Netmarkets Europe

The independent hub for European B2B

B2B E-commerce for European Hi-Tech

An Insider's Guide

April 2001

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Foreword

On 21 March this year, 60 leading e-Business practitioners from the European hi-tech industry gathered in Edinburgh for an intensive afternoon and evening of brainstorming and debate on key e-business issues.
The summit was organised in partnership with leading e-business companies – Asera, Cisco, Sun, Accenture – and sponsored by ARC advisory services, RS Components, iSyndicate, Selectica and Electronics Scotland.
The participants included senior IT, marketing, sales and business development executives from traditional hi-tech businesses, leading B2B software vendors and e-marketplaces as well as associated consultants and analysts. Through the use of Netmarkets Europe's electronically-enabled workshop process, the group looked specifically at the key issues surrounding:

- **E-infrastructure**
- **E-sales**
- **E-markets**

In our role as independent facilitators of the B2B debate in Europe, Netmarkets Europe is delighted to have been given the opportunity to facilitate such an important summit. We would particularly like to thank Asera http://www.asera.com for being the inspiration behind this event, the other sponsors and, of course, the delegates, who worked so hard throughout the day.
Over 50 pages of original verbatim data were generated at the summit. This White Paper contains a synthesis of this output, plus additional analysis and key action points for moving forward.
Netmarkets Europe will be following up this activity with more educational forums on B2B e-commerce in the months to come. For more information please see our website at http://www.netmarketseurope.com or contact me directly at the numbers below.

Simon Torrance
President
Netmarkets Europe
+44 (0) 207 420 4364
simon@netmarketseurope.com

Executive summary

AFTER THE roller-coaster ride of 2000 when many new internet-based ideas, business models and technologies were tested – some successfully, some not – we are now entering the second wave of e-business as it enters the commercial mainstream.

What is the difference between e-business and business? Clearly companies have always bought and sold, but fundamentally, the internet dramatically reduces the cost of connection between people, and increases the scope of that connection. This increases the speed of information dissemination, and thus product innovation. The pace of business overall has therefore increased dramatically and will continue to do so. To take advantage of this, successful e-business initiatives must increase velocity and this means managing change and dealing with obstacles while moving at an incredible pace. So, what does this mean for the hi-tech industry specifically?

Hi-tech has many different facets, ranging from commodity manufacturers producing basic components to sub-assembly manufacturers, manufacturers and a channel of distributors and value-added resellers (VARs). Each of these has its own particular needs but there are common themes. The products are characterised by short and shorter product design and life cycles with intense feature and price pressure. This results in problems with supply-demand mismatch and subsequent planning and stock-flow problems.

One way of describing the effects is to say, "stock is always in the wrong place". Some studies have estimated that 30% of all the trade in the value chain is horizontal and the result of stock re-balancing. At the procurement end of the market, a great deal of manufacturing is outsourced to short-run manufacturing, opening up possibilities for greater design collaboration and request for quote (RFQ) systems. Meanwhile in the sales channel, the products are complex, and so there is a traditional channel but manufacturers are moving to direct sales with customer configuration and build-on-demand systems.

All of this is a rich territory of opportunity for e-commerce systems and there have been many experiments covering the full spectrum of options. Hi-tech was one of the earliest industries to try e-selling, and there have been some well known success stories. In the e-marketplace area, it supports two industry sponsored marketplaces (ISM) in e2Open and Converge as well as more than 17 other independents focused on particular niches such as semiconductor sales (eg http://www.SemiSales.com).

E-infrastructure

In the fast moving world of hi-tech, e-commerce systems need a flexible framework that can cope with major changes in business model and products over time.

Adopting new e-business infrastructure

Key drivers

1. Increased competitive pressure
2. Increased customer expectations

Key barriers

1. Sheer complexity of development
2. Determining and measuring return on investment (ROI)
3. Senior management fear of failure
4. Challenge of process integration

Addressing the issues

The perfect architecture solution

1. Ease of integration and adoption
2. Matching business processes
3. Delivering measurable ROI through rapid deployment

Key success criteria

1. Delivering value in bite-sized chunks
2. Re-engineering processes before automating them
3. Viewing processes from a customer point of view
4. Ultimately, this quotation from one of the group sums up the required approach:

"Have a clear end goal then start with small steps which can be easily repeated."

Done right, this can significantly reduce the risk involved in building e-commerce as individual projects can be done in small steps. This has the added benefit that the individual projects' development can be devolved into the organisation with central IT taking more of a guide role.

Any real world system is going to involve multiple packages from a variety of vendors so the framework needs to support this as well as integrating with back office, enterprise resource planning (ERP) and manufacturing control systems.

A summit workshop, with representatives from IBM, Compaq, Sun, Accenture, Benchmark Electronics and others, identified the key drivers for, and barriers to developing new e-business infrastructure for hi-tech companies. It also looked at how to address them.

"Choose an architecture that allows you to start with a small subset of business functionality and/or customers/partners and evolve into what you ultimately want in smaller steps",
"Technology is ultimately only an enabler – understand new process and business models and implications"
QUOTES FROM WORKSHOP ATTENDEES.

Buy side

The component end of the business lends itself to commodity-style trading and a number of markets have grown up to support this. Companies in the hi-tech sector need to be able to use these, either as buyers or sellers.

The sub-assembly definition and procurement process involves short-run custom manufacturing and so lends itself to automated request for proposal (RFP)/request for quote (RFQ) systems. There is also potential here for collaboration both in design and forecasting.

The key issues in e-sales

1. Selecting an infrastructure
2. Effectively educating internal staff and the supply chain
3. Involving both business and technical teams in the process
4. When using an external organisation to handle implementation, ensure that an internal team shadows the implementation
5. The need for a degree of standardisation in e-markets operating in the hi-tech arena. Particularly in the areas of product descriptions and categorisation

Sell side

The sell side of e-commerce in finished goods (e-selling) has received a lot of attention and is now quite well understood. Direct selling has a great deal of appeal and provides many opportunities for further streamlining of the business processes. It allows customer configuration and hence custom manufacturing.

But both the complexity of the products and their global nature means that the traditional channel is not going to disappear.

Any new sales channel that appears must allow for the older channels whether this is dealing with internal issues with the account sales force or external ones with distributors and VARs.

It may be that for a particular product set it is more effective to build tight integration with key customers than to expand the function into a full direct-selling system. As in other areas, brand is an important differentiator and online initiatives need to support the offline brand.

The e-commerce world represents a major opportunity to add value in the form of information. It's important to open up to your customers and provide them with information about your products, processes and their part in those processes. The tendency to hoard information should be resisted. Finally, online markets also provide the ability to test-market products in separate geographies and to offload surplus or distressed stock without upsetting the main channel.

The e-sales workshop felt that selecting a system/architecture that will meet the requirements of the business and customers now and in the future was the most important issue facing a sales organisation in the hi-tech sector.

Distribution

Distributors fulfil a real need in bridging the gap between manufacturer and end consumer particularly in the hi-tech sector where the products are complex.

Traditionally they have provided credit to fund the channel and held stock to smooth out demand variations. But despite this they were seen as a target by many early e-commerce attempts. They are under increasing margin pressure due to the general competitiveness of the industry. Their core business of unbundling volume and shifting boxes is under pressure from the logistics companies. For these reasons, they need to be the most innovative in their use of e-commerce.

Two approaches have shown success here. The first is to automate both their buy and sell sides, but to keep them apart. This turns them into a virtual distributor, which can take margin from the differences. The second is to take advantage of contacts with multiple manufacturers and to aggregate expertise and information about the products sold.

E-markets

The e-markets workshop looked at the relationship between hi-tech companies and e-markets, whether as market builders or as users. There was a particular focus on the effect on suppliers and, from that point of view, how e-markets could improve customer satisfaction and how to maintain customer relationships in that environment.

Making e-markets work better

Key issues

1. The role of brand in a commodity trading system
2. How to develop an e-markets strategy
3. Defining the potential ROI of various approaches to e-markets

Success criteria of e-markets

1. They must support the suppliers as well as the buyers
2. They must support existing trading relationships
3. They should be handled as a new sales channel that complements existing channels

In Summary

So, production and distribution of hi-tech products has become increasingly complex. The industry is looking for new ways to increase efficiency and profits. E-business offers tremendous opportunities but requires a fundamental change in business processes and practices.

While the hi-tech industry provides the enabling components that make the internet possible, apart from a few notable exceptions, it has been slow to adopt it. Technical architectures must support fast deployment and be flexible enough to adapt to rapidly changing circumstances.

As Charles Darwin observed: "It is not the strongest of the species that survives nor the most intelligent, but the one most responsive to change."

Netmarkets Europe, along with partners like Asera, will be conducting additional research and workshops in the next few months to drill down on some of these issues. For more information see http://www.netmarketseurope.com

"Don't look for IT cost savings as the primary ROI determinant. Likely benefits will be in supply chain costs", "Use the right applications within an Emarketplace for the purchase & sale of the right things – do not confuse brands & commodities", "Any e-Market system has to support existing relationships if it is to succeed",
QUOTES FROM WORKSHOP ATTENDEES.

The Hi-Tech industry

Common problems and attributes of the industry

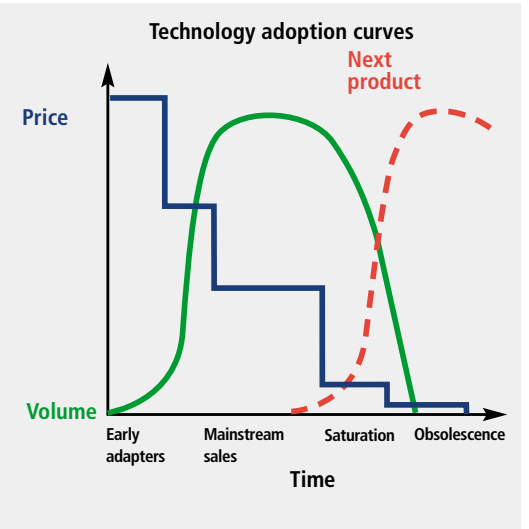
The hi tech industry, and particularly the electronics sector, is becoming a bellwether for e-commerce. This is partly because many of its characteristics are simply more extreme versions of traditional business, but also because the industry, and the companies within it, are younger and less mature. Oddly enough, many of the smaller firms have not automated their back office even though they are in the hi-tech business. The side effect of this is that legacy systems are less likely to be a restraint on building new internal and external processes.

Short product lifecycles

All industries are under pressure to reduce design times for new products but none more so than hi-tech. The extremely competitive nature of the business has meant that a major source of competitive advantage has been to ship faster. The extensive use of computer-aided design and manufacture (CAD-CAM), and related, technologies has fuelled this.

The overall effect has been to shorten and exaggerate product adoption curves but also to inflate the way that price falls with time. It is common to amortise development costs over the early adopters, which then means that during the bulk sales phase, prices can drop faster.

This deliberate policy of rapid obsolescence pumps supply and demand curves and results in major boom-bust cycles as pent up demand is unable to be satisfied by production in the first phase and over-production can dominate in the last phase of a product's life. The net result for the industry is that stock is always in the wrong place. This is a perfect environment to get real gains from B2B e-commerce.



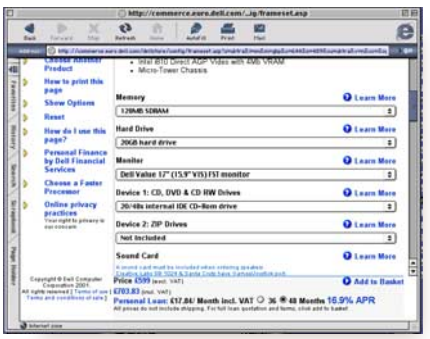
Hi-tech products have short product life-cycles, rapid obsolescence and rapidly falling price curves

Very large number of stock keeping units (SKUs)

There is a huge range of products in the hi-tech industry, possibly only rivalled by domestic food products. Coupled with a rapid turnover of products this makes maintaining an accurate catalogue a major undertaking. This is made worse by disagreements about how to describe products and product-attribute sets. For instance, it is not uncommon for two chip manufacturers to be building identical chips to the same licensed design but to be using different identity numbers and different attributes to describe them. The immaturity of standards and back-office systems means it is also common for each player in the distribution chain to use their own product ID for the same product.

Complex configurations

The move to build-to-order systems and product personalisation at the finished goods stage has had the side effect of increasing customisation available to the end consumer. This has often come about as the whole industry moves to standard interfaces between options with a large third-party industry making parts of the system. At the consumer end, we are all aware of say the customisation of a laptop with something like 30 options each of which can have four choices. This happens at the high end as well with products like servers and routers.



Dell's many laptop configurations are typical of hi-tech hardware

Custom manufacturing

The fast product turnover in the industry and production techniques mean that much of the sub-assembly manufacture is done in short runs of a few thousand to a custom design. Typical of this area is printed circuit board (PCB) manufacturing, something which is highly automated with design tools, but which also shows differences in price around the world of a factor of 10.

Channel conflict

The hi-tech industry has traditionally used a tightly controlled distribution channel. Channel agreements have been used to maintain price variation worldwide.

The channel is also often used as an accounting exercise to improve period-end figures. This leads to a substantial supply push effect on the channel contrasting strongly with the demand pull of the end consumers. The distributors in the middle play a major role in absorbing the difference. This introduces endless opportunities for channel conflict whenever the distribution model changes and particularly when attempts are made to sell direct and bypass the normal channel.

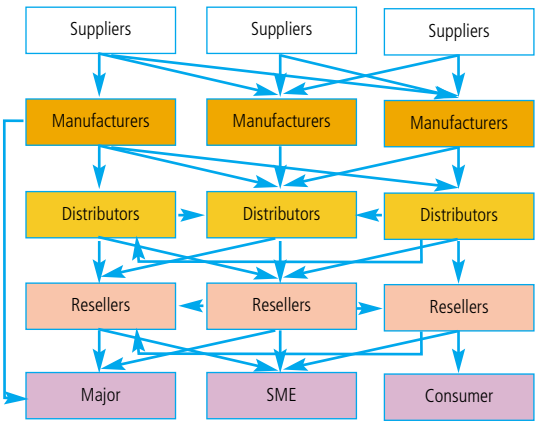
Types of business in hi-tech and opportunities for B2B

The hi-tech industry is not homogenous and there are some clearly defined types of business. It's worth considering these for a moment as their business models and hence their needs from B2B e-Commerce may vary widely. They break down into:

Component manufacturers

Basic component manufacturers such as chip manufacturers have a large capital investment in plant, which has a relatively long start up time. So their greatest interest is in demand forecasting. The most extreme case of this is in the Dynamic Random Access Memory (DRAM) market where each new generation of DRAM chip results in large price volatility. They typically have tight links with a few customers and agents but there is a healthy third-party market.

The products are very like commodities and it's no coincidence that there's a lot of activity in pure e-markets in this area. There are also virtual distributors who operate both buy and sell e-commerce systems but take a margin from the difference between them.



- **Channel friction**
- **Fragmented supply chain and imperfect information**
- **Large market size**
- **Geographical dispersion between buyers and sellers**
- **Short product life cycles leading to volatility in inventory and falling prices**
- **High work flow costs associated with physically moving product from manufacturer to final user**
- **In a word, CHURN**

The Hi-Tech value chain

Sub-assembly manufacturers

Sub-assembly manufacturers (making board level assemblies, power supplies etc) do the vast bulk of the production as the makers of the finished goods increasingly outsource this work.

On the procurement side, sub-assembly manufacturers are the major consumers of components.

On the sell side they depend on tight links with a few manufacturers. These relationships often depend on a large amount of collaboration on design, resulting in document-management issues. Trading is usually done on an RFP/RFQ basis with negotiation of final prices per project.

Finished goods manufacturers

The finished goods manufacturers have the major R&D and project management exercise of creating goods from a wide range of sub-suppliers. This is under intense price and feature pressure as they struggle to produce a competitive product. On the sell side they have to cope with providing increasing configuration as well as maintaining a happy channel to market. This puts them in the front line of e-commerce selling. They are also the major source of expertise, documentation and support for these products so CRM is particularly important to them.

Channel

There are numerous agents and brokers in the early parts of the value chain, but for final goods the distribution channel has always played a major role. For mid and high-end products these distributors provide feet on the ground to help the end customer to install and use the products and value added resellers (VARs) are still a major part of this.

The VARs typically buy on demand to avoid holding stock. But further back, distributors have represented the manufacturers in markets that the manufacturer did not want to support directly.

These distributors are constantly having their margins squeezed from both ends. They provide credit to the channel and hold stock to smooth the supply and finally handle the bulk of the fulfilment, often delivering direct to the end customer on behalf of a VAR. So the distributors' major issues revolve around margin, stock velocity, credit control and fulfilment. But there is no margin left in simply unbundling containers to palettes to single boxes, as the logistics companies can now do this. So increasingly, the distributors aggregate expertise in the form of product documentation as a way of adding value to the process. The problems of stock always being in the wrong place mean there is a large amount of horizontal trade in the channel, as VARs source from alternate distributors, and distributors and brokers trade with each other to deal with temporary over and under supply. It has been estimated that anything up to 30% of the trade in the channel is horizontal.

Current B2B initiatives

The characteristics and problems outlined above mean that the hi-tech industry is ripe for B2B e-commerce initiatives and there are a relatively large number of public e-markets that have grown up with varying success. There are estimated to be at least 17 in the market.

Consequently, companies in this sector need to be aware of these and define a strategy either to use, join or create them.

Industry sponsored marketplaces (ISMs)

The two most well-known initiatives are the consortia set up around IBM, with e2Open, and Compaq-HP, with Converge. These are primarily focused on the procurement issues of the large final goods manufacturers.

Interestingly both have recently acquired a virtual distributor of components in NECX and Partminer. These operated a similar model of electronically broking supply and demand for commodity components, while taking a margin on every transaction through them. They did this by never letting the ultimate buyer and seller deal direct.

Accenture flags up new B2B CRM challenges

Greater transparency through new B2B solutions is going to place fresh demands on the hi-tech industry's ability to manage its customers, says Simon Payne, senior manager in this sector for Accenture.

If customers can see a company's inventory position and that company has two of them chasing a limited amount of units it could be difficult deciding who to disappoint, he points out.

"In the old days, the decision would be made behind closed doors. But now what are your sales people going to say to your customers when it is suddenly transparent?"

Payne argues that companies need to review their strategies for dealing with customers in an online environment.

"You need to have much slicker internal communications and processes so people understand what the strategy is towards each customer."

Independents

There are a number of smaller independent markets serving particular niches in the industry. Some examples are:

- Need2Buy and Semisales in component sourcing
- Ace-Quote and DCI.de doing lead generation between VARs and distributors
- Channelweb doing auctions and reverse auctions of surplus stock
- PCOrder providing catalogue aggregation and sales.

E-retailing

Hi-tech was one of the first areas to seriously attack e-sales and e-retailing in both B2C and B2B contexts. The most well known examples are Cisco and Dell, although all computer manufacturers, including Compaq and IBM, have now set up an e-sales website. Netmarkets Europe's own partner, Asera, has been instrumental in helping Wyse and Cadence set up similar sites.

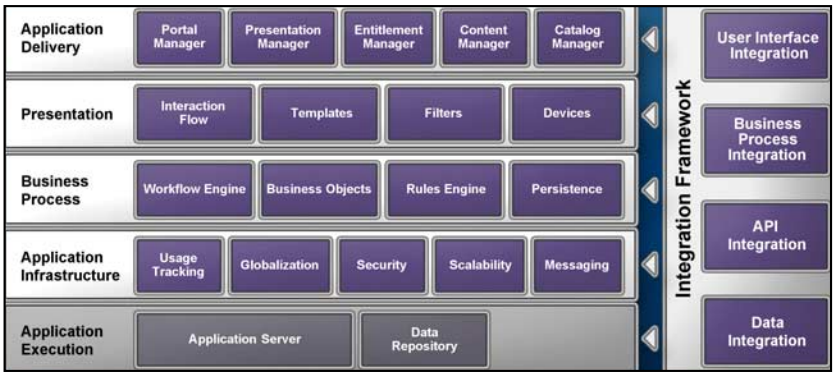
Standards

Standards for product inter-operability are important in the hi-tech industry as most of the industry has recognised the benefits of healthy third party support for products (sometimes under duress!). But similar efforts to standardise trading and product descriptions and categorisation have been less successful. This may well be due to the extreme levels of competition resulting in a great deal of distrust between companies in this area.

Rosettanet and the Desktop Management Task Force (DTMF) are the two most well known. But despite many years of work, their standards are still incomplete and few implementations exist.

The major UN-backed XML standard ebXML from OASIS has substantial parts devoted to hi-tech products and these may finally produce real benefits. Finally the software industry in Microsoft, IBM and Ariba among others are actively working on B2B techniques that hold a lot of promise. These include efforts such as UDDI, SOAP, WSDL.

E-infrastructure



The Asera e-Business Platform

Creating a robust, scalable and enduring framework for e-business is one of the major challenges of B2B e-commerce. This is true in hi-tech where a fast moving industry can't afford to be inflexible and must expect the business model to change in the medium term. It has to replace or enhance existing B2B technologies such as electronic data interchange (EDI) and it must bridge the gap between the front end of e-business and the back end of ERP and back office systems. The aim in building an infrastructure must be to support the continual re-invention and re-engineering of internal processes. This is a major source of ROI as inefficient processes can simply disappear as a result of automation.

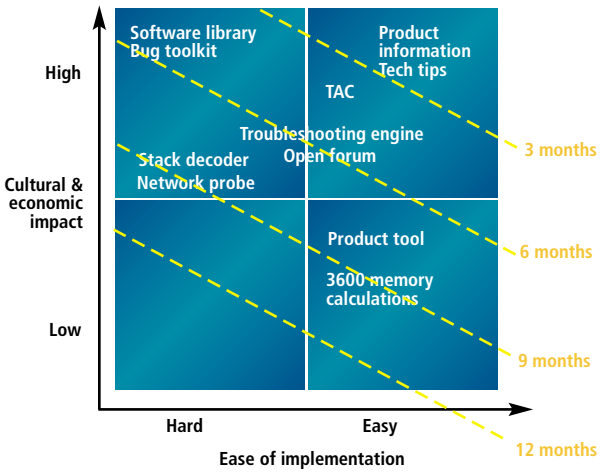
Common framework

It is likely that any set of e-business systems is going to come from a mix of in-house development and packaged solutions from multiple vendors. This will have to cope with both e-selling and e-buying externally as you automate the links between your company and others.

But at the same time it must integrate with your own back office systems. It's essential that applications tied to the system can be personalised and delivered via a common user interface with persistent workflows so business processes are consistent across applications. This makes it easier to build small projects on top of the framework and to extend the system incrementally. In this environment, the role of central IT can change to one of advisor and director instead of attempting to retain complete control of the development. The history of IT is littered with high profile failures where a single huge project has foundered. The promise of internet based e-commerce is that value can be delivered incrementally in bite-sized chunks. But this has to be within a common infrastructure so it all works together.

Development strategy

This approach, with lots of small projects on top of a common framework, significantly reduces the risks involved of any one project failing. It also allows development to be devolved out to the business units where the actual business need exists. Cisco has an approach to this that for a project to be considered it must satisfy what they call "the three threes". It must be under three people, three months and $300,000. Once it has this and has been signed off by central IT and management it is likely to go ahead. Over time, substantial amounts of function will get built. But there still needs to be some central direction or there is a risk of never getting round to the hard problems. It can be useful to build an analysis of the problems by business benefit and ease of implementation. The quick returns can be tackled first but a plan to pick off the others over a realistic timescale should be put in place as well.



Cisco's approach to project timescales for their B2B systems

Co-existence with legacy

Smaller companies in the hi-tech sector often don't have substantial investment in legacy systems or processes. Regardless of this they can benefit from re-examining the business periodically. In any case, any e-business effort must co-exist with this. The implementation of these processes is a great opportunity to re-examine them. It is easy to fall into the trap of simply automating an existing process that does not make sense, so it's important to look at re-engineering processes before automating them. This should be done with the process's end customer in mind and thus from a customer – rather than an internal – needs' assessment. Don't underestimate the time it takes to do this, but the benefits can be substantial.

Buy side

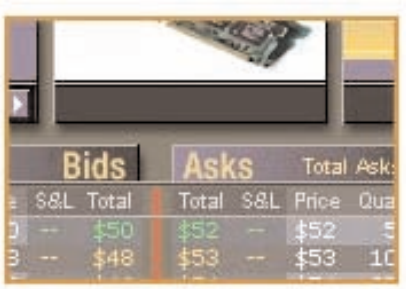
Buy side e-procurement has received a great deal of press in the maintenance, repair and operating (MRO) supplies and indirect goods area. Like all companies, those in hi-tech have this problem but they are also a good opportunity to automate and e-enable direct goods and line of business procurement.

Spot markets

There is a large area of hi-tech that trades essential commodity goods. Key areas include:

- components such as processors and memory
- standardised assemblies such as disk drives, monitors etc.
- surplus and distressed stock

These should be able to support dynamic pricing exchanges either as auctions, reverse auctions or continuous double-sided auctions (CDA). These can be used by your own procurement department or by using brokers that specialise in these areas.



Request for proposal/quote (RFP/RFQ)

There is a large amount of custom manufacturing in hi-tech, such as sub-assembly manufacture, which is generally outsourced. Trade in this area is typically completed by issuing RFPs or RFQ to key partners or possibly publicly. If you are big enough then running your own RFP/RFQ system may make sense. Alternatively there are a number of public systems appearing.

There are also some wide variations in price worldwide with SE Asian prices anything up to a factor of 10 cheaper than sources in the west. This introduces another layer of issues to do with trust and trading relationships. It may not help that a PCB can be built cheaper and faster on the other side of the world, even factoring in delivery time and costs, if you have no personal contact with the supplier.

Design collaboration

A great deal of the custom-manufacturing design is now done via electronic tools. Assemblies and components such as custom chips (ASICs), custom PCBs, software device drivers, embedded systems and so on can be described with electronic files. This is a great opportunity for design collaboration between your engineering department and the outsourced manufacturer. The killer application in this area is, of course, email! But we are now seeing the emergence of more sophisticated collaboration tools from companies such as Groove. These are bringing the benefits that we previously got internally from products like Notes, to the internet.

Collaborative planning, forecasting and replenishment

As you build integration with your suppliers, the possibility opens up for collaborative work that can benefit both your own business and that of your trading partners.

The hi-tech industry is notorious for the bull whip affecting supply and demand. A small change in end-customer demand, driven perhaps by a new product release, gets magnified back through the value chain until it results in huge changes in demand and hence price volatility in the underlying components. Products, techniques and standards are beginning to appear that would allow us to get better and faster information flows up and down the value chain.

This in turn allows us to better plan and forecast demand. Given the amount of inefficiency represented by the 30% of horizontal trade in the industry there are some very large gains to be made in this area.

Slowly but surely, says Cisco chief

Companies that want to web-enable their businesses should not rush into it, argues John Shaw, channel account manager for Cisco Systems. *"Start slowly. Don't try and reinvent the world overnight. Start with some static information. Put up some lead time information."*

Cisco has managed to successfully create a web-centric culture and nearly all of its orders from Europe are placed online. Last year web-based solutions saved the company about $1,352 million. Shaw says that when you begin to encourage your customers to move to new channels, you have to give them something otherwise the take up will be a lot slower.

"We gave them a configuration checker that would ensure that when their orders hit Cisco they were clean. They know the orders are going to be accurate."

He says one of the advantages of buying online is that you do not get order-process people ringing you up and saying they cannot read the fax and asking you to send it over again.

Anyone who places an order online with Cisco gets a sales order number and a delivery date. They can also arrange part shipments if one particular component has a long leadtime. Shaw explains that B2B solutions at Cisco are being driven by two criteria: the need to improve customer satisfaction and to reduce costs.

Cisco uses a third party to continually monitor customer satisfaction across its B2B solutions

Sell side

E-selling was the first major use of e-commerce on the internet and yet all the recent commentary has focused on e-procurement. Only recently have the obvious truths become apparent: that they are just two sides of the same coin, and that one cannot exist without the other.

The challenge for e-sales now is to work out how to integrate with other company's e-procurement and close the circle.

Direct selling

Direct selling systems have a great benefit for manufacturers providing they have the logistics and payment systems in place to support them.

It allows the manufacturer to present a lower end consumer price as channel margins are removed. It also tightens the link and feedback loop between the customer and the manufacturer. Package configuration can be done in a way that is tied directly back into the manufacturing process and enabling build-on-demand systems to be created. All of this provides greater internal control, and hence forecasting, which then provides benefits in reduced stock levels.

A lot of the basic technology to build this is now well understood. But the description above highlights that is an area that impacts on almost every other area of the business. Clearly the need for a common framework is paramount here. As ever there are some issues. Key to this is the relationship between the direct-selling effort and other sales channels both internal and external. It may well be necessary to take deliberate steps to support the existing channels and to reward account managers to avoid the direct channel cannibalising the existing business.

Channel

In most businesses, the top 10% of customer accounts represent 90% of the business. This opens up the possibility of tightly integrating your own selling system into their e-procurement systems. This sort of integration effort has benefits for both parties and can be used to provide significant lock-in of the customer. In many cases the cost of the effort can be split between you.

This is particularly important now with the emphasis on their side of streamlining their e-procurement systems. It may well be better to drive the process from your side to avoid having to interface with multiple, disparate e-procurement systems in the near future.

If you use a traditional distribution channel it may be worthwhile helping your distributors to automate their own buying processes in order to improve your own sales side. Again this is likely to involve tight integration with another company's system and this will be much easier if you can drive the specifications. E-sales efforts or the use of e-markets as a sales channel can also be used to reduce the cost of servicing the other 90% of the customers. These may well be untapped sales simply because the effort involved in managing the accounts means that they are ignored.

Brand

Like all industries, brand in hi-tech represents a major differentiator and companies invest substantial time and money in creating and maintaining it. Care should be taken that online branding complements offline brand activity. There are a couple of pitfalls that appear to be inherent in online B2B. The first is that e-commerce is nothing more than a brand building exercise with no substance behind it. Many early websites were nothing more than company puff pieces. Clearly B2B represents vastly more potential than this to improve the companies bottom line. The second issue is less obvious. Many of the early B2B markets had the effect of submerging brand into a single line item in a list of products. In a pure commodity, this may not matter but it is important to be careful that any system you join allows you to present your brand in the same sorts of ways that you would offline.

Value add of expertise

There is an unfortunate tendency among old-style organisations to hoard information. This is equivalent to building a brick wall around your organisation to prevent anything leaking out.

This is less true in the hi-tech industry as documentation in particular is essential to using the products. But it is still true that many hi-tech companies do not go out of their way to encourage community and peer support among their users. Even though it can be uncomfortable at times, there are numerous cases where a deliberate policy of openness has brought great long-term rewards. The web and internet technologies such as discussion groups and email lists can provide significant lock-in to customers and are relatively easy to implement. The lesson here is clear: publish information rather than hoard it. Your expertise and internal information is a major source of added value.

Test, grey markets and distressed stock

Even with tight control over the channel, there are circumstances where selling product over a public exchange can be beneficial. This may be anonymous or outside channel selling via third parties and can be used to test new products in isolated markets without disturbing the existing channel. More importantly it is an opportunity for manufacturers and broker distributors to shift obsolete or distressed stock. The rapid product turn over of the industry means this can account for significant cost. Currently specialist brokers, who only provide a low return on the capital tied up in the stock, handle it. A public auction can often realise significantly more return.

IBM recommends constantly testing the value proposition of new B2B solutions

If you are looking to introduce B2B e-commerce systems in the hi-tech industry it is advisable to constantly review how many people are using your new services and what value they are getting from them, says Fred Moran, IBM's manager of EMEA Business Process Integration.

IBM is fully committed to extending B2B e-commerce solutions across its operations and is currently rolling out a series of personalised password-protected web sites for its major corporate clients.

On the sites, corporate customers can place orders on electronic catalogues and track and trace their deliveries. The websites have the customer's logo on and will include key IBM contacts for sales, technical support and fulfilment. There is also a range of news which is tailored to the relevance of that particular customer.

Moran says this new B2B approach has had a positive impact on IBM's corporate clients.

"If the information you are presenting is relevant and useful and makes it easier for customers to do business with you, they are going to like it."

He adds that corporate e-procurement teams particularly like the sense of control they gain from accessing the B2B sites.

"The procurement people like to go into the sites and get summarised reports of what is being shipped and what has been ordered."

On the supply chain side, IBM is dealing with their suppliers over the web and through Electronic Data Interchange (EDI) systems. The company has invested a lot of money in EDI and wants to extract as much value as possible from that investment. Most of IBM's smaller suppliers or ones in remote overseas countries are using web-based applications. The long-term aim is to migrate big suppliers over to web-based systems. IBM, however, is not in a rush toi do this and takes a deliberately pragmatic view.

"Everything is complementary. We should feel relaxed about it. It's not a case of EDI versus XML. EDI is up and running. We need to do things in bite-sized chunks. EDI is working so we'll do other things first."

Moran is not a believer in trying to do B2B in one fell swoop. He says that there has been too much of a push to instantaneously automate everything from A-Z in what he says is a 'horrendously difficult environment'.

He explains that a staggered approach is absolutely acceptable.

"If you've got your catalogue information up, and when a customer places an order you have to manually put it into your fulfilment systems, there is nothing wrong with that."

Distribution

The need for distributors

Much of the early work on B2B was done on the basis that the new systems would remove the margin previously charged by middlemen in the distribution channel. This however ignored the fact that distributors exist for a reason. In that they bridge the gap between a manufacturer and the end consumer. The gap may exist for many reasons, whether it is a matter of expertise, volume, geography, or is credit driven, etc.

But margin squeeze, pressure from big buyers, credit problems as the major source of channel funding, are making the position of distributor increasingly difficult. It is essential to keep looking for ways to add value if the distributor is to survive. Channel conflict has been mentioned several times in this paper. Companies that use distributors, either in their distribution channel or as source of supply, would be well advised to build direct support for them into their own e-business systems.

Even for e-market builders, distributors, agents and brokers are important as they help to create liquidity in the market. Their ability to complete the trade between ultimate buyer and seller can both help the trade to happen but can also turn what might have been a single trade into two.

E-commerce approaches for distributors

Distributors, by their nature, have a major opportunity to automate both their sales and purchase sides. The process costs involved in both are a major source of potential ROI. One approach that has succeeded in the more commoditised end of the market is to become a virtual distributor where the company runs a private market. Both sides are heavily automated and the two are linked with automation that is invisible to each side.

All transactions are with the market owner, which allows them to take their margin. Although in many cases the shipping is done almost direct from supplier to consumer, perhaps via their own shippers or nominee warehouses.

Expertise as a value add

Distributors are in a good position to provide expertise to the channel and industry as they aggregate the goods from many different manufacturers. This can be in the form of CRM and product support systems, or knowledge bases of product documentation. This can become a major value add that helps to lock in both suppliers and customers.

Vertacross plans to offer European hi-tech industry real-time market information

Hi-tech suppliers will be able to market themselves more effectively using information gained through neutral European B2B marketplaces, claims Thomas Mart, head of marketing and sales for Vertacross, the marketplace for the automation and control industry.

While it is early days for Vertacross (http://www.vertacross.com), the company aims to eventually publish market studies and offer direct e-mail campaigns to suppliers based on their knowledge of what procurement managers are buying in different sectors.

Vertacross is currently building itself up and has about 40 suppliers including Siemens.

The marketplace is working towards the launch of its first product catalogue, which will carry about 100,000 products. To promote the service to buyers across Europe, marketing executives are planning a direct mail campaign.

"E-business is not an IT issue. E-business is about understanding processes. It is a strategic decision to improve internal processes."

By offering multi-supplier product catalogues, Vertacross believes it will gain credibility across the European hi-tech sector as buyers will have a clear choice on their computer screens of what products and services can meet their technical needs.

For small and medium-sized companies, Mart says it is much more effective for them to have a group of customers managed through an online marketplace where they do not need to take full responsibility for all aspects of those relationships. To get the most out of a marketplace, he says, suppliers need to participate in discussion forums, post up-to-date news about their technical products and keep their catalogue information up to date.

"The pricing is decided by the suppliers in the end. If you are going onto the internet you have to provide attractive pricing to people but you have to protect your investment as well."

Mart adds that joining an online marketplace can be a good opportunity to learn about B2B and fine-tune skills like data management.

Appendix 1

Summit Participants

Accenture
Simon Payne, senior manager
Sharon Berry, marketing manager
Steve Kerzman, partner
Dan Edington, marketing assistant
Michael McAuley, manager

Applied Materials
Gordon Huchison, director strategic marketing

ARC advisory services
Simon Bragg, director of European research

Asera
David Lazarus, account manager
Chris Hyrne, vice president
Kevin Leslie, UK managing director
Merrill Kindred, account manager
Elie Pendreich, marketing manager
John Grady, account manager

Benchmark Electronics
Tom Lawn, IT director

Brands Electronics
Stephen Henry, ICT manager

Business AM
Douglas Friedli, technology writer

Celestica
Scott Morton, director of e-business strategy

Cisco Systems
John Shaw, account manager
Martin Brown, account manager

Citywire.co.uk
Joanne Wallen, technology correspondent

Compaq Computer Manufacturing Ltd
Ian Brock, supply chain systems director

Curvaceous Software Ltd
Robin Brooks, managing director

Electronics Scotland Ltd
Jane Richardson, chief executive

E Point
Marcus Kneen
Gordon Venters, managing director

Farnell Components
Trevor Sweet, European e-business manager
Donald Beattie, e-commerce development

Fisher Rosemount
Judy Buckingham, e-business development manager

Foxboro Italia SPA
Franco Franelli, instrumentation marketing manager

Frontline Solutions
Chris Price-White, senior editor

GenRad Europe Ltd
Graham Slater, software specialist
Paul Ashmore, European sales support manager

Hydrasun Ltd
Mark Johnson, head of IT

IBM
Paul Kinney, IBM global services senior project manager
Freddie Moran, EMEA business process integration

Information Engineering Group
Andrew Latham, technical director
Pat McCarthy, managing director

Ingenico Fortronic
Barclay Milne, director of engineering

InterCorr
Philip Franklin, Marketing Director

iSyndicate
David Roberts, sales manager, Europe
David Welsh, alliance manager

MicroWarehouse
John Buchanan, national account executive

Modus Media International
Andrew McGee, sales director

Pittiglio Rabin Todd & McGrath
Gordon Colborn, director

Rockwell Automation
Kyle Ahlfinger, director, market development EMEA region

rs components
Alex Baker, e-commerce implementation manager

Scottish Computer Headline
Carole Fitzgerald, journalist

See Beyond
Jonathan Sutcliffe, European product marketing director

Selectica UK Ltd
Sharon Forder, marketing director, Europe

SerCom Solutions
Alan Hill, UK business development manager

Sun Microsystems
Dave Allen, UK e-business advocate
Laurence McNamara, sales director

TransBus International
Steve Donaghue, IT manager

Tuboscope (UK) Ltd
Dave Crouch, systems manager,

University of Durham Business School
Brian McGarrie, lecturer in supply chain management

Vertacross - the automation & control marketplace
Thomas Mart, director of sales & marketing

WebMethods
Andrew Kay, manager

Appendix 2

About Netmarkets Europe

Netmarkets Europe is the independent hub for the European B2B e-commerce industry. NME provides education and innovation services on e-procurement, e-sales, e-markets and e-strategy to senior players in B2B.

Our services include:

- Public events – Mindshare workshops, summits, masterclasses, networking
- Private events – strategy, product and market development workshops
- Private advisory services – sourcing, marketing, research
- E-mail newsletter
- E-mail discussion forum
- Website – European B2B portal

Our members include corporations, dot.coms, software/hardware vendors, consultancies, analysts, media, government and specialist service providers.

Our aim is to stimulate the effective adoption of B2B e-commerce across Europe and to help our members maximise their ROI from involvement in B2B projects.

We believe that dynamic collaboration provides the best route to successful innovation and implementation.

NME is building a database of the leading netmarket practitioners who are either already operating in Europe or who are looking to set up in Europe.

Our aim is to continually get this sort of response from our members:

> “I found the session to be of the highest quality. It is without doubt the best networking event I have attended and the resulting analysis and output will be central to some of the initiatives which Microsoft executes within the B2B market this year.”
>
> **Mark Dodds, Head of B2B Commerce,**
> **Strategic Business Development Group, Microsoft Ltd**

Netmarkets Europe has partnerships with NetMarketMakers, Ernst & Young, Netprofit, and Infoconomy

For more information please contact Simon Torrance
simon@netmarketseurope.com
http://www.netmarketseurope.com

Appendix – Summit Partners

> The single biggest obstacle to delivering on the promise of e-business and B2B is integration. The fragmentation of internal ERP, CRM, and SCM systems across sites, departments, and business units will prevent companies from reaping the benefits of cross-enterprise integration and unified relationships with key customers. Thus is the potential power of Private Trading Exchanges (PTXs), and Asera's eBusiness Operating System, more than any other system serving the sell side, is the purest, most ideal commerce platform model meant for this market. The platform brings together the entire foundation layer, including an integration framework, management, and infrastructure; much of the transaction layer through its order management product and relationships with E.piphany, Selectica, and Moai; and nearly all of the components of the value-added services and collaboration layer. The real strength of the platform is an application development environment that lets users define processes, workflow, and business rules while simultaneously letting users configure and customize it for the business environment.
>
> The Report on Customer Management
> AMR Research, January 2001

About Asera, Inc.

The emergence of the web has created vast opportunities for companies to extend market reach, improve business efficiencies and strengthen relationships with suppliers, partners, customers and employees.

However, few companies have been able to deploy eBusiness solutions that have fulfilled the Web's potential for speed, integration and change.
Instead, they have been hampered by inflexible, monolithic software solutions, high up-front costs, and long implementation cycles, and have been forced to buy more functionality than they need. In addition, companies have had to dedicate exorbitant resources on systems integration, operations and maintenance activities rather than driving corporate differentation, innovation and growth.

Asera has developed a breakthrough eBusiness solution that enables companies to harness technology innovation and quickly transform their businesses into eBusinesses. By capitalizing on the promise of the web, companies can evolve their businesses at the pace of change and ultimately differentiate themselves from the competition.

The Asera enterprise operating system is an open Ebusiness platform designed for speed, integration and change. The Asera solution integrates best-in-class software innovations with a customer's existing systems to create a unified, dynamic eBusiness environment, tailored to meet the unique needs of business and user.

Asera provides Global 2000 and emerging-growth companies with an Enterprise Operating System that includes a patent-pending software platform and applications development environment. Asera allows companies to customize best-in-class software applications, implement their business processes rapidly, and remain insulated from the cost and complexity of technology change. Asera's OS is a critical enabling technology for the emerging real-time enterprise. Based in Silicon Valley, Asera also has offices in the UK and Germany. Asera can be found on the Web at http://www.asera.com.

Contact Kevin Leslie, UK Managing Director on +44 (0) 208 237 6368

Ellie Pendreich
Marketing Manager
Asera Ltd
229/243 Shepherd's Bush Rd
Hammersmith
London
W6 7AN

Tel: +44 (0) 20 8237 6368
Fax: +44 (0) 20 8237 6351
Mobile: +44 (0) 7887 870202
ependreich@asera.com

CISCO SYSTEMS is the worldwide leader in networking for the internet. Cisco's networking solutions connect people, computing devices and computer networks, allowing people to access or transfer information without regard to differences in time, place or type of computer system.

Cisco provides end-to-end networking solutions that customers use to build a unified information infrastructure of their own, or to connect to someone else's network. An end-to-end networking solution is one that provides a common architecture that delivers consistent network services to all users.

The broader the range of network services, the more capabilities a network can provide to users connected to it. Cisco's offers the industry's broadest range of hardware products used to form information networks or give people access to those networks; Cisco IOS® software, which provides network services and enables networked applications; expertise in network design and implementation; and technical support and professional services to maintain and optimise network operations.

Cisco is unique in its ability to provide all these elements, either by itself or together with partners. Cisco serves customers in three target markets:

- Enterprises - large organisations with complex networking needs, usually spanning multiple locations and types of computer systems. Enterprise customers include corporations, government agencies, utilities and educational institutions.
- Service providers - companies that provide information services, including telecommunication carriers, internet service providers, cable companies, and wireless communication providers.
- Commercial operations - companies with a need for data networks of their own, as well as connection to the internet and/or to business partners.

In contrast to many technology companies, Cisco does not take a rigid approach that favours one technology over the alternatives and imposes it on customers as the only answer.

Cisco's philosophy is to listen to customer requests, monitor all technological alternatives, and provide customers with a range of options from which to choose.

Cisco develops its products and solutions around widely accepted industry standards. In some instances, technologies developed by Cisco have become industry standards themselves.

Every day, Cisco and its customers are proving that networking and the internet can fundamentally and profitably change the way companies do business. Cisco describes this change in the "Global Networked Business" model.

A Global Networked Business is an enterprise, of any size, that strategically uses information and communications to build a network of strong, interactive relationships with all its key constituencies.

The Global Networked Business model leverages the network for competitive advantage by opening up the corporate information infrastructure to all key constituencies. The Global Networked Business model employs a self-help model of information access that is more efficient and responsive than the traditional model of a few information gatekeepers dispensing data as they see fit.

Cisco itself is a leading example of a Global Networked Business. By using networked applications over the internet and its own internal network, Cisco is seeing financial benefits of nearly $1.4 billion a year, while improving customer/partner satisfaction and gaining a competitive advantage in areas such as customer support, product ordering and delivery times. Cisco is today the world's largest internet commerce site, with 90% of our orders transacted over the web.

Cisco is one of America's greatest corporate success stories. Since shipping its first product in 1986, the company has grown into a global market leader that holds either no. 1 or no. 2 market share in virtually every market segment in which it participates.

Since becoming a public company in 1990, Cisco's annual revenues have increased from $69 million in that year to $18.9 billion in fiscal 2000. As measured by market capitalisation, Cisco is among the largest in the world.

accenture

About Accenture

On 1 January 2001, Accenture (formerly known as Andersen Consulting), debuted as a $10 billion global management and technology consulting leader.

The organization has reinvented itself to become a market maker, architect and builder of the new economy, bringing innovations to improve the way the world works and lives.

More than 70,000 people in 46 countries deliver a wide range of specialised capabilities and solutions to clients across all industries.

Under its strategy, Accenture is building a network of businesses to meet the full range of any organisation's needs – consulting, technology, outsourcing, alliances and venture capital.

The network of businesses is made up of three interrelated operations and more than 100 alliance relationships – all focused on knowledge and innovation in management and technology: Accenture: is a leading client service business that provides consulting and outsourcing for Global 2000 and emerging companies.

- is a world-class venture capital business, focused on technology investing that supports the best new innovations and companies to generate superior returns.
- operates companies that extend our capabilities for the benefit of our clients and business partners.
- has alliances with leading providers that enhance all three businesses and ensure we incorporate market-leading insights from all sources in our work.

The real power of the network of businesses is the synergy among our client service business – with its channel strength, relationships and proven solutions – and our venture capital business, operating companies and alliances – with their emphasis on new technologies and business models.

About electronics and high tech

The electronics and high tech industry segment has more than 3,000 dedicated electronics and high tech professionals. These professionals work with our clients in areas such as strategy development, logistics, customer relationship management (CRM), human resources, technology consulting and process redesign.

Accenture delivers value to our clients through a close organisational relationship between skilled electronics and high tech industry professionals, competencies (including organisation and human performance, technology, strategy and process) and lines of business (such as supply chain management and CRM).

The Accenture team works closely with clients to bring together the right match of skills and resources to develop the optimal solution and create maximum value for clients.

Since each client has unique requirements, Accenture has developed a broad range of capabilities to best serve client needs.

Our electronics and high tech practice has helped our clients to:
establish the infrastructure and processes to launch a new business or improve an existing business

- generate demand
- develop and manufacture products
- integrate the supply chain
- develop channel strategies
- optimise logistics operations
- improve customer service
- manage enterprise-wide systems

With our depth of expertise and worldwide knowledge capital, Accenture leverages best practices and global networking to provide the best integrated solutions for our clients. Accenture is uniquely qualified to both recommend and implement management and information technology solutions that align with the client's strategy.

Founded in 1986, ARC Advisory Group is the leader in providing strategic planning and technology assessment services to leading manufacturing companies, utilities, and global logistics providers, as well as to software and solution suppliers worldwide.

From Global 1000 companies to small start-up firms, ARC provides the strategic knowledge needed to succeed in today's technology driven economy.

ARC now has 70 people, and offices in USA, UK, Germany, Japan, Argentina, India, and Mexico.

ARC has been conducting research for manufacturing applications from the plant-floor sensors to enterprise systems for the past 15 years. Initially these Market Outlook Studies provided critical market data and strategic recommendations to the major automation and manufacturing/IT suppliers.

As these markets globalised, ARC opened foreign offices to improve our ability to keep abreast of these rapidly evolving markets and to better serve our increasingly multi-national client base.

In 1990, ARC launched our ARC Advisory Services designed to provide a broad array of clients timely market information and insight into how technology, automation trends and critical events would affect their businesses.

ARC was the first consulting firm to recognize the importance of the impact of the internet in manufacturing and coined the term collaborative e-manufacturing. Upon recognising that trend in late 1998, ARC launched into a series of Market Outlook Studies to acquire fundamental market knowledge on a number of emerging segments in the e-business arena that would impact the industrial manufacturer.

This primary research has built a significant knowledge base in the areas of e-fulfillment, e-procurement, web application hosting, e-integration, e-business services, supply chain management & execution, enterprise production management and enterprise asset management. These vertical application segments are all important aspects of a global e-manufacturing enterprise.

In this rapidly evolving e-manufacturing market, our expanded knowledgebase has become increasingly more valuable to a wider variety of clients from industrial manufacturers through Wall Street investment firms to venture capitalists and investment banks.

Today, built on ARC's understanding of both plant operations and the e-manufacturing environment, our clients employ ARC data and market knowledge to assist senior executives make more informed strategic decisions.

ARC mission statement

At ARC, we are committed to helping our clients make the transition to become leaders in their markets. We infuse organisations with new knowledge, assist executives with complex business decisions, and help transform organisations into efficient units of a world-class e-business. Throughout, we have a singular focus: client satisfaction with every aspect of our relationship, from consulting to client relationship management. At ARC we recognise that our customers are our most important corporate asset.

About iSyndicate- http://www.isyndicate.com

iSyndicate is a leading provider of internet syndication infrastructure and application solutions. The company develops, markets and supports a line of infrastructure and application software, technologies and tools that allow for the aggregation, distribution, exchange and management of digital content and information across the internet and to any internet-connected device.

The company's solutions allow its customers to maximise the power of information distribution and exchange on the internet. It's partners and customers include some of the world's leading traditional and internet brands including over 1,200 digital content and information providers such as The Associated Press, Sky, Sportal, CNBC, CNET, Dow Jones, Reuters, RollingStone.com, Red Herring and netdoctor.co.uk

iSyndicate's solutions are made available to 285,000 customers and affiliates, including Vizzavi, HSBC, Citibank, Intel, OmniSky, Nortel Networks and Wells Fargo.

iSyndicate supports the ICE (Information & Content Exchange) standard based on XML among a variety of others for all of its content.

iSyndicate, founded in San Francisco, has offices in London, Hamburg and New York and is backed by venture capital firms Scripps Ventures and Labrador Ventures; investment bank Chase Hambrecht & Quist; Infospace.com and Vignette Corporation; NBC (GE), Microsoft, News Corporation and Bertelsmann. iSyndicate Europe is a 50:50 joint venture between iSyndicate Inc. and Bertelsmann.

For further information on acquiring content, syndicating content or utilising iSyndicate's technology platform to distribute your own content please contact:

David Welsh on 44 (0) 207 432 9561 or davidw@isyndicate.com

RS Components

RS Components, part of Electrocomponents plc, is Europe's leading distributor of electronic, electrical and mechanical components, health and safety products and associated tools.

It was formed in 1937 as Radiospares Limited by J.H.Waring and P.M.Sebestyen selling radio spares under their own brand label with same day despatch. This concept still stands today.

RS Components has shown steady growth despite the recession in its principal markets. In the 12 months to March 31, 1998, UK and Ireland have grown to £429.7 million. It continues to pursue its long-term strategy of building on its position as a market leader in the UK. Electrocomponents Group turnover for the 12 months to 31 March 1999 was £677.1 million with operating profit of £106 million.

RS operating companies are also based in over 22 countries worldwide, including France, Italy, Germany and Denmark, with operations as far afield as Chile, America and China. They distribute to over 160 countries worldwide and support over a million engineers.

RS Components sells its products through its catalogues, which are distributed twice a year, with a current product range of 140,000 products. In July 1994, a CD-Rom version of the catalogue was introduced.

In February 1998, RS Components, through its parent company Electrocomponents plc, announced a major seven figure investment in the internet as a serious channel to drive online customer self-service and business transactions. The entire RS catalogue and data library is now accessible through this internet trading channel for RS UK customers (http://rswww.com) allowing anybody in the UK to do business quickly and easily online.

Electronics Scotland

Electronics Scotland™ (ES) is the independent, industry-driven and funded organisation that represents the electronics sector in Scotland.

Formed to bring together all parts of the sector from design through to manufacture, it aims to represent and develop the sector, both through the political arena and through the delivery of major industry-driven projects and membership services.

It has an open membership policy to encourage like-minded individuals interested in developing the sector in a global market.

The organisation's key objectives are to:

- drive proactive, innovative ideas for the foundation of the future of the industry
- drive competitiveness – supply chain improvements
- grow local/global players
- be the voice of the industry
- promote Scotland as the 'electronics gateway to Europe'
- promote industry development

ES is currently focusing on the development of four key areas affecting the sector:

E-commerce: the object here is to create a networked consortium of design, manufacturing and logistics whose trading volume will provide viable, easy entry, and low cost access to e-commerce.

Environment: environmental legislation affects most areas of our sector. ES's Environment and Re-cycling groups, have provided knowledge and experience critical to our member companies. ES is actively involved in, ISO 14001, the WEEE Directive/The Climate Change Levy and Recycling Solutions.

Skills and education: ES's role is to influence the existing infrastructure ensuring the skills needed for the industry are developed now. This requires collaboration with government and industry to provide information for the development of relevant programmes.

Supply chain: the success of the electronics industry in Scotland requires a shared view of the future issues and opportunities throughout the supply chain. Everyone is a supplier in a global marketplace. The key objective for ES is to develop and enhance the supply chain capability in Scotland and globally.

For further information on Electronic Scotland visit our website at http://www.electronics-scotland.com