A Network Application Platform for your Supply Chain

A Technical White Paper by Gert Sylvest,
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Introduction

Business is changing fast. In the span of just a few years, companies have been moving from channel strategies to online digital sales, from physical production to digital products. Production is increasingly being automated and by 2025, one in three jobs may be automated through software, robots or machine learning. Logistics solutions are being commoditized, and distribution channels include digital and 3D-printed goods.

In the supply chain, the increased level of global competition, the accelerated shortening of product lifecycles, new low-cost distribution channels, social marketing strategies and the proliferation of managed service models all point to a future where speed of change and access to data to understand and predict the effects of change will be key differentiators.

At the same time, the threat of disruption from below is higher than ever due to small, agile players that can operate entire businesses in the cloud with SaaS models. They're able to create digital brands, access global markets and distribute their offerings quickly and cheaply.

The agility imperative

In today's hyper-competitive business climate, agility is the imperative. Research has shown that agile organizations achieve faster go-to-market, better operating efficiency, more satisfied customers and employees, and higher revenue. According to a 2012 report, nearly half of the executives of large companies surveyed had little faith in their company's ability to move in time to capitalize on market shifts or serve new customers. The Triple-A Supply Chain study demonstrated how companies that invested in supply chain relationships and agility over cost efficiency were more successful at achieving sustainable success. 68% of respondents from a 2015 study by The Hackett Group indicated that improving the agility of procurement was one of the top priorities of the procurement department.

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(3) Raoul Dubeautland, Kerstin Kubik and Venu Nagai, "How agile is your supply chain?", McKinsey and Company Quarterly, April 2015, http://www.mckinsey.com/insights/operations/how_agile_is_your_supply_chain,
The fundamental catalysts of an agile company

Companies that are agile enough to deal with the level of change knocking on their doors are:

- Using network-based digital collaboration and running digitally connected processes internally and across their supply chains using structured electronic documents and events
- Based in the cloud for collaboration, data sourcing and distribution of digital goods
- Globalized, so they can deal with global markets, customers and suppliers
- Able to change by real-time insight across markets and processes to adapt their business, products and supply and distribution chains

These companies are erasing the line between internal and external and enabling collaboration across their supply chains. They’ve established feedback loops between supply, production and distribution to drive continuous improvement.

Figure 1: End-to-end supply chain performance requires real-time bidirectional information flows.

However, most businesses in the world are lacking three fundamental catalysts when it comes to attaining this level of collaboration, agility and data insight.
Catalyst #1: Network-based digital collaboration

While the past half century of business digitalization has been focused on internal processes, digitalization of the vital processes that take place *between* businesses (e.g., supply chain, logistics, distribution, buyer interaction) has been reserved for the most strategic of relationships. For the vast majority of companies, emails, phone calls and paper exchanges are still the dominant mode of communication.

If we look at invoicing, the most widely digitized B2B collaboration process in the source-to-pay cycle, less than 2.5% were sent digitally in 2014(6). So while more than two billion people are connected in their private lives on social networks, 99% of all businesses in the world are not connected in digital, collaborative B2B networks.

Catalyst #2: Bridging on-premise and cloud

While the majority of IT spend is still on on-premise software, the trend is shifting fast. By 2016, Gartner predicts that more than 50% of all new IT spend will go to the cloud, and a 2015 study by IDG(7) shows that already today, the cloud is the top priority of IT departments. The days where the cloud was seen as a commoditization of IT resources are definitively over. The cloud is now the fundamental enabler of many strategic aspects of the IT investments for any company.

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Most companies, however, are challenged to transition to the cloud in a way that is neither all-or-nothing nor at odds with investments in on-premise software and data management requirements. Tradeshift sees the cloud as the fundamental enabler for digital collaboration processes between companies, people and software – processes that rely on both cloud and on-premise software solutions.

“Tradeshift sees the cloud as the fundamental enabler for digital collaboration.”

Catalyst #3: Leveraging data to drive change

In most large corporations, data points about real-world events, like invoices or orders being received, payments being made or order items being shipped, have traveled far through the corporate data pipeline before they meet the eyes of decision makers, as illustrated below:

During this process, data points that typically start as papers, emails, PDFs or conversations are increasingly biased or compromised by the various perspectives of the business lines, departments, processes and applications through which they pass. At the same time, the relevancy of the data decreases as time elapses.

For example, weeks can pass from the time an invoice has been sent to when it’s available for reports. For non-PO invoices, this might mean that you don’t have direct insight into your spend or currency exposure during that period of time.
With data passing through this complex and costly ride, access is mostly a privilege reserved for the top layers of the company, after which it trickles downward through the hierarchy. This approach largely precludes relevant and current data from reaching those that make actual real-time decisions related to buying and selling.

The best way to overcome this hangup is to connect with 100% of your supply chain to collaborate digitally and to have data points born digitally.

**Introducing the Tradeshift platform for network-powered apps**

Digital collaboration within and between companies in the supply chain is the foundation for a successful transition to cloud-based collaboration.

Companies that pursue this strategy can be more agile by using real-time data to drive actions and decisions across the organization. They can overcome application and process silos while merging legacy and on-premise applications with cloud-based collaboration tools to maximize return on their existing IT investments.

**Platform overview**

Below is a depiction of the complete Tradeshift platform architecture. Born in the cloud, it has data, transactions, network and collaboration at its core. Interactions with the platform are supported with a rich API-, integration- and app-framework layer, which powers the applications and processes running on top of the platform, regardless of whether they were created by Tradeshift, partners or Tradeshift customers.
Network-powered apps

The platform enables applications and integrations for digital, network-enabled processes, both within companies and globally between companies in the supply chain. If companies or developers want to build such applications or enable legacy applications and ERPs to participate in this kind of collaboration pattern, they would need to address how to:

- Connect with and on-board suppliers and customers
- Collaborate between companies on documents and transactions
- Ensure that applications that address one part of the source-to-pay cycle don’t become data or collaboration silos within themselves
- Interact with users, applications or workflows through integrations or external networks rather than a UI
- Localize applications, distribute them globally and make them available over multiple platforms, including mobile and desktop
- Make single sign-on (SSO) work seamlessly across legacy and SaaS applications
Tradeshift addresses all of these must-haves. It is a platform designed for network-powered applications and integrations, and provides the foundation for our partner and customer app ecosystem.

<table>
<thead>
<tr>
<th>What an <strong>app creator</strong> should focus on:</th>
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<tbody>
<tr>
<td><strong>Network-powered app:</strong></td>
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<tr>
<td>- You provide the business logic</td>
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<tr>
<td>- Use any technology you want</td>
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<td>- Host wherever and however you want</td>
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<table>
<thead>
<tr>
<th>What <strong>Tradeshift</strong> adds:</th>
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<tr>
<td><strong>Collaboration</strong></td>
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<tr>
<td>- On any object</td>
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<td>- Workflow</td>
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<td>- Process integration</td>
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<tr>
<td><strong>Documents and objects</strong></td>
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<tr>
<td>- Transactions</td>
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<td>- Integrity</td>
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<tr>
<td>- Storage</td>
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<tr>
<td><strong>UI components</strong></td>
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<tr>
<td>- Desktop / mobile</td>
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<td><strong>Multi-tenant</strong></td>
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<tr>
<td>- Account separation</td>
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<td><strong>Integratable</strong></td>
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<tr>
<td>- Interact through UI, API, integrations or remote networks</td>
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<tr>
<td><strong>Data insight</strong></td>
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<tr>
<td>- Real-time data available through common API</td>
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<tr>
<td><strong>Scalability</strong></td>
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<tr>
<td>- Unlimited global scalability</td>
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<tr>
<td><strong>Secure &amp; compliant</strong></td>
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<tr>
<td>- Use the common validation engine</td>
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<tr>
<td><strong>Distribution</strong></td>
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<tr>
<td>- App store</td>
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<tr>
<td>- In-company</td>
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<tr>
<td>- Global distribution</td>
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<tr>
<td>- In-network</td>
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<td><strong>E2E</strong></td>
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<tr>
<td>- Use inside company</td>
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<td>- Use between companies</td>
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<tr>
<td><strong>Interoperable</strong></td>
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<tr>
<td>- Work with data from other apps</td>
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<td>- Share data with other apps</td>
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<tr>
<td><strong>SSO</strong></td>
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<tr>
<td>- Employee access</td>
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Figure 4: Tradeshift provides the cloud, network and collaboration foundation for apps.

“It is a platform designed for network-powered applications and integrations...”

Every application running on the Tradeshift platform, whether created by Tradeshift or a third party, has been built as a network-powered app.

Tradeshift allows application developers and integrators working in the full source-to-pay or order-to-cash process to focus on the application logic while the platform handles all the imperatives of cloud, cross-company collaboration, connected processes and extensibility. We’ll explore how that’s possible in the following section.
Data and transactions

“Most of the world’s business is, in fact, done by small companies. I want to enable a five-person manufacturer of fabrics in Pakistan to bid on supplying a hundred units out of a purchase request for a million seat covers from General Motors. Seeing both parties to this transaction benefit equally is for me what this is all about.”

Jon Bosak (xml:Father; OASIS UBL Committee Organizer)

The vision behind XML (Extensible Markup Language) and UBL (Universal Business Language) is one that Tradeshift shares: that ultimately, data should be platform- and vendor-independent.

If you aim to realize connected digital processes and overcome data and application silos, it is essential to embed strong data semantics at the very core of your processes. A lingua franca for business processes will enable the applications dealing with catalogues or requests for proposal to interact with applications that deal with downstream parts of the same value chain – such as order collaboration, settlement or spend analysis.

Figure 5: The Tradeshift platform core provides the foundation for collaborative applications and integrations.
This is why Tradeshift has chosen to adopt UBL®, a battle-proven, open and industry-neutral standard that was created from the best de-facto and proprietary industry standards, covering more than 60 document transaction types and thousands of data elements from sourcing to payments.

Tradeshift stores every document transaction, event or other piece of data that is a part of any collaboration in each participant's account, which we make available to the companies that own the data through APIs and other integration options.

We guarantee that no matter the collaboration channel, whether through a cloud-based UI, mobile or desktop form factors, legacy or on-premise applications and EDI, or through external networks, that data will always be available in the same form to all other applications and integration interfaces.

This principle allows order documents that have been created in one application to be flipped to invoices in another, and later, paired with an invoice accept event to form the basis of electronic supply chain financing apps.

Network

Support for dealing with your network and identities, whether these are within your company (coworkers, teams) or within your supply chain (suppliers, buyers, logistics providers), is a core aspect of collaboration and hence part of the Tradeshift platform core. The network ensures that every transaction and every collaborative action is available in the context of a relationship between two or more identities.

Network-powered app

The open standards-based data is one of the foundations to achieve cross-platform (cloud/on-premise) and cross-application digital collaboration and interoperability. The fact that all events of the collaboration are born digitally is the foundation of real-time data insight across applications and processes. The core’s cloud architecture accounts for the scalability aspect.

Network

Support for dealing with your network and identities, whether these are within your company (coworkers, teams) or within your supply chain (suppliers, buyers, logistics providers), is a core aspect of collaboration and hence part of the Tradeshift platform core. The network ensures that every transaction and every collaborative action is available in the context of a relationship between two or more identities.

Collaboration and workflow

The collaboration and workflow core elements ensure that there is a common pattern for collaboration across any document or other object that is exchanged between parties, such as sharing and delegation, regardless of which application, legacy system or external network the object was created in.

We ensure that documents exchanged over any channel (UI, integrations to on-premise or cloud, third party apps) are available to any collaborative workflow in a standards-based set of semantics, which is what makes collaboration across companies, people and systems possible.

"...collaboration and workflow core elements ensure that there is a common pattern for collaboration across any document..."

Globalization

Globalization is much broader than localization, especially in a B2B context. For example, globalized companies need to be able to enforce compliance with regulations (such as VAT compliance) in any document exchange, support local taxes, and distribute apps and other digital content globally.

We offer ways to localize and globalize in a business context that allows businesses to apply controls at the document and workflow level, so that both parties can understand the formal requirements (legal, compliance and otherwise), as dictated by geography and/or jurisdiction.

Network-powered app

Collaboration, network, workflow, globalization & security

The collaboration core ensures that collaboration is always possible on any object that is part of it. Any app may use the workflow engine to orchestrate workflows, end-to-end across companies, applications and integrations. The security services account for SAML-based SSO, and the business firewall for the compliance aspects. Multi-tenancy and account self-management is a core aspect of the network and ensures that any app behaves as 100% SaaS, even when it’s just a view into a process governed by an on-premise ERP.
The interfaces

There are many possible ways through which companies and users would want to interface into a collaborative process, including:

- Cloud-based applications through desktop, tablet or mobile devices
- On-premise or legacy systems such as ERPs, workflow applications or specialized applications
- APIs, connectors or other integration options such as FTP
- Open, external networks such as PEPPOL, commercial EDIs or protected industry specific networks such as INTTRA
The API

The Tradeshift API (Application Programming Interface) is the foundation for all interaction and access to company data. Each company controls their API and which apps, connectors or integrations have access to their data and the functions operating on that data.

Ours is a REST (Representational State Transfer) API that incorporates UBL semantics for dealing with everything from document transactions to network management, validation and globalization.

Anything that can be done on Tradeshift can be done using the API – in fact, the UI is based on the same API that is made available to application partners, customers and integrators alike.

The Tradeshift open data pledge promises that any company, at any time, may access all of their data in a standards-based format through their account API, and be in full control over which apps or connectors that operate through the API they want to grant access to.

“The Tradeshift open data pledge promises that any company, at any time, may access all of their data.”

The app framework

The app framework allows Tradeshift, application partners and customers to write network-powered apps that snap into the Tradeshift UI experience responsively across any device type, and allows users to use core collaboration, notification and other cross-functional features.

Network-powered app

App framework

App distribution is a core aspect of the app framework, and comes in the shape of the global or regionalized app store or supply chain onboarding process. The API is key here in that it provides real-time insight into data as it is being created, in addition to all historical data. The API is also the foundation for the integration services. With the app framework comes a set of responsive/cross-device UI components.
Apps may be written using any technology preferred by the application partner or customer and can be hosted anywhere. Tradeshift provides a ‘blank canvas’ for the application and a set of conventions for interacting with shared UI elements such as the menu.

To ensure a consistent user experience and accelerate the creation of apps, Tradeshift provides a library of UI components (comprising UI behaviors, such as click/touch behavior) that may be embedded in web applications written using any technology.

Apps are published and may be deployed across the network – either through the Tradeshift app marketplace or through a supplier/buyer onboarding flow – or simply used internally in an organization. Apps may play the role of a UI bridge between processes that span on-premise and cloud, in-company and across the supply chain.

Integration services

We offer a comprehensive set of integration services on top of the API that includes free choice of transports (such as SOAP, SAP-specific protocols, email, FTP, SFTP, AS2 and many more), of communication mode (such as push and pull models, batch and real-time integrations and reliable delivery with retry and business level confirmations), and arbitrary two-way document conversions.

This allows companies to bridge UI-based cloud, on-premise applications and external networks while still operating on the same data basis.

“To ensure a consistent user experience and accelerate the creation of apps, Tradeshift provides a library of UI components.”

Security

Tradeshift is ISAE 3402 certified, covering platform aspects such as business message integrity, systems monitoring, authenticity of origin, archiving and access restrictions to data and functions.

Multi-tenancy ensures complete logical separation of each account.

Tradeshift offers Single Sign-On through SAML 2.0, web access protection with EV certificates, and API access protected through TLS and OAuth 2.0. Tradeshift integration services apply security
technologies appropriate to each transport, such as WS-security profiles for SOAP, TLS for SFTP and AS2.

Tradeshift builds on a secure cloud platform with data centers that conform to the following security, infrastructure and related standards:

- SOC 1/SSAE 16/ISAE 3402
- SOC2+SOC3
- ISO27001 certified
- FedRAMP Compliant Cloud Service Provider (CSP)
- PCI DSS level 1 compliant
- FIPS 140-2
- DoD 5220.22-M / NIST 800-88 for decommissioning of hardware

**The applications**

The application layer comprises the actual applications, as well as access to external networks such as PEPPOL and INTTRA.

All applications, whether created by Tradeshift, application partners or customers, are built as network-powered apps on top of the platform. They are available either as a standard part of newly created accounts, or available through the app marketplace. Customers may also choose to write apps or integrations for internal use or for manual distribution that are not featured in the marketplace.

Apps created on Tradeshift span the full process of source-to-pay or order-to-cash. Examples include order collaboration, procurement and spend analysis, billing, supplier lifecycle management, e-invoicing, dynamic discounting and supply chain financing.
Apps leverage the Tradeshift network as a distribution channel. Every company on Tradeshift has access to the app marketplace and can view, install and purchase apps relevant to their region. Apps are often distributed during supplier onboarding cycles when trading partners seek certain types of collaboration and functionality that are available with free accounts. One such example is advanced line-level order collaboration in real-time, which is available via partner apps.

Applications span the entire source-to-pay and order-to-cash spectrum. All apps allow digital, connected collaboration even if different participants are interacting through different channels (such as cloud apps, on-premise ERPs, external networks or connectors).

“Every company on Tradeshift has access to the app marketplace and can view, install and purchase apps.”
Conclusion

The future of business belongs to companies that are able to adapt to the accelerated change in sourcing, production and distribution that we are witnessing today. Tradeshift was built on the belief that open models of digital, online collaboration between companies have the potential to change how businesses interact and how business software works.

By focusing on the fundamentals of business processes – collaboration, transactions and relationships – and bringing these interactions into the cloud in digital form, we believe that businesses can overcome the traditional challenges of enterprise software. These challenges include introducing digital processes between companies, bridging cloud and on-premise, connecting processes across application silos, and bringing relevant data into the hands of decision makers in real time.

For any company operating under the agility imperative, we see three catalysts of change:

- Bridging internal and cross-company processes
- Bridging on-premise and cloud infrastructures
- Having the data available to drive change

We believe that these initiatives are profoundly interconnected – digital collaboration is the foundation for providing the data needed to drive change in the supply chain.

Applications that emerge from this paradigm are fundamentally different from past generations of business software. They are collaborative, can be used between companies in the supply chain, are available anywhere, and can be deployed globally across any device. The challenge is to provide the platform for creating this type of application.

To bring about this kind of radical change and connect the world’s largest global supply chains, however, businesses need collaboration across industries, geographies and specialist domains. This is why, since day one, Tradeshift has been built as a true platform on an open standards foundation so that any software company in the world can join us in adding value to collaboration across the supply chain.

The platform can act as the technical onramp for companies to move their processes into the cloud, without disrupting current processes or rendering existing application investments obsolete. The platform will allow their employees to access Tradeshift applications from laptops, mobile devices or on-premise systems through rich integrations and connectors. It opens up the doors for companies to leverage an ecosystem of third party applications and integrations that can help them not only stay at the forefront of innovation, but also help push business forward.
<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
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<tbody>
<tr>
<td>Tradeshift Inc.</td>
<td>612 Howard Street, Suite 100, San Francisco, CA 94105, USA</td>
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