planning, and execution with shop floor scheduling. Many ERP systems tend to actually accommodate this in separate planning modules that only transfer data to each other in batch mode from the highest planning level to the lowest planning level.
In many industrial organizations where such a mechanism is used, the various planning layers are often housed in different departments that usually do not fall under the same hierarchical person with ultimate responsibility. The drawback in supporting the integral operation of the primary industrial process is clearly evident here: the transfer from level to level takes place at different times under different responsibilities.

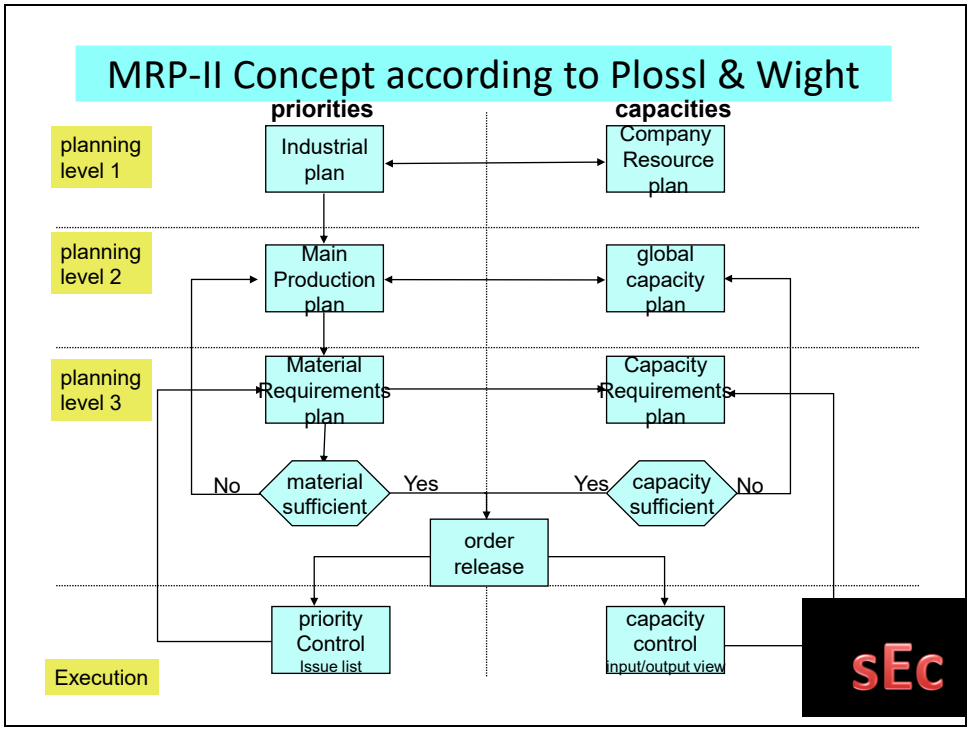

Figure 2 Planning levels in a MRPII system according to Plossl & Wight (1970)

This means that a lot will have changed at each level in the meantime, which the higher level will not (be able to) take into account. In addition, this mechanism has a major limitation with regard to the integral planning of materials, people / machines, resources and outsourcing because the focus is on planning materials independently of available capacities. The feedback from level to level that is necessary for ensuring the control of the whole and the tuning of the underlying planning parts takes place according to the same mechanism and thus loses much (if not all) of its power.
In an ABP system such as Infor ERP Visual, the above planning layers are actually integrated into one whole. In an ABP system, the planning function and thus the planner for the proper and correct management of the industrial organization is of all-encompassing importance. For the value-adding process (the production process in the long and short term) the planner or the planning department has thus become the most important functionary or department.
The planner or planning department controls the factory. All planning and management layers are brought together in this one function or department and will therefore have to fall under one responsibility, namely that of the management of the industrial organization. Both in the system and in the organization, it has become possible to have all planning layers anchored steplessly in 1 integrated plan, whereby the relationship from strategic planning via tactical planning and operational planning to implementation will be and remain visible at any moment in time.

10.6 From purchasing on stock to purchasing on customer order.

In an ERP system based on MRPI / MRPII, a purchaser will always purchase from stock. The MRP plan makes suggestions to purchase certain components at a certain time based on the make-buy indicator of the component to be purchased that is stored

in the Item Master file. In the same Item Master file, it is stated for the component how much time is required to obtain the component to be purchased.
Usually, this is a time frame that is greater than the time interval between 2 MRP planning runs. It is common for many components to have an acquisition time of more than 2 weeks. If MRP's suggestions to purchase are actually converted by the buyer into purchase orders that are subsequently placed with the supplier, the buyer's organization becomes the “beneficial” owner at the moment of acceptance of the order on the part of the supplier.

For the buyer's organization, this means the obligation to purchase and thus constitutes a financial risk. For example, if the acquisition time is 2 weeks and MRP has made the suggestion to buy at “moment now”, the purchaser places a purchase order “now” with the supplier, who then accepts it “now” with the notification that he will actually receive it within 2 weeks, this will not be able to be reversed if the MRPrun of a day or a week later still indicates that this component is no longer necessary for whatever reason.
In such a situation, this component is placed in stock with the assumption that a subsequent MRPrun will use this stock if a need arises again. In an MRPI / MRPII system, the so-called 80/20 rule applies to the phenomenon described here; in 80% of the cases, the quantity suggested by MRP and subsequently taken over in a purchase order will no longer appear to fit the MRP plan once the purchasing organization has become “economic” owner.
This phenomenon has already been described in MRP literature in 1975 by Joseph Orlicky, one of the founders of the MRP concept, under the name “System Nervousness”. Orlicky started from the principle of the so-called Netting mechanism. Under this assumption, the Netting mechanism will first use up the available stock of the component to be purchased before a new purchase suggestion is made by MRP. This means that the purchased components are by definition always placed in stock before being used by MRP in a subsequent run. In an MRPI / MRPII system, the MPS mechanism does not retain the relationship with the sales order, where the need for components comes from, and the MRP mechanism does not retain the relationship with the purchase orders that have arisen as a result. MRP only takes into account the inventory that those purchase orders will trigger.
In an MRPI / MRPII system a purchaser buys by definition in stock. In everyday practice, the past 40 years have shown that Orlicky's assumption that MRP through Netting would eliminate the stock is rarely correct. There are a number of logical explanations for this:

- Because MRP suggests a different quantity to be purchased for the same components from the same suppliers from week to week, the credibility of the MRP information for purchaser and supplier decreases. In many industrial organizations this has led to a culture of seeking safe margins in quantity and procurement time. Buyers demand more than is strictly necessary and suppliers will promise a longer delivery time than strictly necessary. MRP thus extends lead time instead of shortening lead time.
- Buyers and material planners would rather have a specific component than to be short of. Buyers are, as it were, “charged” on the basis of 2 conflicting performance indicators: they must ensure that production has sufficient materials

on time and they must purchase as cheaply as possible with as much discount as possible. This means that buyers have a “natural tendency” to deviate from the MRP plan and to purchase more than is strictly necessary according to the plan.
- Developments in technology, economy, market demand, internationalization, infrastructure, environment and legislation are changing More Levels BOMs faster than 40 years ago. As a result, components will age faster economically and end stock will be created that is no longer usable.
- Components themselves also change faster due to the above developments. Purchasing industrial organizations have the “natural tendency” to want to join the latest developments as quickly as possible. This will also lead to a quicker end stock that is no longer usable.

All this has resulted in the past 40 years in which many industrial enterprises are still saddled with large and expensive stocks of components and intermediates. In many industrial companies there is still a lot to improve and save on that point.
With ABP, the purchaser can achieve such savings much easier and better than would ever be possible with MRP.
Because an ABP system such as Infor ERP Visual works with More Levels BOMs of Value Added Activities (Engineering Models, Quotation Models and Work Order Models are equivalents) of which the components to be purchased are part of, it will always be clear to the buyer from which work order and via the work order from which sales order the need for certain components comes. The relationship between the sales order and the work order on the one hand and between the work order and the components on the other hand remains in a system such as Infor ERP Visual from the moment the sales order is created until the moment the final product is delivered to the customer.

Since the order of priority of all sales orders is determined by the desired delivery date of those orders agreed with the customer, it will be clear to the buyer at any time where the need for certain components comes from and according to which order of priority they must be purchased. By definition, a purchaser no longer has to buy in stock, although Infor ERP Visual will not prevent this. The components that are purchased based on the material requirements of a work order can also be assigned to that work order when they are received in Goods Receipt. This mechanism can ensure:
- That the purchaser does not have to order more from the supplier than is strictly necessary. The supplier will tend to give a delivery time that is much closer to reality because the delivery date requested by the purchaser can be given to the supplier with much greater precision. It is a delivery date that matches the priority list of the customer orders.
- That the buyer can deal more easily with the 2 conflicting performance indicators mentioned. He can ensure that Production can have the right amount of material available on time and he can still make certain price agreements with the supplier.
- By working with Work Order Models in planning and production, developments in technology, economy, market demand, internationalization, infrastructure, environment and legislation can be integrated into these models from moment to moment, also with regard to their effects on the required materials. . The responsiveness of a purchaser to such developments can therefore be many times faster than is possible with an MRPI / MRPII system.

It will be clear that such a way of working makes the work of a purchaser different than in an MRP environment. The interdependence between purchaser, planner, production manager and salesperson will increase strongly and the purchaser will have to work according to the priority list of customer orders, which was not visible and necessary to him / her in an MRP system.

10.7 Activity Based Planning = Activity Based Costing.

For the calculator or calculation department when it comes to determining the correct costs of a product, project or service, working with an ABP system such as Infor ERP Visual also has major consequences. In the Engineering Models, Quotation Models and Work Order Models, it is possible for the calculation department at any time to use the current prices of purchase items, make items and subcontractors during the construction of a new model.
The calculation department can do this by calculating the average purchase or manufacturing price over a certain period from the historical file with purchase orders and work orders or by using the purchase or manufacturing prices of the most recently realized purchase order or work order to which this purchase or manufacturing item was involved. For existing models such as work order models that are already active in production at any point in time, the costing department can update the prices of purchase and manufacturing items based on the purchase orders and work orders realized for that work order.
This ensures that the calculation department uses the most up-to-date price and cost information, whereby prices and costs are mainly determined by activities and the coherence of activities as recorded in the models.
For the calculation department, the great advantage of working with an ABP system compared to an MRP system could be that the obligation to work with pre-and subsequent calculation is no longer required, because it is possible to work continuously with the most current prices and costs situation.
In an MRP system, standard prices and costs are generally used and after production and delivery it is determined what the product, project or service has really cost. This often results in large differences between the preliminary costing (standard prices) and subsequent costing (actual prices) that still have to be accounted for at that time. There is then little or no possibility of anticipating and guiding action in the event of major deviations or exceedances. It is not possible to pursue an anticipatory financial strategic policy for products, markets or combinations thereof with MRP. This is possible with ABP. The calculation department can play an all-determining role in this.

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J. Selders, Selders ERP Consultancy