Case Study:
A general-purpose distributed business transaction repository

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Objectives - Learning outcomes

Context of use

- a quick perspective of historical document exchange paradigms

Distributed business transaction repository

- a transaction repository model contrasted to document transmittal model

Blockchain benefits

- an open yet private and secure implementation of a distributed business transaction repository

Implementation case

BBILLER.com / BBILLER.io

- a corporation becoming a distributed autonomous organization (DAO)
- implementing the breadth of a business transaction with a brand-independent dynamic smart contract architecture

Disintermediated supply chain on the blockchain

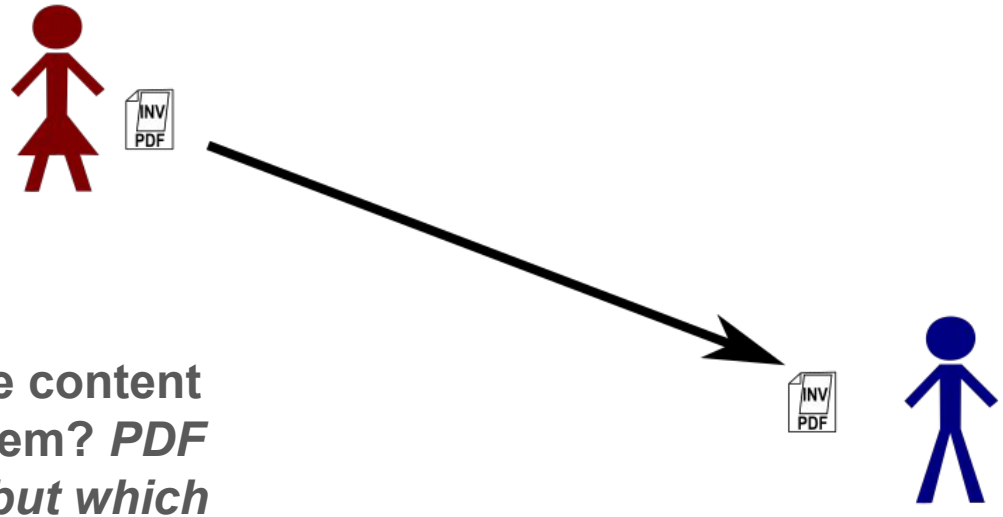
- initially the choreography and orchestration of business processes associated with the documents used in business transactions
- followed by the exchange of value using crypto
- followed by asset provenance and tracking
- providing an alternative to the encumbrances of document transmittal and storage

2-corner transmittal model

A supplier *(in red)* sends an invoice to a customer *(in blue)*.

Can the customer understand the document format? *PDF is very commonly understood.*

Can the customer incorporate the content of the invoice into their ERP system? *PDF is not suitable. XML is suitable, but which XML format to use?*



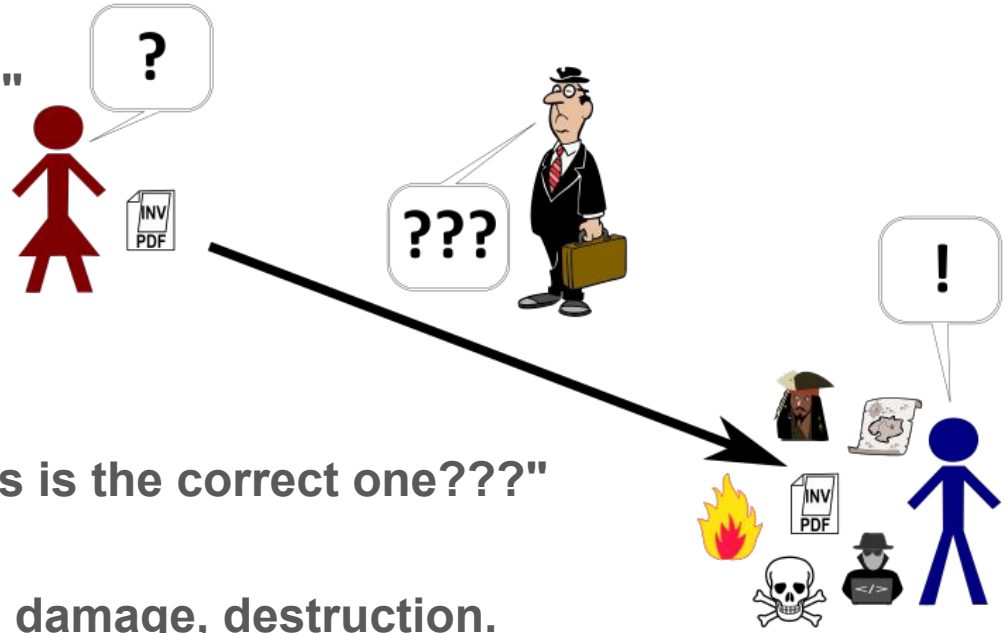
2-corner transmittal model issues

Supplier:
"Has the invoice been accepted?"

Customer:
"I've accepted this invoice!"

Auditor:
"Which of these different invoices is the correct one???"

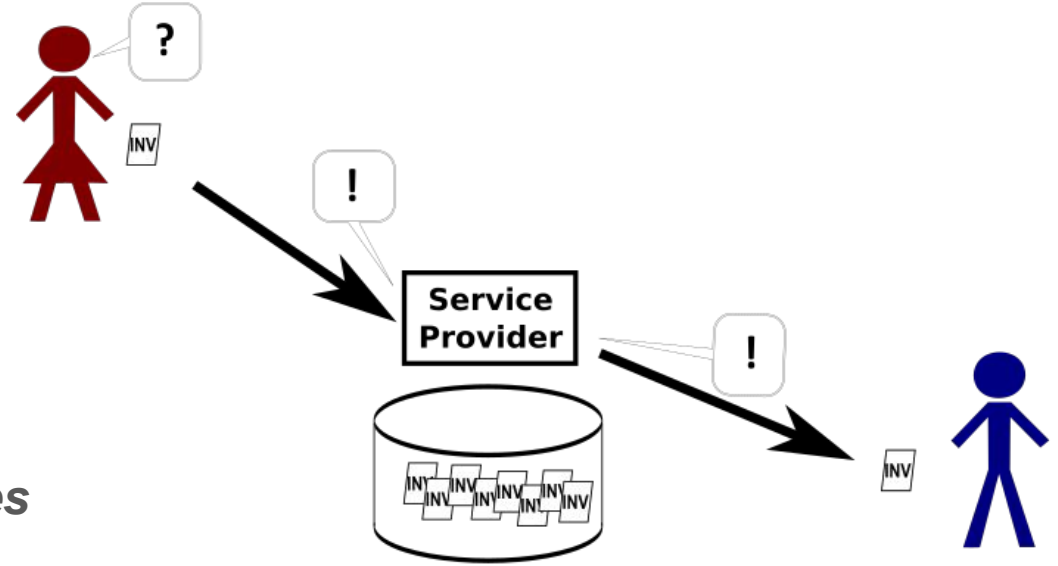
Threats of theft, loss, inspection, damage, destruction.



3-corner repository model

Commonly specified as "supplier portals" or "single windows" managed by an organization governing the connections, the document formats, and the documents themselves.

A centralized repository focuses all control on a single service provider entity.



3-corner repository model issues

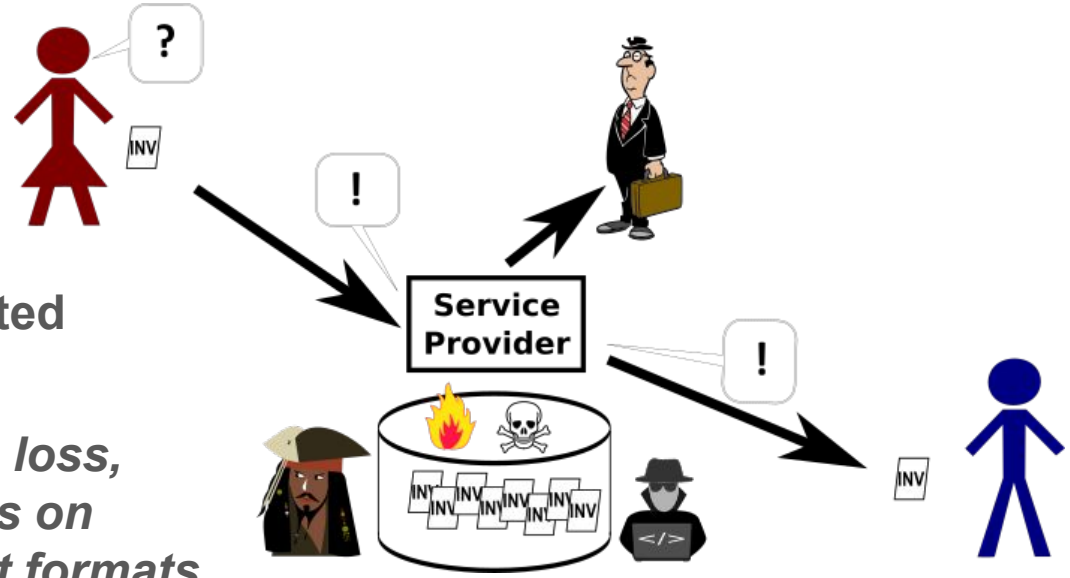
Central storage of the business documents.

Can support status (accepted? accepted!).

Can support auditors (undisputed copy of the document).

A single store is susceptible to loss, damage, privacy. Also imposes on users to use specific document formats.

Rogue operators could disenfranchise user communities by changing pricing, imposing access constraints, or having arbitrary policies.



4-corner transmittal model

Best transmittal model for access and openness.

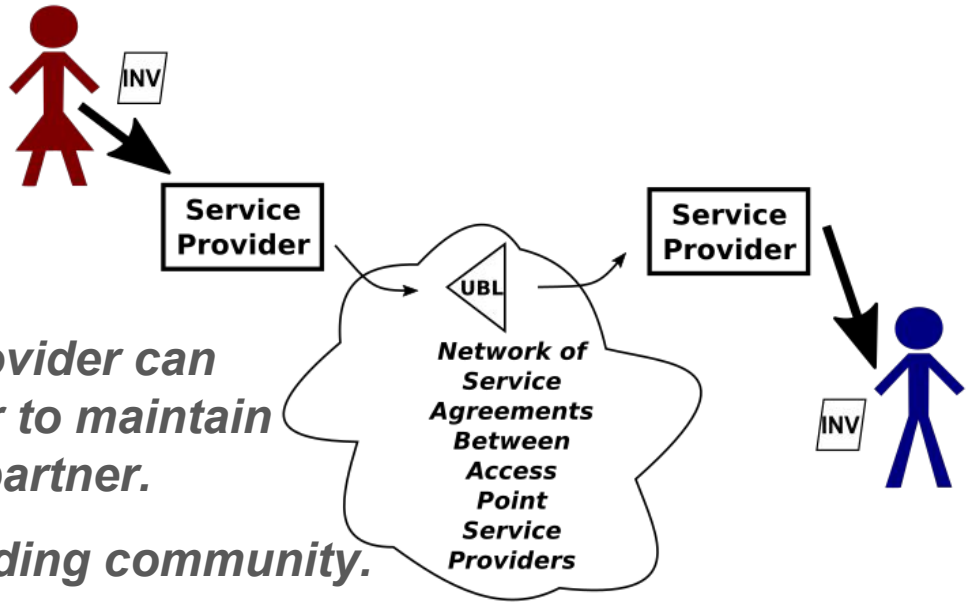
Private document relationship between parties and providers.

Mandated and certified document relationship between providers.

A party disenfranchised by one provider can seamlessly use a different provider to maintain the relationship with their trading partner.

Supports organic growth of the trading community.

Mimics international telephone and postal service models.



4-corner transmittal model issues

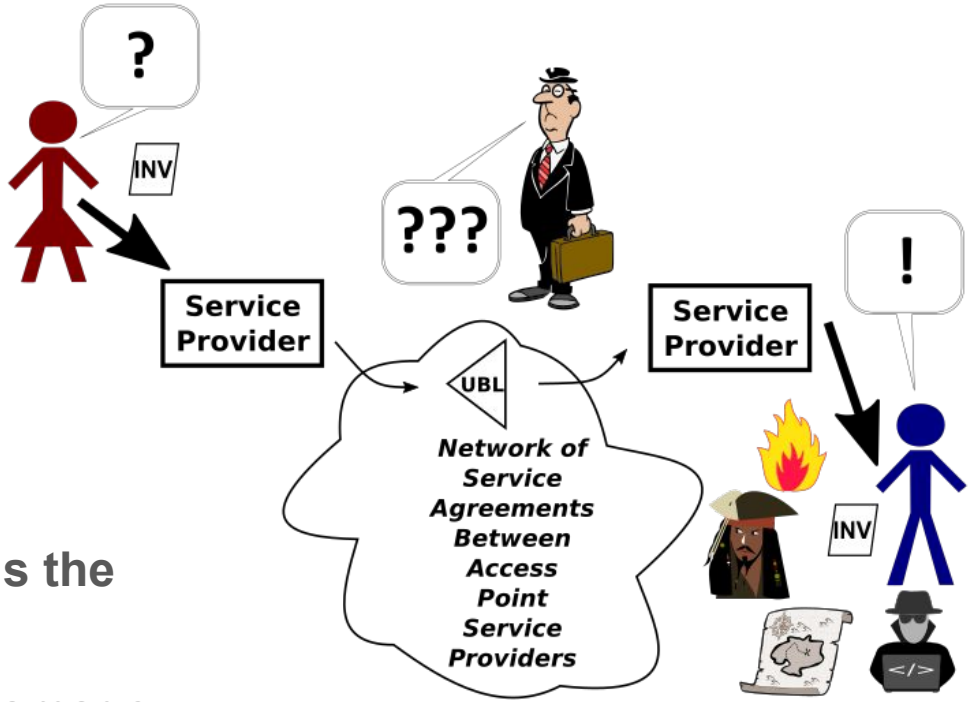
Only the transmittal (sending and receipt) of the document is guaranteed by the network.

Supplier:
"Has the invoice been accepted?"

Customer:
"I've accepted this invoice!"

Auditor:
"Which of these different invoices is the correct one???"

Threats of theft, loss, inspection, damage, destruction at either end (but not along the way).



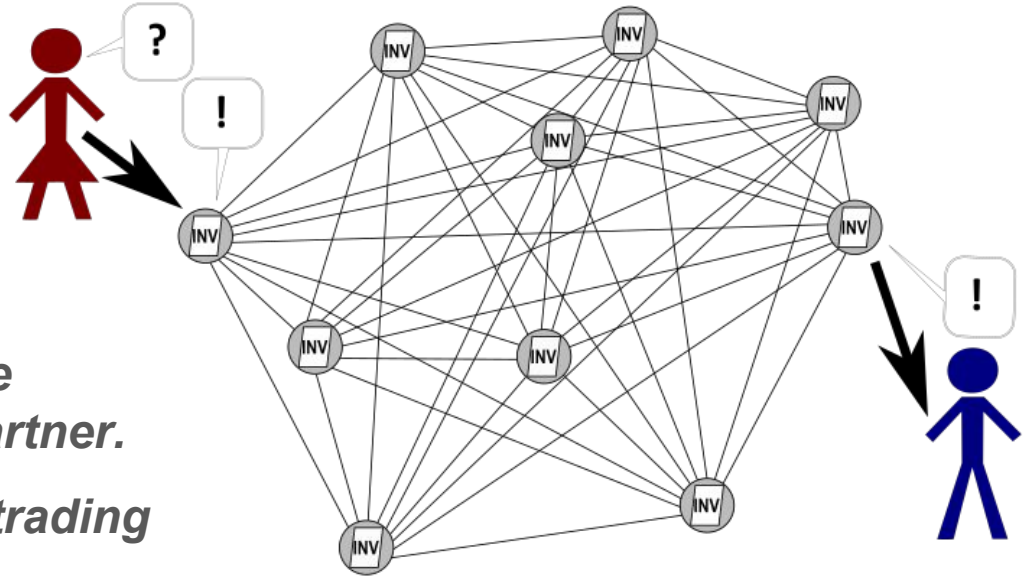
Decentralized repository model

A distributed business transaction repository stores both the document itself and the status of the document from the perspective of the parties.

Querying the document and the status at any distributed node.

A party disenfranchised by one provider can seamlessly use a different provider to maintain the relationship with their trading partner.

Supports organic growth of the trading community.

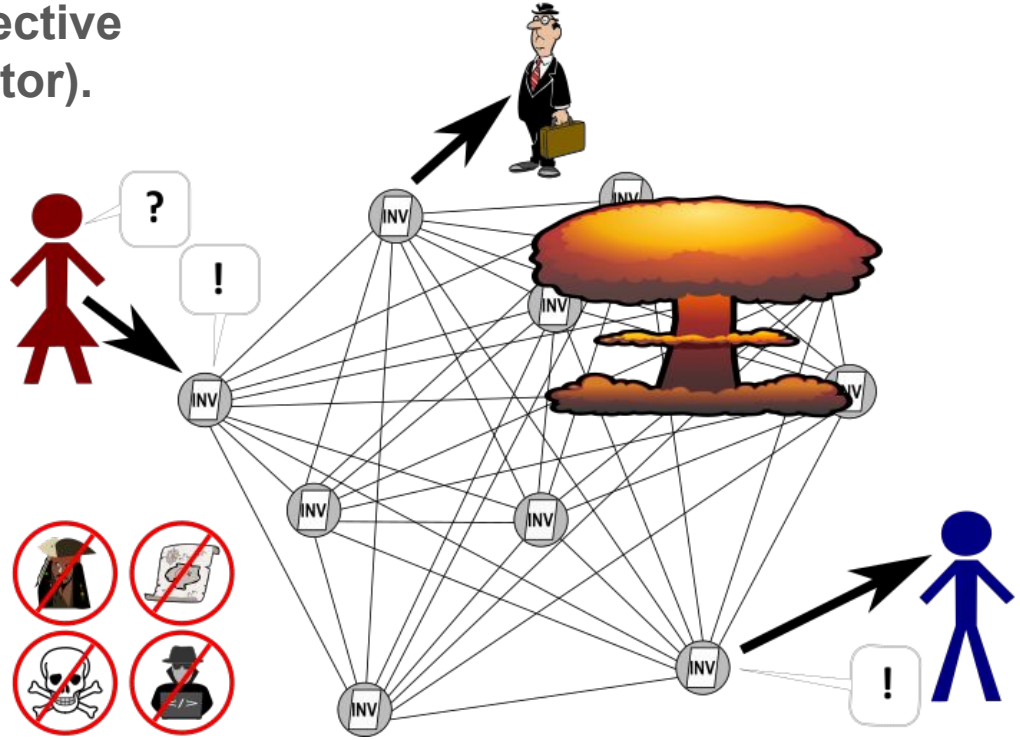


Decentralized repository model benefits

Supports an independent perspective of the transaction (as by an auditor).

Supports resilience to damage to a significant portion of the network.

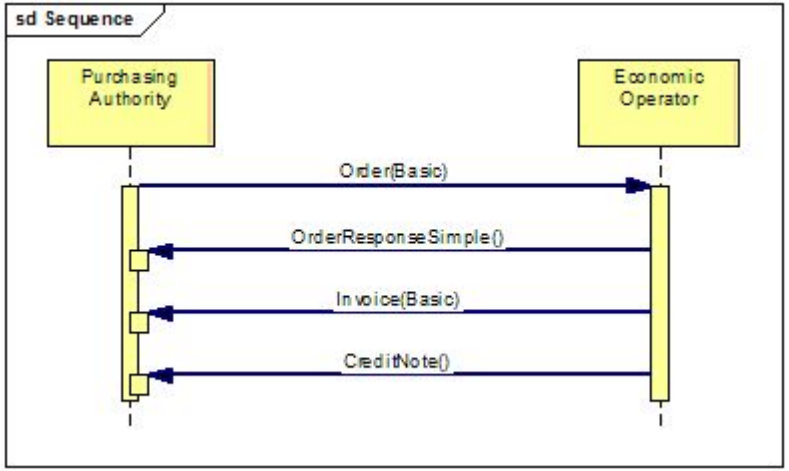
Use of cryptography prevents piracy, damage, and inspection.



Macro-scenarios

BII06 Procurement:

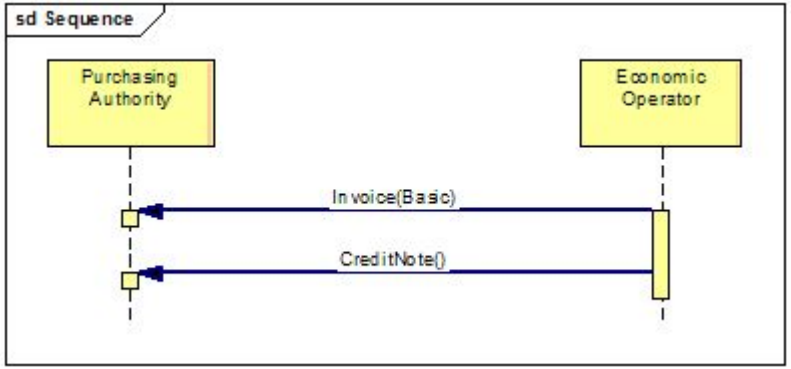
From CEN (European standards) technical committee and implemented on PEPPOL.



Macro-scenarios

BII05 Billing:

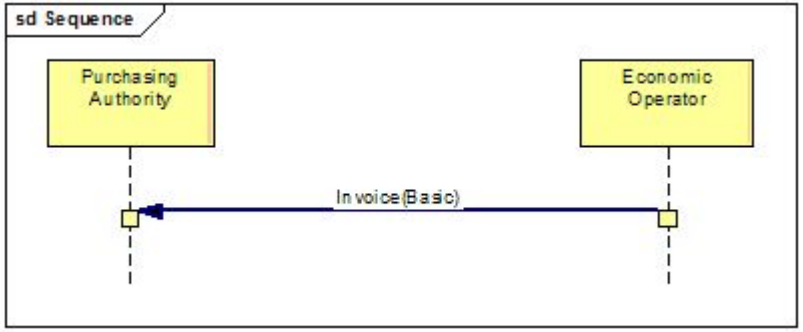
From CEN (European standards) technical committee and implemented on PEPPOL.



Macro-scenarios

BII04 Invoice Only:

From CEN (European standards) technical committee and implemented on PEPPOL.

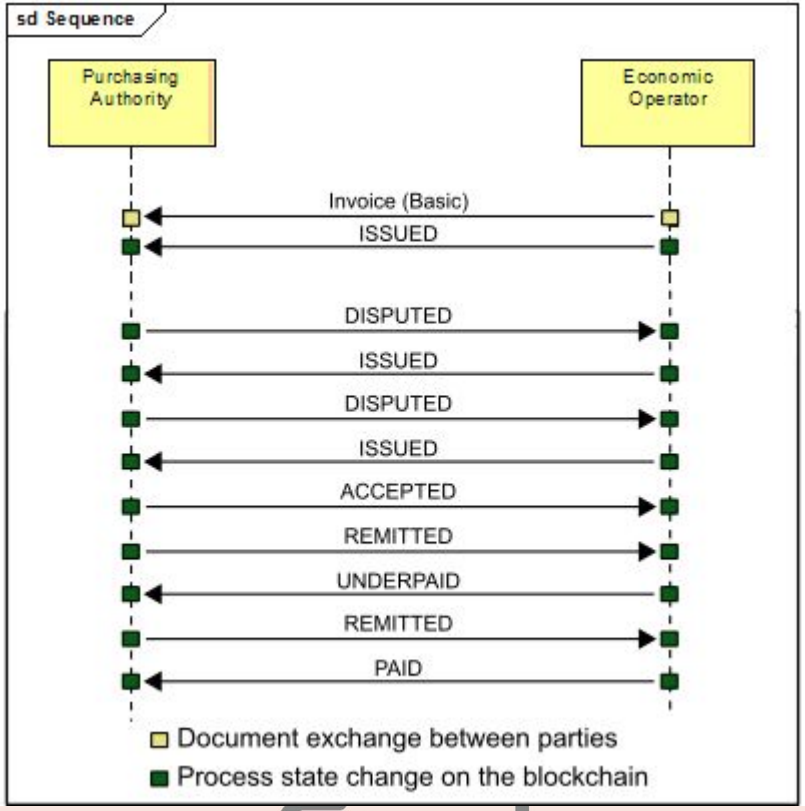


Macro- and micro-scenarios

BII04 Invoice Only:

The business document can be unambiguously identified by its proxy/fingerprint.

Augmented with micro-process scenario between trading partners, tracked on blockchain technology.

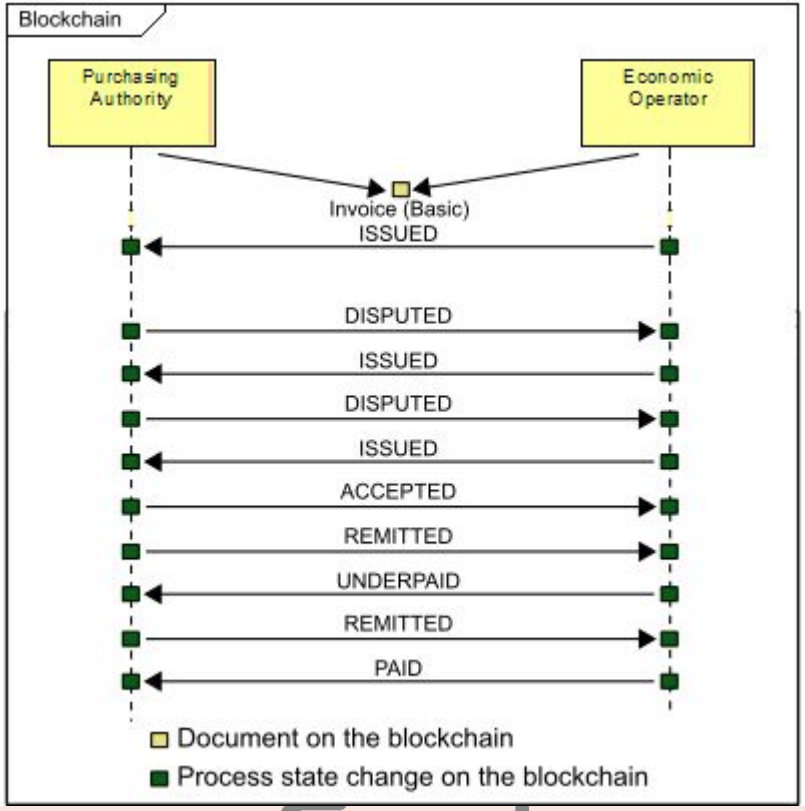


Macro- and micro-scenarios

BII04 Invoice Only on the blockchain:

Replacing document transmittal with document storage (either off the blockchain or on a blockchain).

Augmented with micro-process scenario between trading partners, tracked on blockchain technology.

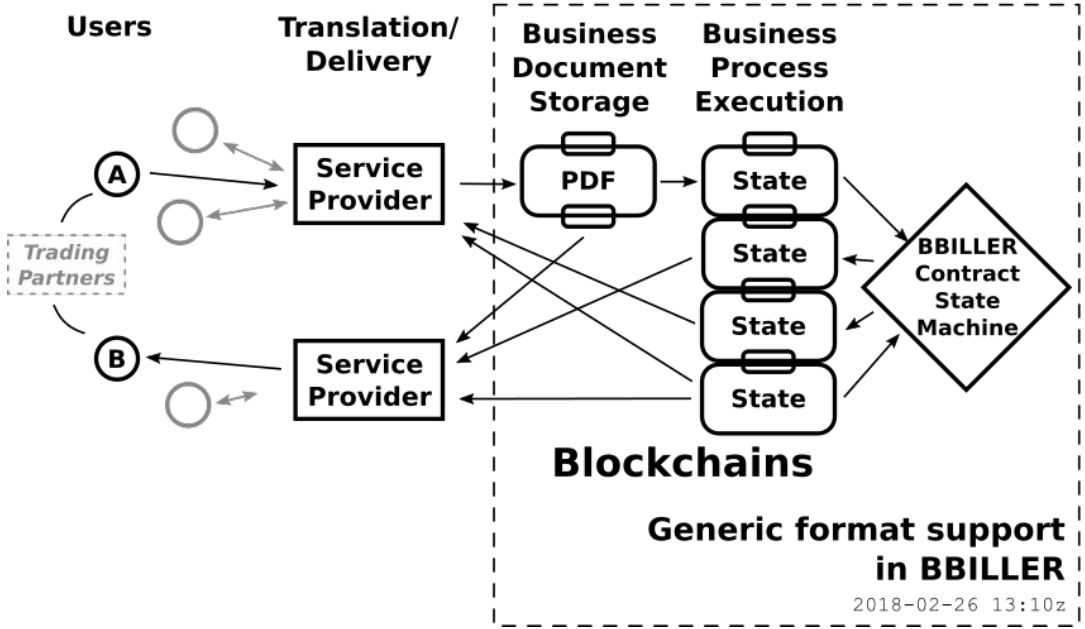


4-corner repository model

Orchestration:
A business transaction requires the performing of a business process(es) against a business document(s).

Choreography:
Each process is defined by a transaction scenario (state machine definition).

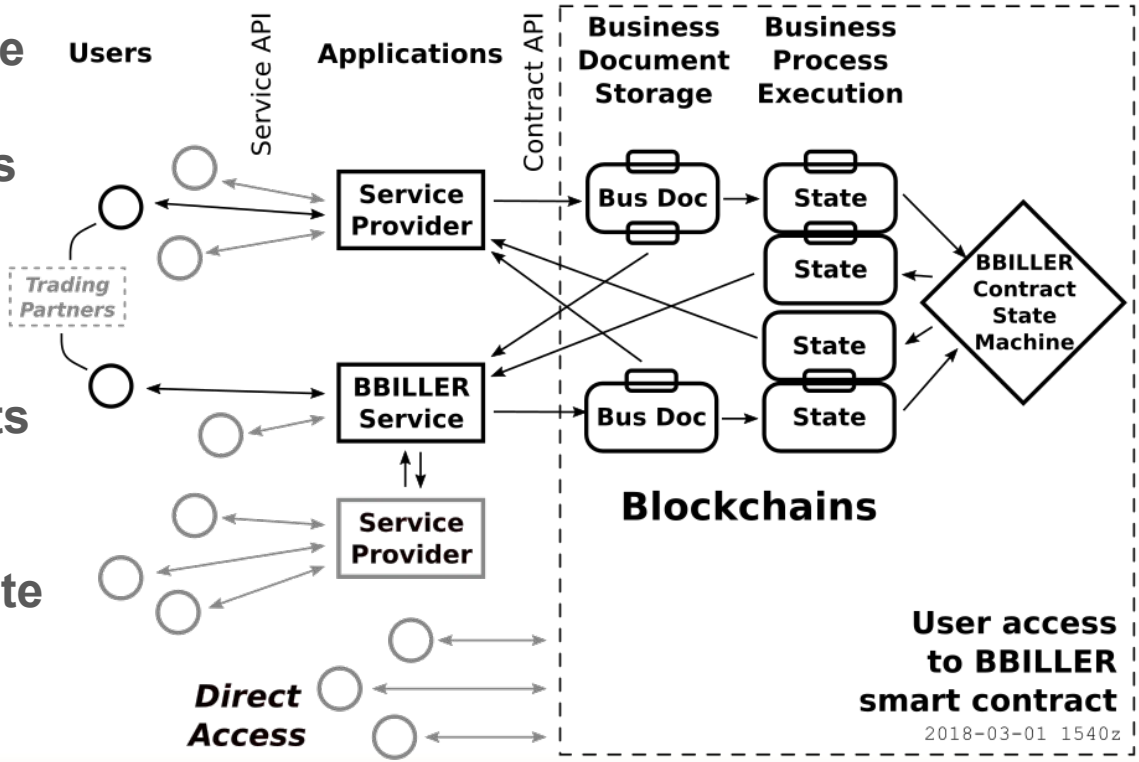
Repository:
The immutable blockchain history is in a *distributed business transaction repository*.



Distributed business transaction repository

The service API presents the information bundles and scenario states to end users using a private and personalized relationship.

The contract API implements the distributed business transaction repository in a public manner with all private content both secured and protected by using diligent cryptographic techniques.

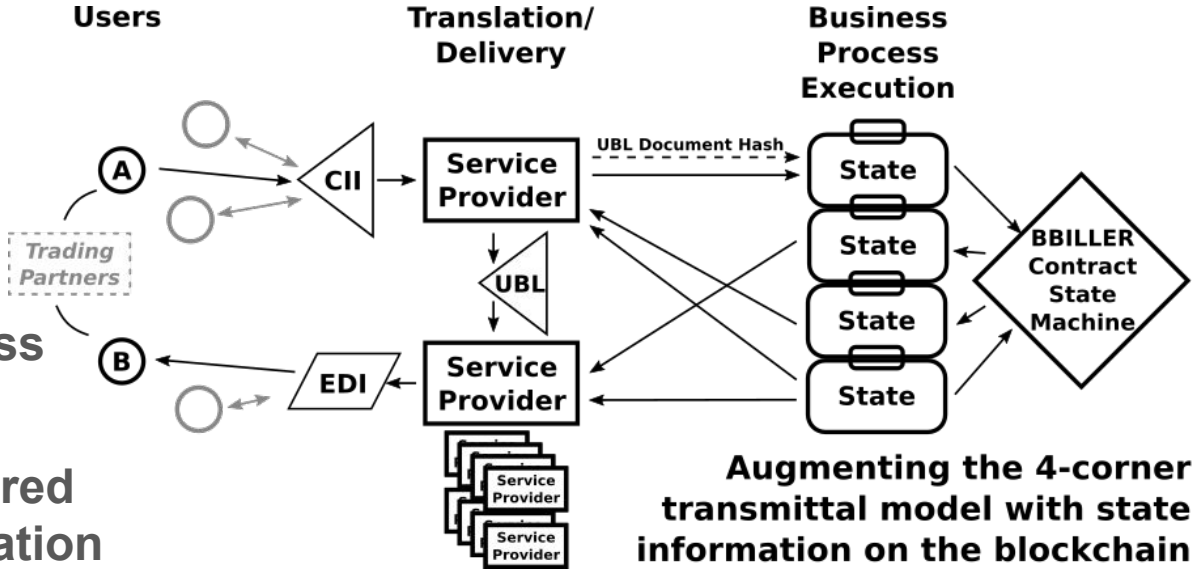


Augmenting 4-corner transmittal model business

Certified access point providers have revenue opportunities to augment document transmittal with the document hash (proxy of the original) and business process state changes.

All access points are required to fully support the information bundles using UBL syntax.

European PEPPOL: (2018-04) 175 access points certified in the use of UBL ISO/IEC 19845

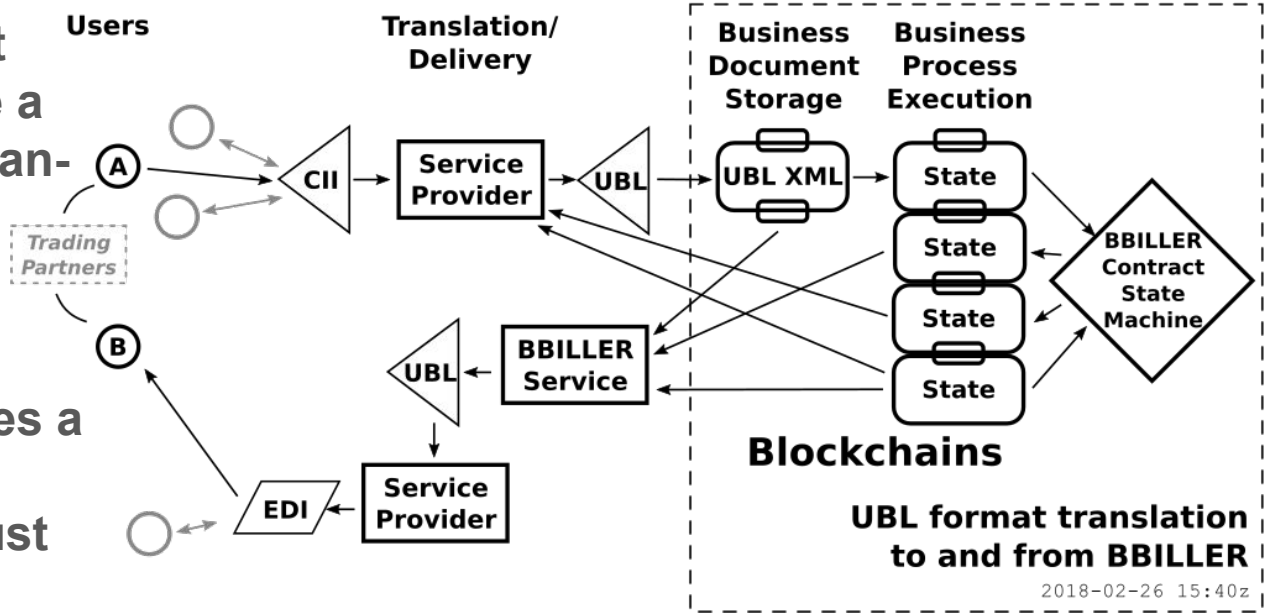


https://peppol.eu/who-is-who/peppol-certified-aps/

Comparative 4-corner repository model business

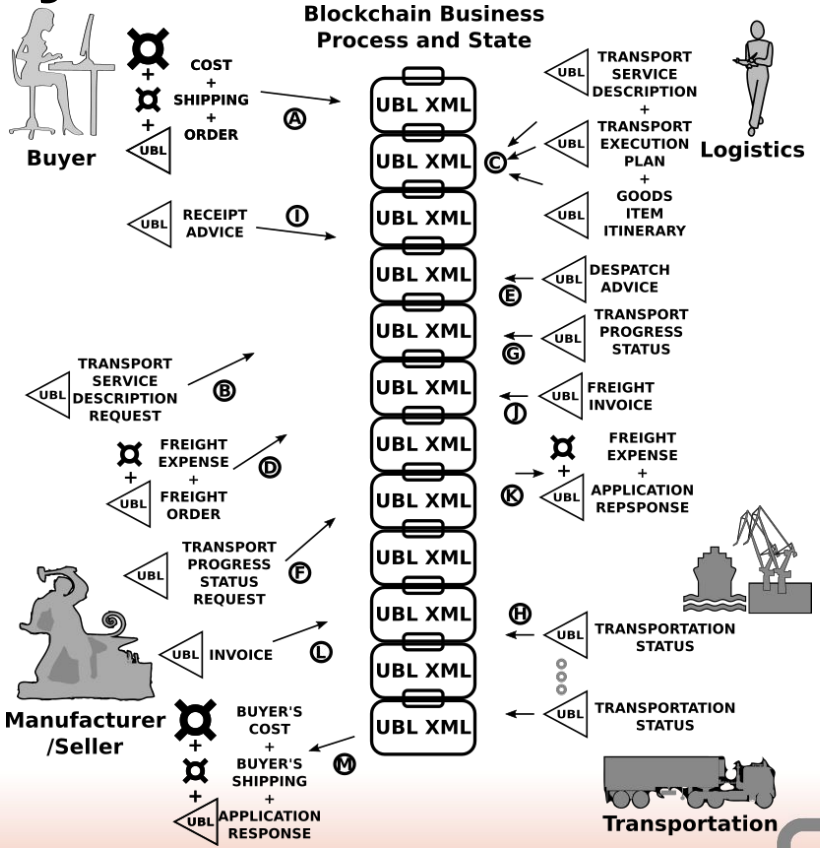
The same access point providers can leverage a distributed business transaction repository for the same document format independence.

The blockchain provides a trust mechanism in communities where trust may be a problem.



This approach supports an organic growth of the disintermediated trading community and protects the investment in using the distributed business transaction repository.

Towards a fully disintermediated business model



Towards a fully disintermediated business model

The steps of this illustrative idealized profile are as follows, and do not include tendering or catalogue components:

A: The buyer adds to the blockchain the UBL Order for goods and their cost and the shipping charges as published by the seller, to be released subject to the successful receipt of goods.

B: The seller needs to determine the shipping logistics and supplier and so issues a UBL Transport Service Description Request with details.

C: Logistics providers competitively respond with a UBL Transport Service Description outlining how each will be meeting the request, the UBL Transport Execution Plan describing the details of the shipment process and the UBL Goods Item Itinerary detailing the contents of the shipments and consignments.

D: The seller selects a logistics provider and responds by adding to the blockchain a UBL Order for freight service and its payment.

E: The logistics provider posts to the blockchain a UBL Despatch Advice announcing the despatch of the shipment.

F: At any time the seller may request an aggregated status by posting a UBL Transport Progress Status Request.

G: The logistics provider responds by posting to the blockchain a UBL Transport Progress Status with the latest information.

H: Through the transportation process itself, it is possible for participants to post to the blockchain their specific changes in status using the UBL Transportation Status document.

I: The goods having been delivered triggers a UBL Receipt Advice being added to the blockchain. This could be triggered automatically by the buyer signing for the delivery through a device presented by the shipper, so as not to allow the buyer to delay.

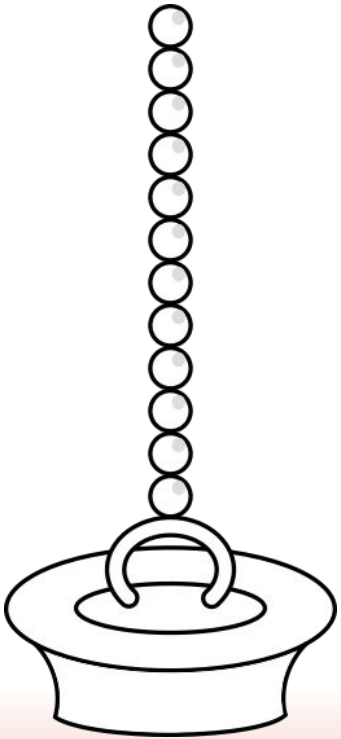
J: With the shipment made the logistics provider can add the UBL Freight Invoice reflecting the actual incurred costs.

K: This automatically triggers the freight expense to be released into the hands of the logistics provider and an acknowledgement using a UBL Application Response. Any overpayment would stay in the blockchain.

L: At this point the seller can issue the UBL Invoice reflecting the cost of the actual goods delivered and the amount of the shipping the seller wants to charge the buyer.

M: This automatically triggers the buyer's goods and shipping costs to be released into the hands of the seller and an acknowledgement using a UBL Application Response. Any overpayment would be returned to the buyer.

Questions?



Sources of terms

All these completed ISO specifications are available at no charge through:

http://standards.iso.org/ittf/PubliclyAvailableStandards/

ISO/IEC 14662:2010

- Open-edi reference model

ISO/IEC 15944-1:2011

- Business Operational View -- Part 1: Operational aspects of Open-edi for implementation

ISO/IEC 15944-4:2015

- Business Operational View -- Part 4: Business transaction scenarios -- Accounting and economic ontology

ISO/IEC NP TR 15944-15 (work in progress)

- Business operational view -- Part 15: Application of Open-edi business transaction ontology in distributed business transaction repositories and open value networks

Other ISO/IEC 15944 parts