Business Service Networks and Beyond

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“The Promises of B2B”

- Conventional EAI/EDI:
  - requires large investments that only established trading partners can afford
  - only serves to automate existing trading patterns

- Internet Services:
  - promise an “open e-business platform where companies can do business spontaneously with anyone, anywhere, anytime”
  - “companies can build on each other’s services to create new services and link them into industry-transforming, network-centric business models”
World’s Largest B2B Network

$2 Trillion of Buying Power Connected
Trough of Disillusionment

- Hard To Connect
- Limited Interoperability
- > 75% Closed or Consolidated
- Flawed Business Models
Why did anyone believe in them?

- ... much less invest untold sums into the “New Economy” of B2B dotcoms?
- A: However utopian it may seem, the real world does manage to work this way!
  - Businesses “do business” with each other almost anyone, almost anytime, and almost anywhere. So shouldn’t our software, too?
Who cares about BSNs, anyway?

• “Three generic buzzwords, shuffled”
  • Business Service Grids
  • Business Service Networks
  • Business Services Network
  • Next-Generation Service Providers
  • Service-Oriented Architecture
  • Web Service Grid
  • Grid Web Services
  • ...

• Without a clear definition, how can industry possibly care about “BSNs”, much less build and use them?
We’ve cared for a long time...
Jay M. Tenenbaum has believed in some form of this vision for over two decades.

CommerceNet has pioneered commercial use of the Internet for over a decade.

- First credit-card transaction over the Web
- First security protocol for the Web
- First secure Web browser
- First measurements of Web users
- First XML common business formats
- ...
OK... but who else cares?

- Clearly, the IT industry is in the grip of a much-hyped “Web Services” movement
  - Does that mean we’ve already won?
- But so far, WS has been “introverted”:
  - WS adoption being driven by internal IT architects
  - WS-* technology stack developed as EAI++
  - Public Web Services have mainly been machine-readable versions of existing website functionality
    - Amazon, eBay, Salesforce, PayPal, Flickr, ...
- Relatively little evidence of industry-wide or cross-industry interoperability
BSNs Must Be “Extroverted”

- ‘Business services’ are not ‘web services’
  - *FedEx* is a business service!
  - *SetOriginatingZipCode()* is only a web service...
- Business services should become *easier* to reuse than smaller-scale components
  - Expect document-centric protocols, not APIs
  - Expect event-driven interfaces, not ACID RPCs
- We’ll know we’re succeeding when different firms start sharing interfaces
  - Seek pilot projects that connect entire industries
BSNs Support Decentralization

• The fundamental reason anyone should care about BSNs is the emergence of a decentralized “Now Economy”
  • The “New Economy” celebrated dramatic efficiency gains within traditional firm structures
    • “The World’s Largest Bookseller”
    • “The World’s Largest Music Store”
    • ...
  • The "Now Economy" is our vision for a world where networks of firms can coalesce in real time to pursue new business opportunities
    • Related to concepts like swarming, social networks, simulations...
    • Formally, decentralization is an inevitable response to fundamental physical and social limitations (latency & agency)
Overview of this Talk

- *Business Services Networks: Delivering the Promises of B2B*
  - Our position paper
- *Decentralizing Web Advertising*
  - A challenge problem beyond today’s BSNs
BSNs: Delivering the Promises of B2B

Based on CN-TR-05-01
Our Definition of BSNs

- “Internet business communities where companies collaborate through loosely-coupled business services.”
  - **Community:** It’s made of people...
  - **Collaborate:** It’s not just about transactions...
  - **Loosely-coupled:** It can’t be procedure calls...
  - **Business services:** It can’t stay at machine-level...
- Our definition *presumes* that multiple, independent firms are working as peers
The Power of BSNs

- BSNs can be public or private
  - ... *but always must be based on open standards*
- BSNs can be broad or narrow
  - *Look for horizontal, vertical, or geographic focus*
- BSNs can grow organically
  - *A single company can start with a single process*
- **BSNs should aspire to interoperate at the scale of business processes**
  - *Because firm-boundaries are much larger, and more stable, than any software component interface*
Example: PC Industry

Vendor: IBM
Distributor: Ingram Micro
Reseller: MicroAge
Buyer: 3M Worldwide

$100,000 100 days per connection!
Example: PC Industry

Vendors: IBM, HP, Sony
Distributors: Ingram Micro, Merise
Resellers: MicroAge
Buyers: 3M Worldwide, CompUSA.com, GSA, Ford

$1,000 1 day per connection!
Example: PC Industry BSN (PCnet)

Suppliers

Distributors

Resellers

Buyers

PC Industry BSN on the shared services grid
Example: High Tech BSN

Manufacturers  Suppliers  EMS  Vendors  Distributors  Resellers  Buyers

Electronics Industry  PC Industry
The Evolution of BSNs

- From sites to marketplaces to services...
- BSNs offer four advantages:
  - **Removing integration barriers**
    - SMEs in particular lack resources and skills to tightly integrate
  - **Facilitating organic growth**
    - Registering & discovering services reduces deployment risks
  - **Allowing incremental automation**
    - Paper → web forms → structured documents → scripted agents
  - **Driving plug-and-play commerce**
    - Designed from the outset for Lego™-like composability
BSN Adoption Milestones

- Four market forces driving BSN growth:
  - **Enterprises** will join industry-wide BSNs
  - **Software vendors** will provide BSN-compliant tools, especially as hosted services
  - **Business service providers** will use BSNs as distribution channels
  - BSNs will affiliate with each other and legacy business networks

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<td><strong>Supply chain management networks</strong></td>
<td>Wal-Mart, Dell, Flextronics, E2open</td>
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Technical Foundations of BSNs

- The enabling technologies for BSNs did not exist until quite recently
  - Many of the relevant WS-* specs are still immature
- “Few organizations are focusing on business level interoperability; they will not magically ‘plug and play’ without that”
- CN’s design is eCo II, a service-oriented successor to its 1996 eCo Framework
  - Self-provisioning onto the CommerceNet is key
  - Not a standards body; goal is to profile & translate
The eCo II Architectural Stack

Web Services Standards and Protocols – UDDI, WSDL, SOAP, BPEL...

Flexible, Scalable Inter-enterprise Collaborations

**BUSINESS SERVICES**
- SRM
- Logistics
- Financials
- Supply Chain
- Procurement
- Sourcing

Moving From Web Services to Business Services

**COMMON APPLICATION SHARED SERVICES**
- Provisioning
- Process Mgmt
- Aggregation
- Event Management
- Syndication
- Search/Discovery

Leveraging Shared Enterprise Web Services

**INFRASTRUCTURE SHARED SERVICES**
- Guaranteed Msging
- Routing
- Transformations
- Monitoring
- Auditing
- WS Management
- Reliability
- High Availability
- Security

Web Services Creation

Services Registration & Repository
Realizing the BSN Vision

• CommerceNet is a unique organization with a 10-year history of accelerating innovation in electronic commerce

• We have three guidelines for sponsorship:
  1. The industry is experiencing significant pain
  2. The industry has Internet initiatives & leaders
  3. No single vendor or ‘channel master’ dominates

• Currently investing in startups and pilots:
  • SupplyFX
  • SmartHealth
  • Webify
Electronics industry includes many SMEs
  - Generating competitive quotes for a bill-of-materials (BOM) from several distributors can take a week of back and forth phone and fax
    - Also requires intimate knowledge of product catalogs to map codes
  - Paper-based process also complications supplier-selection policy compliance and performance measurement / spend analysis
    - On both the buyer and distributor side, by the way.

CN seed-funded a startup to pilot a BSN
  - The first product, QuoteFX, even works with Excel
  - Well over a billion dollars of aggregate quotes
  - Recently closed a Series A venture capital round
QuoteFX is Part of an Ecosystem

- It’s a hosted Web application
  - Charges monthly fees, not a “tax” on volume
  - Works via email, fax, EDI, Excel uploads, and WS
- Complementary service providers
  - Logistics companies interested in shipping leads
  - Banks interested in financing purchases/factoring
- Incremental integration with others
  - Distributors interested in direct connections to ERP
- Platform for more business processes
  - Increasingly used as a sales-force automation tool
  - Looking to expand into inventory, planning, ...
HealthConnect *(with Webify)*

- Pilot BSN to connect payers & providers
  - US Healthcare has 280K providers, 1.2K payer
  - First service: real-time eligibility verification
  - Next: submit and track claims across insurers
  - Future: support consumer-directed care by billing through to personal Health Savings Accounts

- Goal: “point-of-sale” charge settlement
  - Within the year, doctors will be able to determine who’s covered, for what, and for how much *during* a office visit
A Regional Health Information Network
- Pursuant to the National Healthcare Infrastructure Initiative (NHII), regional link-ups are essential
- Smart Valley is a community action program supported by high-tech and life-science businesses
  - Provided key seed funding for CommerceNet itself, too

Starts with a specific business problem
- Clinics that routinely see each other’s patients
- Clinicians who are already inclined to adopt IT
- A secure hosted Electronic Medical Record is key
- Eventual expansion to include pharmacies, etc
Smart Health as a BSN

- Unlike previous initiatives, this BSN can:
  - Reduce the cost of adoption by eliminating any central patient registries in favor of peer-to-peer
  - Encourage widespread participation across both clinical and administrative (payment) processes
  - Enabling appropriate experimentation with data models, security models, storage and networking.
  - Creating a “test bed” for innovative healthcare, integrating monitoring from “bench to bed”

- For more information, see CommerceNet Technical Report 05-03, *Smart Health: A Flexible, Open Path to Community Health Interoperability*
Decentralizing Web Advertising

A challenge problem beyond Today’s BSNs
BSNs Support Decentralization

• BSNs are what comes after the reign of point-to-point, client/server services.
  • No one party can be in “in charge” of all transactions
  • No one party may even be able to enumerate all the parties involved in providing a service
  • Every party must reserve the right to disagree

• The Now Economy
  • What happens when you “blow up the center”?
  • How can we build B2B exchanges without hubs?
  • How can peer-to-peer systems ever stabilize well enough to work?
One of the hottest e-commerce stories is the (re)emergence of Web advertising

- Overture and Google’s keyword ad networks make billions of dollars, a nickel at a time
- Creating a “place” where myriad diverse advertisers and publishers can meet
  - But they control who can advertise
  - and what can be advertised and how
  - as well as which ads go on each page
  - and how much they sell for, and their take.

- Regardless of their public WS APIs, these are not BSNs... yet
Our View of Market Evolution

- **Centralized — NYSE**
  - A single server is “in charge” of all transactions

- **Distributed — NASDAQ**
  - Multiple servers coordinate the illusion of a market

- **Decentralized — FOREX**
  - Independent servers form trusted networks
  - No single “correct price” & potential for abuse
  - … but dramatically more robust & flexible

- Decentralized markets require a new style of software architecture
  - Peer-to-peer, not client/server; Events, not RPCs
Types of Marketplaces
Decentralizing Force #1: Latency

- Latency can make simultaneous agreement impossible when it exceeds the rate of change.
  - The “Now Horizon” is an absolute physical constraint:
    - Propagation Delay (speed of light)
    - Bandwidth Limits (entropy)
    - Disconnection (buffering)
• Political independence is a *social* limit.
• The essence of an organization is the ability to compel its members to obey a decision.
  • “An agency boundary denotes the set of components operating on behalf of a common (human) authority, with the power to establish agreement within that set and the right to disagree beyond it.”
• Other fields use synonymous terms such as ‘organizational boundary,’ ‘autonomous system,’ or ‘security perimeter.’
Today’s ad networks are central hubs that intermediate (and charge for) transactions between several distinct players

- **Advertisers** want to pay **Publishers** only when **Readers** follow the ad link back to their site:
BSNs Support Broader Ecosystems

• In the real world, there are many other policies that come into play:
  • Advertisers want to control what kinds of publications they appear in
  • Publishers want to control what kinds of products and services they are seen to advocate
  • Both parties want to prevent fraudulent ‘clicks’
• There also are many other participants in the advertising ecosystem:
  • Media Buyers
  • Campaign Scheduling
  • Demographic Analysis ...
How Can We “Blow Up the Middle”? 

- We don’t know how to eliminate the centralized ad market bottlenecks yet
  - Would the right ads get to (all) of the right sites?
  - Would more-sophisticated pricing policies apply?
    - Pay-per-click can be seen as selling “options” on ad slots
  - Could automated ad campaign agents stay “under budget” by adjusting supply/prices?
  - How would spammers and deadbeats be detected?
- *Would peer-to-peer real-time markets actually work in practice? And still be economically efficient?*
Forecasts & Conclusion
Future Research Themes

• The return of AI in the guise of BSNs
  • As open, multi-agency networks, BSNs defeat all the classic optimization techniques of ERP systems
    • We need software that works the way people work
  • linear programming ⇒ “taxicab assignment
  • planning applied to service composition
  • information aggregation through inferencing
  • market signals / prediction
  • massively collaborative data collection
  • reputation management

• Case studies from crisis response — could BSNs reverse Conway’s Law?
Our Key Observations

- BSNs fulfill the promise of B2B:
  - “Every company an Amazon”
- BSNs build on “Web Services”:
  - elevates them to the business level
  - networks them into ecosystems
    - R/T “autonomic” supply webs, information-based medicine, self-optimizing logistics...
- Beyond BSNs: “reverse the arrows” and “blow up the middle”
  - Architectural styles for networks without hubs
  - New ways to organize (networks of) firms