Business Service Networks: Delivering the Promises of B2B

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Abstract

The fundamental challenge of e-commerce is enabling companies to do business with one another across a network, despite different business processes and computer systems. Traditionally, these problems were overcome through custom point-to-point integration or Electronic Data Interchange (EDI) networks. These expensive, time-consuming approaches make economic sense only when companies do a lot of business together. The promise of the Internet, by contrast, is an open e-business platform where companies can do business spontaneously with anyone, anywhere, anytime. Business Services Networks fulfill that vision. This vision paper also presents CommerceNet's role in catalyzing industrial adoption.

1. Introduction

We define Business Service Networks (BSNs) as Internet business communities where companies collaborate through loosely coupled business services. Participants register business services (e.g., place an order, make a payment) that others can discover and incorporate into their own business processes with a few clicks of a mouse. Companies can build on each other's services, creating new services and linking them into industry-transforming, network-centric business models.

BSNs can be public or private. They can be Internet-wide, or focused on a particular vertical industry (e.g., retail, healthcare), horizontal sector (e.g., payment or logistics services), or geographic region (e.g., the Bay Area). A retailer, for example, should be able to build an online store in an afternoon by outsourcing fulfillment to Ingram, shipping to Fed Ex, and payment processing to Citibank. Healthcare providers and insurers can save billions of dollars in administrative costs by publishing real time services for eligibility and claims processing. High-tech manufacturers can eliminate billions of dollars in returns and write-downs by subscribing to the real-time "inventory services" of thousands of distributors and resellers.

Although capable of spanning global industries, BSNs can grow organically, beginning with one company publishing a single service. This potent combination of publish-once services, loose coupling, and organic growth fundamentally reduces the complexity, cost, and risks associated with large-scale enterprise integration projects.

Ultimately, our central claim is that large-grain reuse via BSNs will actually become easier than fine-grained Enterprise Application Integration (EAI) approaches. Rather than communicating at the level of abstraction embodied by today's software components, BSNs should aspire to interoperate at the scale of business processes – because firm boundaries are much larger, and more stable, than object interfaces.

1.1 Demonstrating the Power of BSNs: PCnet

PCnet, a pilot BSN for the PC industry, illustrates the importance of BSNs in a complex, global business ecosystem involving designing, building, distributing, and selling personal computers.

Today participants in the PC value chain connect one-to-one via EDI and other costly, proprietary technologies: it's not unusual to spend $100,000 and several months developing a single connection. For trading partners that do millions of dollars of business with each other, such as IBM and Ingram-Micro, it's a good investment.

But the PC ecosystem includes thousands of vendors, hundreds of thousands of resellers and millions of buyers, so connecting one-to-one simply isn't viable. Therefore, only a small fraction of the industry actively shares information, leading to much inefficiency. It is impossible,

for example, to accurately track inventory as it moves through the channel. If reseller MicroAge runs out of IBM ThinkPads, it reorders another thousand from its distributor, IngramMicro. Ingram forwards the order to IBM, which builds and ships the machines. Suppose, however, that another reseller had a surplus of ThinkPads. If Ingram knew about that surplus, it could broker a sale between the two resellers, avoiding manufacturing costs and minimizing the return or write-off of unsold inventory.

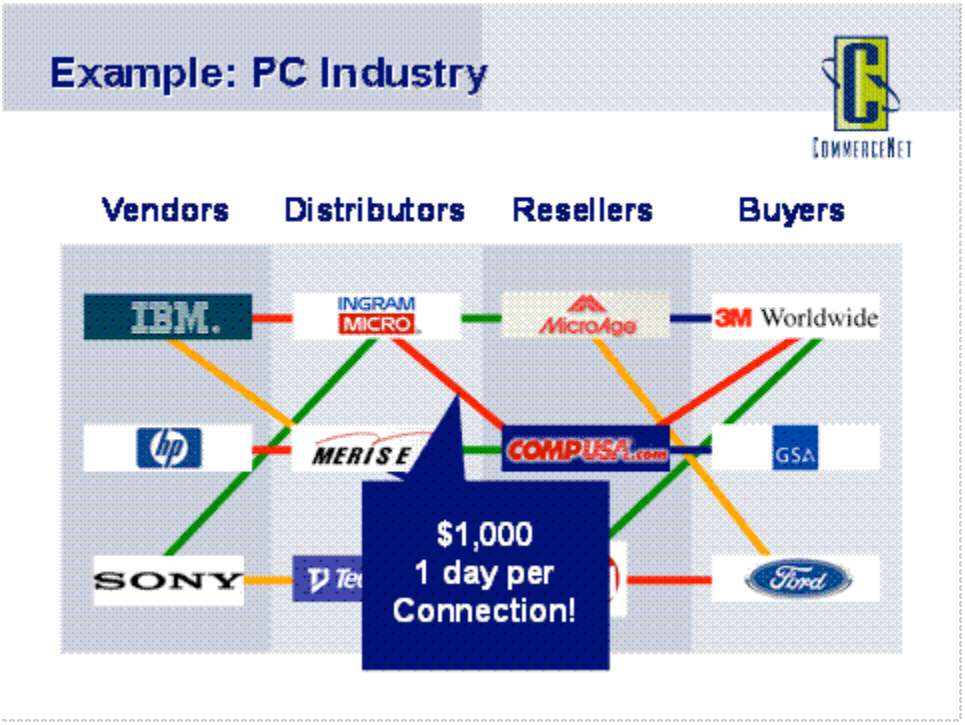

Figure 1. A BSN reduces the "cost per connection."

The solution is to replace rigid supply chains with an open BSN for PC distribution. In less than a day, and for under $1,000, companies will be able to connect once to PCnet, publish their business services in the PCnet registry, and do business with every other company that has registered. Basic business services will give trading partners access to information – product data, catalogs, price lists, availabilities, inventories, production and shipping schedules – and the ability to act on it by placing an order. The resulting visibility solves many intractable channel management problems. For example, IBM can create an inventory tracking service that periodically polls its thousands of distributors and resellers about what's in stock. More sophisticated services can manage inventory, schedule production, and forecast demand not just within a single enterprise, but across the entire PC industry. PCnet can also be extended back into the supply chain of component manufacturers, electronics distributors, and contract assemblers to balance supply and demand dynamically.

The problems and opportunities addressed by PCnet are hardly unique to the PC industry. They are endemic to scores of industries with fragmented value chains, including most manufacturing sectors, financial services, healthcare, and entertainment/publishing.

2. The Evolution of BSNs

BSNs are the latest stage in the evolution of Internet commerce, which began with Web sites in the mid 1990's, e-marketplaces in the late 1990's, and most recently Web services. This evolution represents a steady progression along the continuum, from swivel-chair integration to hard-coded interfaces to lightweight, standards-based APIs. Business services extend Web services for inter-company use because they integrate business processes, not computer systems.

2.1 Beyond 'Web Services'

Much has been written about the business value of Web services [4]. BSNs offer four additional, compelling advantages over Web services and more traditional e-business approaches:

Remove integration barriers: BSNs enable companies to do business *spontaneously* regardless of their internal e-commerce systems, data formats and communication protocols. Many organizations, especially small- and medium-sized businesses, have lacked the resources and expertise required to tightly integrate their systems.

Facilitate organic growth: BSNs can start with one company registering a single business service that its business partners can discover and use. Such incremental deployment significantly mitigates business and technology risk.

Allow incremental automation: Organizations that still employ paper-based processes can simply convert their paper documents to Web-based forms, and fulfill service requests interactively. Upgrading to electronic documents improves productivity immediately by reducing delays and errors caused by people moving paper. Structured documents also lay the groundwork for automation, since business rules can now be applied to generate routine service requests automatically, while still allowing exceptions to be handled manually. Services can be automated independently, a task at a time, such that users need never know or care whether a service they request is delivered manually or automatically.

Drive plug-and-play commerce: Business services can be assembled into larger business processes. Unlike traditional software applications, which are seldom designed with integration in mind, business services are designed from the outset for plug and play assembly into larger business processes. Businesses can build on each other's services, using them as components to create new services that others can, in turn, build on. This Lego™-like ability to assemble services will spark an explosion of innovative new business services.

2.2 Adoption Milestones

With such advantages, BSNs will proliferate rapidly. Four market forces will drive their growth:

Enterprises will join industry BSNs to automate cross-company business processes with trading partners quickly and cost effectively.

Software vendors will provide BSN-compliant solutions so their customers can connect directly with trading partners and other applications. Increasingly, business software will be offered as provisioned BSN-compliant services, addressing the growing market for on demand applications.

Business service providers will use BSNs as channels. For example, FedEx or Citibank could offer their customers the ability to provision their services directly into customers' own business processes.

BSNs will affiliate with each other and with legacy business networks to expand their networks and add complementary services so they can support end-to-end business processes.

Early efforts like *PCnet* (§1.1) will focus on specific vertical industries or on horizontal business functions such as payment and logistics. They will grow organically, starting with a few natural hubs (e.g., large OEMs, distributors and banks) provisioning out services to their business partners. Pushed by market forces, these corporate BSNs will affiliate with industry BSNs to do business with many partners. This industry-based approach makes sense because connecting once is more efficient than requiring a company to integrate with individual trading partners.

Credit Card Networks	Visa, MasterCard
ATM networks	Plus, Cirrus
Airline reservations networks	Sabre
Interbank payment settlement networks	SWIFT, ACH, FedWire
Stock exchange networks	NYSE, NASDAQ
Public EDI networks	GXS, Sterling
Supply chain management networks	Wal-Mart, Dell, Flextronics, E2open

Table 1. Examples of Legacy Business Networks

Contrast the cost and speed of organically growing a BSN with that of deploying legacy business networks (Table 1). These traditional networks were built at great expense on proprietary platforms. Wal-Mart and Dell Computer, for example, spent billions of dollars over many years building out formidable, proprietary networks to support their supply chain operations. Today, a K-Mart emerging from bankruptcy and its supply chain partners could capture the same advantages from an Internet-based BSN at a fraction of the time and cost. In a few years, virtually any company will be able to assemble a custom BSN in days by connecting to the published services of their customers and suppliers.

Legacy networks will of course continue to play important roles in a BSN world. Wrapped with new business service interfaces, they can serve as key BSN building blocks for core business functions such as payment or logistics. A public EDI network, e-marketplace or clearinghouse linked to a BSN can add thousands of customers. Proprietary networks of a major distributor, manufacturer or bank can gain access to new business services and new trading partners, especially small businesses.

3. Technical Foundations of BSNs

With all of their advantages, why haven't BSNs taken off yet? Until quite recently, the enabling technologies for BSNs simply did not exist. Web services are a key enabling technology, but they are relatively immature. They must be hardened to provide enterprise-class security and reliability, and extended to interoperate at the level of business processes rather than applications.

Numerous companies and standards initiatives are already working on making today's immature Web services more reliable, secure and manageable. Unfortunately, they are too often working at cross-purposes, creating proliferating standards and incompatible products. By comparison, very few organizations are thinking about business-level interoperability, the second piece required for BSNs. Business services will not magically "plug and play" unless they are explicitly designed to work together.

Our design is called eCo II, a second-generation, service-oriented architecture for e-business, based on CommerceNet's pioneering eCo System framework, introduced in 1996 [3, 8, 15]. The eCo II platform enables organizations to exchange information and services spontaneously without custom integration or prior agreement on standards. Companies consult the registry to learn how to communicate with a particular partner, then personalize the service by specifying their preferred data formats and communication / security protocols, etc. Services are invoked by exchanging standard business documents and forms. The potent combination of self-provisioned services, loosely coupled through registries and documents, fundamentally reduces the complexity, cost, and risks associated with large-scale health networks.

3.1 The eCo II Approach

eCo II is a reference architecture that extends Web service standards in two dimensions: 1) to support enterprise-grade reliability and security, and 2) to promote interoperability at the business process level. eCo II complements rather than competes with existing Web services standards bodies. Like the Web Services Interoperability (WS-I) consortium [1], eCo II's objective is not to invent new standards but rather to select products and profiles that can work together. Indeed, eCo is agnostic about standards, supporting de facto standards when they exist and relying on protocol negotiation ("tell me what standard to use") and translators to facilitate interoperation when companies can't agree. This pragmatic approach is a key differentiator from other interoperability initiatives.

3.2 The eCo II Architectural Stack

The eCo II architectural stack, as shown in Figure 2, has four layers of services:

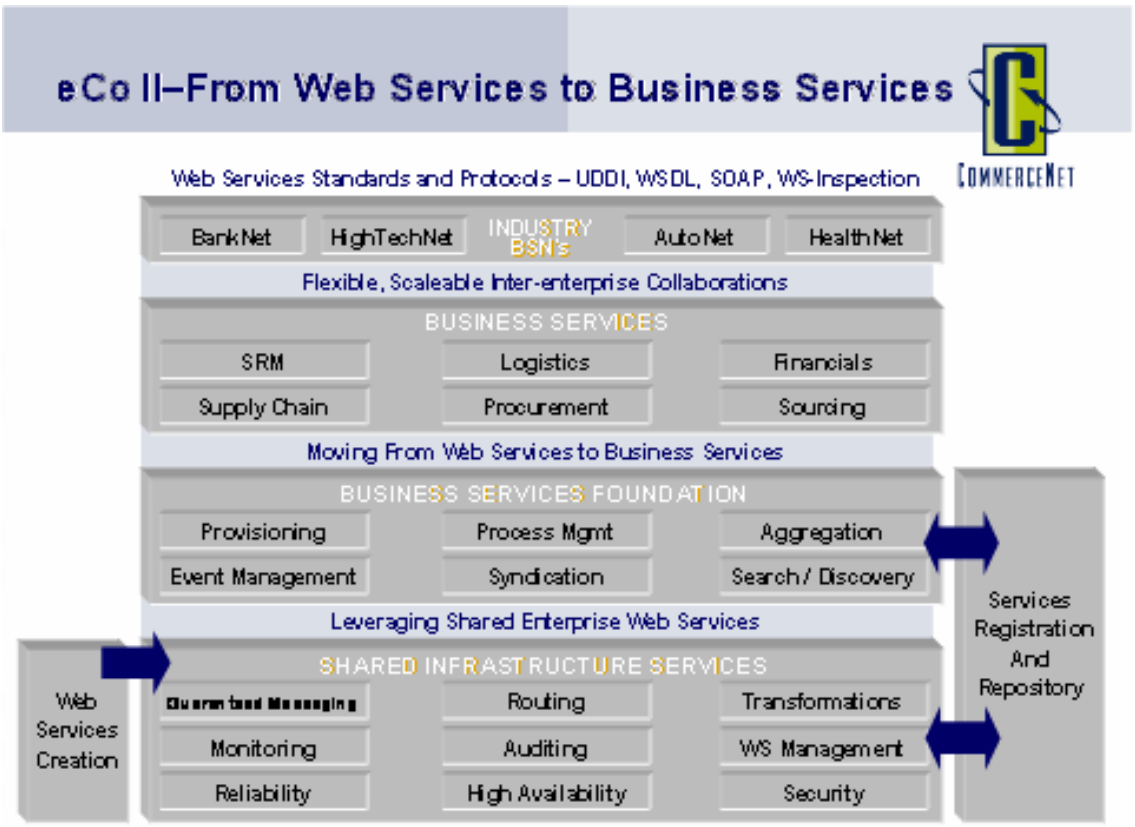

Figure 2. The eCo II architecture 'stack.'

Infrastructure Services provide essential utilities for secure, reliable messaging (e.g., authentication, authorization, and digital signatures; single sign-on access controls; time-stamped "FedEx-style" document tracking and receipts)

Foundation Services are shared utilities that support cross-company business processes (e.g., service registries, digital identity management, user profiles for provisioning, document mapping and translation, workflow management, and audit controls). Like traditional utilities, such services are best provided centrally, rather than replicated in each business service.

Business Services are "plug and play" Web service applications for core business processes such as sourcing, payment and logistics. A manufacturing company, for example, could offer services that enable customers to "search a catalog," "request a bid" or "place an order." Business services are accessed using XML versions of standard business documents such as purchase orders and invoices.

Industry BSNs customize the generic business services to meet the needs of specific verticals (e.g., claims management services for healthcare), and adds industry-standard commercial terms and conditions and service level agreements, to minimize off-line business negotiations. This level also includes gateway services for interacting with legacy business networks.

3.3 Discussion

Business Services have long been used in distributed computing frameworks to provide simple ways of accessing a company's core processes. Unfortunately, proprietary application programming interfaces (APIs) were required to access them. Most APIs are complex and proprietary because they are designed to tightly integrate idiosyncratic computer systems. Custom systems integration is usually required.

eCo II avoids these problems by using loose coupling. Business services are invoked simply by sending them XML business documents. These documents are structured versions of the documents businesses use everyday to communicate via mail, email, the Web, EDI, and fax. Because of this ubiquity, much of the information in common business documents (e.g., purchase orders, invoices) has already been largely standardized. Unlike APIs, documents are easy for people to understand, and they contain information in a declarative form that is also easy for machines to 'understand'.

Integrating business services *loosely* through the exchange of documents is fundamentally simpler than coupling them tightly through APIs. Companies need only agree on the information in a document, not how that information is processed. Each company can then utilize the information freely in its own business processes. When a service receives a document, business rules can route it to an application or another service for automated processing, or to a person for a manual processing. Documents thus provide an intuitive way of integrating people and services over a network.

Foundation Services are the essence of eCo II, because they enable companies to do business spontaneously, without custom integration or any prior agreement on standards. Three of these are particularly noteworthy:

Registries tell potential trading partners how to do business with a specific company. Companies can publish a listing of their online services, which documents to use in interacting with those services, and in what order the services should be utilized.

Provisioning is how subscribers sign up to use a business service and customize it to work with their systems and processes. Instead of rigid standards, each subscriber can specify preferences such as transport (e.g., FTP, HTTP, SMTP), document format (e.g., ANSI X12, SAP IDoc file, Excel spreadsheet), batch or real-time interactions, and security (password, Kerberos, 128-bit Public Key). Companies consult the registry to learn various ways of communicating with a particular trading partner, and then select their preferred option during provisioning. For example, a large supplier could register with an OEM customer to receive purchase orders in SAP format in real time via FTP, whereas a smaller supplier might opt to receive its purchase orders in Excel format, batched and emailed once a day at 4 p.m.

Process management services orchestrate business processes that involve the exchange of multiple business documents. These services support both state-based process management and asynchronous events, but unlike traditional middleware, are designed only to deal with loosely-coupled, inter-company processes, rather than complex, tightly-coupled, intra-company workflows.

3.4 eCo II enables large-scale reuse

The eCo II reference architecture fosters the development of lighter-weight business services that derive most of their functionality from other BSN services. For example, a primitive eCo business service might do little more than route incoming business documents to the right person, application or business service based on business rules in an XML process description. Foundation services like registry lookups, provisioning, process management and other support functions are obtained through subscription over the net, rather than building them into each company's business service.

This creates the opportunity for software reuse on an unprecedented scale. Business services can carry household names – a DHL shipping service, a Wells Fargo payment service, and more. DHL and Wells Fargo are complex entities involving hundreds of thousands of people and thousands of computer systems, all orchestrated by hundreds of processes, policies and procedures. However, they have evolved simple document-based interfaces to harness this complexity and provide useful services. BSNs exploit this simplicity; foundation services let a company like DHL or Wells Fargo publish services that other companies can integrate into their business processes.

4. Realizing the BSN vision

CommerceNet has been driving the vision of open Internet BSNs for nearly a decade. With the proliferation of core Web services standards and the conceptualization of the eCo II architecture, the technology is ready to fulfill this vision. For example, Webify Solutions, Inc. has developed a commercial e-business framework called the SOBA Fabric, inspired by eCo II, and has deployed it successfully in healthcare and insurance BSNs [11].

To accelerate broader adoption of BSNs, CommerceNet is planning to sponsor pilots in verticals that fulfill three conditions:

1. The industry is experiencing significant pain and there is the potential to achieve high business impact.
2. The industry has Internet initiatives and industry leaders willing to recast them as BSNs.
3. No single vendor or channel master is dominant in the industry.

Manufacturing, healthcare, financial services and the entertainment industries all demonstrate these characteristics. In each pilot, CommerceNet will work with industry leaders to identify the key inter-enterprise processes and the business services required to implement them across the industry's value chain. We will then launch the BSN by encouraging commercial software vendors and application service providers to deploy seminal business services that can drive early adoption. We briefly describe three early pilots, one in high-tech manufacturing modeled after the PCnet example and another two in healthcare.

4.1 SupplyFX: integrating the electronics industry supply chain

The electronics industry is a complex ecosystem that includes thousands of component suppliers, contract manufacturers, and distributors. The vast majority of them are small to medium size companies with less than a few hundred employees, that still rely on manual, paper-based processes to source and procure goods and services from each other. Unfortunately, these slow, expensive processes are incompatible with the rapid product cycles and demand swings of most electronic products. Automation has proved elusive since most communications involve phone, email and Fax, except for occasional EDI links between larger firms. The fragmented electronics industry supply chain is thus ripe for a BSN pilot.

To jumpstart an electronics industry BSN, CommerceNet put up seed funding for an initial business service, SupplyFX, to expedite the solicitation of RFQs, a critical bottleneck in the sourcing process. A bill of materials (BOM) for a complex product can run to hundreds of pages. The BOM must be broken down into the individual subassemblies and components to be bid, and then RFQs prepared and sent to approved vendors. These vendors, in turn, will often require bids from their subcontractors and suppliers. Using phone and fax, it can easily

take weeks to propagate requests down the supply chain, and compile the responses to select winning suppliers and determine a project's true cost.

SupplyFX is a simple, web-based service that automates this entire process. When users upload a BOM, it is automatically parsed into components and RFQs sent to qualified vendors, selected using buyer-specified rules. Communication with small venders is via the web, fax, email, EDI or through a web service. All responses are tracked in real time, with automated reminders and alerts sent as necessary. The bottom line: a process that once took weeks can now be handled routinely in days.

The SupplyFX service has been operational for several months, and is already in daily use by thousands of companies. Aggregate quotes are well over a billion dollars.1 As expected, this early liquidity has begun attracting the attention of complementary service providers, from shipping companies interested in outsourcing logistics, to banks eager to finance receivables. Suppliers with ERP or automated quoting systems are thinking of exposing them as a business service, and an SDK will soon be available for them to download. SupplyFX, itself, is planning additional on-demand services to help smaller vendors without sophisticated business systems respond to quotes, manage their customers inventories, plan production, etc., and other software and service vendors will surely follow with "on-demand" services of their own. The Electronics Industry BSN is, indeed, off and running.

4.2 HealthConnect

Healthcare is a highly fragmented and troubled sector. The U.S. medical system encompasses over 280,000 service providers and 1,200 insurance companies, each with its own rules. Not surprisingly, paper documents clog back offices of hospitals, clinics, and insurance payers, driving costs up and quality down. Information systems, where they exist, tend to be antiquated and incompatible.

To jumpstart a healthcare BSN, CommerceNet and Webify Solutions piloted a service called HealthConnect, which connects payers and providers via the Internet. The basic service, which is now up and running in several states, enables a physician's office to check a patient's eligibility for a procedure in real time, and then submit and track an insurance claim. Additional services are being added that will enable physicians to send medical documentation in support of claims and insurance companies to settle claims. Next up will be services that enable banks to reimburse uncovered procedures from a patient's Health Savings, checking or credit card account. Within a year, HealthConnect should enable a physician to determine, during the course of an office visit, what's covered and how much they will be reimbursed, and enable the patient to settle the difference on the spot. Legacy services, including EDI-based claims networks, clearinghouses and third-party billing services can then be wrapped as business services to rapidly expand the functionality and reach of the network.

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1 Only a handful of the large industry exchanges that were formed during the bubble ever achieved such traction, and none were successful in integrating SMEs

4.3 Smart Health

Smart Health is an open Internet-based healthcare BSN for Silicon Valley [16]. It is being developed in partnership with Smart Valley, a long-standing local community action program to improve the quality of life for Valley residents, while creating economic opportunities for local high tech and life science companies. Through real-time electronic medical records and claims processing, Smart Health will link the region's clinics; community, county and tertiary-care hospitals; and small and large physician practices. We will start with a few institutions that share a specific business problem (e.g., they frequently see each other's patients) and will allow new organizations to join the network organically as their business needs support it. HealthConnect will handle claims processing. A web portal will enable consumers to view their health data along with the status of insurance claims. A similar web portal will provide a hosted EMR service for small providers who lack systems of their own. Pharmacies and labs will be recruited early to add valuable data to the network (e.g. prescriptions filled, lab results).

Unlike previous initiatives, Smart Health will be built on an open BSN platform to take full advantage of the benefits of an open network:

- Reducing the time and cost of deployment, and enabling the network to grow organically, without a central bureaucracy or a central patient registry.
- Encouraging widespread participation from diverse participants including providers, payers, patients, pharmacies, labs, government agencies, and consumers, as well as third party software and service providers (e.g., clearinghouses, billing services, contract research organizations, data mining).
- Enabling experimentation with different technical approaches (e.g., security, data models, federation v. centralization), which is important given the lack of consensus about the "right" architecture for local health networks.
- Supporting the exchange of both administrative and clinical data (and ultimately, research and public health data, too).
- Creating a test bed for innovative health processes and services, ultimately extending from "bench to bed." For example, payers can offer services that enable providers to check a patient's eligibility and submit and track claims in real time, and providers can publish services for scheduling appointments, and use services to order labs and e-prescribe.

5. Beyond BSNs: Decentralization

However radical BSNs may appear to be, the first wave of BSN adoption will automate existing business relationships. The so-called "New Economy" was largely about using Internet technology to reduce friction and set up new centers of power such as B2B 'hubs' and B2C 'malls.' CommerceNet is also investigating what comes next, the "Now Economy" [12].

An instructive comparison is between stock markets and foreign exchange markets: while stocks trade in vast volumes at a few national hubs at well-known prices, currencies trade in even larger amounts (nearly $2T/day!) directly between banks without any central exchanges at all. While a completely decentralized market means that prices can vary more — depending on whom you ask and when — the entire system can be much more scalable and resilient.

In the context of a traditional electronic commerce application such as auctions, the BSN vision implies that rather than hosting the entire process at a single website, a seller could "plug in" their own financing, or a buyer their own shipping. The underlying assumption that a central mediator is required to operate the auction, or indeed that an increasing-price (English) auction is the best method to sell it, is not negotiable.

The unique challenge of the Now Economy is to build genuinely peer-to-peer markets and architectural styles [7] that allow traders to communicate and consummate trades directly. Other researchers are also pursuing these ideas, such as ETH's PeerMart [5].

Consider some of the practical obstacles to building 'an eBay without eBay,' though: reputation management, product identification [13], catalog search, real-time bid notification, and many others. Market-lubricating role like arbitrageurs can, in principle, be unbundled into independent business services and made available to independent market makers.

For another example, one of the hottest electronic-commerce markets today is the renaissance of Web advertising with real-time, pay-per-click keyword matching [3]. However, centralized 'ad networks' such as Google AdSense and Yahoo! (neé Overture) control *who* can advertise, *what* ads are acceptable, *which* ads run on which pages, and *how* payments are allocated.

So-called Publisher-Driven Advertising (PDA) such as BlogAds allows authors to solicit advertisers directly [2]. A decentralized BSN that offers freedom along all of these axes — as well as enabling entirely new kinds of business services, such as ad campaign optimization — remains an open research question in electronic commerce [6]. There are strong reasons to believe that decentralized mechanisms can approach the efficiency of centralized ones with global knowledge [17], but such an ad market has not been demonstrated yet, nor shown to be economically efficient enough.

6. Conclusion

Our vision for the future of BSNs is millions of business services, all interoperating on the largest, open network for commerce — the *CommerceNet*.

The CommerceNet will evolve as an ad hoc federation of eCo-compliant corporate and industry BSNs, loosely coupled through registries, authentication and other shared services. Like the Web, the evolution will be highly decentralized. Participating BSNs will grow and affiliate in response to market forces, one company, one service, one network at a time. And, like the Web, all BSN participants will reap the benefits of a common reference architecture, including:

Economies of scale: All BSNs can build on and contribute services to the eCo repository. Since business processes tend to be similar across industries, many new services can be constructed by customizing and assembling existing ones.

Interoperation: Because eCo services are architected to plug and play, companies will be able to connect once to any CommerceNet BSN and do business with every other company on the CommerceNet.

Rapid scaling: Certain services can effectively add thousands of new companies and services to a network. These include gateway services that connect natural hubs (large distributors, public EDI networks) and provisioning services that let small and mid-sized businesses access legacy back office systems. Retrofitting popular EDI suites for eCo-compliance can add a software vendor's entire installed base to the network, along with those customers' trading partners. Linking two industry BSNs through a common registry can instantly enable the thousands of companies on each network to do business.

6.1 CommerceNet's role as catalyst

CommerceNet's mission is to rally others to the BSN cause by distributing risks and costs among companies, sharing knowledge and resources, accelerating ROI and developing new business opportunities.

By building all of the pilots on the eCo II reference architecture, developers of one pilot BSN will be able to use services developed for another pilot BSN. Thus, although the pilots will be conceived and executed independently, they can also lead to cross-industry synergies.

To facilitate this, we will offer a variety of tangible deliverables beyond spearheading the pilots:

- Host registries and other shared Foundation services as needed, so that the pilots can draw on shared infrastructure services,

- Run a repository of eCo-complaint business services, along with software components and tools for service development and customization, and encourage BSN pilots to build on and contribute to it, and

- Develop service provisioning toolkits and self-certification processes to drive large-scale adoption of successful pilots.

6.2 A Call to Action

The stakes are high. Billions of dollars have been invested in business-to-business commerce, with scant returns. Many companies won't spend more until the ROI is proven. But more participation is precisely what's needed to realize the network effects that will make B2B pay off. This paralysis is rooted in profound structural problems that only collective action can solve:

Proprietary software platforms and "standards" make it difficult for companies to communicate with business partners. Patents and other intellectual-property concerns affecting standards activities could compound the difficulty [9].

Companies cannot solve these problems alone. They must come together, define key business processes for their respective industries and then work cooperatively with IT vendors and systems integrators to instantiate them as BSNs. CommerceNet, as a neutral non-profit, is uniquely positioned to catalyze these BSN initiatives.

7. Acknowledgements

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