Global Commerce Initiative

Collaborative Planning Forecasting and Replenishment (CPFR®)

n-tier CPFR

Interim Report Update #5

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Co Authors:

Chris Lewis, AssiDoman Packaging Ltd.
Chris.Lewis@asdo.co.uk

Larry Roth, Kimberly-Clark
lroth@kcc.com

Andrew White, Logility, Inc.
awhite@logility.com

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Introduction

In December 2000, the efforts of the Voluntary Interindustry Commerce Standards (VICS) Association and ECR Europe were unified to develop a recommendation for a global standard for Collaborative Planning Forecasting and Replenishment (CPFR®) This effort was driven under the auspices of the Global Commerce Initiative (GCI) that has, as one of its primary goals, the support for standards that can be used to support Business to Business Commerce and Net Market (Trading Exchange) Interoperability.

The initial effort of the new joint GCI CPFR Committee has been to review the VICS CPFR model in order to adapt it to support Global business needs such that global trading companies, inside and outside of Net Markets, can feel confident that the standards used will be recognized and supported by their trading partners. This effort will culminate in a new document that will be called the GCI Recommendation for VICS CPFR. The impact of such a recommendation cannot be underestimated. The vast majority of previous efforts to make standards global have met with medium to low success. The timeliness and speed with which this next step will be taken is breathtaking and a testament to the driving forces and commitment of members of VICS, EAN and GCI in this "new economy".

The next priority that the GCI has set refers to the work that VICS, ECR Europe and other ECR Initiatives previously undertook under the name "n-tier CPFR". This Interim Report will give an up date as to the status of the work as well as outline the following:

- Defining what is meant by "n-tier CPFR"
- Defining where n-tier is applicable in a general sense
- Explain some of the preliminary insights garnered from the combining of the VICS and ECR Europe teams
- Describe how the n-Tier CPFR sub-committee will evolve

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- Present what the deliverable of the sub-committee will be, targeted for June 2001
- Document additional resources that will be primary inputs to the initial work of this sub-committee.

By replacing the original terms "retailer" and "manufacturer" from the material with "buyer" and "seller" we have come a long way to showing the general reader the applicability of CPFR in many other industry segments. However, this is not sufficient to show readers further up the value chain that CPFR "fits as is". One purpose of the n-tier CPFR effort is to provide a bridge for those users to map the original CPFR model to one that more precisely fits their needs.

In a nutshell, n-tier CPFR concerns itself with two aspects of CPFR:

1. Mapping the original 2-tier CPFR model to other 2-tier deployment scenarios in other industry segments and at other levels of a value chain (e.g. Manufacturer/Supplier); and
2. Creating a new business model that defines what CPFR looks like when 3, 4 or more organizations in a vertical chain align strategically.

The former represents an extension to the current model; the latter to a new model that builds on the original. The value that the first aspect above can bring to a value chain is as obvious and will be as quantifiable as CPFR was to the retailer/manufacturer scenario.

Figure 1: Stated Mission Statement for the n-tier sub-committee.

The value that the second aspect above will bring is more difficult to understand and quantify. Its value is found in the elimination of the famous "Bullwhip effect" that Supply Chain Managers see throughout their careers. There is no blueprint for this work, as this concept has remained almost a dream or the holy grail of Supply Chain Management (as it was originally conceived) for many years. Other than through the physical ownership of such a vertical value chain was this ever achieved before. The Japanese Kieretsu model also comes close, but with the cloud of ownership hanging overhead. The voluntary alignment of such companies in a new, dynamic value chain is probably the greatest challenge industry faces – and will prove to be the source of the greatest value. How we estimate the value before we complete the first project will be difficult without some level of simulation.

Looking forward several years it is plain to see that the work undertaken by the GCI CPFR Committee will be of major significance to the global economy.

Never before have we been this close to a single, unified business model that major corporations across the world can sign up to as a "standard". The implications are staggering. The benefits that each company has slowly but surely squeezed out of their own value chain will now be squashed out in a "network effect" as more and more trading partners, big and small, national and international, come on-line and begin to collaborate.

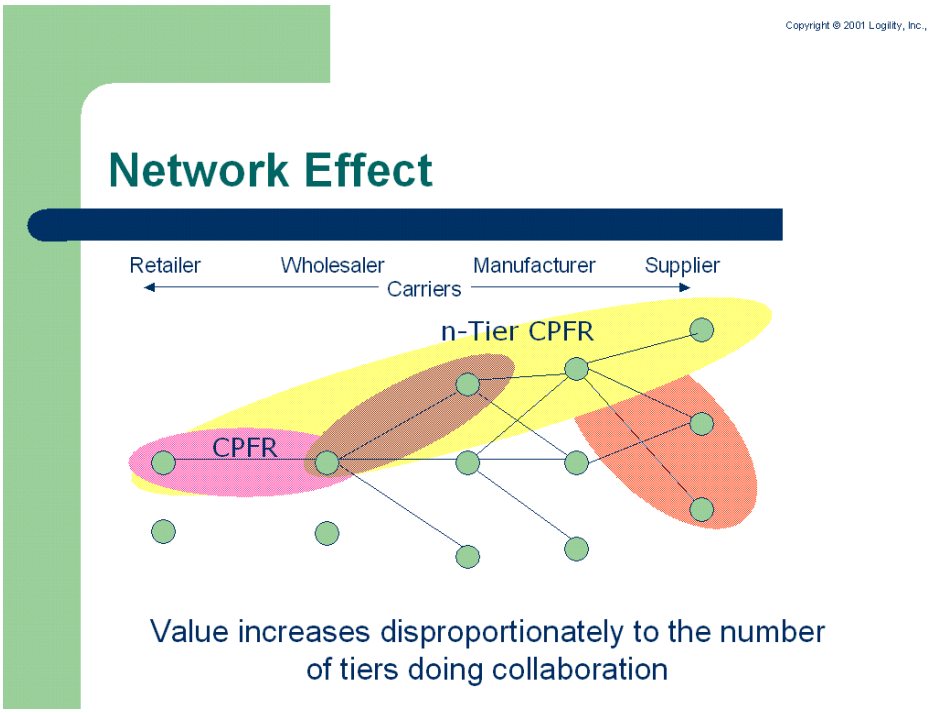

Figure 2: Benefits of n-Tier CPFR can be modeled on the Network Effect

CPFR practices span many disciplines, from merchandise planning to supply chain management. The objective of CPFR is to better align supply and demand through trading partner data interchange, exception-based management, and structured collaboration to eliminate issues and constraints in fulfilling consumer expectations. N-tier CPFR elevates what has been thus far a "two-tier" business model in several ways. The following section outlines and defines what is meant by "n-tier" CPFR.

"n-tier" CPFR Defined

CPFR as it was originally conceived involved a retailer and a manufacturer. These two companies collaborated on a piece of information that drives the success (or failure) of their value chain – that information usually being the sales forecast that describes consumer demand. When the forecasts that describe likely consumer demand is accurate, most of the other participants in the value chain have a much better chance in delivering value to each other in order to meet or exceed consumer expectations. When that initial sales forecast is inaccurate, no amount of "catching up" later down the chain can restore the maximum possible value that can be achieved. Once lost, that value can never be recovered. Any improvement at the front-end of the chain, i.e. that which describes consumer demand, has knock-on affects throughout the chain.

CPFR established itself as the main business model for collaborative fulfillment planning once it had been tested on a wider scale. During 1998 and 1999 numerous pilots were undertaken. Reports showed that benefits could be accrued above and beyond that which had been achieved through other, preceding initiatives such as Efficient Consumer Response (ECR), Vendor Managed Inventory (VMI), and Quick Response (QR).

During 1999 several other avenues of thought were undertaken. One of these was Collaborative Transportation Management (CTM). Under the guidance of the VICS Logistics Committee, CTM has as its mandate the extension of CPFR to include the logistics component of the value chain. CPFR "stops" at the affirmation of an order. In reality, multiple orders are grouped and carriers are selected and routed. This latter stage represents again huge potential savings if improved – and that is the goal of this sub-committee. CTM is more than just simple aggregation of loads across the series of point-to-point movements. CTM is about extending the visibility of the planning horizon to key carrier partners and extending the use of exception-based management and improved commitment from buyer and seller in order to obtain improved customer service – taking as its primary input the original one-number consumer sales forecast.

CTM is still a 2-tier model in that it extends to include a buyer and seller but also includes a shipper and/or carrier. CTM explicitly defined 2, 3, or 4, organizations but still supports the 2-tier nature of the original CPFR.

CPFR will also in time extend laterally across any 2-tier relationship and be exploited as a collaborative commerce platform as a basis on which to build additional collaborative business processes. This can be seen as the extension of CPFR and explicit business processes within to cover such things as:

- Product Design
- Product Introduction
- Category Planning
- Merchandise Management
- Assortment Planning
- Sales and Operations Planning (S&OP)
- (Suppliers) Rough-Cut, Capacity Requirements Planning (CRP)
- Flow Rate Planning
- Capable to Promise and Profitable to Promise
- Allocation (for short supply)
- Etc.

Today these processes are not supported by a global standard nor are they defined anywhere as explicit collaborative business processes. They are deployed as unique, proprietary activities locked up within each B2B environment. It is likely that CPFR will in time be extended to explicitly include some of these more formally.

n-tier takes as its premise the following, taken from a VICS CPFR Committee meeting in 2000:

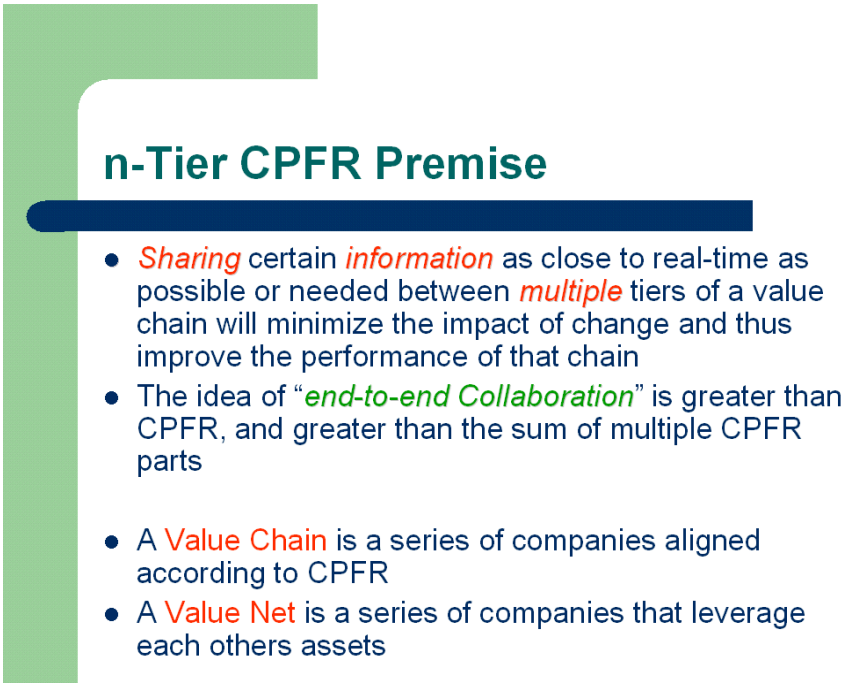

Figure 3: n-Tier Premise

N-tier is a simple concept. By sharing additional information between additional layers or tiers of a value chain, benefits should accrue to those that are sharing and in receipt of the shared information based on some "network affect". In other words, each additional "node" or tier that is added should increase the mutual benefit far in excess to the value of the node itself. This is demonstrated by the fact that CPFR has to date proved in several cases to provide real win/win benefits to both buyer and seller and not just to produce benefits that one side or other enjoy. This is unlike the traditional VMI-type projects that, if implemented according to their prescriptive standard at the time, often produced benefits far greater for the buyer than for the seller.

Forms of n-tier CPFR

There are several forms of n-tier CPFR. They are as follows:

1. 2-tier CPFR between a buyer and seller (the current and previous model) **
2. 3-tier CPFR between a buyer, seller and the supplier to the seller **
3. n-tier CPFR where any number of buyers and sellers in a deep, vertical value chain align **

** - with or without the inclusion of lateral partners such as Carriers and/or Shippers.

2-Tier CPFR – up stream towards raw material suppliers

The first form is the basic CPFR model as defined by VICS, now enhanced and support by the GCI. Traditionally this model was applied to retailers and their suppliers. More recently, many companies and service providers have recognized that the same CPFR model can be applied to manufacturers and their suppliers. This is where this sub-committee's work begins. CPFR in principle does fit up stream (towards the raw material supplier) but there are some differences that have to be made in order to make CPFR applicable. These are outlined in the next chapter.

The following graphic shows how CPFR "as is" can be deployed as discrete units of work between successive layers of a value chain. The question is clear when this graphic is looked at: what is the implicit or even explicit relationship vis-à-vis CPFR and the retailer and supplier? That is what led to the n-tier concept.

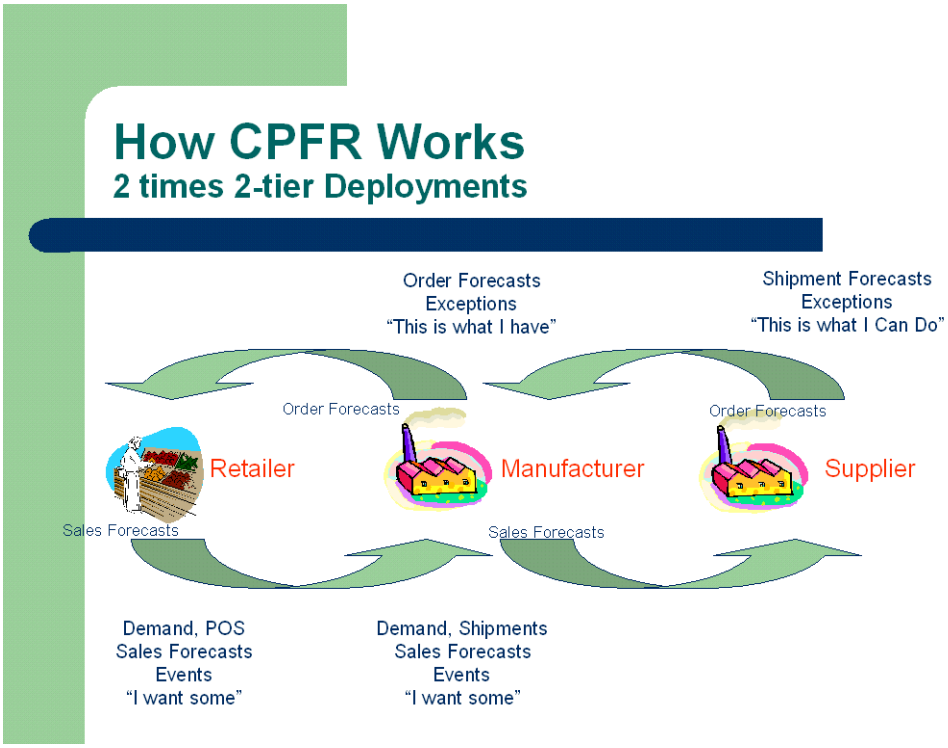

Figure 4: CPFR replicated throughout the Value Chain "as is"

3-Tier CPFR

The second form really is an explicit recognition that there might be suppliers of critical goods (materials or primary packaging) that can and often do dictate or have a major impact on the performance of the downstream (towards the consumer) value chain. This was once called in committee work as the "Intel effect". This was described, with no offence to Intel, as an example when a major natural disaster befell a single sourced product and its possible cataclysmic impact on the rest of the downstream processes. If there was a single-sourced chip, and the plant blew up as a result of volcanic activity, all downstream processes might come to a grinding halt and supply would be eradicated. The "Intel affect" was coined, as it was a simple-to-grasp example.

In the real world there will be many "Intel effects" but the example given is probably extreme in most cases. There will always be weaknesses in the value chain, up and downstream, that cause performance to be less than excellent. When this takes place, response signals (Exceptions or Alerts – see below) might

be needed in order to notify partners and prepare for re-planning activities in order to invoke alternative modes of action.

The reverse is also true. In some cases the retailer might be experiencing exceptional variation in demand that warrants emergency action further back through the value chain in order to turn off the supply before a glut of inventory is procured or replenished. Note that under the definition of Supply Chain Management from the 1980's we would have been happy "just to get the order off my books". With the advent of real collaborative B2B SCM or so-called New Economy, Value Chains are aligning such that they now compete as single entities. Consequently the whole chain is more at risk from any single element under-performing and dragging the chain's performance down. This is not the same as altruistic behavior towards ones competitors. This is the same as saying that a supplier's supplier is important to the success of the customer and consumer – therefore the value chain needs to align itself accordingly. Altruism in B2B has its place but it does not cross the threshold of any B2B activity that undermines or threatens the then established status quo.

3-tier CPFR, and its successor, really test the boundaries of partnership. Collaboration is a reality between 2 companies as they are accustomed to doing business with each other. Even CPFR "as is" is a step-change in how buyer and seller view each other. However, 3-tier suggests that for maximum competitive advantage, 3-tiers of a value chain can so align as to provide superior service to the consumer. That is an old idea now made real.

n-Tier CPFR

The third form, n-tier, is really the same as for 3-tier other than the fact that it is less explicit about how many layers of a value chain are aligned. This is the most complex model, as all this requires such an alignment that may almost be impossible to preserve for any reasonable length of time. In all cases partnerships evolve over time. CPFR itself will only be successful when partner strategies are in line. When they diverge, CPFR will be less valuable to the partnership and will evolve to some other business process. CPFR will be seen to strain the partnership in such scenarios. When strategies are in line, today there is no other better process to bind the companies in preparation for true value chain management.

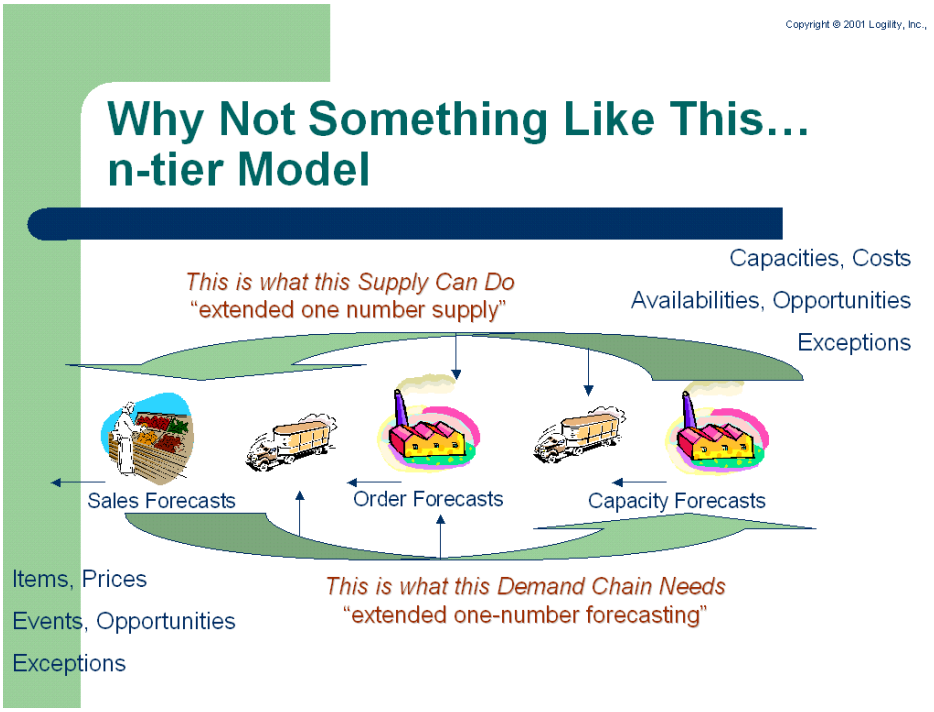

Figure 5: Ultimate n-Tier CPFR Model

This model (shown above) simply extends the principle of 3-tier CPFR to include any number of buyers and sellers in a deep, richly collaborative value chain.

An extended "one-number" plan might be possible throughout the whole value chain with retailers, manufacturers, suppliers, and packaging suppliers. However, the size and strategy of each company and segment has direct impacts. For example, the packaging industry is very fragmented and there are a few suppliers who are single sourcing to manufacturers and suppliers.

The form of the extended relationship has been determined to be either:

- Process Based, where a new process called "n-tier" will explicitly define each company in the relationship (the real focus of the n-tier model), and
- Data Based (where certain pieces of data are shared among partners outside of an industry standard.

The above model might look as though the value chain is a linear arrangement. However, that is more for conventional presentation. Generally most people would draw such a value chain more as a value web as though all members have the ability to work together. In essence this is possible although this is not the only model where these companies participate. Each company works in their own series of concentric rings or webs with key, strategic partners, second tier, and third tier partners, and so on. A question that has surfaced recently to the Net Market hosting of CPFR queries where the data and business process take place when Net Market members have secured access to their own "private" CPFR technology. This leads to the discussion of deployment scenarios as it relates to Peer to Peer (P2P) computing as it relates to a "shared process".

n-tier CPFR and Net Markets (Trading Exchanges)

CPFR "as is" is already being deployed in several different ways. The primary models for deployment have been described at length on the preceding publications on CPFR from VICS, but the key ways are:

- Hub and Spoke
- Centralized
- Hosted
- Peer-to-Peer (P2P)

'Hub and Spoke' was the initial deployment mode that was pioneered and deployed in 1997 and 1998. This model involved one company (buyer or seller) acting as the service provider to its partners (spokes). This was very attractive to early adopters as this enabled them to get their CPFR efforts underway and not be held back by any partner's lack of access to CPFR technology. The original VICS CPFR documentation did not use the phrase "hub and spoke" or "Peer to Peer" but they have become the generally recognized names for these models.

The 'centralized' offering for CPFR is what is being deployed now by the Net Markets. These "middle-men" act as agents to facilitate various B2B business processes, not least of which is CPFR. In this sense, neither buyer or seller who want to do CPFR with each other need access to their own solution as they can both use what is offered on the Net Market. In some cases, both partners use the same physical solution – although data is not replicated from their Enterprise data source on the Net Market. For pilots and small scale deployments this is a reasonable concept but taking an industry viewpoint, this is a huge challenge – not just for CPFR but for any other business process that seeks to replicate huge chunks of data that used to reside behind a company's firewall. The idea of Net Market interoperability evolved from this early realization. However, for various reasons, several large companies decided to operate as an independent Peer-enabled company such that they could leverage this Net Market interoperability

(or Exchange to Exchange, X2X, as it has become known) and interoperate on a neutral basis with other hubs, Net Markets or spokes. That is what also contributed to the most recent development, the Peer-to-Peer discussion shown below.

Some companies can also opt for a hosted model whereby they simply use a CPFR solution that is offered as an out-sourced offering. This would be no different to a company outsourcing their Human Resources solutions. However, irrespective of this, the company in question might still be party to hub and spoke, centralized or even P2P integration. In other words, the hosted offering is not a different integration option. It is simply a different way to access the service.

Peer-to-Peer (P2P) is perhaps the most interesting model of all. P2P Computing is normally associated with "file sharing" systems such as Napster, or "resource sharing" processes such as Set@Home. CPFR is one of the first "shared processes" but when it was conceived, P2P Computing had not yet been applied to B2B. Now it has been with great affect. When a company elects to act as a peer, they become insulated from all other forms of integration. Irrespective of if they wish to join one or more Net Markets, if they will interact with other CPFR peers, or if they wish to act as a hub to partners (as spokes), they can do so without any change in their technology offering. P2P seems to offer more of a long-term solution. Indeed, P2P is impacting B2B in many other areas that are not addressed by CPFR. P2P connectivity maximizes the number of connection approaches a company can deploy and ensures that whatever technology they connect to, they do not need to change their technology platform.

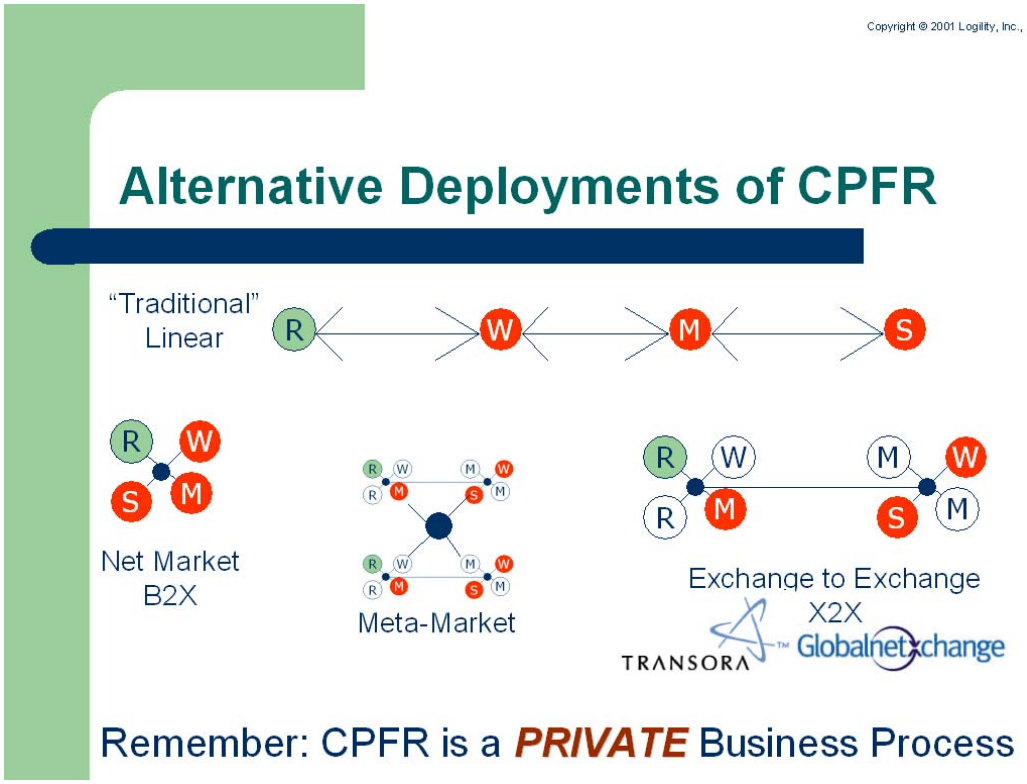

Figure 6: Examples of Deployment Alternative Models.

Since CPFR is applicable to Net Markets, it is a good working assumption that n-tier CPFR is also applicable. Any Net Market that seeks to facilitate business between buyers and sellers might extend its coverage and footprint to the suppliers of those sellers. The key concern is at which level of a given value chain does a Net Market wish to serve. If a Net Market wishes to act as a demand aggregator for retailers in preparation for bidding of supply from primary sellers, then the basic CPFR model applies. If a Net Market wishes to serve the manufacturers (the buyers) and their primary suppliers, a version of n-tier might be applicable in case the terminology, data dictionary and process differ from the basic CPFR model. If a Net Market wishes to act as the enabler of the entire value chain, then the n-Tier CPFR model is likely to be the preferred model.

Priorities for GCI n-Tier CPFR

At the sub-committee meeting in November 2000 we set ourselves the following:

Figure 7: Stated Mission Statement for the n-tier sub-committee from Figure 1 repeated.

To that end we have agreed thus far to focus on several fronts, in this order of priority:

- Determine, define, and document revisions to the GCI Recommendation for VICS CPFR to support:
    1. Manufacturer/Supplier (material or packaging) for supported industry segments in GCI such as Food and Beverage, Household Consumables etc.
    2. 3-tier or n-tier models that extend the above models to include upstream or retail operations.

Our mission, therefore, was set at the initial GCI CPFR Committee in December 2000 as:

Figure 8: Summary of Goals and Objectives for this Committee

Please see the section Current Status below for more details of the to-dos.

Resources

We are lucky that we have many resources to bring to bear on this effort. The primary resources are the combined volunteer strength of the joint committees across the Atlantic. This comprises many sizable companies that are committed to CPFR in particular and n-tier in general. More importantly the pressure from the Net Markets will ensure that we remain focused on delivering the needs of our members.

n-tier CPFR and the DAMA Project

Late last year the n-tier sub-committee took delivery of some material provided from the DAMA Project. Marge Peterson, Jim Lovejoy, and their team had been working in a similar concept for some time, focused on the apparel and textile industry segment. The resulting model at the time had been proprietary, but with the open emphasis of VICS and GCI, they turned the material over to the n-tier CPFR sub-committee. It is our expectation at this stage that this work will act as an entry point towards mapping the general CPFR model to a specific industry n-tier example. The sub-committee is indebted to the DAMA Group for their contribution.

Appendix B represents an extract from the Dama Project document that was deemed to most closely fit with the part of n-tier CPFR that the sub-committee wanted to review. This review and determination of the documents use as a template for additional industry models are a major “to do” ahead of the sub-committee members.

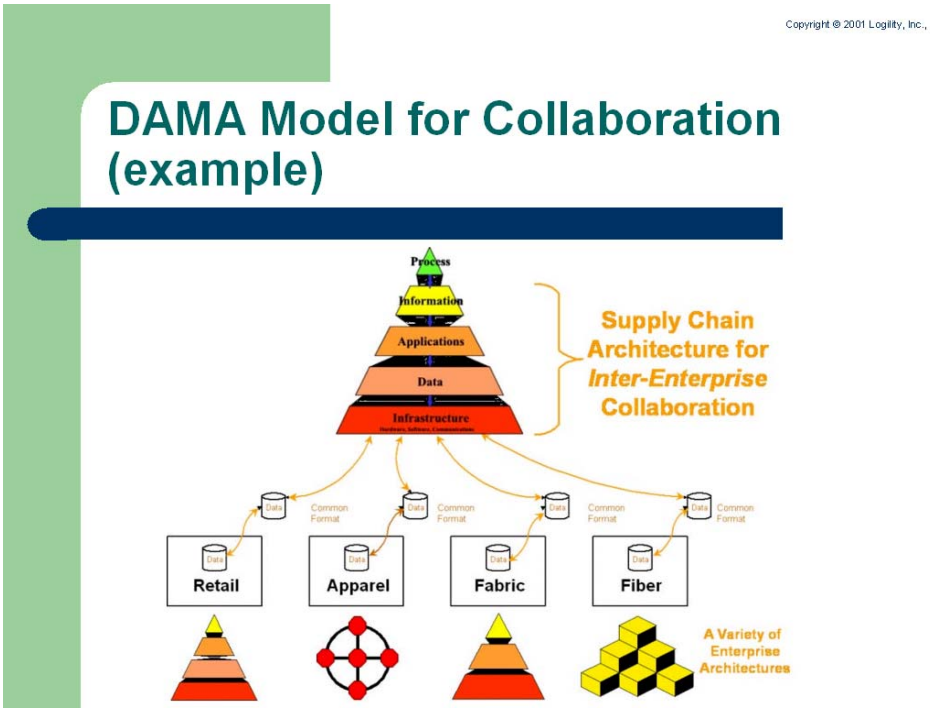

Figure 9: DAMA Model Co-ordinates information sharing and collaboration across many touch-points for the apparel and textile industry.

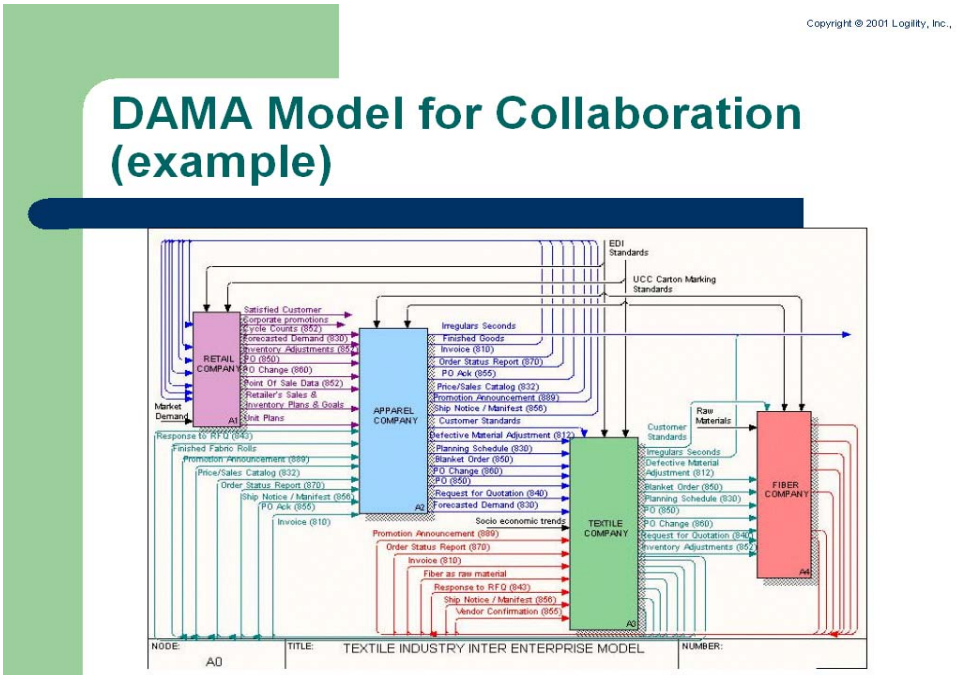

Figure 10: DAMA extends into process and data model.

n-tier CPFR and new GCI CPFR Committee (as of December 2000)

After one official meeting and several communications the ECR Europe team has also made some important contributions to the next phase of n-tier. One document in particular was shared within the Committee primarily as input to the initial GCI CPFR publication earlier in 2001. The ECR Europe team is in fact further ahead than the work at VICS in terms of pilots for 2-tier collaboration upstream between manufacturers and packing suppliers. It is the sub-committee's hope that these resources can be extensively mined so that we can, in time with the deadline, publish the results and key learnings from those pilots.

n-tier CPFR and previous ECR Europe work

Via Chris Lewis, the co-author of this document, another key document was shared with the sub-committee. The paper is called: "Integrated Suppliers: ECR is also for Suppliers of Ingredients, Raw Material and Packaging." The first sentence in the Executive summary is:

> *"Integrated Suppliers is a concept for improving the part of the supply chain between manufacturers and their tiers of suppliers of ingredients, raw materials and packaging. By sharing information both parties are able to exercise judgement on costs, quantities and timing of deliveries and production in order to streamline the product flow and to move to a collaborative relationship."*

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By comparing this to the goals of CPFR, one can see that the two initiatives are very much in line. Accordingly, this document is a key resource for those that

want to understand the state of collaboration between manufacturers and suppliers in Europe. The document also describes the involvement of Suppler Managed Inventory (SMI) as it is known in Europe. SMI is similar in concept to VMI except it is applied specifically to the raw material and packaging suppliers and how they interact with Manufacturers in Europe. Case studies are also included in this material.

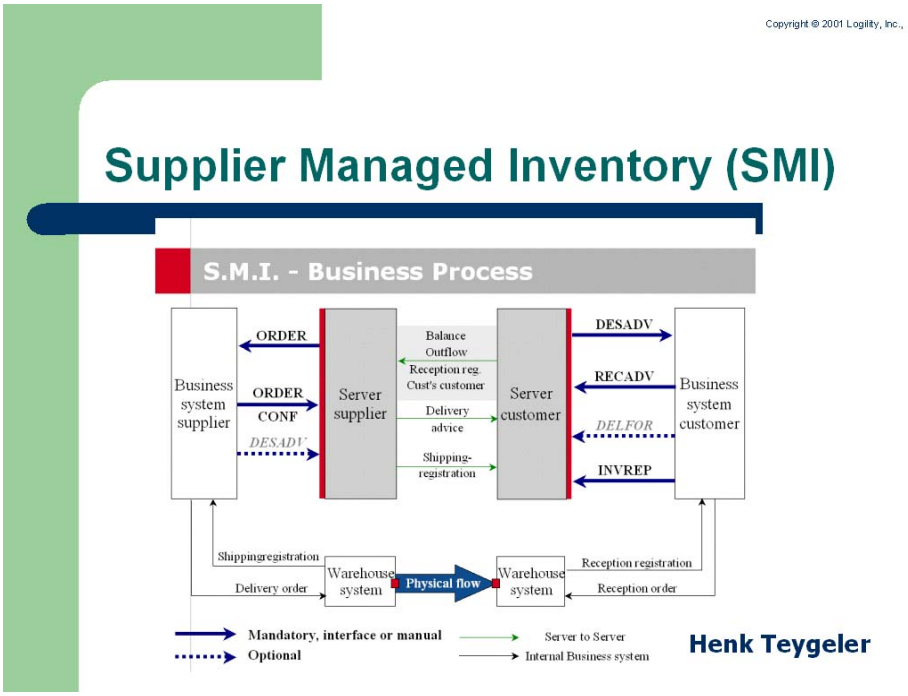

Figure 11: SMI Business Model.

n-tier and other Industry Initiatives

The concept of n-tier CPFR is not new. Indeed, the ECR Europe document described above refers to work initiated to this effect in 1996. For those readers that remember attending SCM conferences in 1992, they will remember that the goals of SCM have been long in the coming. The interesting thing about the timing of this effort is that it coincides with the adoption of CPFR and the associated Internet technology that facilitates characteristics of collaboration that could not be sustained on any real-time, scalable basis using previous technologies. More interesting is that that original goal of SCM actually mirrors

what n-tier CPFR seeks to achieve – the complete alignment throughout the value chain.

EDI was designed to move huge lumps of static data between computers – such as an overnight Purchase Order dump. CPFR could be deployed using EDI as the primary communications (exchange) vehicle but it would by definition be a slower process and less proactive than a deployment based on the use of the Internet. Note that this is not a reflection of the carrier: EDI transactions could be deployed over the Internet. It is more a reflection of the general technical evolution of XML over EDI. EDI can be used but it was designed to solve one problem – the bulk transfer of huge volumes of generally static data overnight between computers. XML was designed to solve a different problem: the quick transfer of small pieces of information between people and computers, in this sense, client rather than servers. EDI is not extensible unless you bastardize the use of pre-defined file elements; XML is by design extensible and simply so. This is not to say that EDI is a disabler to CPFR – more that it was designed to serve the needs of business back in the 1980's. CPFR was and is a business process that can be exploited using the technologies available and evolving today.

There are several other industry initiatives that have at their core the concept of end-to-end Supply Chain Management. It is not the intent of this effort to duplicate that work. It is for us (VICS, GCI, ECR Europe, EAN•UCC), upon completion, to promote this material widely to ensure that those other initiatives can adopt the revised standards as proxies for their work that, to date, are incomplete.

In all cases, please go to the CPFR website and access the "n-tier" page to obtain any and all of the materials pertaining to n-tier CPFR. Note that this page will be made available as soon as possible.

Please also refer to the relevant appendix in this document for a more complete overview of the other major initiatives that are undertaken by buyers and sellers, and how they relate to CPFR.

Current Status

The n-tier sub-committee is at a critical juncture. We now have two groups of people focused on the work. The European Group represents the bulk to-date of real world pilot and companies seeking to work on n-tier. The most sophisticated example in the US of what an n-tier model might look like is provided by the recent work by the Dama Project. The coordination and cross-pollination of the work over the next few months will be the key to success.

The primary objective for this sub-committee for the second GCI VICS CPFR publication is to contribute the following:

- n-Tier Overview (drafted from previous white papers and this document)
- n-Tier Value Proposition
- n-Tier Applicability (drafted from previous meetings minutes, white papers, and this document)
- Overview of n-Tier work as it relates to the previous DAMA project (graphical view of multi-tiered model)

The proposed next steps are as follows (red tasks are required for the second publication):

001	Set-up n-Tier CPFR page accessed via www.cpfr.org; post all n-tier related materials on that page	Mar 20	Andrew White Tbd
002	Publish formal n-tier sub-committee on website	Mar 20	Complete (via these updates)
003	Select which Industry Verticals will be targeted for 2-tier CPFR analysis, based on known pilots and desired focus	Ongoing	All
004	Committee Work – review CPFR and compare to targeted verticals for differences (see ECR Europe documents, n-tier CPFR Meeting minutes etc); distribute to team for review	Complete	All
006	Committee to read Dama Project material with a view to determine	Complete	All

	use as a template to document and define additional n-tier models		
006a	Develop a simple, generic model, based upon the DAMA model	Complete	M. Petersen D. Liles
006b	Write three sample scenarios of how N-Tier Collaboration might work for textile replenishment, brokers, and food & beverage.	2 of 3 completed for publication	L. Fennel N. Afonsky M. Costello
006c	Write a discussion for the applicability of N-Tier	Complete	L Roth
006d	Write a value proposition for N-Tier	March 1 thru Apr 2	P. Garvey
006e	Develop an Industry Matrix of Tiers / roles & relationships	Complete	P. Hyman
007	Conference Call to review Dama Project Material Deliverables 6a-6e	N/A yet	
008	Approve n-Tier Scenario Template Reports and revise in this document	Complete	
009	Document additional tasks for Tech Team (date dictionary, object model revisions) or Business Process Team (model revisions) based on Pilots and any others identified between current date and June	TBD	
010	Draft Initial Submission for June 30 Publication (contents: n-Tier Overview (from this document, white papers), Value Proposition, Pilot Status, reports and metrics, initial model overview, next steps to end of 2000	May 21	
010a	Draft Final Submission for June 30 Publication (contents: n-Tier Overview (from this document, white papers), Value Proposition, Pilot Status, reports and metrics, initial model overview, next steps to end of 2000	May 28	

If pilots are not ready to submit findings in time for the second publication (meaning they need to submit data by first week May) we hope to report in subsequent publications those findings. Additional publications will also drill down on the true, multi-tiered CPFR model.

CPFR to n-Tier CPFR Mapping

Note: This section was substantially updated as a result of the last VICS/GCI Committee Meeting in April 2001.

The end result of this work will be a document that will outline the differences between the GCI CPFR Recommendation and specific industry vertical Manufacturing/Supplier requirements. The resulting publication will provide a reader the ability to understand how they would need to modify the basic model to support their initial efforts. The follow on will result in possible revisions to the CPFR Object Model, Data Dictionary and Schema.

The following is a proposed template to be used to capture and explain these industry requirements. Readers should take this section and use it as a checklist for them to understand better where the likely differences between the generic model and a specific industry segment needs are.

n-tier Template Example

Scenario Supported.

This will be a brief description of the specific scenario that is described in the template document. For example this would include a description of the companies involved at certain levels of the value chain; which industry segment that is covered; and how this scenario is or is not supported by the models described in the GCI VICS CPFR Guidelines.

Additional data should be collected and described to help further delineate the specific segment in question as follows:

- Supply Chain Identification and Overview (level, form, naming convention, where in the chain you exist; what comprises the "whole" product, are who has "power" in the chain, who "owns" the end consumer, relative size of partners [revenue, headcount], any known core competencies, what role are members playing in the chain, what metrics are common between partners [if any], what level of "information

liquidity" [defined as formality and speed of information dissemination] exists between current partners, what previous partnerships or partnership-based processes exist or existed in this value chain, level of competitive activity, level and form of any known internal collaborative efforts, etc.)

- Demand Chain Characteristics (what drivers exist in the customer value chain that drive the business: seasonality, promotion, heavily promotion, only promotion, price, external factors, if B2C is present or pure B2B, etc.)
- Supply Chain Characteristics (what drives sourcing variability such as global implications, pricing, constraints, competitive activity, level of commoditization, multi-or single sourcing strategies etc.)
- Brand Status; own label present (if and how much the varying differentiating factors add perceived value to the customer).

n-tier Applicability. Previous meetings have outlined thus far examples of where n-tier CPFR appears to add value. These are:

- Critical Ingredients
- Primary Packaging Materials
- Secondary Packaging Materials (for transportation)
- Private Label
- Highly Promotional or Fashion Products
- New Item Introduction, Product Change, Replacement
- Highly Seasonal
- Strategic Products
- MTO, ETO: High Tech, Automotive, Contract Manufacturing

Some of these examples make obvious and intuitive sense from a CPFR viewpoint. Those that are more time sensitive and risk heavy lend themselves to extended or n-tier collaboration also. What is not perhaps obvious to the reader is that CPFR does not explicitly provide support for each of these examples. This is an important point that is resolved once you have implemented CPFR. In essence, CPFR for some companies is

"enough" in that that is all they wish to implement. For other companies, CPFR becomes a platform, a framework upon which to build other collaborative business processes that do not, at this time, have formalized processes supported by VICS, GCI or any other body. Collaborative Promotion or Event Planning is a good example in that it is already in place at several implementations and yet it is not explicitly defined in the standard, thus far.

As has been explained previously, the Committee has entertained two forms of collaboration as it relates to n-tier CPFR: informational and process.

- Informational collaboration refers to the framework in which certain information is shared between multiple tiers in a manner that requires less of a process than that established by CPFR; thus the focus is on what sort of information is shared, and what is to be done with it;
- Process collaboration is the essence of the n-tier CPFR model: what business model and process can be developed as a standard to facilitate more of a process that drives collaboration between multiple organizations. This is best represented thus far in the DAMA work that is seen in this document. This level of collaboration would naturally build on the "simpler" informational collaboration and may still contain it.

The following represents an analysis of the applicability of the informational aspects to collaboration (primarily for POS data) for a 2 tier value chain and an n-tier chain.

When is POS data valuable to first tier?

- Provides insight to real demand and trend changes
- Possible preview to demand chain surprises
- Currency of data (most recent period) is particularly critical around new items or seasonal items, for example. Traditional syndicated data sources are delayed by several weeks and this can have a dramatic affect in letting the inventory pipeline get seriously impacted before there is any recognition of a problem, and is therefore best suited for data mining

processes. Often this can be the difference between a supply problem and an opportunity for additional sales to the consumer. Hence the value and cost to correct a problem is directly associated with the time it takes to be aware of it; and how far through the value chain one needs to "go" in order to "fix" it

- Timeliness of data (yesterday) along with a read of inventory throughout the supply chain can be critical for understanding the short term ups and downs of demand (i.e. beverages and snacks around the weekend or sporting events, emergency supply items around changing weather events, pesticide sales around the outbreak of a particular species of insect)
- New products (uncertain forecast, demand changing quickly, higher margin product, no substitute means truly lost sales from each OOS, risk is higher for lost collateral sales for the retailer, repeat customers for the retailer, loyal user for the manufacturer, growing store distribution can hide true demand pattern without store level data being available)
- An accurate understanding of the true consumer demand pattern may be an opportunity to dampen rather than accentuate the bullwhip effect as close to the true source of demand as possible

When is POS data valuable to an n-tier member of a value chain?

Visibility to true demand may emphasize the need for immediate action when the item sold to the consumer is readily interpreted by the supplier. Particularly when their supplier (in the case of a Retail/Distributor/Manufacturer scenario) can more readily recognize that this is not a temporary bump in demand. This would allow a more timely assessment of the impact on capacity issues (i.e. is this spike in demand for a particular insecticide because of an outbreak of an insect in particular county or is this a situation that is affecting the entire Midwest?)

In fact, the very beginning of the supply chain (raw material supplier) may be the only place where a full assessment of the situation can take place. For example an unexpected growth rate of 5% may be well below the level that would attract attention from the first tier level supplier; however, if all the manufacturers of

product category incur the same growth rate, the entire supply chain may be at risk.

In contrast, where a complex bill of material is involved or many different end products affect the demand for a raw material, POS sales data may not add value to the collaboration process.

Serial versus parallel visibility

POS sales data alone can give a false read on true demand, particularly if an inventory bump is already in the supply chain to accommodate the demand or if forecasted demand is declining (i.e. temporary price reduction to reduce inventory levels have been known to trigger new production cycles) in other words the raw data in and of itself is not necessarily good enough; we might need to share it with partners along the value chain with some subjective interpretation.

Early recognition of marketplace changes can allow revisions in schedules at the third and fourth tier supplier weeks earlier

The earlier a manufacturer can communicate a need to a supplier, the more likely they are to lock in the needed supply item; conversely, the sooner a supplier with some opportunity in items of raw materials price or availability can influence the ultimate buyer, the sooner such an opportunity can be exploited ahead of competitor activity.

The added visibility can provide a more stable demand pattern and therefore a lower cost structure to the supplier and consequently to the buyer as well.

Just as establishing business goals and business plans has a direct impact on the accuracy of a retail sales forecast, improved retail sales forecasts have direct impact on the value of forecasts being shared with n-tier suppliers.

Business Model Differences

Based on the generic models in the GCI Recommendation for VICS CPFR, this section will outline any differences that are needed. Examples here include who will do which steps, where the data resides and how do the processes get

executed. The implicit result is that there will be revisions to the Business Process, and accordingly the Business Process sub-committee will be charged with this work.

It is our estimation at this stage that the Collaboration Arrangement will NOT change in any manner for 2-tier CPFR that takes place further down the value chain. The Joint Business Plan will not change in form but the contents may change according to the details below. Readers need to "test" the following simple areas to determine where the differences lay:

- What data is needed from the buyer and sellers?
- Which systems provide the data?
- How is the data translated if they are not directly compatible?
- Who owns the process for sharing the data?
- How is the data communicated?
- How widely is the data radiated? Is it publicly shared easily or is it secured to key members of a partner?
- What frequency is the data communicated, collaborated and received back?
- What data is collaborated on?
- Where does the data go?
- What systems, at either end, are "touched" in that they receive the data?

In early work, it is our estimation that the type of data collaborated on and communicated is different. For example, manufacturers are using MRP systems in some cases and integrating them to supplier Kanban or Just in Time systems. Accordingly, the unit of discussion is not category or brand related – but typically when common resources from the sellers are consumed. In other words, products that to the retailer appear as different and unrelated are to the manufacturer and supplier, directly related.

The excellent work that has been identified in the DAMA project will be, at this time, the basis for documenting the alternative business models that n-tier CPFR will support. That material will be the basis for the new Guidelines later this year. From this basis, this section (n-tier CPFR

Template) will be applied to each business model in order to draw out the level of detail needed to document the differences between each business model, in order that revisions to the basic CPFR standard can, if needed, be identified and developed.

Differences between "Retail/Manufacturer" and "Manufacturer/Supplier" data.

It is agreed that capacity plays a much greater importance in the manufacturer / supplier relationship, based on our pool of experience in both the US as well as Europe. In fact there are several levels of data related to capacity that is regularly traded between manufactures and suppliers in many industries. The two most common are Tactical Capacity and Strategic Capacity. The lowest level of data sharing and hence collaboration remains Stock Keeping Unit (SKU), that is Item at a location.

Strategic Level Capacity

- Shared view of aggregated capacity of partners "capability to promise"
- Selection of Partners for Sourcing
- Commitment, via freeze fence, at capacity level for machine/line consumption
- Three month to twelve month horizon
- Feeds into Sales and Operations Planning (S&OP)

Tactical Level Capacity

- Drill from Strategic to Tactical; acts as link between capacity allocation to product mix at source
- Simultaneous process with strategic and SKU planning
- Required to generate a material schedule
- Three weeks to three months
- Feeds into Master Product Schedule (MPS)

SKU Level

- Most closely resembles Order Forecasts in CPFR

- Used to generate a real schedule
- Days to weeks horizons
- Feeds into Material Requirements Planning (MRP)/Kanban

There will be additional issues arising from global sourcing that need to be addressed.

There are also significant extensions that are brought sharply into focus when n-tier CPFR is considered. Collaborative Transportation Management, while being a logical extension to CPFR becomes a much more critical element in the extended value chain. This is highlighted when one realized that the same carrier might participate in several layers of the same value chain! Therefore at some time the sub-committees need to be brought closer together in order to synchronize their efforts.

Data Dictionary Differences

The generic data dictionary may also need revising to support this scenario, even when there are no business process revisions; and more likely in the case of such changes. This section will outline differences in the data elements. The implicit result is that there will be revisions to the XML formats. This will be resolved in subsequent work by the Technical Sub-Committee.

Metric Differences

The past and future metrics used for CPFR will need revising based on the industry vertical and level of the value chain. This section will capture those differences. Proposed revisions will be shared with the Metrics sub-committee as well as the GCI working group "Global Scorecard" for verification and inclusion in their work.

There are several works already available and underway in this changing area. The Case Studies: Road Map to CPFR publication has some excellent material, as does the ECR Europe (now GCI Global) Scorecard. At some point, all these efforts will be synchronized under the auspices of the VICS CPFR Metrics Sub Committee. When this work is complete, a comprehensive analysis of the

differences needed to be supported for n-tier can be undertaken. Until that time this will be an ever-changing area and wholly dependent on that sub-committee for its starting point.

Impact on Trading Exchanges

It is possible that some work here will also impact the work of the Trading Exchange group. This section will capture any issues and differences that might be needed and this will be shared with that group for their review.

Some of the work already undertaken for the generic CPFR model when it is hosted in a Trading Exchange model should be leveraged here. This includes the integration of the CPFR solution with the global Catalog services on the Trading Exchange via the GTIN and GLN standards.

There are, at this time, few if any real differences that need to be identified for n-tier CPFR when applied to a Trading Exchange delivery mechanism. However, it is very possible in this dynamic market that we shall see far more P2P-based CPFR projects than hosted CPFR projects via an Exchange – at least for larger companies.

Case Study Reporting

Case Studies

This section will document case studies that have contributed to this scenario report, along with any benefits that can be shared. The format of this section should reflect the template as documented in the CPFR Case Studies: Road Map to CPFR publication.

It will be seen that the format of the Case Study template follows closely the mapping questions outlined above. This supports the idea that in principle the CPFR model should be the starting point for a pilot and that users should "test" each step to ensure that it still "fits" as is or it may require revision.

The format to be used will mirror the format used in the second GCI Recommendation for VICS CPFR, The Case Studies: Roadmap to CPFR. The main sections are here repeated. Please refer to The Case Studies: Roadmap to CPFR for more details.

- Introduction
- Executive Summary
- CPFR Processes Addresses
- Pilot Objectives
- Scope **
- Technology Used
- Metrics and Results
- Resources Involved
- Project Challenges
- Methodology
- Summary of Pilot Effectiveness
- Trading Partner Relationship Changes

- Model/Guidelines Functional?
- Other Key Learnings
- Rollout Plans

** The scope above is where we can outline the initial business processes modeled. It is in this section where a graphical representation can be used to intuitively describe what was modeled and how, if at all, any differences between CPFR and the n-tier pilot work.

Below is a simple example of the level of detail that might be described. This is only an example.

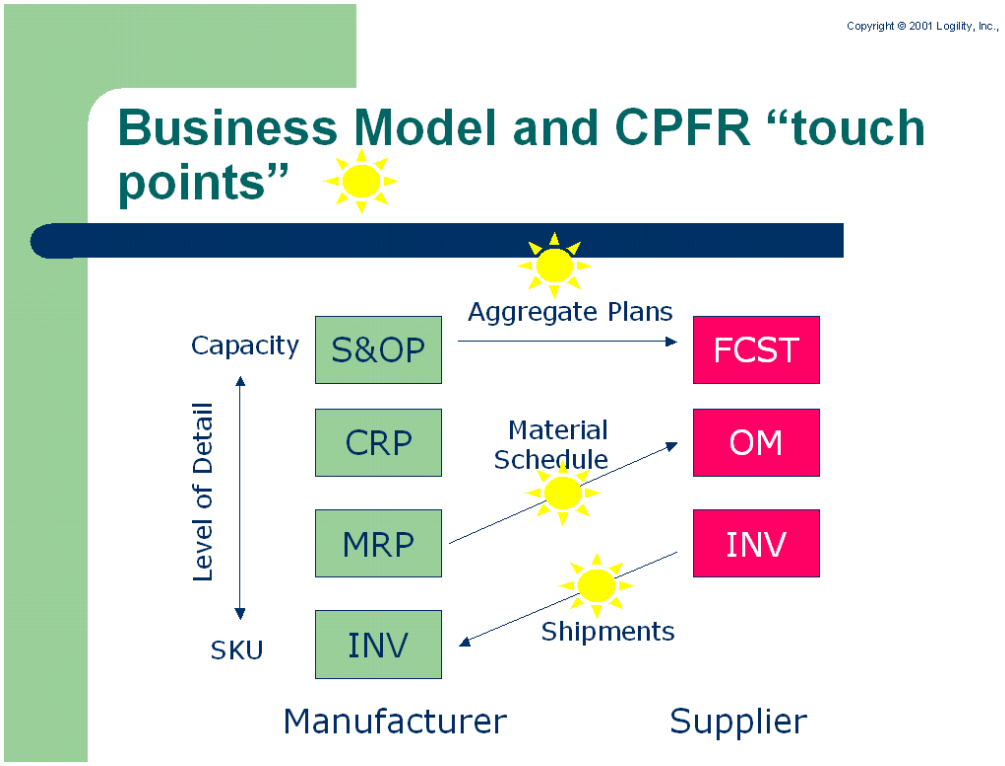

Figure 12: Example of Business Model implying 2-tier CPFR Integration.

It is likely that as n-Tier CPFR evolves, it will integrate to a whole host of different established business processes and systems including:

- Material Requirements Planning (MRP)
- Manufacturing Resource Planning (MRP II)
- Sales and Operations Planning (S&OP)
- Capacity Requirements Planning (CRP)
- Distribution Requirements Planning (DRP)
- Distribution Resources Planning (DRP II)
- Efficient Consumer Response (ECR)
- Vendor Managed Inventory (VMI)
- Retailer Managed Replenishment (RMR)
- Co-Managed Inventory (CMI)
- Supplier Managed Inventory (SMI)
- Continuous Replenishment Planning (CRP)
- Just in Time (JIT)
- FLOW and/or Continuous Manufacturing

Each of these (and any others that n-tier "touches") might overlap considerably with n-tier CPFR. The major difference being that these processes (in part or in whole) are four-wall processes in that they operate inside a single organization, and they might model trading partner's involvement. CPFR is a B2B processes that focuses on the interactions between trading partners. It is not clear how these processes will be impacted once collaboration and CPFR are implemented. Note that in most cases true collaboration was not defined in any of these business processes – it was an implied assumption in some. Additionally, any one of these can be deployed with a (true) collaborative framework in which case

they become hybrid models and do not reflect the original design for which they were created. CPFR has now "ownership" here – it is but the most recent embodiment of two converging activities; Supply Chain Management and e-Commerce.

Please also refer to the relevant appendix in this document for a more complete overview of the other major initiatives that are undertaken by buyers and sellers, and how they relate to CPFR.

Industry Matrix

Back in 1997 this author remembers one of the first minuted Business Implications sub-committees. We discussed the applicability of how CPFR might be applied to other non-CPG spaces. Generally we focused our efforts in other product segments of the general retail space, but we did begin to discuss the wider implications of CPFR. However, due to the focus and timelines of the VICS CPFR project, these discussions were not central to the work that took place over the next couple of years. It is now that we again pick up that discussion, through the work that we are doing in the n-tier group.

To facilitate an open and fluid discussion we agreed to document alternative industry models so that we could frame our discussion in a way as to make understanding CPFR easy. For example, when the words "retailer" and "manufacturer" were replaced with the words "buyer" and "seller" in the initial GCI CPFR publication, this went a long way in making the translation of CPFR easier for other members of *any* value chain. However, we need to make CPFR friendlier to other industry segments. This is where our Industry Matrix comes in.

This is the second draft of this matrix and is meant to represent the kind of terminology and structure of other industry groups that we think we can safely apply CPFR to. This emphasizes the overlap of CPFR on these other groups especially when you consider that many of these groups have their own industry initiatives!

The following will be maintained in this document and updated as needed by members of the n-tier Committee. In future publications, this matrix can act as a guide to for terminology use and model description. This Matrix was a key "to do" from our summer work.

Generic	Food/Service	Automotive	Apparel	Pharmaceutical
Tier 1	Retailer/Restaurant	Dealer	Retailer	Doctor/Hospital
Tier 2	Broker/Distributor	Assembler	Distributor	HMO/Group Purchasing Organization
Tier 3	Food Manufacturer	Parts Manufacturer	Apparel Manufacturer	Drug Manufacturer
Tier 4	Co-packer	Tier 1 Supplier	Textile/Parts Manufacturer	Chemical/Biological material supplier
Tier 5	Co-operative	Tier 2 Supplier		
Tier 6	Farmer			

Generic	Hi-Tech Retail	H-Tech Commercial	CPG
Tier 1	Retailer	Re-Seller/Distributor	Retailer
Tier 2	Re-seller/Distributor	Manufacturer/Assembly	Distributor
Tier 3	Manufacturer/Assembly	Sub-Assembly/Contract Manufacturer	Manufacturer
Tier 4	Sub-Assembly/Contract Manufacturer	Component Supplier	Co-Mfg (either packer or manufacturer)
Tier 5	Component Supplier		Ingredient Supplier/ Commodity Supplier

Figure 13: Industry Matrix last revised May 2001

Appendix A: References

DAMA Model for Collaboration, Sandia National Laboratories, operated for the United States Department of Energy, October 2000

Efficient Consumer Response: Enhancing Consumer Value in the Grocery Industry, Kurt Salmon Associates, January 1993

Guidelines for CPFR, VICS, 1998

Integrated Suppliers: ECR Europe if for Suppliers of Ingredients, Raw Materials and Packaging, Frauhofer Applications Center Transport Logistics and Communications Technology, 2000

n-tier CPFR – A Proposal, Andrew White, Logility, May 2000

The Case Studies: Roadmap to CPFR VICS, 2000

GCI Recommendation for VICS CPFR, 2001

Appendix B: Initial Generic n-Tier CPFR Business Model

One of the Committee's tasks was to take the material that had been provided by the DAMA project that was specific to the Apparel and Textile industry, and map it to a more generic n-tier model. The purpose is to define a business model that supports more than two companies in a collaborative business process such that later, we could map this generic model to the Industry Matrix (above) and therefore create several n-tier CPFR templates. From this we could then drill down and define any changes that are needed in the technical specification.

The initial cut at a generic business model is shown below. A Visio copy of the file will be made available on the www.cpfr.org and the www.globalcommerceinitiative.org web sites along with this document.

There follows several documents. The initial document describes the data flow between multiple companies in a joint, mutual collaboration process. The latter document is in fact the generic model proper. It will be hard to see in this document; please access www.cpfr.org to download a Visio copy of the file.

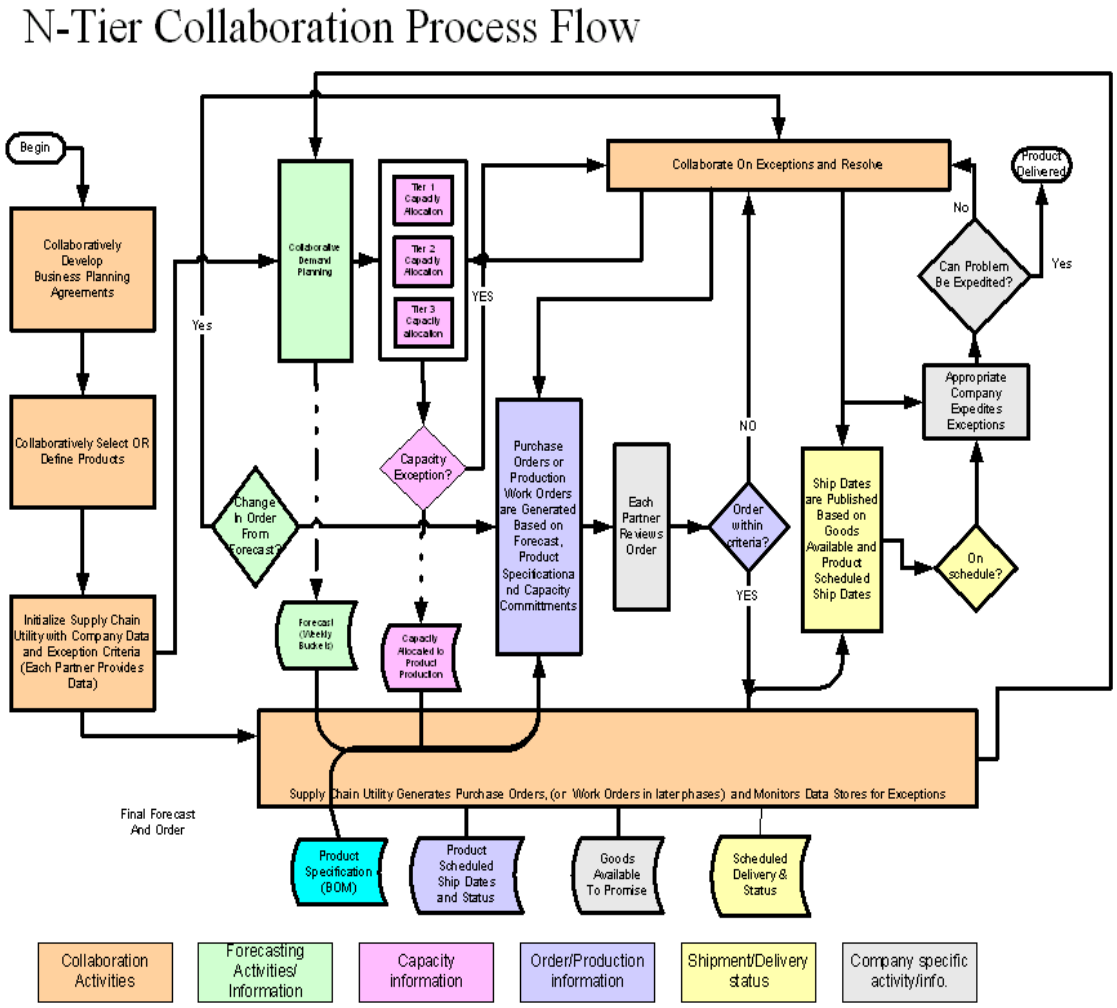

Figure 14: Generic n-tier CPFR model (highest level)

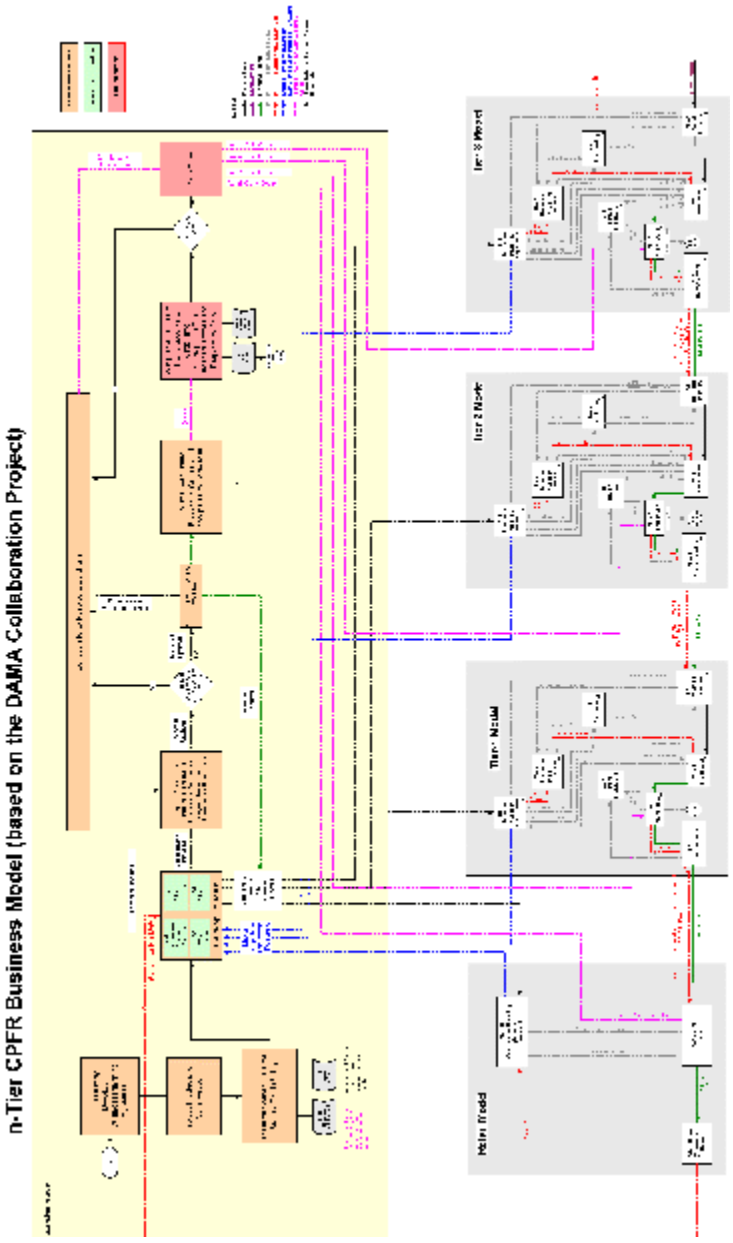

Figure 15: n-tier CPFR Business Model (please go to www.cpfr.org for a cleaner copy of the Visio File.

Appendix C: DAMA Model for Collaboration (Extract)

There follows an extract from the DAMA Model for Collaboration (October 2000). The complete document is available from the www.cpfr.org web site on the White Paper section. The DAMA Model for Collaboration uses an excellent example of what a complete, end-to-end n-tier model might look like for a specific industry segment – this being apparel and textile. Each industry segment will eventually define an n-tier model that will look something like the DAMA model. The DAMA model is today the best example of an actual deployment model for true, n-tier CPFR in general and n-tier collaboration specifically.

4.2.1.3 Collaboratively Forecast and Plan Capacity Commitments

The collaborative forecast was first defined by CPFR®. In DAMA's model (see Figure 9), one or several partners in the supply chain may develop the forecast. Once the forecast is developed, it is made visible to all members through the Supply Chain Utility. Each forecast must be reflective of the portion of the order that will be filled by each member in the partnership. The initial loading of the Supply Chain Utility will ensure that the correct proportions for an order are maintained. Based on the forecast received, each manufacturing member of the partnership should then provide a capacity commitment to the forecast for that specific product line.

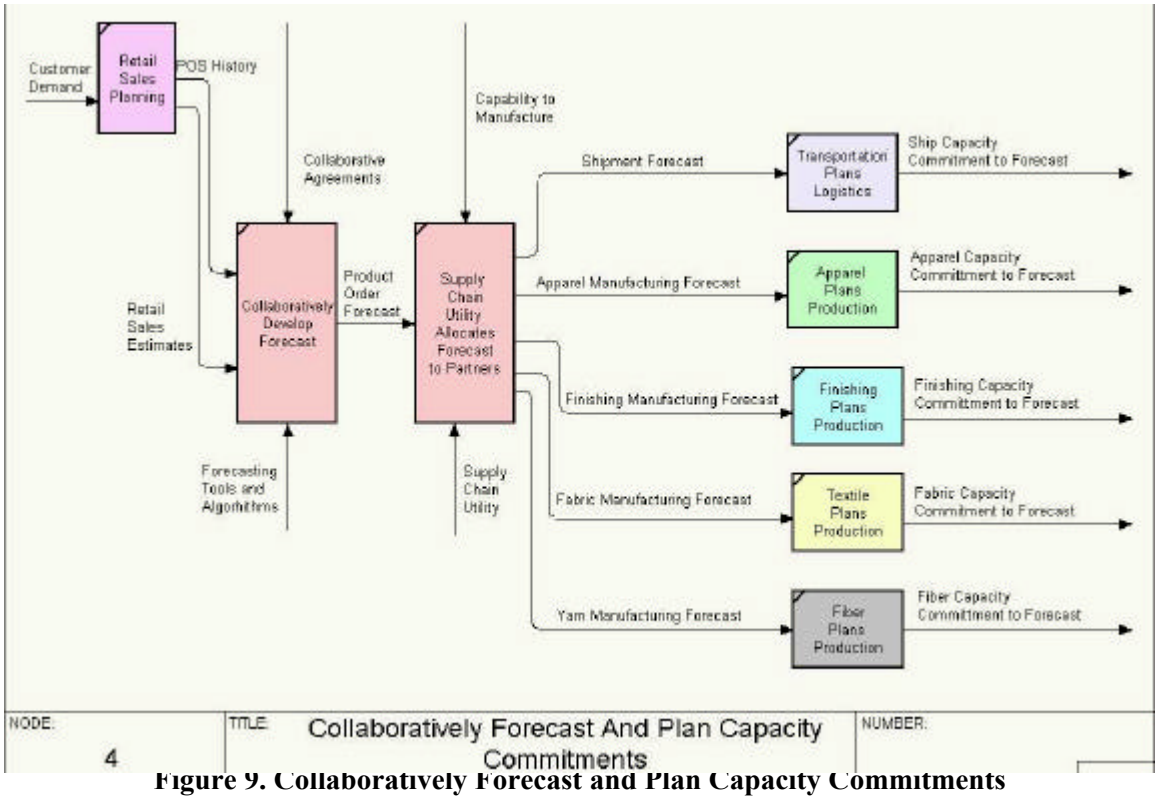

Figure 9. Collaboratively Forecast and Plan Capacity Commitments

4.2.1.4 Collaboratively Schedule Product and Product Delivery

The Supply Chain Utility will balance a final order commitment against initial capacity commitments. Using that information, in addition to manufacturing capability data, the utility will generate work orders for each manufacturer in the supply chain. Each manufacturer then processes these work orders individually. From their internal information, each manufacturer generates a ship date (see Figure 10).

A complete timeline for manufacturing the product could be generated from the Supply Chain Utility (see Figure 11.) The timeline here assumes no inventory is available, and the ship date at each stage of the process has been calculated by evaluating the process times provided by each of the manufacturers.

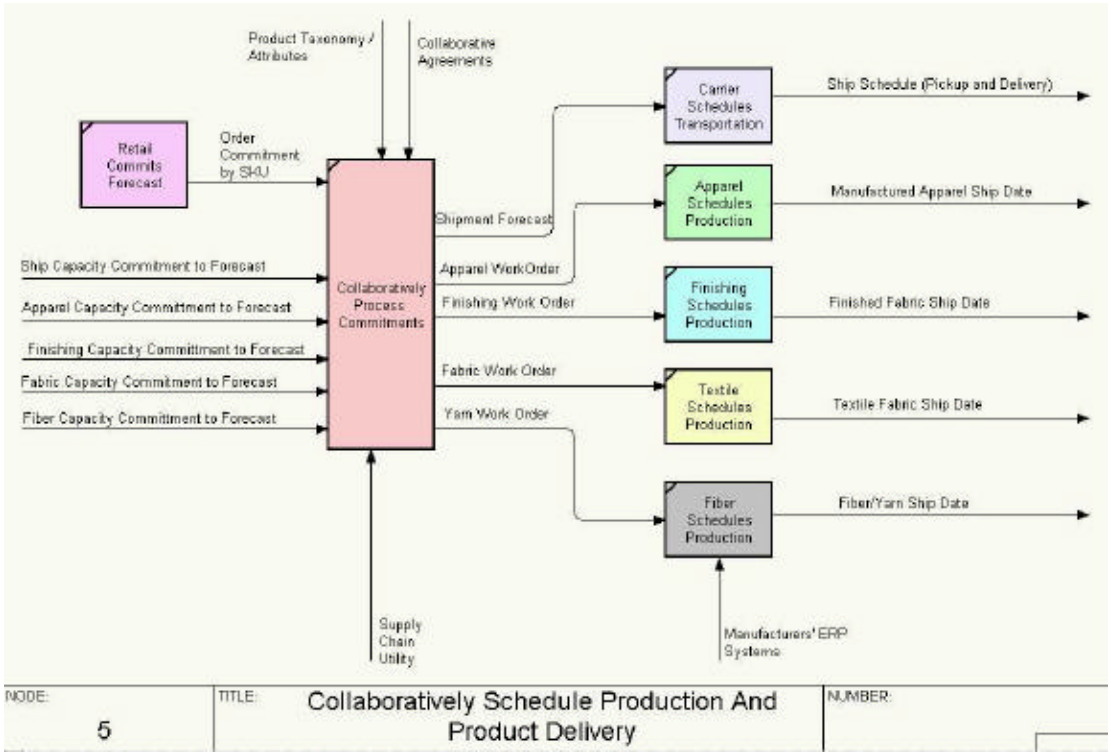

Figure 10. Collaboratively Schedule Production and Product Delivery

4.2.1.5 Collaboratively Expedite Production and Delivery Exceptions

Manufacturers' ship dates generated from the process of collaboratively scheduling production will be compared to delivery status provided by each manufacturer on a regular basis. If ship dates and delivery status for product are not meeting the agreed upon product ship dates, an exception will occur (see Figure 12).

Exceptions may be handled in a variety of ways. Most exceptions will only be made available to the trading partner who is initially impacted by the exception. For example, late shipment of goods would trigger an exception for the finishing plant. Resolution of that exception would either be expedited or negotiated with the appropriate trading partners.

Section 5 provides a description of the process for implementing this model and resolving exceptions.

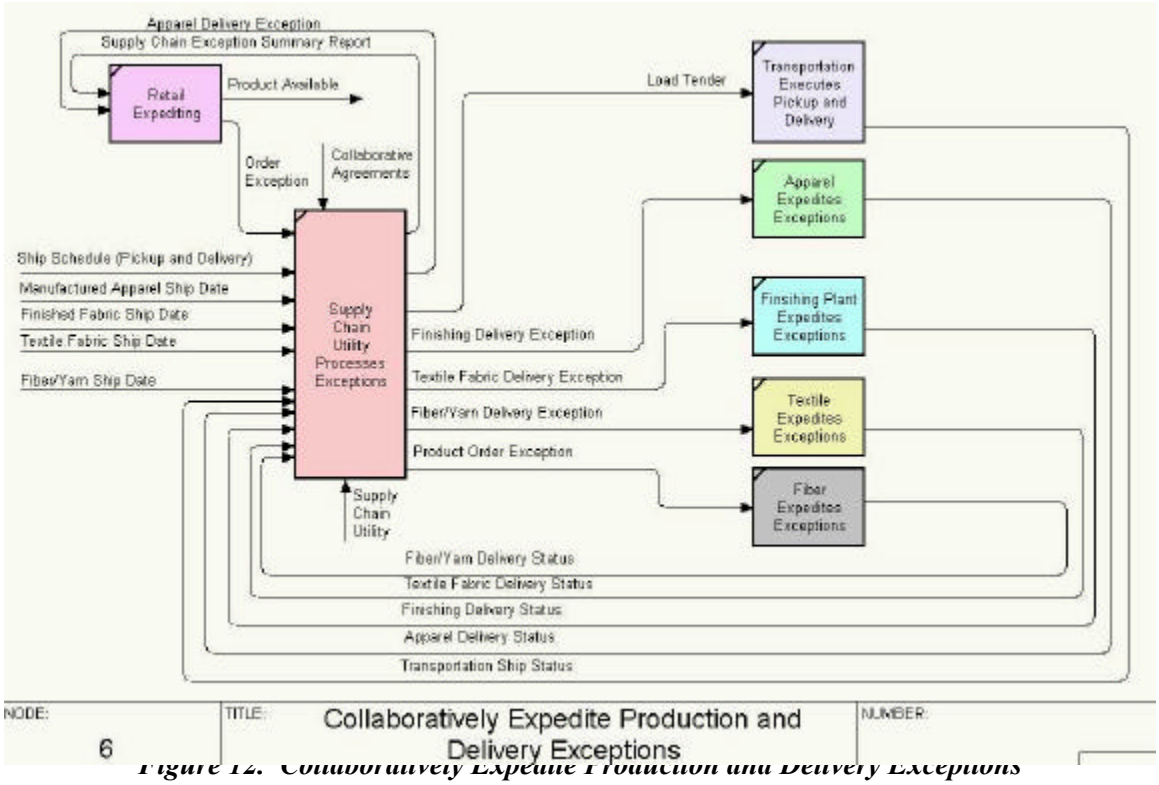

Figure 12: Collaboratively Expedite Production and Delivery Exceptions

Appendix D: n-tier CPFR Scenarios

Using the Industry Matrix above we have as a Committee agreed to apply the n-tier CPFR model to each, as a means to verify if and when the basic 2-tier model needs to change. Thus far, we have been able to document two such scenarios. These are presented below. This material is a work-in-process and is here duplicated to show the work we have done. It is expected that more work will be affected in committee to finalize and complete this material.

The scenario described is a 3-way relationship between a retailer, wholesaler or distributor, and manufacturer. The two alternative models reflect if the wholesaler takes title and effectively "controls" the replenishment process or not.

Scenario 1: 3-Tier Retail/Whole/Mfg

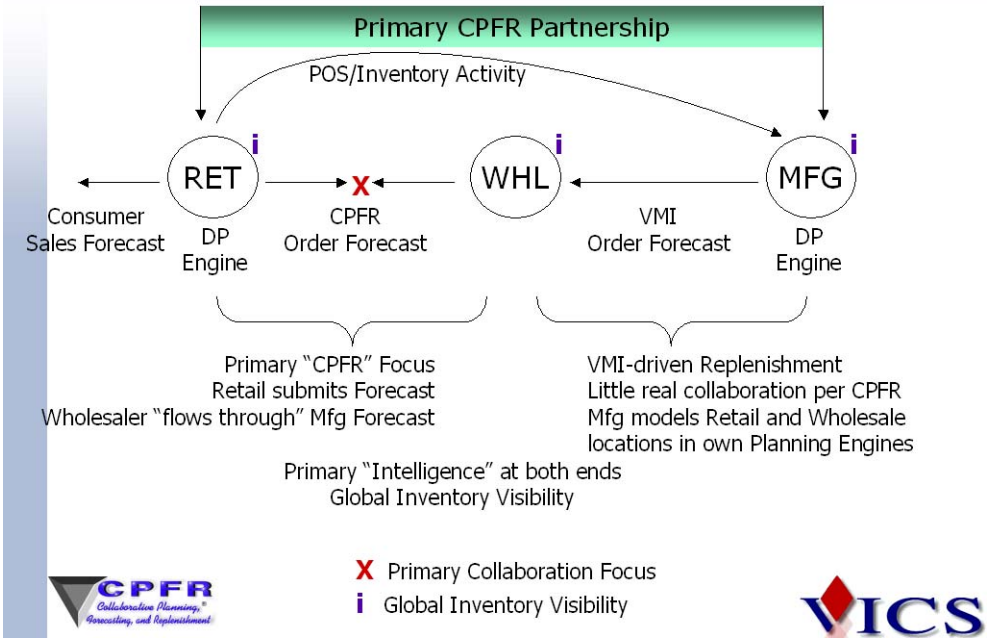

Figure 16: This graphic represents the model where the Manufacturer drives the replenishment via a VMI model.

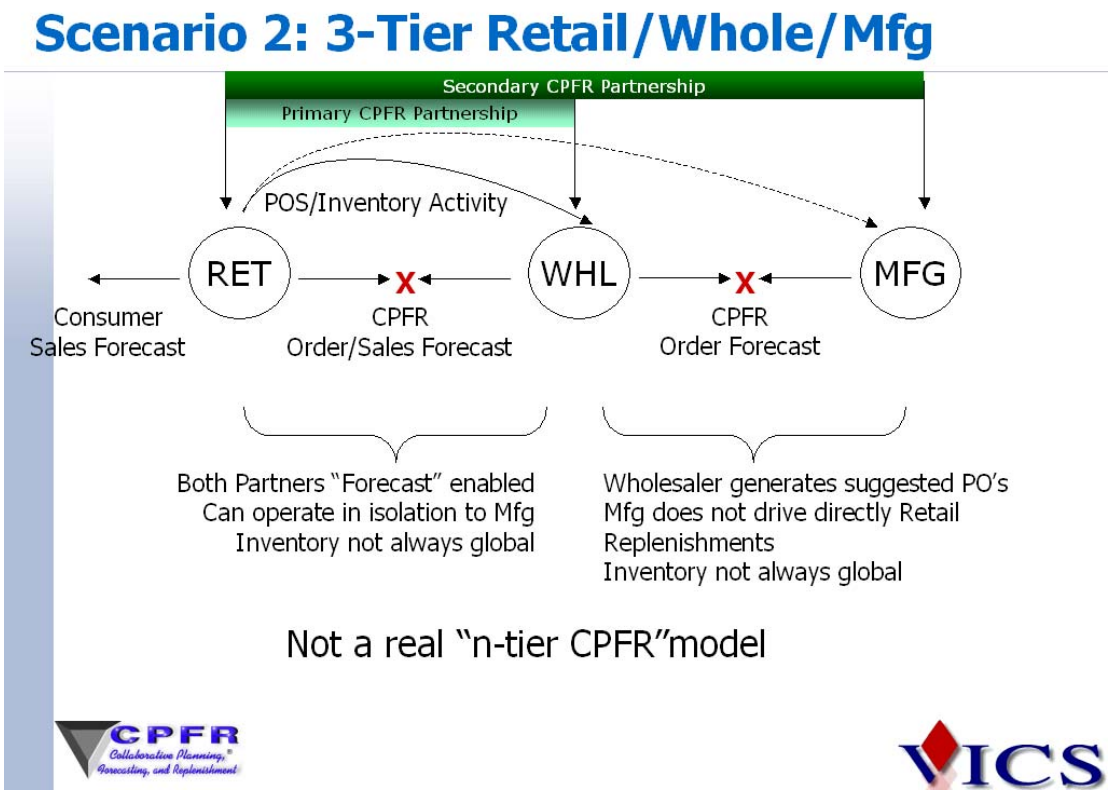

Figure 17: This graphic represents the model where the Wholesaler drives the replenishment via a Purchasing Model.

The following text describes the above model using the more neutral word "broker" rather than using the terms wholesaler and/or distributor. The following example also follows the template outline described above.

n-tier CPFR Scenario Example

Scenario Supported - Broker (3-way model)

Many CPG manufacturers use Brokers actively to manage and execute day-to-day sales and product promotions in the grocery retail channel. Indeed, some manufacturers "outsource" their entire sales activities to Brokers, while some pursue a "hybrid" strategy with in-house sales for some categories or regions, and Brokers for other categories or regions.

Brokers serve as a field sales force for hire, and although outsourced, they often operate as if they were employees of their Manufacturing clients – contract employees whose interests are perfectly aligned with the sales objectives of the manufacturer.

In this regard, Brokers are involved in all aspects of sales planning, operations, and execution, and represent the Manufacturer in the Retail channel. Invariably, Brokers play a heavy role in planning and executing new product introductions and product promotions. Brokers actively engage in sales and order forecasting, VMI, order management and reporting, and as such are natural infomediaries in the CPG supply chain. For these reasons, Brokers are an interesting subject for discussion when we consider n-tier collaborative commerce.

The purpose of this brief is to explore how the n-tier collaborative model applies to the Manufacturer-Broker-Retailer supply chain. In general, we find that the GCI Recommendation for VICS CPFR apply to the Broker n-tier model without much modification. However, the underlying data structured do suggest that the model might need to change if advantage is to be taken of certain data sharing activities – and also on who acts as the "intelligent" agent.

Further qualification of the Broker n-tier model yields the following high-level analysis:

- Supply Chain Characteristics. n-tier with Brokers in the Food/CPG business involves the Retailer, Broker, and Manufacturer collaborating on information regarding plans, forecasts, and replenishment for finished goods only.
- Demand Chain Characteristics. The primary drivers of demand are promotions, new product introductions, seasonality, and price. The scenario concerns only a B2B business model.
- Supply Chain Characteristics. We are considering sourcing decisions made only by the retailer, who will source a finished good exclusively from a Broker, as the Broker is the exclusive sales agent for the manufacturer. Category-wide decisions are made by the Retailer on brand strength, price, market development funds, and manufacturer-sponsored consumer-direct promotional plans.

- Brand Status. This element is important, especially for those manufacturers that pursue promotions based on building brand equity rather than pure price promotions.

n-tier Applicability. n-tier CPFR adds value to the existing Broker business model in the following areas:

- Brokers are natural "infomediaries" for Retailers and Manufacturers as they currently collect and sit on top of vast stores of data relevant to the CPG supply chain. Providing Retailers and Manufacturers visibility to that information in a timely manner is the main value Brokers can provide.
- Planning promotional events and new product introductions
- Forecasting promotional events and new product introductions
- Improving forecast accuracy for promotional events, and turn business
- Improving flow of information and reducing latency of information in the Retail-Broker-Manufacturer supply chain
- Improving the link between promotional planning at the Manufacturer and execution by the Broker at retail
- Closed loop reporting on promotional effectiveness
-

Business Model Differences

There is one basic scenario for n-tier Broker model, where the Broker takes an active and direct role in planning and forecasting sales, and in forecasting replenishment orders. In many cases, Brokers are already providing Manufacturers and Retailers with VMI services in addition to store-level sales execution. The Broker is either the repository for planning and execution data, or has access to that data, required to operate a CPFR process.

The basic process involves the Broker, acting as an extension of the Manufacturer's sales force, generating a promotional plan with the retailer, and a

sales forecast to be shared with the retailer for collaboration. The Manufacturer may also be given read only visibility or collaborative capability to that sales forecast.

Based on business rules, the Broker and Retailer resolve exceptions to the sales forecast and the Broker generates a replenishment order forecast for collaboration and consensus with the Retailer. Again, the Manufacturer will probably be given visibility to the replenishment order forecast, or may be given the ability to collaborate with the broker on the order forecast. Depending on the Broker's replenishment planning capability and access to order and inventory planning data, the Manufacturer may generate the replenishment order forecast instead. The Retailer would be given visibility to the order forecast, or could collaborate on the forecast to reach consensus.

The Broker is responsible for sales execution and will have access to actual order and forecast information, so is a logical source of data necessary to create and publish Key Performance Indicators for use by all three parties.

The basic roles and responsibilities are outlined below and do not differ from CPFR "Scenario C" that describes a Retailer-Distributor-Manufacturer supply chain.

CPFR Step	**Owner(s)**
1. Collaboration Arrangement	Broker & Retailer
2. Joint Business Plan	Broker & Retailer
3. Sales Forecast Generation	Broker*
4. Exceptions to Sales Forecast	Broker & Retailer*
5. Resolve Exceptions	Broker & Retailer
6. Create Order Forecast	Broker*
7. Exceptions to Order Forecast	Broker & Retailer
8. Resolve Exceptions	Broker & Retailer*
9. Order Generation	Broker*

*Broker gives visibility of planning data to Manufacturer

For the most part, planning and execution data will reside with the Broker. Between Manufacturer and Retailer a Broker is uniquely positioned to bring together store-level market intelligence with corporate level SKU planning data in a timely manner. At the same time, by nature of its sales execution role, a Broker may provide more accurate sales and order forecasts than either the Manufacturer or Retailer. Brokers are a natural infomediary in the food/CPG supply chain and can serve as a natural value added hub for planning and execution information around which both retailers and manufacturers can synchronize.

In most cases, the Manufacturer who employs a Broker will own neither sales, nor order forecast for the CPFR process, and will instead require only visibility to consensus sales and order forecasts generated by the Broker.

It is our estimation that the Front End Agreement will NOT change in a Broker n-tier scenario. Nor do we expect the Joint Business Plan to change in form or in content because:

- the collaboration will be taking place between companies at the end of the supply chain.
- Brokers and Retailers will be collaborating on forecast and order data relating only to finished goods

Metrics

Metrics required to support evaluation of Broker n-tier CPFR results are expected to be consistent with standard metrics used for point-to-point CPFR processes, mainly:

- Forecast accuracy
- Accuracy of Broker's sales and order forecast
- Retailer vs. Broker forecast accuracy
- Manufacturer customer service levels

- Retailer out-of-stocks
- Planned vs. actual promotional lift
- Time-phased inventory levels for manufacturer & retailer.

Appendix E: CPFR and other Initiatives like VMI

The following represents some material that has been requested on several occasions from different sources. With n-tier CPFR touching more aspect of how buyers and sellers operate and interoperate across the value chain, it seemed appropriate to establish the relationship between CPFR and other initiatives that might be in operation at either buyer or seller companies. This is not an exhaustive list and will be built on as we move forward.

Here is a summary description of some of the major business process mentioned in this document:

Quick Response (QR): perhaps the earliest example of a "continuous replenishment planning" business processes, this was a soft goods initiatives that dates back to around 1986. It has a goal of synchronizing buyer and seller (value chain) and eliminating cost in the soft goods/apparel industry via better, more consumer centric replenishment. POS was part of the shared information flow and EDI was the technology base. QR in fact preceded the formation of VICS in 1986 that had as its role the formulation of a standard for electronic communication – EDI as we know it today.

Efficient Consumer Response (ECR): the grocery industry looked at QR in the middle of 1992 and determined that the goals were consistent with their needs but that they needed a more comprehensive model to create a value chain framework was to include:

- Efficient Store Assortment
- Efficient Replenishment
- Efficient Promotion
- Efficient Product Introduction

ECR is far more comprehensive than QR and in fact also extends the business process to include suppliers as well as manufacturers. ECR has since spawned many other initiatives, many of then international in flavor. It also seeks to share information between partners, driven off POS driven consumer demand, and using EDI as its core technology.

Vendor Managed Inventory (VMI): took its rise from the elements of QR and Efficient Replenishment and was used again by the general consumer goods value chain. VMI had its mantra, "Provide the right product, to the right place, at the right time, in the right quantity, at the least cost." VMI was a flavor, if you will, of Efficient Replenishment whereby the supplier was primarily responsible for the replenishment of inventory through a customers supply chain. VMI spawned a series of additional flavors, which were all really just extrapolations: ***Vendor Managed Replenishment*** (VMR), a Canadian flavor of VMI; ***Retailer Managed Inventory*** (RMI); a flavor of VMI where the buyer has more of an "approval" role in the ordering mechanism; rarely deployed as most retailers of any size have few resources available for this; ***Co-Managed Inventory*** (CMI), a more sophisticated model of VMI where collaboration takes place to a degree but no where near as formalized as in CPFR. CMI was perhaps the closest these early "continuous replenishment" strategies came to CPFR using the EDI platform.

Supplier Managed Inventory (SMI): is a European developed business model that recognized that VMI as it was defined in the USA did not fit the upstream value chain in general and the European market in particular. There are numerous differences not least of which are the cross border issues, lead time demands being different across such borders and very different within borders, and the greater disparity in systems for integration. SMI is the de facto standard for European upstream continuous replenishment.

Note that almost all of these initiatives have very similar goals; and they all focus on consumer demand and ideally POS driven forecasting and planning.

Note also that ECR is generally recognized as a far broader initiative, and most of the others focus in on the Efficient Replenishment element of ECR. Also, these initiatives today look far different from when they were originally conceived. For example, EDI is a batch oriented, computer to computer technology that is today "Internet-enabled" in which case greater emphasis on real time information can now be placed. Back in 1992 this was not possible and so these initiatives continue to change shape and evolve and take advantage of new technologies**. It is very possible, and it has been observes, that any and all of these initiatives can be implemented with a CPFR "layer" included, that would provide the collaborative framework on which to build.**

Other initiatives mentioned in this paper include:

Material Requirements Planning (MRP): conceived in the 1970's, MRP was a planning system that took input from customer orders initially and later forecasted customer orders, and exploded the demand through the product bill of materials (BOM) that provided a complete listing of material requirements for acquisition. Additionally MRP was used to schedule shop floor activities. In the early days it took no account of capacity or other constraints.

Manufacturing Resources Planning (MRP II): MRP II evolved out of the preceding MRP activity. MRP II extended the model to include many other aspects of an organization such that the "answer" given out of the system was more achievable. MRP produced "logical" results that might not be possible and often resulted in lots of expedite and "hot" lists; MRP II sought to overcome this by including more information respecting other constraints and resources, such as shop floor and work center capacity, output rates, supplier material rates, some elements of cost (standard, average, etc,) and so on. Included in this umbrella is ***Rough-Cut Capacity Planning*** (RCCP) and ***Capacity Requirements Planning*** (CRP). RCCP was a high level, bucketed view of a plants aggregate capacity and was used as a preliminary verification of a plants ability to meet orders and inquiries. CRP was a detailed explosion of capacity (resource) requirements much like MRP was a detailed explosion of material requirements. CRP required much more information on a traditional Bill of Material and the resultant

document was called a ***Bill of Resources*** (BOR) and/or ***Bill of Distribution*** (BOD). The BOR was more focused on all resources; and BOD was more to do with location to location distribution resources needs – much more applicable to DRP. CRP was also enhanced and eventually supported Finite Capacity Planning (FCP) that mirrors very closely the Advanced Planning and Scheduling (APS) applications as they are known for optimized production planning and scheduling. Back in the 1980's FCP was used to re-schedule plants based on capacity violations – and costs and revenue were sometimes used to make such decisions.

Distribution Requirements Planning (DRP): DRP evolved out of MRP and was a similar process that provided time-phased resource requirements for distribution rather than for manufacturing. DRP sought to determine which products were needed in which warehouses in order meet forecasted and customer orders. DRP evolved into ***Distribution Resources Planning*** (DRP II) much like MRP evolved to MRP II, to include other resources beyond product such as distribution and transportation equipment, taking into account costs to move, and store products etc. Additionally DRP was an un-constrained model (like MRP) and DRP II was constrained to some degree (like MRP II and CRP).

Sales and Operations Planning (S&OP): S&OP started out as an outgrowth of MRP II and was more of a *process* that facilitated the continual integration and synchronization of information inside a company including the following departments:

- Sales and Marketing
- Production
- Distribution
- Finance
- Engineering (if applicable)

The goal was to meet frequently to review performance and direction with a view to ensuring that all departments work to one set of numbers, thus represented in the MRP II system so that execution was to the plan.

Since those early days, S&OP has since evolved and now operates inside many organizations under different names and often times without any reference or need to MRP-activities. For example, a Distributor might operate with some S&OP process and yet they do not use MRP. Likewise a manufacturer that exploits Flow or JIT technology (for repetitive manufacturing cycles, such as ball bearings) may follow an S&OP process, although it will be called by a different name (that implies the same soft of coordination across the enterprise). S&OP is principally about synchronizing and balancing the demands on an organization with its ability to supply and serve. It is about visibly coordinating plans and actions across all aspects of an enterprise.

Summary

Several of the above initiatives and processes are buyer or retailer centric, several are manufacturer or seller centric, and some are more value chain or B2b centric. Several contain elements of both. Is CPFR really an outgrowth of one or other of these activities? It is arguable. The founders of the preceding movement, known to those in the know as CFAR (for Collaborative Forecasting and Replenishment), CPFR is an outgrowth of VMI programs that "had not performed". Therefore it could be said that CPFR is an evolved form of VMI. For those that were involved with VICS and other associations when ECR was all the rage, this is a painful and arguable point as they would maintain that ECR was the grandfather of CPFR. To those early pioneers of DRP that had to develop "one number demand plans" inside an enterprise, CPFR is "obviously" nothing more than an "extended one-number" principle. In fact all these viewpoints are correct. The early definitions of ECR even look like those from the CPFR world!

Ignoring the emotional attachments that we each make to our experiences, it should be seen that CPFR is really just the latest embodiment of knowledge and experience that we compile, that seeks to continually improve our company internal efficiencies while increasing external effectiveness. We should not get hung up on where CPFR came from. We should focus on where we could take it.

Appendix F: n-tier Sub-Committee Membership

The list below represents the combination of all those people that have attended one or more n-Tier Committee Meetings.

Last	First	Advisory	Virtual/Core	Company	n-Tier	Email
Barriskill	Brian		V	Kmart	X	BrianB@lactalis.co.uk
Bremant	Caroline	X	C	Gencode	X	cbremant@gencod-ean.fr
Engler	Georg	X	C	Accenture	X	georg.engler@accenture.com
Lewis	Chris	X	C	Assi Domain	X	chris.lewis@asdo.co.uk
Marzian	Rita	X	C	Metro AG	X	marzian@metro.de
Roth	Larry		C	Kimberly Clark	X	lroth@kcc.com
Stewart	Lynne		V	EAN South Africa	X	stewart@ean.co.za
Teygeler	Henk	X	C	Smurfit Stone	X	henkteygeler@compuserve.com
White	Andrew	X	C	Logility	X	awhite@logility.com
Acosta	Julie		V	Pillsbury	X	jacosta@pillsbury.com
Afonsky	Nick		V	Manugistics	X	nafonsky@manu.com
Bunkley	Heather		V	Viewlocity	X	hbunkley@viewlocity.com
Clavey	Westley		V	PWC	X	Westley.clavey@us.pwcglobal.com
Costello	Mike		V	Atlas Commerce	X	costello.mike@atlascommerce.com
Cruz-Solano	Orlando		V	i2	X	cruz-solano@i2.com
Caciula	Raz		V	Unilever	X	Razvan.caciula@unilever.com
Dadachanji	Keki		V	Mars, Inc.	X	Keki.dadachanji@effem.com
DeMarb	Darrin		V	Thinkfast Consulting	X	ddemarb@thinkfast.com
Fennell	Lawrence		V	Wal-Mart	X	lefenne@wal-mart.com
Fisseha	Haeran		V	Netfish Technology	X	hfisseha@netfish.com
Frank	Kathy		V	Surefit Inc	X	kfrank@surefit.net
Franz	Philip		V	Crowe, Chizek, and Co LLP	X	pfranz@crowechizek.com
Freeman	Joe		V	Thompson	X	freemanj@tce.com
Garvey	Pat		V	VF Corp	X	pat_garvey@vfc.com
Gomez	Aaron		V	IP Net	X	agomez@ipnetsolutions.com
Goteti	Raju		V	Oracle	X	rgoteti@us.oracle.com
Gould	Russ		V	Ipnet Solutions	X	rgould@ipnet-solutions.com
Hallyburton	Paul		V	Uniteq	X	phallyburton@uniteq.com
Harty	Jim		V	Sherwin-Williams	X	jfharty@sherwin.com
Hassan	Ihab		V	i2	X	ihab_hassan@i2.com
Hyman	Pete		V	Syncra	X	phyman@syncra.com
Hatfield	James		V	Turkey Hill	X	jhatf@turkeyhill.com

Kalgren	Dick	V	e.Intelligence	X	dkalgren@eintelligence-inc.com
Karrer	Urs	V	KPMG	X	ukarrer@kpmg.com
Kessler	Robyn	V	Manugistics	X	rkessler@manu.com
Krauska	Greg	V	Syncra	X	gkrauska@syncra.com
Liles	Don	V	Worldwide Dreams Inc	X	dliles@worldwidedreams.com
Lovejoy	Jim	V	TC{2}	X	jlovejo@tc2.com
Mackie	Jim	V	Bolero.net	X	James.mackie@bolero.net
Mack	Andy	V	Crowe, Chizek, and Co LLP	X	amack@crowechizek.com
Manyem	Prasanna	V	i2	X	prasanna_manyem@i2.com
Meixell	Mary	V	Bell Labs	X	marymeixell@lucent.com
Millard	Tao	V	Viacore	X	Tao.millard@viacore.net
Morris	Lynn	V	Best Buy	X	lmorr@bestbuy.com
Moreay	Steve	V	International Paper	X	Stephen.moreau@ipaper.com
Nearnberg	Jay	V	Adams/Pfizer	X	Jay.nearnberg@pfizer.com
Nelson	Karen	V	Uniteq	X	knelson@uniteq.com
Newman	Daniel	V	Best Buy	X	Daniel.newman@bestbuy.com
Owens	Nick	V	Milliken	X	NICK_OWENS@Milliken.COM
Parvis	Cindy	V	Mars, Inc.	X	Cindy.parvis@effem.com
Petersen	Marge	V	DAMA Project	X	mbpeter@sandia.gov
Petragnani	Jim	V	UCC	X	jpetragnani@uc-council.org
Richards	Troy	V	DCM Solutions	X	troy@dcmsolutions.com
Ridley	John	V	HP	X	John_ridley@hp.com
Rose	Jeff	V	Demantra	X	Jeff.rose@demantra.com
Sekhri	Anu	V	CPGMarket	X	anu.sekhri@cpgmarket.com
Shoreen	Bob	V	Tumi Software	X	Bob.shoreen@tumisoftware.com
Singh	Gurdip	V	i2	X	Gurdip_singh@i2.com
Sivo	Frank	V	SupplyWorks, Inc.	X	Frank_sivo@supplyworks.com
Sullivan	Steve	V	Hershey Foods	X	ssullivan@hersheys.com
Tallman	David	V	HON Company	X	TallmanD@honcompany.com
Vavrick	Terry	V	Hershey Foods	X	tvavrick@hersheys.com
Volkens	Amy	V	Manugistics	X	avolkens@manu.com
Williams	Jeffrey	V	Surefit Inc	X	jwilliams@surefit.net
Wise	Mike	V	J.D.Edwards	X	Mike_wise@jdedwards.com

Appendix F: Contributors to this Document

Nick Afonosky	Pillsbury
Mike Costello	Atlas Commerce
Razvan Caciula	Unilever
Westley Clavey	PriceWaterhouseCoopers
Keki Dadachanji	Mars, Inc.
Lawrence Fennell	Wal*Mart, Inc.
Philip Franz	Crowe, Chizek
Pat Garvey	VF Corp
Greg Krauska	Syncra
Pete Hyman	Syncra Systems
Greg Krauska	Syncra Systems
Chris Lewis	AssiDoman Packaging Ltd.
Andrew Love	Uniform Code Council
Rita Marzian	Metro, AG
Steve Moreau	International Paper
Cindy Parvis	Mars, Inc.
Marge Petersen	DAMA Project
Larry Roth	Kimberly-Clark
Andrew White	Logility, Inc
Don Wiles	Worldwide Dreams, Inc.

Many other people have helped in the n-tier work. Please refer to the www.cpfr.org web site for a complete of attendees and participants.