

Trust Enabled™ Supply Networks
Uncovering the trust-building secrets of highly collaborative supply chains.
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Biographical Notes

Alex Todd is Founder and CEO of Trust Enabling Strategies; a management-consulting firm specializing in improving business performance by defining business processes that build stakeholder trust and confidence.

Mr. Todd's methods derive from his thought-leadership work that contributed to IBM's "Business On Demand" strategy. He has delivered trust-consulting engagements to "very satisfied" clients in diverse industry sectors on several continents.

Mr. Todd holds a Bachelor of Commerce Degree from the University of Toronto and is an IBM Certified Consultant, described by one IBM Global Services Principal as "a trusted advisor to clients" with "a passion to change the world." [1]

Abstract

In today's information economy, value is increasingly being defined by services and other intangibles, where "deep support" and "advocacy" are becoming the sustainable differentiators and critical success factors. Buying intangibles requires higher levels of trust than do specification compliant products and therefore demands new approaches to building confidence in the supplier's value proposition. Trust Enablement™ gives suppliers a strategic approach to building value based on trust into the supply chain. Readers will learn how to evaluate and define trust building business processes through Trust Enablement™ Assessments of industry best practices.

Keywords: supply chain management; trust; trust enablement; configuration typology; maturity model; collaboration

Word Count: 5,765

1. Introduction

Imagine a world where products and services materialize for customers at will, like the food “replicators” found on the television show Star Trek. The notion of a “supply chain” would not exist, since all value creation processes would be collapsed into one immaculate creation event. Today’s supply chain processes therefore represent the transaction costs associated with value creation that are destined to a future of continuous collapse, if not eventual extinction.

Over the years, supply chain management improvement initiatives have evolved from the original static [2], open market [3] models through to today’s coordination [4] and process integration [5] configurations. We now have our sights aimed at achieving true collaboration [6] in federated [7] supply chain configurations that will result in the envisioned “on-demand” [8] supply chains of the future. The move from coordination to collaboration focuses on reducing specific supply chain-wide transaction costs experienced when crossing organizational boundaries, such as the so-called inventory “bullwhip effect” that requires joint planning and technology sharing [9]. However, the biggest challenge to attaining true collaboration between suppliers and customers is establishing and maintaining the levels of trust that let them share and rely on each other’s mission critical business plans, expertise and collective decision-making [10].

Supply chain management experts are still struggling to gain a clear understanding of how to measure, build and maintain trust [11]. This paper introduces a framework that describes the conditions needed to establish and ensure trust by relating them to specific supply chain management practices. Supply chain management practitioners can use this framework to help them identify opportunities to build higher levels of trust and confidence with their supply chain partners and thereby move up the supply chain configuration maturity scale, characterized by reduced transaction costs and improved operational agility.

2. Trust

“In both serious social thought and everyday discourse, it is assumed that the meaning of trust and of its many apparent synonyms is so well known that it can be left undefined or to contextual implications.” Barber (1983:7) Hosmer (op cit 380) [12]

“Of all the elements critical to managing supply chains, trust is one of the most commonly cited elements, yet one of the most difficult to measure.” [13]

So what is trust as it relates to supply chain management? There are many proposed definitions [14], but for this paper we propose the following general definition:

Trust = Acceptable Uncertainty

This suggests that in the real world one can never attain absolute trust, which means that there is always some level of uncertainty. Trusting is therefore the willingness to take consequential

actions knowing that the outcome is somewhat uncertain. Trust is a willingness to be vulnerable. It is the opposite of control, which shuns uncertainty and vulnerability.

This paper also introduces one critical and paradigm-shifting premise that trust does not depend entirely on personal relationships. Divergent from traditional practices, today's information and communication technology has empowered people to:

Trust the information, despite its source. [¹⁵]

People trust other people to be able to rely on what they say, whether explicitly or implicitly. For example, "I trust my supplier to deliver on time" means that I accept my suppliers' promise that he will deliver the products on time. I am actually relying on the information that the products will be delivered on time and am using my supplier as a "source of trust" for that information. This is an important distinction, because it allows us to choose our preferred sources of trust for any information, regardless of the messenger. Think of eBay as an example. Unknown online merchants post assertions about the features and benefits of their products on eBay's web site. Shoppers are willing to rely on that information only because they use eBay as their source of trust in the validity of online offers.

Today, with globalization and rapidly evolving business conditions, it is becoming increasingly difficult to rely on relationships to build trust. Although relationships will always be one important method for building trust, they do not define trust. Recall, eBay members trust without relying on relationships. While relationships are an example of a longstanding source of trust, they are no longer essential. In fact, relationships may not even be the preferred method for building and maintaining high trust in today's business environment.

3. Trust Enablement™

The separation of information from sources of trust, such as the messenger, makes it possible for business architects to think about trust as something that can be engineered, rather than only a behaviour that social scientists can modify. Trust Enablement™ offers a framework that organizes business processes, mechanisms and instruments according to their relative roles in helping to establish and ensure required levels of trust. Organizations should therefore be able to design business processes and practices that achieve specific trust objectives, namely to establish and ensure trust.

The Trust Enablement™ Framework shows how trust can be established and maintained with or without personal relationships. It helps change the emphasis on interpersonal relationships when people are making business decisions, to an emphasis on the information itself, through alternative or complementary Trust Enabling™ mechanisms. This makes trust less dependent on personality congruence and more of an objective process.

eBay provides an excellent example for introducing each of the elements of the Trust Enablement™ Framework, because it is one of the most trusted and successful online businesses.

eBay tops the list of most trusted companies for privacy protection. eBay is also known for its feedback system that assigns transaction satisfaction ratings to buyers and sellers after each transaction, so that transacting parties can build online credibility. It is also among the most popular web sites as measured by traffic volumes. Most notable however, is eBay's stock performance. The growth in market value of eBay's stock literally dwarfs virtually every other business, whether online or offline.

How is it possible that an unknown online business can attract many small, unknown merchants from all over the world to successfully sell products to consumers, who do not even trust the Internet, let alone the no-name suppliers on the other side of the transaction? The Trust Enablement™ Framework can help to decompose the criteria that contribute to eBay's trustworthiness and success [16].

Trust Enablement™ Deconstruction of the Conditions for Trust on eBay [17]	
Establish Trust	Ensure Trust
Experiential Sources of Trust <ul style="list-style-type: none"> • Feedback Forum • Tradenable escrow • Product authentication 	Motivation <ul style="list-style-type: none"> • Policies (comprehensive) • SafeHarbor investigations • Disallowed products • SquareTrade dispute resolution • VeRO notice of IP infringement
Authoritative Sources of Trust <ul style="list-style-type: none"> • ID Verify from Equifax • Product Opinions and Grading • Product Appraisals • Privacy Policy • TRUSTe seal • eBay brand 	Ability <ul style="list-style-type: none"> • Sophisticated IT infrastructure and applications • Security and Privacy best practices
Trust Empowerment <ul style="list-style-type: none"> • Identify reliable providers of feedback 	Risk Transfer <ul style="list-style-type: none"> • User Agreement • Fraud Protection Insurance • PayPal Buyer Protection

3.1. Establishing Trust

There are only three ways to **establish trust**:

1. **Authoritative Sources of Trust** for fast trust;
2. **Experiential Sources of Trust** for high trust; and
3. **Trust Empowerment** for choosing conditions for trust.

Authoritative Sources of Trust serve to establish trust quickly and are critical for providing a base level of confidence in information. They include both:

- a. Self-assertions, such as features and benefits statements, offers, promises, published policies, and brands. For example, eBay publishes its Privacy policy and has a strong brand; and
- b. Third party expert opinions, such as certification marks, expert opinions, product reviews and ratings, customer endorsements and reputation that generally serve to establish higher levels of “fast trust”. For example, eBay carries a TRUSTe seal for privacy protection and provides third party services that attest to the authenticity of members and the quality of their products.

Experiential Sources of Trust help to establish the highest levels of trust required for deep business collaboration. They include both:

- a. Personal experiences of the relying (trusting) party; and
- b. The experiences of others who are trusted to relate them objectively, such as eye witnesses, customers, as well as technology, such as computer audit logs and video surveillance cameras. For example, eBay has their famous customer feedback system and offers third party product and shipment verification services.

Trust Empowerment allows relying (trusting) parties to choose their preferred sources of trust rather than having to rely on those supplied by the source of the information, because trust is contextual and people do not all trust the same people for the same things. For example, eBay provides members with resources that allow them to assess the relative reliability of the feedback providers, as well as offering a suite of optional services that users can choose to build even higher levels of confidence in the transaction.

3.2. Ensuring Trust

Similarly, there are only three ways to **ensure trust**, or protect from a loss or deficiency of trust:

1. **Motivation** for protecting from a loss of trust in the longer-term;
2. **Ability** for protecting from a loss of trust in transactions; and
3. **Risk Transfer** for protecting relying parties in the event of a breach or a deficiency of trust.

Motivation and **Ability** represent the entire business environment that governs business conduct and its ability to deliver expected value. Many of these mechanisms are often invisible to the relying party, unless something goes wrong in the business dynamic to bring attention to specific business practices.

Motivation defines the “rules of the game”, including laws, regulations, policies, values, ethics, culture, incentives and recourse mechanisms. For example, eBay has a comprehensive suite of policies that govern member conduct, including a Disallowed Products policy. They also provide dispute resolution and other recourse mechanisms, such as SquareTrade, SaferHarbor investigations and the VeRO notice of IP infringement service. Moreover, eBay acts as a benevolent third party node (trust steward) between sellers and buyers, which means that they are inherently motivated to be equitable to all members of their community.

Ability represents all capabilities of an organization to reliably deliver expected value, these include people, their knowledge and competencies; and business processes, including information technology, product or service features, controls and security. For example, eBay is strong in many of these areas, but highlights the reliability of its information technology and application of best practices for security and privacy.

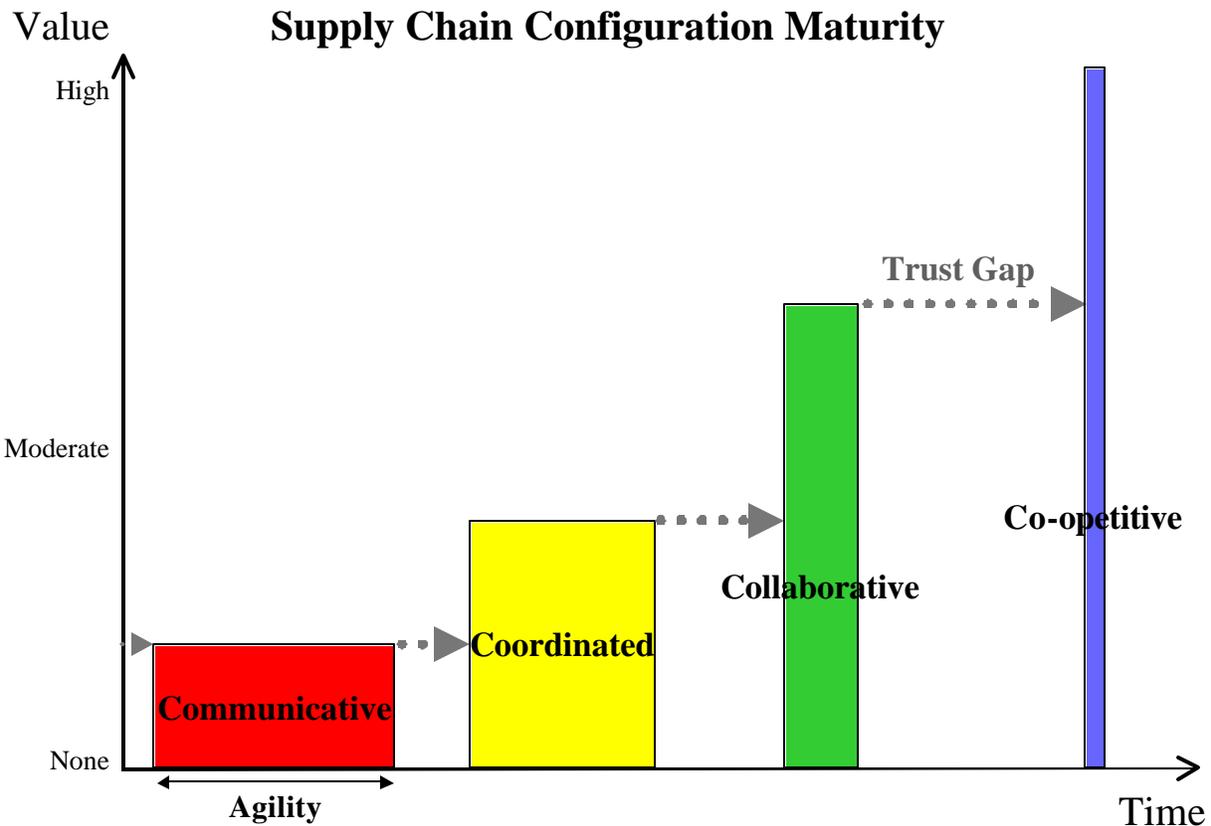
Risk Transfer mechanisms and instruments, such as agreements, contracts, warranties, guarantees and insurance serve to make any residual uncertainty (deficiency of trust) more acceptable. They are important for accelerating commitment to business transactions before a sufficiently high level of trust can be attained. For example, credit card companies protect credit card holders from online losses due to fraud. eBay does this through Fraud Protection Insurance and PayPal's free Buyer Protection of up to US \$1,000.

All aspects of Trust Enablement™ need to be addressed to achieve a balanced and effective trust environment that is not overly dependent on a few fragile mechanisms, such as relationships or contracts. Note how eBay takes a very balanced approach to enabling trust. They address all the elements of the Trust Enablement™ Framework with proportional emphasis on each one. The conditions most appropriate for establishing and ensuring required levels of trust in information depend largely on the nature of the business and the information being relied upon, thereby making each Trust Enabling™ system unique.

The following sections illustrate how varying Trust Enablement™ conditions contribute to building trust in supply chains at various levels of configuration maturity: communicative; coordinated; collaborative; and co-opetitive [¹⁸].

4. Trust at Supply Chain Configuration Maturity Levels

This section examines the role of trust at each level of supply chain configuration maturity and provides evidence to support the trust/value dynamics shown in the chart below. It suggests that more trust is required to attain each successive level of supply chain maturity, but the payoff is increased agility and more value generated by the supply chain.



The following case studies, representative of successive levels of supply chain configuration maturity, are assessed for:

1. The contribution of **intangibles** to value creation in supply chains;
2. The **agility** of the supply chain to respond to unforeseen externalities; and
3. The overall business value of the extended supply chain to its participants.

The Trust Enablement™ Framework is then used to:

1. Deconstruct the conditions for trust required to support each supply chain maturity configuration for insights about the level of trust present; and
2. Determine the relative role that personal relationships played in establishing that level of trust.

4.1. Trust in a Communicative Configuration

A Communicative Configuration [¹⁹] is also called the Open Market Negotiations [²⁰] or Ad Hoc-Defined [²¹] process maturity. It is characterized by price-based discussions [²²] and an adversarial win-lose relationship. Trust considerations are limited to the reliability of the supplier to deliver quality on a timely basis and the buyer to pay on time. The following hypothetical case study shows how typical Trust Enabling™ conditions in a Communicative supply chain configuration tend to be *limited to non-existent*.

Hypothetical Example of a Communicative Supply Chain Configuration

On June 15th, Blazer Barn, a fictitious retailer in Philadelphia, orders 10,000 navy blue blazers from Hong Kong Blazer on online auction, BuyEverything.com, for a remarkably good price, payable in advance. They also order 2,000 made-to-order school blazers, all for delivery by August 1, in time for back-to-school season. By August 1st neither shipment arrives. Upon inquiring, Blazer Barn is informed that the goods are in the shipper's hands and beyond control of Hong Kong Blazer. On August 3rd the 10,000 auction lot arrives, but: the shipment is short 1,000 units; 1,000 of the blazers are brown; and several hundred are water damaged. On August 13th, the 2,000 made-to-order school blazers arrive, but with two weeks of selling season lost; incorrect fabric; and plastic instead of gold-tone metal buttons. Upon confronting Hong Kong Blazer, they adamantly claim that they sent the complete shipment and that gold-tone metal buttons were not specified in the order. After weeks of frustrating discussions, Blazer Barn learns that the cause for the impasse was that Hong Kong Blazer management was insulted that they had to deal with low-level employees at Blazer Barn, since they were accustomed to communicating with peer executives.

Significant observations from the Communicative configuration case example are that:

1. Intangibles, such as support and advisory services, did **not** contribute to the value of the trading relationship between the supply chain partners;
2. The agility of the supply chain process to satisfy unexpected changes to supply or demand was **poor**, and
3. The overall business value to the trading partners appeared to be **limited**.

The following table applies the Trust Enablement™ Framework, described in the previous section, to assess the conditions that contributed to helping the buyer establish and ensure trust in the supplier, within a Communicative supply chain configuration, as seen in the Blazer Barn example:

Trust Enablement™ Assessment of a Communicative Configuration	
Establish Trust	Ensure Trust
<p>Experiential Sources of Trust - NONE</p> <ul style="list-style-type: none"> No previous personal or referential experience with supplier. 	<p>Motivation - NONE</p> <ul style="list-style-type: none"> The seller had virtually no inherent motivation to protect the buyer's interests and there were no dispute resolution or other recourse mechanisms in place to protect the buyer should something go wrong.
<p>Authoritative Sources of Trust - LIMITED</p> <ul style="list-style-type: none"> Relied only on self-assertions and promises of supplier. 	<p>Ability – LIMITED</p> <ul style="list-style-type: none"> Demonstrated ability to deliver blazers, but neither reliably or accurately.
<p>Trust Empowerment - NONE</p> <ul style="list-style-type: none"> No services provided to help identify possible sources of trust by either the supplier or online auction. 	<p>Risk Transfer – NONE</p> <ul style="list-style-type: none"> A virtually unenforceable contract, without warranties or guarantees. The buyer also did not have any business insurance to compensate them for any lost business.

Legend

NONE	LIMITED	MODERATE	CONSIDERABLE	HIGH
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The Trust Enablement™ Assessment reveals that:

1. Conditions for trust were virtually **nonexistent**; and
2. Personal relationships were a negative factor in the outcome of the supply chain process. Had the relationships been better, they could have improved the outcome, however with only **limited** effect.

4.2. Trust in a Coordinated Configuration

The Coordinated Configuration [23] is also called the Linked-Integrated [24] or Synchronization [25] level of process maturity. It is typically characterized by asymmetric power relationships [26], with information linkages and common process measurements and goals. Advanced processes may cause traditional functions as they relate to the supply chain to begin to disappear. Confidence in the reliability of the supplier is based more on control or authority than on trust and is enforced primarily with deterrence mechanisms, with goal congruence limited to necessity. The following actual case study shows how typical Trust Enabling™ conditions in a coordinated supply chain configuration tend to be *moderate* and largely dependent on personal relationships and contracts.

Actual Example of a Coordinated Supply Chain Configuration

Proctor & Gamble pioneered continuous, automatic replenishment of Pampers with a pilot study at Kmart, which they implemented with Wal-Mart in 1988. This may have been one of those turning points where one could say Kmart missed the boat and Wal-Mart made it, because they enjoyed dramatic improvements in landed costs, which could be reflected in lower pricing for diapers in the store and better in-stock performance. Continuous replenishment, an automated process that does not require the customer to place explicit orders because the supplier manages inventories, is as much about trust as it is computing. Coordination and synchronization requires cooperative planning, forecasting and replenishment. In an industry dominated by so many win/lose trading partner relations that are focused primarily on price, trust levels tend to be low. However, trust is required for both trading partners to have confidence that the other will not use the other's information for opportunistic purposes, such as sharing it with competitors. "Imagine the scepticism among [subsequent] retailers hearing a manufacturer say they could manage the retailers' inventories better than they could themselves. Buyers at the different retailers were very reluctant to let go of this responsibility", recalls Ralph Drayer, who was P&G's Vice President of Customer Service in 1987. This was the first step to adopting a new mission at P&G to help make their customers more profitable selling P&G products, which almost positioned P&G as consultants to their retailers and led to the elimination of sales quotas and served to build even higher levels of trust. [27]

Significant observations from the Coordinated configuration case example are that:

1. Intangibles contributed **considerably** to the value of the trading relationship in the form of specialized supplier knowledge and technology;
2. The agility of the supply chain process to satisfy changes in supply and demand anticipated in the design (for business as usual) and within the scope of the integrated process was likely at a very high level. However, their ability to resolve unexpected externalities beyond the scope of the integrated processes is expected to have been **moderate**, due to a risk management culture that relied heavily on contracting; and
3. The overall business value to the trading partners appeared to have been strategically significant, since it made it possible for both trading partners to build levels of trust that subsequently enabled them to evolve to higher levels on the process maturity scale. However, although the coordinated business processes added considerable value to inventory replenishment by significantly reducing transaction costs in that area, they likely contributed only **moderately** to the overall value to the business between the trading partners.

The following table applies the Trust Enablement™ Framework to assess the conditions that contributed to helping the buyer establish and ensure trust in the supplier, within a coordinated supply chain configuration, as depicted by the Proctor & Gamble case:

Trust Enablement™ Assessment of a Coordinated Configuration	
Establish Trust	Ensure Trust
<p>Experiential Sources of Trust - MODERATE</p> <ul style="list-style-type: none"> • Pilot projects to demonstrate value; and • Strong leadership. 	<p>Motivation - MODERATE</p> <ul style="list-style-type: none"> • Long-term relationship objectives by both supplier and buyer; • Compelling need for the two industry leaders to cooperate for mutual benefit; • Strong disincentive for opportunistic behaviour; and • Limited overall business goal congruence.
<p>Authoritative Sources of Trust - MODERATE</p> <ul style="list-style-type: none"> • Industry leading supplier; • Strong business case; and • Evidence from the Kmart pilot project. 	<p>Ability – CONSIDERABLE</p> <ul style="list-style-type: none"> • Powerful software enables considerable cost reductions for inventory and in-stock.
<p>Trust Empowerment - NONE</p> <ul style="list-style-type: none"> • No services provided to help identify possible additional sources of trust by the supplier. 	<p>Risk Transfer – MODERATE</p> <ul style="list-style-type: none"> • Tight contractual underpinning with clearly assigned roles and responsibilities.

Legend

NONE	LIMITED	MODERATE	CONSIDERABLE	HIGH
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The Trust Enablement™ Assessment reveals that:

1. Conditions for trust were **moderate**; and
2. Personal relationships between trading partner leaders were a **considerable** factor in success of the coordinated supply chain process.

4.3. Trust in a Collaborative Configuration

A Collaborative Configuration [28] is also referred to as an Extended [29] level of process maturity. It is typically characterized by “symmetric relative power relationships [30], with common goals and jointly developed solutions for common problems and particular functions [31] that extend throughout the supply chain. Decision-making related to those superordinate objectives is relegated to a centralized role for supply-chain-wide parity and equality matching [32]. Confidence in the reliability, competency and goodwill of the decision-making role is based more on trust in the benevolence of the role and is enforced primarily with strong goal congruence for mutual competitive advantage [33]. The following actual case study is presented to illustrate how typical Trust Enabling™ conditions in a Collaborative supply chain configuration tend to be *considerable* for the focal area, but may be *limited* otherwise.

Actual Example of a Collaborative Supply Chain Configuration

(Source: Evans, P., and Wolf, B. (2005) "Collaboration Rules", Harvard Business Review July-August 2005 Online Version.)

Saturday, February 1, 1997

At 4:18 am, a fire broke out in the Kariya Number 1 plant of Aisin Seiki, a major Japanese automotive parts supplier. Within minutes, the building and virtually all the specialized machinery inside were destroyed. Kariya Number 1 produces 99% of the brake fluid–proportioning valves, or P-valves, for Toyota’s Japanese operations—parts required by every vehicle Toyota builds. And Toyota, true to its just-in-time principles, had less than a day’s inventory. The Japanese Toyota Production System faced the possibility of a total shutdown lasting months.

Within hours, Aisin engineers met with their counterparts at Toyota and Toyota’s other tier one suppliers. The group agreed to improvise as much production as possible. As news spread through the supplier network, some tier twos volunteered to play leadership roles. Aisin sent blueprints for the valves to any supplier that requested them and distributed whatever undamaged tools, raw materials, and work in process could be salvaged. Aisin and Toyota engineers helped jury-rig production lines in 62 locations—unused machine shops, Toyota’s own prototyping shop, even a sewing machine facility owned by Brother. Denso, Toyota’s largest supplier, volunteered to manage the messy logistics of shipping valves to Aisin for inspection and then on to Toyota’s stalled assembly lines.

Everyone was surprised when a small tier two supplier of welding electrodes, Kyoritsu Sangyo, was first to deliver production-quality valves to Toyota—1,000 of them, just 85 hours after the fire. Others followed rapidly, and Toyota started reopening assembly lines on Wednesday. Roughly two weeks after the halt, the entire supply chain was back to full production. Six months later, Aisin distributed an emergency response guide containing lessons drawn from the experience and recommending procedures for responding to such situations in the future.

No one individual or organization planned this effort: rather, people and companies stepped in where they could. Competitors collaborated. No one at the time was paid for contributing. Months later, Aisin compensated the other companies for the direct costs of the valves they had delivered. Toyota gave each tier one supplier an honorarium based on current sales to the automaker, encouraging—but not requiring—they to do likewise for their own tier twos. [³⁴]

Significant observations from the Collaborative configuration case example are that:

1. Intangibles contributed **considerably** to the value of the trading relationship with deep support being provided by suppliers to overcome adversity;
2. There was **considerable** agility of the supply chain to resolve unexpected changes to supply or demand beyond the scope of the integrated processes, requiring only three and a half days to restore the supply process; and
3. The overall business value to the trading partners was **considerable**, since all partners were highly dependent on each other and the collaborative process bypassed formalities to effectively compress the supply chain and thereby reduce transaction costs.

The following table applies the Trust Enablement™ Framework to assess the conditions that contributed to helping the buyer establish and ensure trust in the supplier, within a Collaborative supply chain configuration, as depicted by the Toyota case:

Trust Enablement™ Assessment of a Collaborative Configuration	
Establish Trust	Ensure Trust
<p>Experiential Sources of Trust - CONSIDERABLE</p> <ul style="list-style-type: none"> • Tier twos voluntarily assumed leadership roles; • Within hours Aisin met with Toyota and Toyota’s other tier one suppliers; • Aisin shared their blueprints (proprietary intellectual property) and other salvageable resources with any suppliers who requested them; • Aisin and Toyota helped suppliers to jury-rig production lines in 62 locations. 	<p>Motivation - CONSIDERABLE</p> <ul style="list-style-type: none"> • Long-term relationship objectives by both supplier and buyer; • Compelling need for all supply chain partners, even competitors to collaborate for mutual benefit; • Strong disincentive for opportunistic behaviour by most suppliers as they belong to the same <i>jishuken</i>, a Japanese-style supply chain form, initiated by Toyota that is an “exclusive or semi-exclusive supplier-purchaser relationship that focuses on maximizing the efficiency of the value chain [³⁵]; and • Moderate overall business goal congruence, since self-interest depends on Toyota.
<p>Authoritative Sources of Trust - CONSIDERABLE</p> <ul style="list-style-type: none"> • Aisin and Toyota’s assertions about the implications from the fire; and • Tier one suppliers and Toyota’s aggregate expert assessment of the situation and recommendations. 	<p>Ability – CONSIDERABLE</p> <ul style="list-style-type: none"> • Highly effective collaboration configuration allowed many partners to successfully improvise production lines.
<p>Trust Empowerment - MODERATE</p> <ul style="list-style-type: none"> • A common supplier network facilitated discovery and engagement. 	<p>Risk Transfer – LIMITED</p> <ul style="list-style-type: none"> • No formal mechanisms to protect supply chain partners from loss or damages; • Cultural/community norms provided some level of protection.

Legend

NONE	LIMITED	MODERATE	CONSIDERABLE	HIGH
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The Trust Enablement™ Assessment reveals that:

1. Conditions for trust were **considerable**; and
2. Personal relationships between trading partner leaders were only a **moderate** factor in success of the collaborative supply chain process.

4.4. Trust in a Co-opetitive Configuration

Co-opetitive Configuration [36] is analogous to a Federated Support Networks [37]. It is characterized by deep interdependence of competitors and complementors for strategic competitive advantage and “plus-sum” results [38]. Decision-making is based on parity-based common goals for a broader scope of business functions and is relegated to a centralized role within the supply chain [39]. Collaboration is strategic, with a long-term view that promotes intense resource sharing and investment [40] for deep customer support for supply chain agility. The level of commitment and fluid business dynamics expose participants to considerable risks that cannot be adequately protected with contracts [41]. The high levels of trust in the business practices of all participants are sustained with true goal congruence [42] that portends little concern for opportunistic behaviour. Trust and confidence is placed in the reliability, competency and goodwill of all participants, and the benevolence of the centralized decision-making role [43]. The following actual case study shows how comprehensive Trust Enabling™ conditions found in a Co-opetitive supply chain maturity configuration tend to be *high* overall.

Actual Example of a Co-opetitive Supply Chain Configuration

(Source: Evans, P., and Wolf, B. (2005) “Collaboration Rules”, Harvard Business Review July-August 2005 Online Version.)

Tuesday, December 2, 2003

Near midnight, Andrea Barisani, system administrator in the physics department of the University of Trieste, discovered that an attacker had struck his institution’s Gentoo Linux server. He traced the breach to a vulnerable spot in the Linux kernel and another in rsync, a file transfer mechanism that automatically replicates data among computers. This was a serious attack: Any penetration of rsync could compromise files in thousands of servers worldwide.

Barisani woke some colleagues, who put him in touch with Mike Warfield, a senior researcher at Internet Security Systems in Atlanta, and with Andrew “Tridge” Tridgell, a well-known Linux programmer in Australia on whose doctoral thesis rsync was based. They directed Barisani’s message (made anonymous for security reasons) to another Australian, Martin Pool, who worked for Hewlett-Packard in Canberra and had been a leader in rsync’s development. Although Pool was no longer responsible for rsync (nobody was), he immediately hit the phones and e-mail, first quizzing Warfield and Dave Dykstra (another early contributor to rsync’s development, who was based in California) about vulnerabilities and then helping Barisani trace the failure line by line.

By morning Trieste time, Pool and Barisani had found the precise location of the breach. Pool contacted the current rsync development group, while Barisani connected with the loose affiliation of amateurs and professionals that package Gentoo Linux, and he posted an early warning advisory to the Gentoo site. Pool and Paul “Rusty” Russell (a fellow Canberran who works for IBM) then labored through the Australian night to write a patch, and within five hours Gentoo user-developers started testing the first version. Meanwhile, Tridge crafted a description of the vulnerability and its fix, being sure (at Pool’s urging) to credit Barisani and Warfield for their behind-the-scenes efforts. On Thursday afternoon Canberra time, the announcement and the patch were posted to the rsync Web site and thus distributed to Linux users worldwide.

A few days after the emergency, having caught up on his sleep, Barisani volunteered to collaborate with Warfield in setting up a system of deliberately vulnerable servers to lure the system cracker into revealing himself.

No one authorized or directed this effort. No one—amateur or professional—was paid for participating or would have been sanctioned for not doing so. No one's job hinged on stopping the attack. No one clammed up for fear of legal liability. Indeed, the larger user community was kept informed of all developments. Yet despite the need for the highest security, a group of some 20 people, scarcely any of whom had ever met, employed by a dozen different companies, living in as many time zones and straying far from their job descriptions, accomplished in about 29 hours what might have taken colleagues in adjacent cubicles weeks or months. [⁴⁴]

Significant observations from the Co-opetitive configuration case example are that:

1. Intangibles contributed **high** value to the trading relationship, with deep support being provided by experts in their time invested and their knowledge codified in software;
2. The agility of the supply chain to resolve unexpected changes and externalities was **high**, requiring only 29 hours to resolve the security crisis; and
3. The overall business value to the trading partners was **high**, since the self-organizing process significantly compressed the supply chain and reduced transaction costs down to nominal levels.

The following table applies the Trust Enablement™ Framework to assess the conditions that contributed to helping the user-developer supply chain community establish and ensure trust in software developers, within a Co-opetitive supply chain configuration, as depicted by the Linux case:

Trust Enablement™ Assessment of a Co-opetitive Configuration	
Establish Trust	Ensure Trust
<p>Experiential Sources of Trust - CONSIDERABLE</p> <ul style="list-style-type: none"> • Experts collaborated with colleagues who shared previous relevant experiences; • Experts personally provided deep support to trace vulnerabilities; • Independent testing of the patch by multiple volunteers; • Full transparency of technical issues and solutions; • - Identity concealed for security reasons; and • - Secret system of deliberately vulnerable servers to catch crackers. [45] 	<p>Motivation - HIGH</p> <ul style="list-style-type: none"> • Long-term relationship objectives by both supplier and buyer; • Compelling need for all supply chain partners, even competitors, to collaborate for mutual benefit; • Self-motivated volunteers spontaneously organize within a loosely associated community of lateral relationships, without predefined responsibilities or authorities; <ul style="list-style-type: none"> ○ No sanctions or recourse for non-participation; ○ No remuneration for contributing; and • High overall business goal congruence, as all employers of experts had products and services that rely on the success of Linux and all technical experts are valued almost exclusively on their reputations within the community.
<p>Authoritative Sources of Trust - HIGH</p> <ul style="list-style-type: none"> • Colleagues referred reputable experts; • Community stakeholders notified with early warning advisory as soon as vulnerability was identified; • Preliminary patch posted within five hours; • Posted description of vulnerability and fix for user community on relevant web sites for worldwide distribution. 	<p>Ability – HIGH</p> <ul style="list-style-type: none"> • Expert volunteers collaborated to trace vulnerability; • Experts voluntarily wrote patch to fix vulnerability; • Multiple user-developers independently tested patch; • System of deliberately vulnerable servers to catch crackers.
<p>Trust Empowerment - CONSIDERABLE</p> <ul style="list-style-type: none"> • Professional network for expert location. 	<p>Risk Transfer – MODERATE</p> <ul style="list-style-type: none"> • Collegial reputation was the predominant risk transfer mechanism; • Multiple user-developers involved in independently testing patch; • - No formal mechanisms to protect supply chain partners from loss or damages, such as for legal liability; and • - No compensation for time, effort and intellectual property. [46]

Legend

NONE	LIMITED	MODERATE	CONSIDERABLE	HIGH
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The Trust Enablement™ Assessment reveals that:

1. Conditions for trust were relatively **high**; and
2. Personal relationships between trading partner leaders were only a **moderate** factor in the success of the co-opetitive supply chain process, because trust is founded mainly on reputations within a virtual community enabled by Internet-based communication technologies.

5. Conclusions

Findings from each of the case study examples and the Trust Enablement™ Assessments are summarized in the table below:

	Communicative	Coordinated	Collaborative	Co-opetitive
Intangibles	NONE	CONSIDERABLE	CONSIDERABLE	HIGH
Agility	POOR	MODERATE	CONSIDERABLE	HIGH
Value	LIMITED	MODERATE	CONSIDERABLE	HIGH
Trust	NONE	MODERATE	CONSIDERABLE	HIGH
Relationships	LIMITED	CONSIDERABLE	MODERATE	MODERATE

The findings suggest that:

- Conditions for trust are greater in higher supply chain maturity configurations;
- Both conditions for trust and supply chain maturity are good indicators of the significance of intangibles, the agility with which supply chain processes can respond to change, and the business value of the supply chain to its trading partners; and
- Relationships become less important for attaining the higher levels of trust associated with more mature supply chain configurations, which rely more on reputations and community structures to create conditions suitable for deep collaboration.

Further research is required to validate these preliminary findings, which support the original premise that increased trust is associated with supply chains that are more agile, with lower transaction costs and higher value. The Trust Enablement™ Framework helps to deconstruct conditions for trust to both measure and forecast levels of trust as an important indicator of supply chain performance. It can therefore be used as a tool to assess the current state of trust and define systems and best practices that establish and maintain required trust at any level of supply chain configuration maturity.

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