

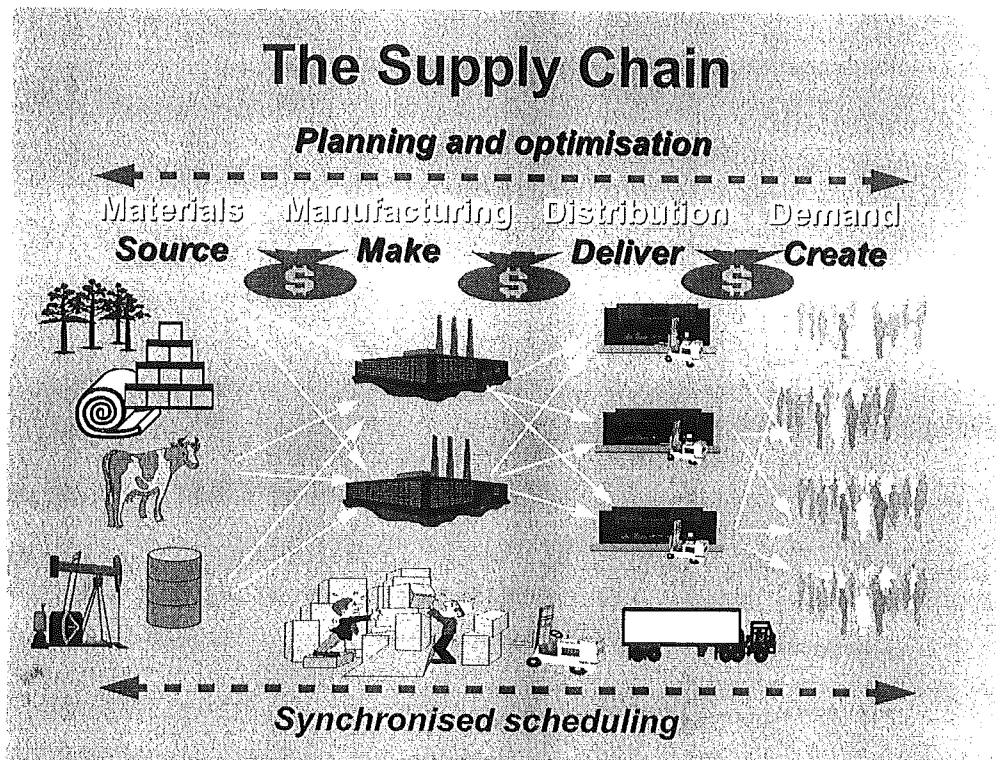
# “Supply Chain Analysis using Interactive Technologies to streamline your logistics.”

Chris Macquet, Deloitte Consulting

## 0. Pre-amble to the demonstrations

Understanding and perspectives on :

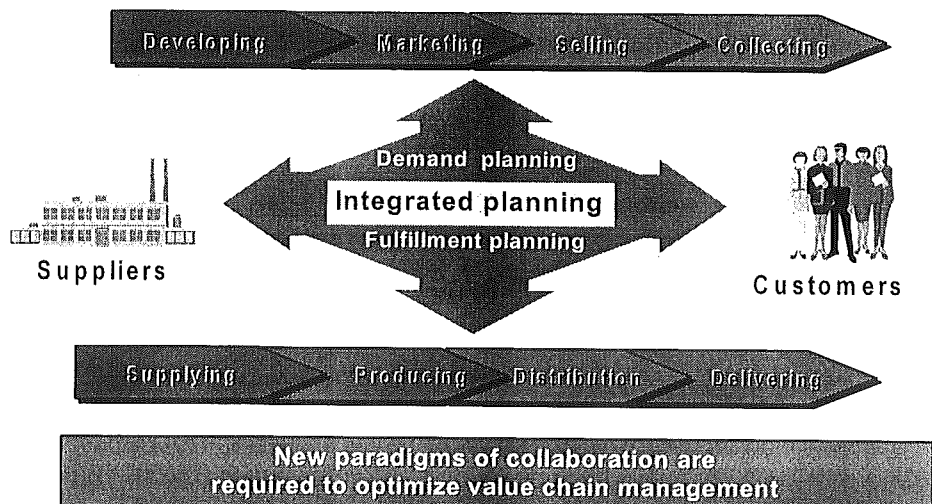
### What is the Supply Chain?



### What is the Revenue Chain? What is the Value Chain?

*The Business Imperative*

Integrated value chain management enables  
breakthrough competitive advantage



## **What is logistics? What is the best logistics methodology?**

### **Logistics - a simple definition**

Logistics encompasses everything involved in getting the right product to the right place at the right time and the right price, at maximum profitability and with greatest efficiency. (*my own definition*)

### **Logistics - a purist's definition**

"The discipline of integration which ensures that all business processes across functions are matched at strategic and operational levels to deliver customer and key stakeholder value"

or "*The Process of planning the alignment of logistics functions and processes with other strategic business planning units by establishing cost and service delivery options as a means of improving stakeholder value*". Dawson Consulting - Logistics Consultants.

## **Best logistics methodology? This comprises elements of ...**

### **Value-Added Logistics Management**

This is an approach whereby cost and benefit options in the logistics process are aligned with or related to the other strategic planning units as a means of improving stakeholder value.

To-day's technology enables us to comfortably add optimisation and agility. And we can apply them at all levels : Strategic, Tactical, Operational and Execution.

### **Logistics Optimisation**

Optimisation simultaneously considers costs, constraints, business objectives, and other variables across logistics (supply and revenue) structures, processes, and activities to identify all feasible options to determine the most profitable resource flow and measures to achieve desired results.

### **Value-Added Logistics Costing.**

An activity based costing methodology is critical to the process of measuring costs and benefits in both the supply and revenue chains.

This provides the benchmark for assessing improvement strategies and the key foundation for effective optimisation (\$ maximiser) for solving for the most profitable options.

### **Logistics Agility**

The ability to respond to and seize emerging opportunities in a competitive environment of continuous, unanticipated change.

Tools that enable you to do this and to assess the impacts on your business, give you increased agility. You need to re-configure, or re-model (benefits of OO technology),

your business process and capabilities, both internally and externally, rapidly and accurately.

### **Logistics Optimisation and Agility gives Strategic Agility**

*"The compound annual growth rate in the market value of the companies that achieved higher-than-average profit growth but lower revenue growth than their industry's average - the cost cutters, in other words - was 11.6% from 1989 to 1992. By contrast, the companies that achieved their higher-than-average revenue growth saw their market value jump at an annual rate double that - 23.5%. As usual, the market looks forward with wise eyes." Fortune Magazine March 7, 1994.*

# 1. Structuring your optimisation, planning and scheduling processes.

## Planning Horizons

These depend on the life cycle of the product, the capital intensive nature of the process, the complexity of planning decisions in each industry. In most cases, it is appropriate to group planning activities in three levels : strategic, tactical, and operational. In some industries, particularly in process manufacturing, where incoming raw materials are not that predictable, we often have a fourth level of planning : execution.

**Strategic or long range Planning** involves long-term goals and commitments where we may even question exactly “*what industry we are in*”. Here we seek to combine the intuitive with the analytical aspects of planning in identifying key strategic areas that are most crucial to our organisation’s future success and that require focused attention up to the 50 year horizon. Typically we are looking at issues such as raw material sourcing, new product development, plant location, plant capacity and market development for products.

**Tactical Planning** involves the medium term (1 - 5 years) with a focus on the optimal use of existing resources, resulting in “*where to produce what*” to meet the 5 year forecast in the most profitable way.

A key question at the tactical level could be :

*“How do we best utilise the company’s resources of materials, logistics and plant capabilities over the next 5 years to produce maximum profits?”*

Other questions that are addressed in the Tactical Planning Process?

- What product groups or classes should be made at each plant based on market demand, logistics, plant and source capacities?
- What is the cost benefit of new processing equipment in any one plant?
- What is the value impact of new sales and marketing strategies?
- What is the sensitivity of the plan to the key issues in the business?

**Operational Planning** (also called **SOP - Sales and Operational Planning**) involves near term execution of tactics and the master scheduling of sourcing, logistics, processing, shipping and marketing and sales activities within the 1 year time horizon. Key drivers of SOP are :

- to improve customer service levels to meet a required specified standard in terms of deliveries being in full, on time, to specification and with full documentation
- to lower operating and supply costs by reducing inventories, work-in-progress and distribution costs, and
- to increase operational efficiency by reducing cycle times, improve output and quality, and reduce variability in performance and specification.

A key question could be :

*“How do we best meet this week’s net demand requirements given the constraints of inventories, production capacities and cut pattern options at each mill?”*

Other questions addressed at the SOP level?

- What products (SKU level, i.e. grade, condition, size and length) should be made at each mill based on profit, plant capacity and log availability?
- What is the cost benefit impact of short-term solutions, e.g. 3 shifts, in over utilised mills?

- What is the cost benefit of log sorting and grading prior to mill delivery?
- What is the benefit of optimised harvest schedules?
- How do we minimise downfalls yet still meet demand profitably?

### **Execution Optimisation**

Due to the variability of input, and of changing customer demands, a focus needs to be kept on “profit maximising” when re-assessing how you are going against the master schedule from shift to shift. These would include ‘cut pattern’ optimisation in forestry, meat, ‘recipe or formula’ optimisation in brewing, dairy, chemicals, food.

### **Designing Planning and Optimisation Systems**

A properly designed and applied enterprise-wide planning and optimisation model brings value to all planning phases or types by ensuring that :

- Strategies create and preserve tactical flexibility
- Tactics recognise strategies, as well as operational capabilities and opportunities
- Operational activities follow tactical plans while optimising use of logs, mill capabilities, and inventories to satisfy orders and current market demands.

Our experience is that Tactical opportunities offer the quickest and easiest results since we are not dealing with the ‘nth degree of detail and of data accuracy. Very significant results (up to 70% of supply chain optimising effectiveness) based on higher level information, which is generally readily available, but providing it is relevant to the key decision making process defined in the model.

Also, tactical opportunities can be implemented and results achieved almost immediately within the context of “where (which forest / mill) to produce what” in maximising profits from the supply chain point of view.

## 2. How OO assists in supply chain information technologies

### Generic OO features, advantages and benefits

#### 1. Faster Development

- Model the process with the user,
- Rapid prototyping replaces conventional development
- Building software out of standard objects
- Re-using existing models of corporate processes

#### 2. Higher quality

- Programs assembled out of existing, proven components

#### 3. Easier maintenance

- Higher quality leads to less maintenance
- Superior modularisation of OO reduces interactions between software components
- Easier to verify program functionality
- Impacts or effects of changes more localised

#### 4. Reduced Cost

- Programming - assemble new programs out of existing components
- Design - rapid prototyping with user
- Administration - user involvement.
- Buying components is cheaper than making them

#### 5. Increase Scalability

- Large systems are easier to build and test highly modular OO subsystems
- Easy to add new object types from existing proven components

#### 6. Better Information Structures

- OO can more effectively represent more complex information scenarios
- OO reflects the way people and organisations naturally think and organise
- OO enables a transition from information systems to knowledge systems

#### 7. Increased Adaptability and Flexibility

- OO inherent adaptability is crucial in an ever changing world
- OO enables changes without re-building systems

Throughout the supply chain, we can use OO technology to

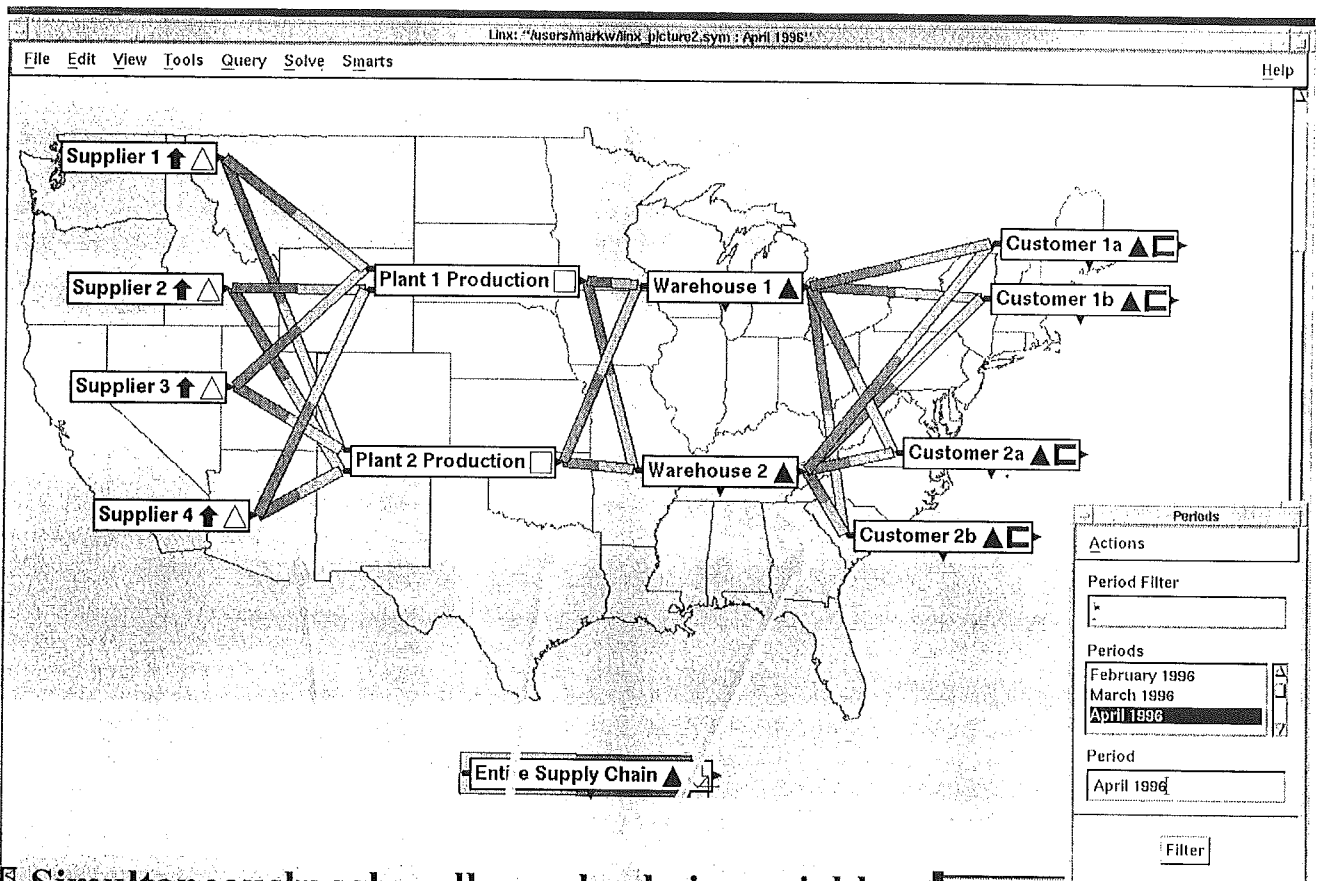
- model business processes,
- measure the processes - apply ABC (Activity Based Costing),
- collect information - internally or externally via the Internet,
- understand relationships and relational impacts,
- run simulations in seeking better ways or solutions in business processes,
- build enterprise systems and to
- maximise profitability through an optimiser.

<live demo>

### 3. Building a Supply Chain optimisation model

- defining what you want to achieve, the business case
- understanding how you are going to achieve this
- scoping the technical issues
- developing the project plan
- collecting and validating the information
- “what if” scenarios

<Live demo>



**Simultaneously solve all supply chain variables.  
Enterprise wide decision support - optimized.**

## 4. What is the best methodology to evaluate and select SCS

### **Best practices and methodologies in implementing Value Chain Solutions**

- understand the technological possibilities, case studies in your industry
- state the business case (are you in growth or trouble mode?)
- define detailed business requirements
- look at possibilities, ensure an industry fit,
- confirm business case in detail
- clearly state what and how : Strategic, Tactical or Operational Planning
- detailed definition and analysis of requirements, SCORE
- compare to 'packaged' solutions, FastTrack for SCS solutions
- decision time, use prototypes, proof-of-concepts, IndustryPrints
- decide on implementation **approach and tactics**
- get your activity costing right, use SCC (Supply Chain Costing) tools
- plan your milestones, make them achievable and relevant to the business

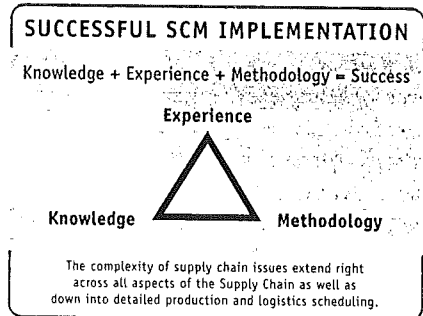


# Evaluating, selecting and successful *supply chain*

by Chris Macquet \*

**Most BPR exercises have resulted in the advice to focus on the supply chain. In evaluating supply chain management (SCM) solutions, it is wise to assess your and your management team's capability to do justice to such an evaluation.**

Where does your ERP system fit in?, how do you embrace EDI?, CFAR? (Internet enabled collaborative forecasting), APS (Advanced Planning and Scheduling) tools? are some of the questions you have to consider. Knowledge of all these options, understanding their technologies and the degree of 'fit' to your kind of business is a starting point.



The tried and tested formula of 'Knowledge + Experience + Methodology = Success' certainly applies in assessing the business case and the viability of success of a supply chain solution implementation and in evaluating the various offerings on the market.

First, knowledge and experience are separate skill sets. Experience enhances knowledge but does not substitute for it. Likewise, knowledge is no substitute for experience. Varying degrees of success of past systems implementations bear testimony.

In the relatively new field of SCM

solutions, all three factors: knowledge, experience and methodology; are in short supply.

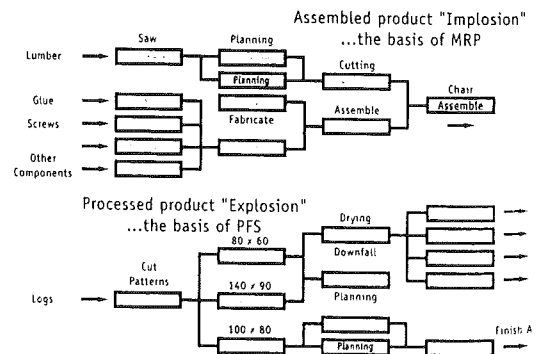
However, one can look at the two foundations of the supply chain, manufacturing and logistics, for guidance in the search for knowledge. In addition, one can look at supply chain education courses and review 'industry relevant' case studies to assist in the process.

## KNOWLEDGE

In both manufacturing and logistics, there are 'bodies of knowledge' espousing 'best practices' developed over the past 30 years. The critical issue is deciding how much you need before jumping into the evaluation, selection and implementation processes.

When it comes to educating people on subjects related to manufac-

## MRP vs PFS Scheduling Logic



turing systems, the American Production and Inventory Control Society (APICS) is the foremost authority in the world. APICS administers a certification program that accredits those who have proven knowledge and expertise in those fields.

The CPIM (Certificate in Production and Inventory Management) certifi-

### Transactional & Real-time (ERP & MES)

- Records, files, tags
- Acquire and manage data
- I/O Intensive
- Batch or real-time optimised
- Disk resident database
- Transaction, updates, gets/puts
- What is, was
- Schemas
- Fill-in-the-blanks

### Interactive Modelling (APS)

- Data sets, tables
- Concentrate and use data
- Computer intensive
- Interactive end-user optimised
- Memory resident database
- Cases, scenarios
- What-if, will be
- Models
- Data configuration

# implementing management solutions

cate is the most widely recognised measure of knowledge in the manufacturing sector. However, be aware that the CPIM qualification has been based on MRP II scheduling logic where many items are assembled or 'implode' into one or few.

Where one or few raw materials of variable quality 'explode' into a variety of end, co-products and by-products, decisions need to be made in the context of the new 'Process Flow Scheduling' (PFS) principles. These have recently been approved by APICS, after 25 years of collaborative research with Dr Sam Taylor and Dr Steve Bolander.

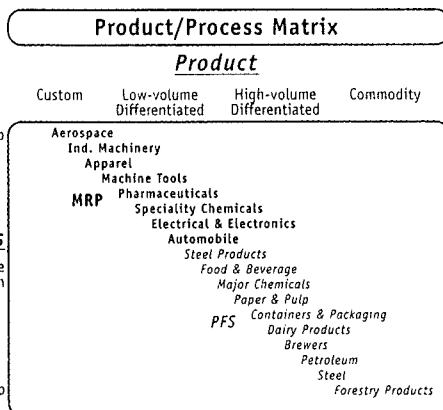
Process flow industries comprise 50 per cent of manufacturers worldwide, the proportions are much higher in Australia (70 per cent) and in New Zealand (80 per cent).

Look carefully at where your industry fits, since it is the synchronisation of schedules, manufacturing and logistics, which are the focal point of SCM. The importance of the 'right' scheduling logic can not be over-emphasised in selecting your APS solution.

APICS has affiliations throughout the world, including NZPICS (New Zealand) and APICS (Australasia).

Likewise, in the logistics field, the American Council of Logistics Management (CLM) is probably the foremost authority, but locally, the Logistics Management Association of Australia (LMA) seems to be the most active.

The odds of achieving success in the software selection process increase significantly if there is at least one person on the team who has these



levels of knowledge and expertise.

## UNDERSTANDING

In addition to experience in the fields of manufacturing and logistics, one needs to understand the principles of the 'engines' that drive supply chain solutions. Invariably one is looking across the entire supply chain with essentially two different objectives:

- Maximising profits, and;
- Determining the best schedules.

This has given rise to a new field of knowledge around APS (Advanced Planning and Scheduling) engines. Those involved need to have a basic business appreciation of what these are: simulation, heuristics (best of business rules), linear programming (LP), MILP as well as constraint controlled intuitive modelling such as TOC, and fuzzy logic.

Self-paced tutorials, with both a personal requirement and a business perspective, are now becoming available from the author.

## METHODOLOGY

In comparing Supply Chain Management (SCM) to Enterprise Resource Planning (ERP) implementation methodologies, there are some



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- 11 November Teamwork
- 8 December Resolving Day to Day Conflicts
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For more information contact:  
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key differentiators. Here I will address just two at the higher level. First, SCM/APS tools are predominantly 'modelling' tools (conceptually like spreadsheets). Therefore, they are not as prescriptive as transaction based ERP systems, where you have to be able to record and reflect virtually every transaction.

**THE THIRD DIMENSION**

Second, SCM tools operate right across the four main activities of your business in three dimensions—the Strategic, Tactical and Operational Planning levels of your business.

In some industries, 'profit maximisation' APS tools go down to a fourth 'Execution' level, eg. selecting most profitable 'cut patterns' of logs or carcasses, or the most profitable 'formulae or recipes' in chemi-

plex, capacity constrained single site manufacturing plant. This LP model added 10 per cent of sales to the bottom-line. This percentage is consistent with the 50 odd studies of APS/SCS implementations I have reviewed since.

Recent supply chain successes (locally some in forestry and dairy) are suggesting even higher figures. Multi-site operations increases the complexity, and therefore opportunity, in a combined manufacturing/logistics 'solve'.

**Project Management**  
**Supply Chain Process**  
**Supply Chain Model & Software**  
**Technology Infrastructure**  
**Change Leadership**

**PLANNING PROCESSES**

To get the best benefit out of your SCM tools, a careful structuring of your planning processes and physically implementing such structures is critical: eg. the strategy of 'if and where

to plant more trees?' is quite clearly a different process and people skill set from the 'best cut patterns to use this shift?'

**PEOPLE/TEAM PROCESSES**

Another important consideration in implementing SCM systems is the impact on the corporate culture.

People would need to adjust from a 'silo' mentality, where their KPIs are their main measurement criteria, to a more 'lateral' supply chain understanding.

Having proven methodologies in educating, training and in change management, both before and after a SCM implementation, is an absolute requirement for success.

**EXPERIENCE**

It is worth the effort since the rewards can be significant. As an ISM, my first experience of a 'dollar optimisation' model was in 1980 in a com-

**SUMMARY: THE CEO IS IN CONTROL**

Many of the most successful projects are started with a cross-discipline training session for company executives to ensure that everyone in the organisation has a common understanding of the overall goals and expectations from SCM systems.

As with ERP systems, it has always been advisable for the company's management team to become knowledgeable at least on a conceptual level. But with SCM tools, designed to enable top management strategic and tactical 'what if' scenario planning, the CEO will be in the driving seat this time.

\* *Chris Macquet is with the Deloitte Consulting Supply Chain Solutions global team. As an ISM in 1980, he first installed APS (LP optimisation) concurrently with MRP II, and has a very clear understanding of how APS tools and ERP systems complement each other.*

*Chris was a founding chairman of an APICS Chapter in 1980, is currently Chair of NZPICS PI-SIG, and is a member of the Supply Chain Council, ORMS and CLM (USA).*

*(The theme for this article is adapted from another: Educate Before You Evaluate, for ERP systems by D. Kuiper, CEO, Expert Buying Systems Inc.)*

Typical Supply Chain Matrix

Materials	Manufacturing	Distribution	Demand Forecasting
Enterprise Material Planning	Enterprise Production Planning	Enterprise Distribution Planning	Enterprise Demand Planning
Plant Level Material Requirements Planning	Plant Level Master Production Scheduling	Distribution Requirements Planning	Forecast
Material Releases	Execution Level Scheduling	Inventory Deployment	Orders

icals, food, dairy and textiles.

As for MRP II, JIT and PFS models, an industry standard Supply-Chain Operations Reference (SCOR) model is being evolved by a recently formed Supply Chain Council. However, it will only set common terminology, industry standards and model or process descriptions in about eight months' time.

The firm I work for (Deloitte & Touche Consulting Group) has developed a tried and tested FastTrack for SCS Implementation Methodology which provides an immediate answer to this problem.

Currently, it integrates other

