



Ecosystems and Evolution: A Ti whitepaper in partnership with Kewill

Manufacturing mechanisms and global trade are evolving at an accelerating rate. This has huge implications for the supply chain management and logistics networks that enable and orchestrate them. Many of the legacy tools implemented to support these endeavors are unable to do so in an appropriate fashion. In this whitepaper, Ti's technology expert Ken Lyon, in partnership with Kewill, gives his view on supply chain management and logistics networks and how they can support the needs of dynamic actors engaged in global manufacturing, trade and logistics.

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Manufacturing mechanisms and global trade are evolving at an accelerating rate. This has huge implications for the supply chain management and logistics networks that enable and orchestrate them. Many of the legacy tools implemented to support these endeavors are unable to do so in an appropriate fashion.

This is because they were, in the main, designed for a world where operations and processes are linear, well defined and tolerant of latency. The ability of these systems to interoperate and collaborate on an ad-hoc basis with other systems has also proven to be inadequate in many cases.

Today, companies are looking for networked solutions that exhibit similar characteristics to the ecosystems that have evolved in the natural world. These natural systems have evolved to be both resilient and enduring. Within the supply chain, such 'ecosystems' are designed to co-exist and integrate with similar platforms and solutions across the globe. They work across functional silos and application boundaries, combining a mix of capability that used to be tightly defined according to function. e.g. WMS, TMS, OMS, etc.

This white paper will illustrate the advantages of this kind of platform and how it can support the needs of dynamic actors engaged in global manufacturing, trade and logistics.

Data can be found everywhere across a supply chain. It is generated by every system engaged in operations or management and from every action that takes place. Because information systems are ubiquitous, their interconnection is a necessity. As these systems come together to form networks, they begin to resemble other connected systems, especially those biological ones found in nature.

In this regard the network acts as a platform upon which a range of activities and actions take place. It can also evolve into a mechanism that becomes adaptable and responsive to a variety of stimuli. These systems also 'learn' from the feedback they receive and as a result, can often adapt and improve their performance. At this point the system is somewhat analogous to an ecosystem.

The general definition of an ecosystem is that it is a "biological community of interacting organisms and their physical environment". The parallels are therefore reasonably clear. As the various elements of a supply chain become more intelligent, the platforms supporting them need to be designed for this evolution.

The world of manufacturing is changing and the basis on which numerous supply chains have been established is looking increasingly outdated. Vertically integrated production plants with raw materials coming in one end and finished products emerging from the other have all but disappeared in many industries. Evolution to outsourced, very flexible, 'manufacturing on demand' models is now taking place on a large scale. As a result, the specialized technology solutions developed for the various logistics functions are struggling to adapt to this new reality. e.g. Transport management systems (TMS), warehouse management systems (WMS), Enterprise Resource Planning (ERP), etc.

It is unrealistic to expect an ERP solution, designed and configured to support a very precise functional process, to be able to suddenly support an operating environment that is in a state of constant flux. By the same token a TMS that has been hardwired to work with a selected

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number of carriers, will struggle to accommodate a variety of ad hoc partners, all of whom work with a wide variety of regional and local subcontractors.

The inability of many solutions to adapt and adjust quickly enough is taking place against the backdrop of increasing customer demand. Not only do vendors have to compete for customer retention, but also the notion of customer loyalty is not what it was. Customers are subjecting their vendors to greater scrutiny and demanding more data (in real-time) as a means of measuring performance. This is because of the relentless focus by the customer on better value, greater choice and enhanced performance.

In an industry sector where many of the players are still coming to terms with the ability of social media to highlight and amplify shortcomings and poor performance, this immediate feedback loop is challenging. So as customers become more demanding and incumbent systems struggle to support these demands, what kind of solution is required for the future?

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The Advantage of the Cloud

As functional boundaries become blurred, a new generation of systems are emerging. They exploit technologies such as 'the cloud' and standard interfaces to seamlessly exchange relevant data with solution sets that need it. Instead of looking into a variety of different systems for information, which then often needs to be assembled into a coherent answer, these new systems will always have "a single version of the truth".

In many respects the delivery of technology services through the Internet, also described as cloud services, is ideal for the logistics industry. Global trade thrives on fast, transparent communications. As the Internet has evolved, companies have realized that instead of needing to own and operate servers themselves, they can rent the computing resources they need, for as long as they need them. This flexibility frees them from the burden of continuous maintenance and upgrades, allowing them to focus on creating the best solutions for their customers.

Platforms designed to operate across cloud infrastructure also address the challenge of integrating with new partners. The supply chain and logistics sectors are constantly connecting and exchanging data with partners. Historically, companies running their own computing facilities expend huge amounts of effort creating and maintaining connections to their trading partners. With the cloud solution, this workload is reduced as libraries of interfaces can be exploited alongside the increasing standardization of the same.

Adding new partners and establishing new locations is much easier when working with a cloud platform. All of the salient technologies, applications and data stores are available immediately, provided robust and reliable communications exist. The contrast is stark when compared with prior models where operations could not commence until local servers and networks had been implemented and the appropriate application services commissioned.

By exploiting a platform capable of maintaining coherence between systems across the chain, not only will the answers be available in real-time but they will also mean the same thing to everyone looking at them. This is not usually the case and is the primary reason why so many companies are unable to attain genuine supply chain visibility.

Achieving this is not a trivial task however, as many of the participants in such networks connect into them with varying degrees of capability and expectation. In essence, the best approach is to start small and agree some basic rules on data definitions, before attempting some more ambitious goals.

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The Significance of Context

Understanding the meaning and context of a piece of data to everyone who receives it may appear straightforward, but in practice is far from the case. Across a supply chain network, the problem is compounded, as it is impractical (someone would say impossible) to expect every party to use the same data definitions.

This is particularly true with regard to inventory. Understanding that an item of inventory may have a variety of different product codes and descriptions, but is essentially the same thing, is just one potential source of confusion that often results in double counting and over ordering. Across a supply chain, there are many other examples of this basic problem. So any platform seeking to share data across the supply chain must exhibit the appropriate characteristics that ensure data coherence.

What other factors will the platform supporting the supply chain ecosystem have to contend with?

By definition it will have to support a variety of partners, many of whom will be short-term, ad hoc subcontractors. It will also have to interconnect and interoperate with a variety of different operational systems. The growing population of mobile devices and sensors will also be a challenge. Primarily because of the volumes of data they will generate and the fact that they will extend the size and scope of the network almost infinitely.

In a traditional supply chain comprised of multiple partners, all with different priorities, trying to coordinate and consolidate the myriad pieces of data into a coherent picture is both time-consuming and costly. Invariably the resulting information is out of date. All of this again illustrates why conventional solutions are unable to support the supply chain and logistics operations of the future.

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Alarming Visibility

The essential capability of any modern supply chain operation is to have effective supply chain visibility. This supports all of the activities and actions needed to maintain the smooth running of the supply chain network. Akin to the central nervous system found in most creatures, its existence is necessary for function.

Across the supply chain community, meaning the network of buyers, suppliers, logistics service providers, carriers and Government agencies, etc., there is a requirement to exchange and share information. The context and clarity of this information determines the effectiveness and efficiency of the network. This is why any supply chain technology platform worthy of the name must perform this function appropriately.

There are huge advantages to being able to gather data and then proactively respond to the problems and disruptions that occur across the supply chain. Being alerted proactively to a delay in production or the diversion of a shipment, enables the supply chain manager to reschedule or reroute different orders, maintaining the customer promise.

There are numerous examples of external supply chain disruptions that resulted in either disaster or triumph, according to how well prepared the supply chain was.

Being able to take advantage of an extensive and proactive visibility capability requires integration between key elements of any supply chain technology platform. This does not mean that the solution should be rigid and tightly coupled, but more loosely coupled and able to interoperate and accommodate any new data sources and desired functionality.

One of the hardest problems to resolve when adopting this approach is the issue of data context. Making sense of the data running through the system and understanding its context and meaning coherently across the network, is vital.

Another challenge involves managing the issue of data accuracy. Huge volumes of data are generated by supply chain operations. These volumes will increase as more devices are added across the network and operational envelope. These devices and sensors will be constantly broadcasting information about their location and status. But all the operators need to know about are the exceptions. In short, is the data showing a problem, or is the absence of data indicating there may be a problem?

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The Ultimate Platform for IoT

As large numbers of devices become connected to the network, the so-called 'Internet of Things', many systems will struggle to cope with the volumes of data they generate. Indeed, many systems were never designed to support massive numbers of devices, less so the data they are likely to generate. To the supply chain 'ecosystems' of the future however, this is the essence of their capabilities.

As the devices generate a constant stream of data about their condition and environment, it provides a 'real-time' picture of the operational landscape. Any supply chain solution that was not designed to support this explosion in device and sensor numbers will be at a significant disadvantage to those that can. Nevertheless, the data must be accompanied with an appropriate degree of context, so that the subsequent analysis by the data mining and artificial intelligence engines provides real insight.

There is also a temptation to get lost analyzing data at a granular level without appreciating its significance (or not) in the context of the entire operation. Certainly, there is a danger that the real signal may be being lost in the noise.

Supply chain managers need systems that can absorb and understand huge amounts of data, but only highlight what is necessary and relevant to maintain operational performance. This requirement is why any solution should be a platform rather than discrete functional system. Indeed, as a platform it should make it easier for all of the parties involved in the network to embrace and interact with it as the ecosystem evolves. It must be for the benefit of everyone rather than just the main player. This is how loyalty and continuing cooperation endure.

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Get Smarter – Applied Analytics

The data accumulated by the platform can be exploited for multiple purposes. Real-time operational signals drive performance, while the analysis of historical data informs future strategy. Appropriate solutions will also learn from the data and become smarter as the data accumulates and inferences can be improved.

In recent years the analysis of very large data sets has provided a degree of insight that was unavailable before. Many of the earlier attempts were constrained due to the poor quality of the data. The situation has improved significantly and new tools and solutions exist to accumulate and then analyze these huge data stores.

Because supply chains generate so much data, many of the existing analytical tools can only provide discrete answers to specific questions. Going forward the streams of data produced by supply chain ecosystems will be analyzed in real-time, drawing conclusions and providing insight and recommendations to users. This is potentially very powerful, as the constant feedback should result in improved performance.

Because the ecosystem is a community, the intelligence and insight will become part of the network, rather than remaining an asset of a single participant. The fact that the network itself becomes the store of intelligence may unsettle some parties. But this is to ignore the lessons of the past because networks always grow and continue to add value for every participant that connects. Years ago, Sun Microsystems proclaimed that “the network is the computer”. Given the technology at the time, this seemed more aspirational than realistic, but this is now a reality.

The work of Jeff Jonas formerly of IBM’s entity analytics division has proven that the more data is accumulated the smarter the answers will become. Paradoxically, his work has shown that the larger the dataset, the faster the answers will appear. Within the supply chain ecosystem, capabilities like this will be deployed to inform and suggest a continuous stream of performance improvements. This provides a compelling case for new players to join.

Such capabilities represent a fundamental change from the traditional functionally orientated solution sets that have prevailed for the past few decades. Moreover, thanks to developments such as cloud computing and elastic computing systems, it is possible to deploy systems at scale across geographically dispersed operations; precisely the landscape of most global supply chains. This approach is also the necessary platform for advanced supply chain visibility.

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Mobile means Management

Mobile devices are proliferating throughout supply chains as versatile and capable application and sensor platforms. Their use has resulted in the extension of information services platforms out to the edges of every supply chain network. It also means that visibility can be extended out and down multiple tiers into the supplier base.

Being able to drill down into the subcontractors of subcontractors makes it very difficult to avoid responsibility in the total chain of custody.

This extension of capability insures that performance and compliance requirements can be monitored and enforced anywhere in the ecosystem. The result should be enhanced efficiency and effectiveness. In many ways, the network becomes flatter and more transparent as instructions can be dispatched and the results monitored in real-time, without the signal being diluted as it passes through multiple systems and interfaces.

The ubiquity of mobile devices also means that customers now expect the same access to relevant data as the operations. In the same way that the integrated carriers opened up their 'track and trace' applications, reducing workload in their call centres while at the same time improving customer performance, mobile applications can be used to inform, suggest and enhance the customer experience.

This means that as the ecosystem learns from the feedback and data it accumulates, the customer can also participate in this exercise. The net result is that they will hopefully begin to appreciate the benefits of belonging to the community exploiting the ecosystem.

It should also be possible to introduce some of the concepts found in the communities of the massive multiplayer online gaming platforms. The customer will be able to consistently adjust the metrics and performance goals of many aspects of their supply chain operations. Co-opetition as it has been described could be managed between various suppliers who participate in the community.

The only potential impediment to optimal performance will be where the network interconnects with and is influenced by government agencies. The systems operated by most customs agencies around the world are a few generations behind that of commercial platforms. This is usually down to the constraints of any procurement processes they go through as well as the legislative frameworks they have to comply with. The legislation is increasingly global and requires consensus among a very large number of governments. Hardly the most appropriate set of circumstances for speedy decision-making. The one upside is that when legislation is passed, it is implemented globally and endures from years.

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A Platform for a Community

Kewill's Move platform has been designed to support such supply chain ecosystems. It exhibits many of the capabilities previously described. As a platform, members of the supply chain can engage with it on their own terms.

This is crucial because previous attempts by solution vendors have usually required every party to utilize the same system. The result has been to enforce a single process flow onto every participant in the network, irrespective of the fact that the flow is optimized for one party. As the number of participants increases, the efficiency of the network diminishes as they find ways to accommodate the inappropriate solution. The practical effect is that users find 'work-arounds' that "bloom like a thousand flowers", which compounds the problem.

Rather than seek to enforce a rigid ERP like solution, it is much better to invite participants to connect according to their own capabilities and share information across a common platform. The more participants able to connect, the greater the utility of the network becomes.

The Move platform also provides the appropriate infrastructure to support proactive alerts and alarms. This is an essential capability for enabling rapid response to any problems. As participants join the network and contribute, the ecosystem begins to function appropriately. Initially transparency should improve, problems are identified earlier and resolution happens faster. Over time the system develops into an efficient and effective capability far in excess of each individual component.

Furthermore, the supply chain ecosystem underpins a variety of Green initiatives in that it will constantly drive participants to operate as efficiently as possible. Because this occurs across the entire network, the impact could be considerable. The reduction in operating costs, the effective use of assets and efficient consumption of energy and resources are all potential outcomes.

Because each member of the network has a unique view of the advantages it provides, they will constantly seek improvements. However, because they have to work in harmony with the ecosystem, improvements must benefit the other members to some degree. This introduces a new business model in that potential competitors will be introducing operational improvements and goals that may benefit each other.

The constant adaptation to operational conditions is a key element of success. Traditional solution sets have usually been constructed to address a detailed list of requirements established at the start of any project and are very difficult to change. The Move platform has been designed to accommodate frequent change, in a similar manner to the way biological systems adapt over time in response to external stimuli. If this construct gains traction in the market, then it will represent a step change in capability.

The utility of such a platform enables it to support different kinds of supply chain activity. This ensures that the participants can drive multiple business lines across it. Indeed, it should be possible to define, design, configure and implement new supply chains across the platform very quickly. This is precisely the capability necessary to compete in the marketplace of the future.

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Obviously a construct such as this requires a business model that is appropriate for all participants. Fortunately, because it is based on cloud technologies it is able to support the transactional oriented business models they use.

It is this transition from capital expenditure to operational expenditure that drives the very rapid adoption by participants and enables the establishment of very large communities of users. Companies are increasingly competing through their supply chains. Those that do so via a platform such as Move will therefore be well placed to succeed.

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About Ken Lyon, Ti Advisory Board Member

Ken Lyon is Managing Director of Virtual Partners Ltd and has over 30 years of experience in the transportation industry. Ken specialises in the use of advanced information systems to manage the operations of 3PL (Third Party Logistics), 4PL and Lead Logistics Providers and their trading partner networks. Over the past few years he has helped start-ups concerned with supply chain technologies and before that, he spent 10 years as a Director and VP of information services at UPS, helping to establish its Logistics and supply chain services Group. Ken was recently appointed Chairman of the Board for an international logistics software group and also sits on the board of Ti. During the past 25 years, he has participated in conferences and conventions for the US Department of Defense, Government of Singapore, The JOC, Nikkei and many others. Ken is a Fellow of the Chartered Institute of Logistics & Transport, a member of RUSI and a member of the US OSD sponsored Highlands Forum.

About Transport Intelligence

Ti is one of the world's leading providers of expert research and analysis dedicated to the global logistics industry. Utilising the expertise of professionals with many years of experience in the mail, express and logistics industry, Ti has developed a range of market-leading web-based products, reports, profiles and services used by all the world's leading logistics suppliers, consultancies and banks as well as many end users of logistics services.

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About Kewill

Kewill, a Francisco Partners portfolio company, is a global leader in logistics software. Kewill empowers organizations to efficiently move goods and information across the global supply chain. Kewill supports supply chain execution activities for 7,500 companies in more than 100 countries.

The Kewill MOVE® platform helps companies collaborate, reduce costs, manage volatility and automate processes across the entire supply chain – from transportation and warehousing to compliance and visibility.

<http://www.kewill.com/>