AI-Driven E-document Framework for Seamless Supply Chain Document Exchange
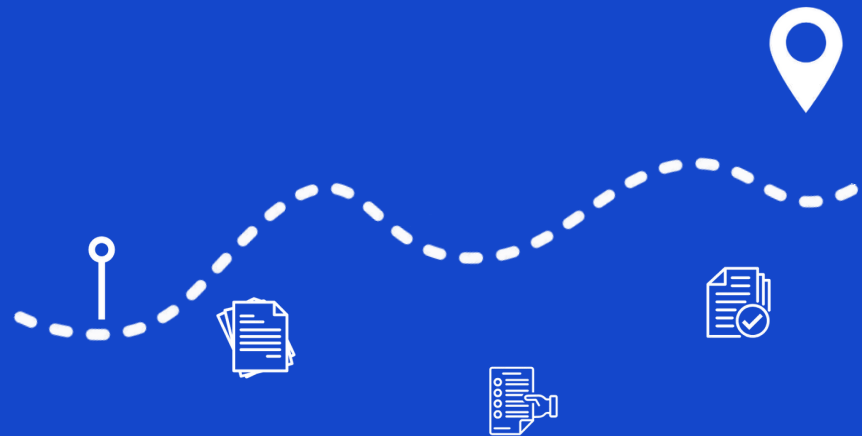
Speaker:

Zack Dikhtyar, CEO
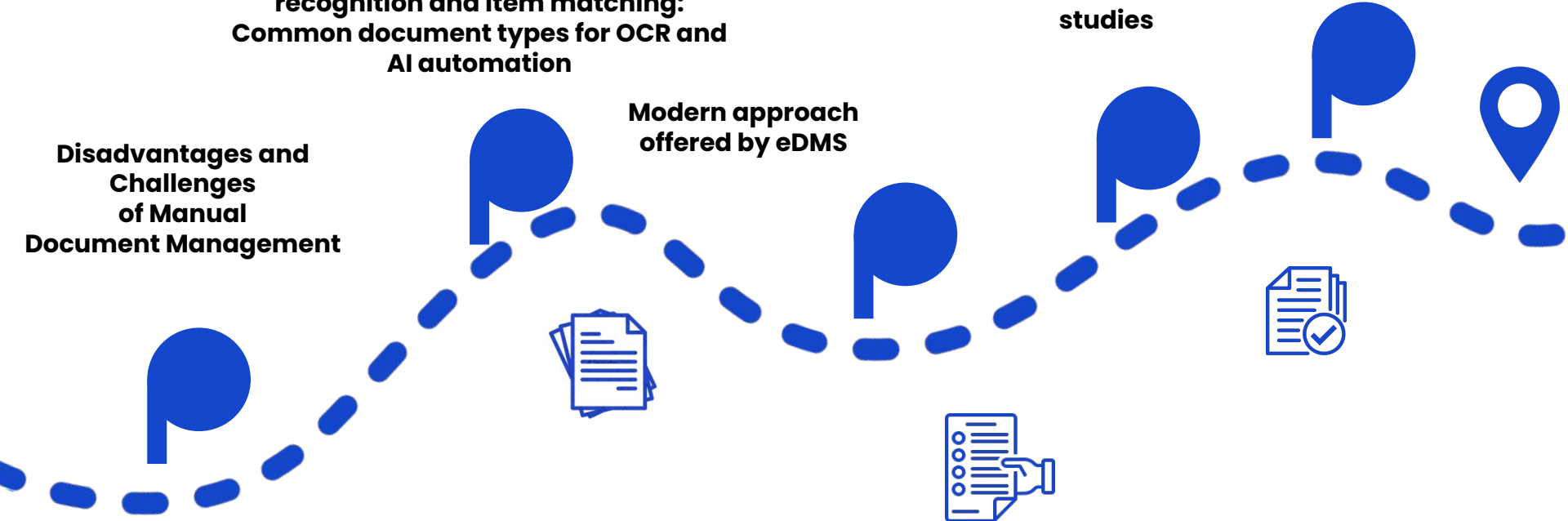
DocStudio

Agenda

Disadvantages and Challenges of Manual Document Management

Current options for document recognition and item matching: Common document types for OCR and AI automation

Modern approach offered by eDMS

Document automation case studies

Breakdown of costs and benefits offered by AI-automation

Enterprise Document Flows in Supply Chain

Supply Chain Documents

Purchase Orders

Invoices

Inventory Reports

Delivery Orders

Goods Receipts

Advanced Shipping Notices

Requests for Quotation (RFQ)

Bills of Lading
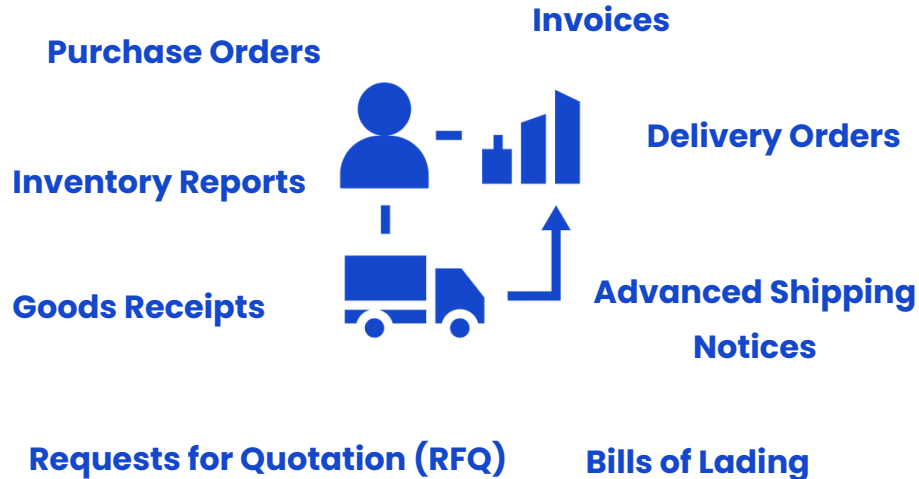
Legal and Operational Documents

Employment Agreements

Contracts

Partnership Agreements

NDAs

Terms and Conditions

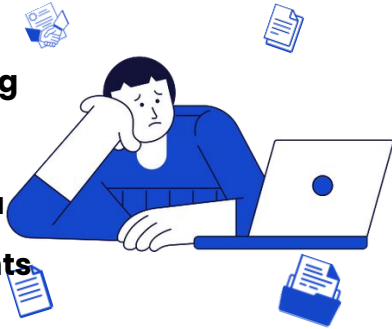Compliance Forms

Service Level Agreements

Disadvantages of Manual Document Management

Reduced efficiency and productivity

Risk of document loss or damage

Difficulties in tracking and retrieving documents and data from those documents

Higher administrative and labor costs

Poor document security and compliance risks

Slower response times to business needs

Why Go Digital

40%

of document-related costs can be reduced when using document management systems

up to 80%

of time spent file-sharing can be saved when using a DMS

around $49,600

is saved in salary costs if a regular-sized company starts using a DMS
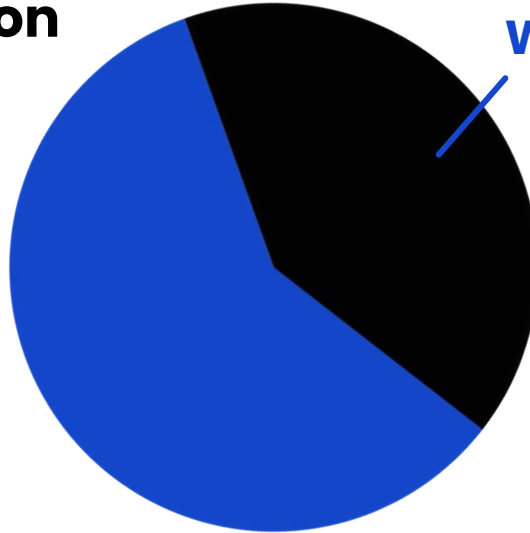
45%

of companies spent at least 1 week to have a contract signed

Supply Chain Documents

Challenge: lack of master data and incomplete EDI integration /automatization

59% of US companies in Supply Chain adopted EDI for their daily operations

What about the other 41%?

Source: Data Interchange. (2023, October 5). *Over 41% of companies at risk without EDI.* https://datainterchange.com/over-41-of-companies-at-risk-without-edi/

While EDI systems work smoothly, not all your partners will have the necessary infrastructure to use them.

Main Challenges with Invoice Recognition

Some invoices are difficult to recognize due to complicated design and layout.

There are chances of mixing up invoice number with invoice date as well as the columns of Quantity with Price or Total amount

Handwritten marks are not always processed equally: they should sometimes be ignored, other times taken into account

Decimal separators and ".00" in cents need to be processed appropriately.

Even after successful OCR (character recognition) data is still not structured.

Item matching against ERP item list still needs to be done manually .

Finding Solutions: Three Steps to Take

OCR

Optical character recognition (OCR) is used to convert scanned images or documents into editable text. For digitally rendered files (such as DOCX, Excel, and some PDFs), OCR may not be necessary, as these formats often retain text data directly.

Structure detection

Document structure detection identifies key elements like invoice number, date, sender, EIN, address, and values, followed by validation (e.g., Quantity × Price = Amount, summing to Total). This process produces a standardized document, such as in PIDX format.

Item matching

Matching each item from the invoice to the closest matching item in the ERP system's item list involves using an AI-based natural language model. This model analyzes product descriptions from the ERP item list to identify the best matches for invoice items.

Results must be human-approved to ensure the quality of final data and can then be imported to the ERP.

Available Software for Document Recognition: OCR and AI Automation Options

There are some products and SaaS on the market providing document structure recognition:

They are available as a web platform, API-only, or as applications for iOS and Android.

Some options like SAP or Dynamix365 provide integrations with ERP systems .

However, none of those offer item matching;

Integration with existing EDI (Electronic Data Interchange) and DMP (Document Management Platforms) is not provided by either of them.
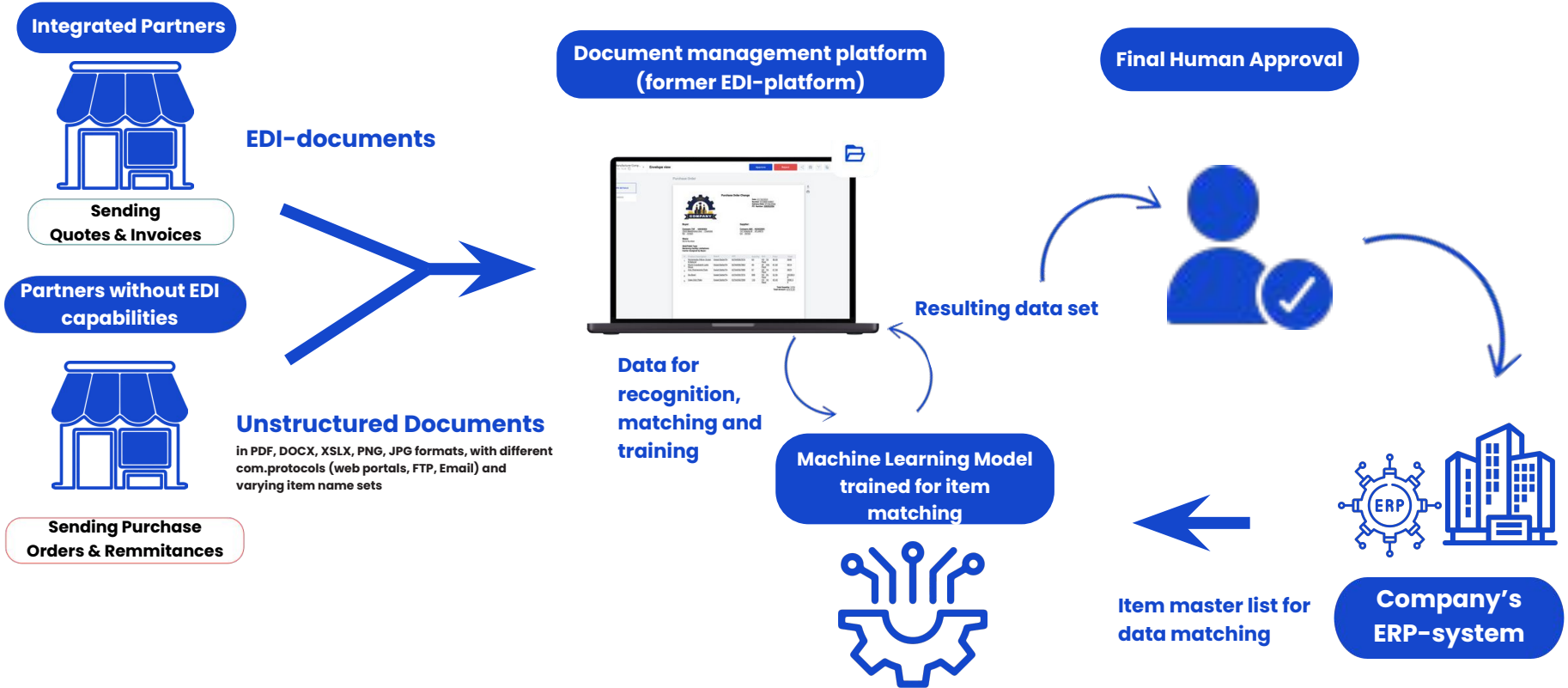
AI Document Posting Framework

Integrated Partners

Sending
Quotes & Invoices

EDI-documents

Partners without EDI capabilities

Sending Purchase
Orders & Remmitances

Unstructured Documents

in PDF, DOCX, XSLX, PNG, JPG formats, with different com.protocols (web portals, FTP, Email) and varying item name sets

Document management platform (former EDI-platform)

Data for recognition, matching and training

Resulting data set

Final Human Approval

Machine Learning Model trained for item matching

Item master list for data matching

Company's ERP-system

AI Document Posting Framework Description

Ongoing Daily Processes:

Document Ingestion

Hundreds or thousands of documents of predefined types (quotes, invoices, orders, specs) arrive via different channels (web portal, procurement platform, FTP, email, etc.) and in various formats (PDF, DOCX, PNG, JPEG).

OCR Processing

Image files are processed using OCR to extract text-based content.

Block Detection and Decomposition

Once all documents have a text-based representation, they undergo block detection and decomposition (e.g., DocumentType = "Invoice", DocumentDate = "November 15, 2024", SenderEIN = 352589633).

Data Storage

Detected data is stored in a structured format (e.g., PIDX). **However, at this stage, items are not yet matched with the ERP's item list.**

AI-Based Item Matching

The AI-based item matching tool pairs items from the document with corresponding items in the sender's list.

Approval Process

All invoices are sent for approval by a responsible and experienced person. Correct matches enhance the system's reliability, while incorrect matches are used to retrain the AI model.
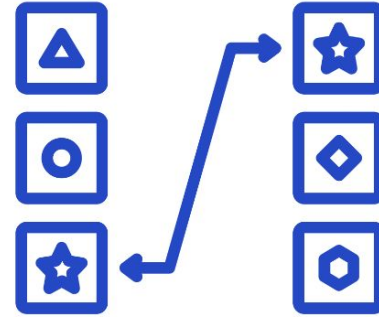
ERP Integration

Recognized and matched invoices, in the predefined format, are sent to the enterprise ERP system as regular EDI documents.

AI Document Posting Framework Setup Process

There are two AI-models to be used for such framework:

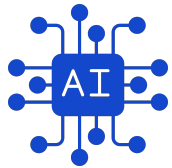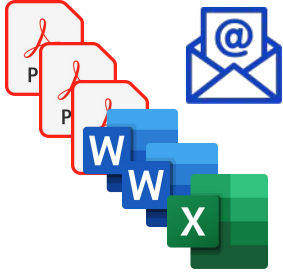**Document Structure Detection Model**

Item Matching Model

At the initial stage, and each time there are significant changes to the document type set, design, layouts, or major updates to the item list, the accuracy of the AI models needs to be reevaluated.
If necessary, the models should be retrained using the new data. This process may be ongoing, but it requires a supervisor to act as a quality judge for the system.

Unstructured Documents

AI Models

Structured Documents

ERP System

Automatic Item List Synchronization

PIDX INTERNATIONAL

SAP

Purchase Order Change

Date: 07/18/2024
Number: 8734897438897
Delivery Date: 07/26/2024
PO Number: 326562356

COMPANY

Buyer:
Company TGF , 64646464
2543 Weddington Ave. , Charlotte
NC , 87654

Supplier:
Company ABC , 930432081
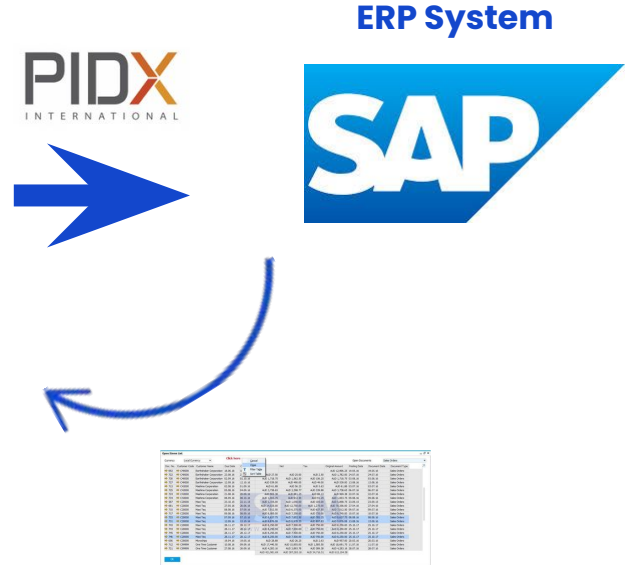167 Atlanta St , ATLANTA
GA , 30755

Store:
Store Number

Skid/Pallet Type:
Receiving Facility Limitations:
Carrier Assigned by Buyer:

#	Product Description	Brand	UPC	Quantity	Unit	Price	Total
1	Rectangular Pillow, Ocean & Natural	Sweet BatterFly	657643567875	65	H3 : 18-Pack	56.00	3640
2	Black Crosshatch Latte Mugs	Sweet BatterFly	657643567865	45	4F : 100-Pack	67.00	3015
3	Aria Champagne Flute	Sweet BatterFly	657643567888	87	H3 : 18-Pack	67.00	5829
4	Big Bowl	Sweet BatterFly	657643567875	898	H6 : 30-Pack	32.56	29238.8 8
5	Deep Dish Plate	Sweet BatterFly	657643567898	123	H3 : 18-Pack	45.45	5590.3 5

Total Quantity: 1218
Total Amount: 47313.23

ROI and Cost-Benefit Analysis

With an average company processing 500 transactional documents per month, or around 6000 documents annually.

Manual Handling

20 mins

spent processing one document

On average, it takes 15 minutes to create one document, with around 40-80 line items of information that need to be retyped manually in every transactional document.
An additional, 5 minutes are spent correcting errors and double-checking the information.

$8

in labor costs per document

With the average wage of 25$ per hour for employees working with document processes.

+

other operational costs

That includes the use of paper and ink, document storage, mailing fees, and others.

$~50,000

annually in labor and document processing costs

AI -automateed processing

0.5 mins

spent processing one document

With ready-to-use templates and streamlined document workflows in place.

$0.6

cost per document processing

Including costs for labor and software license for 5 users.

$~9,780

annual total cost for the first year

Including software license for 5 users, project rollout, support and maintenance, manual labour costs involvement.

$~5,780

annual total cost for the second and subsequent years

Including software license for 5 users, support and maintenance, manual labour costs involvement.

ROI of ~ $40,220 (80.44%) in the first year of adoption and $44, 220 (88.44%) in the subsequent years

Takeaways

✓ **AI may eliminate up to 90-95% of manual job for document re-entry (including item matching document type detection, document structure detection).**

✓ **This innovation is available for all EDI-users, small & medium companies and big enterprises with little or no changes to their existing internal IT-infrastructure.**

✓ **Implementation and maintenance of such functionality needs little to no AI competences.**

✓ **Human approval of documents still needed but take 10-20 times less effort than manual processing. Probably this inconvenience will be eliminated in next generation of AI in a few years.**

✓ **This approach may be used for all supply chain documents (Invoice, Purchase Order, Shipping Notice, Bill of Landing, Field Service Ticket, Remittance advice), and most other document types (agreements, contracts, application forms).**

✓ **Standards and code lists play even more important role of "common language" than before.**

Q & A

DocStudio

Thank You for Your Time!

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