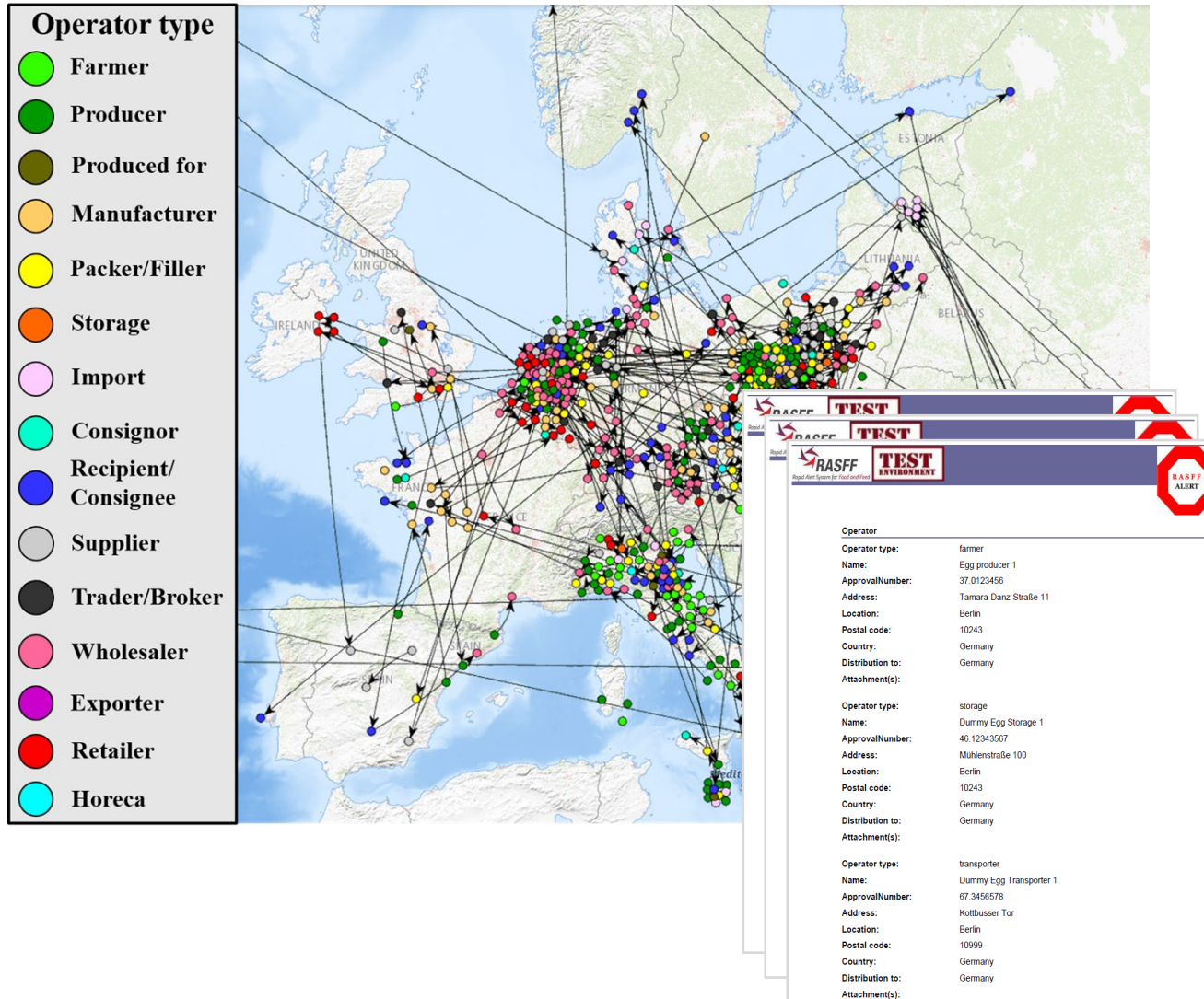


AI-supported data extraction: The Rapid Alert Supply Network EXtractor (RASNEX) tool for mining supply chain information

15.05.2025

Daria Savvateeva, Matthew Salewski & Marc C. Lorenzen

Contamination in the Supply Chain



Need to stop outbreaks as fast as possible!

Rapid Alert System for Food and Feed (RASFF) provides relevant information

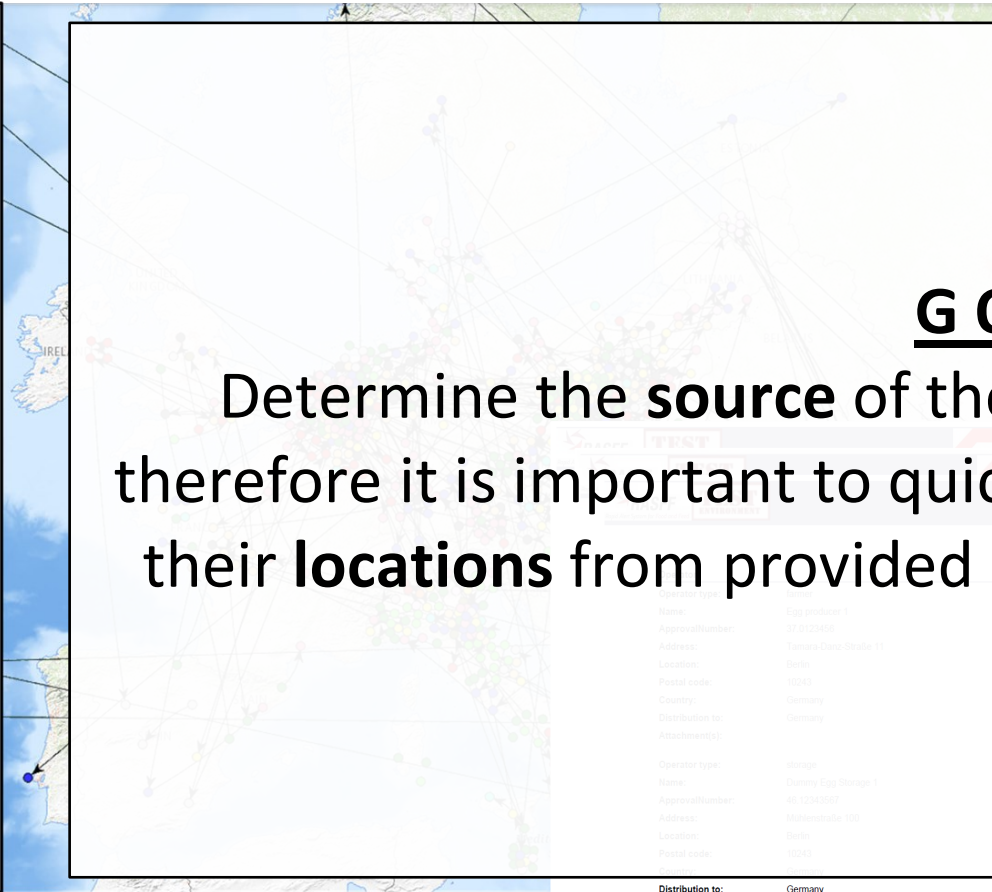
Collected information (manual work)

- laboratory and delivery data
- times, locations, quantities
- Food Business Operators (FBOs) and affected products

Contamination in the Supply Chain

Operator type

- Farmer
- Producer
- Produced for
- Manufacturer
- Packer/Filler
- Storage
- Import
- Consignor
- Recipient/Consignee
- Supplier
- Trader/Broker
- Wholesaler
- Exporter
- Retailer
- Horeca



During an outbreak need to stop it as fast as possible!

GOAL

Determine the **source** of the contamination to **resolve** it, therefore it is important to quickly determine the **operators** and their **locations** from provided information contained in RASFF.



Collected information (manually)

- laboratory and transport data
- time, locations, quantities
- Food Business Operators (FBOs) and their products

Distribution to:
Attachment(s):
Germany

Operator type:
Name:
ApprovalNumber:
Address:
Location:
Postal code:
Country:
Distribution to:
Attachment(s):
transporter
Dummy Egg Transporter 1
67.3456578
Kottbusser Tor
Berlin
10999
Germany
Germany

Rapid Alert System for Food and Feed (RASFF) notifications



food - alert notification - company's own check - eggs - Germany - no definition_fipronilno definition_fipronil
Notification Link <https://webgate.acceptance.ec.europa.eu/rasff/notification/view/348541>

General Information

Notification number: 348541
Reference:
Notification type: food
Notification basis: company's own check
Notification classification: alert notification
Product name: eggs
Product category: eggs and egg products
Notifying country: Germany
Notifying Country region: BfR
CP Reference:
Date of notification: 15/07/2020
Subject: fipronil dummy contamination
Infosan Informed: No
eCommerce Related: No
Mutual recognition: No
Notification status: DRAFT
15/07/2020 10:31:37
Follow-up status:
Number of follow-ups: 0

Distribution Status



distribution to other member countries

Countries notified for the notification and associated follow-up

For follow-up:

Countries notified for the notification and associated follow-up

Notification reference: (348541) 01/09/2020 09:16:20 Page 1 of 13
Document reference: 348541_1598944581062



Additional information: Additional analytical reports attached. Additional analyzes were commissioned by Dunrin Polska Sp. z o.o. - "Bio almond milk" purchased from Almondina GmbH Schillerstraße 9, Bad Dürkheim, 69345, Rheinland-Pfalz - test result correct, ethylene oxide content # 0.01 mg / kg. - two batches of baking mixes called Whole & Tasty Bio produced in January 2021 by Dunrin Polska Sp. z o.o. - test result correct, ethylene oxide content # 0.01 mg / kg

Follow-up type: additional information
#357488 - rg validated - N_AAC_RASFF - AAC/RASFF

CP Reference: 1-2
Organisation / ministry: German Ministry of Test Notification
Contact person: TOM TRACING

Additional information: In the outcome of the investigations at the company FURMA - Via Fogorina 19 - BARLETTA, it was found that the same had received a package of the product subject to the alert. The product has not been marketed, and is put aside, pending withdrawal by the manufacturer

Follow-up type: additional information
#357489 - rg validated - N_AAC_RASFF - AAC/RASFF

CP Reference: 1-3
Organisation / ministry: German Ministry of Test Notification
Contact person: OLGA OUTBREAK

Additional information: The company WOB from Maastricht (NE) is included in the distribution list of the company Magic Herbs. In reality the product was delivered to: WOB Sudo srl - Van Brakelstraat 58 - 3514 HH Utrecht

Follow-up type: additional information
#357491 - rg validated - N_AAC_RASFF - AAC/RASFF

CP Reference: 1-5
Organisation / ministry: German Ministry of Test Notification
Contact person: LAURA LABORATORY

Additional information: With reference to -fup32, it is reported that the withdrawal was not known at the company A & O, Bundesstr. 19, 74465 Dresden, Germany. The goods found on site were voluntarily taken out of circulation.

Follow-up type: additional information
#357492 - rg validated - N_AAC_RASFF - AAC/RASFF

CP Reference: 1-4
Organisation / ministry: German Ministry of Test Notification
Contact person: ANTONIA ANALYSIS

Additional information: With reference to fup11: During the investigation of one of the recipients it was found that Freshmarket Klaus Hohn, Weißenseeufer 34, 55930 Sonnersdorf does not have the questioned product in stock. to the statement of the operator, Mr. Klaus Hohn, the product was sold to individual customers on a receipt. Mr. Klaus Hohn also stated that there was no product in question on the market in his stationary store. Moreover, as established, the trader was not informed by Ganz Biohandels GmbH about the non-compliance.

Notification reference: (348541) 05/09/2023 12:46:30 Page 14 of 16
Document reference: 348541_1693910790350

Attachments:

- Invoices, Delivery lists, Receipts
- Product labels, Ingredients lists, Recipes
- Lab reports, measurement slips
- Official reports and letters from agencies

How to extract data from RASFF?




Operator	
Operator type:	farmer
Name:	Egg producer 1
ApprovalNumber:	37.0123456
Address:	Tamara-Danz-Straße 11
Location:	Berlin
Postal code:	10243
Country:	Germany
Distribution to:	Germany
Attachment(s):	
Operator type:	storage
Name:	Dummy Egg Storage 1
ApprovalNumber:	46.12343567
Address:	Mühlenstraße 100
Location:	Berlin
Postal code:	10243
Country:	Germany
Distribution to:	Germany
Attachment(s):	
Operator type:	transporter
Name:	Dummy Egg Transporter 1
ApprovalNumber:	67.3456578
Address:	Kottbusser Tor
Location:	Berlin
Postal code:	10999
Country:	Germany
Distribution to:	Germany
Attachment(s):	

Challenges:


- Manual work that is done in multiple institutions and Member States in parallel
- Non-standardised & unstructured formatting of attached documents
- Multiple languages
- Multiple address formats amongst Member States
- Continuous flow of information (updates on the RASFF)

→ How can we support people working with RASFF?

Where do we come from? RASNEX 1.0



TEST
ENVIRONMENT



Operator

Operator type:

farmer

Name:

Egg producer 1

ApprovalNumber:

37.0123456

Address:

Tamara-Danz-Straße 11

Location:

Berlin

Postal code:

10243

Country:

Germany

Distribution to:

Germany

Attachment(s):

Operator type:

storage

Name:

Dummy Egg Storage 1

ApprovalNumber:

46.12343567

Address:

Mühlenstraße 100

Location:

Berlin

Postal code:

10243

Country:

Germany

Distribution to:

Germany

Attachment(s):

Operator type:

transporter

Name:

Dummy Egg Transporter 1

ApprovalNumber:

67.3456578

Address:

Kottbusser Tor

Location:

Berlin

Postal code:

10999

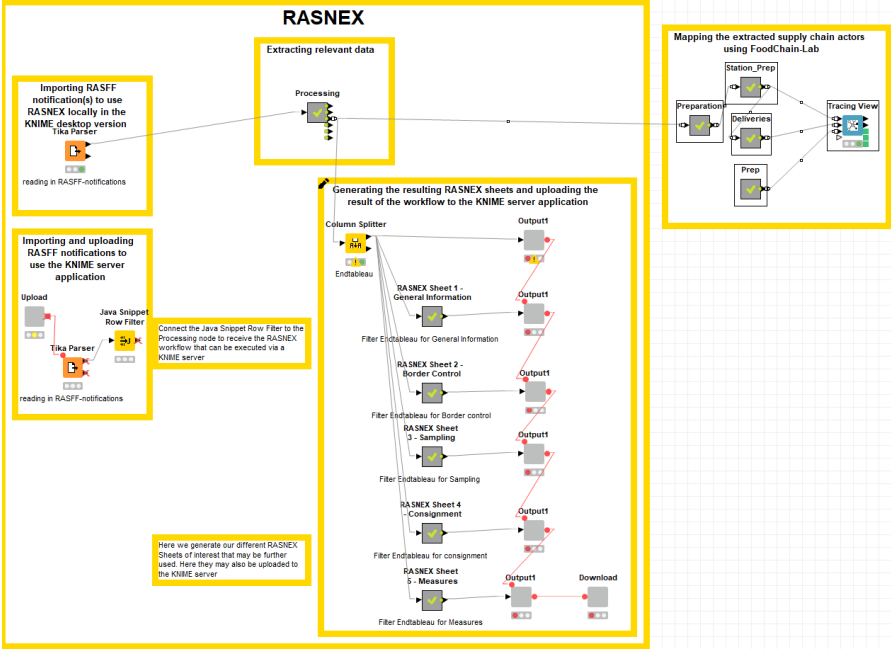
Country:

Germany

Distribution to:

Germany

Attachment(s):



Row ID	EU legs...	Specify...	Maximu...	Sample...	Distribu...	Consign...	Origin	Public h...	Public health certificate date	CIED n...	Other d...	Durabi...	Descrip...	Descrip...	PLU	Operat...	Approv...	Address	Location	Postal ...	Count...	Distribu...
Sampling (Ma...	37/2010	?	Absence	0_0	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Sampling (Ma...	37/2010	?	Absence mg...	0_1	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Traceability (...)	?	?	?	?	distribution t...	Printnumber...	Germany	?	1-0E-1234567 und 2-0E-3456789	?	?	?	5000	350 kg	0_0	farmer	37.0123456	Tamara-Danz-Straße 11	Berlin	10243	Germany	Germany
Traceability (...)	?	?	?	?	distribution t...	Printnumber...	Germany	?	1-0E-1234567 und 2-0E-3456789	?	?	?	5000	350 kg	0_0	storage	46.12343567	Mühlenstraße 100	Berlin	10243	Germany	Germany
Traceability (...)	?	?	?	?	distribution t...	Printnumber...	Germany	?	1-0E-1234567 und 2-0E-3456789	?	?	?	5000	350 kg	0_0	transporter	67.3456578	Kottbusser Tor	Berlin	10999	Germany	Germany
Traceability (...)	?	?	?	?	distribution t...	Printnumber...	Germany	?	1-0E-1234567 und 2-0E-3456789	?	?	?	5000	350 kg	0_0	wholesaler	12.789123	Marktplatz	München	80331	Germany	Austria
Traceability (...)	?	?	?	?	distribution t...	Printnumber...	Germany	?	1-0E-1234567 und 2-0E-3456789	?	?	?	5000	350 kg	0_0	retailer	45.123456	Prinz Eugen-Straße 27	Wien	1030	Austria	Austria
Traceability (...)	?	?	?	?	distribution t...	Printnumber...	Germany	?	1-0E-7891234	?	?	?	1000	70 kg	1_0	farmer	78.456789	Schloßplatz	Stuttgart	70173	Germany	Germany
Traceability (...)	?	?	?	?	distribution t...	Printnumber...	Germany	?	1-0E-7891234	?	?	?	1000	70 kg	1_0	wholesaler	89.123456	Südstraße 1	Heilbronn	74072	Germany	Germany
Traceability (...)	?	?	?	?	distribution t...	Printnumber...	Germany	?	1-0E-7891234	?	?	?	1000	70 kg	1_0	exporter	56.123123	Bernhard-Grünel-Allee 1	Frankfurt am Main	60316	Germany	Spain
Traceability (...)	?	?	?	?	distribution t...	Printnumber...	Germany	?	1-0E-7891234	?	?	?	1000	70 kg	1_0	importer	11.456456	Plaza Mayor	Madrid	28012	Spain	Spain

KNIME-based solution

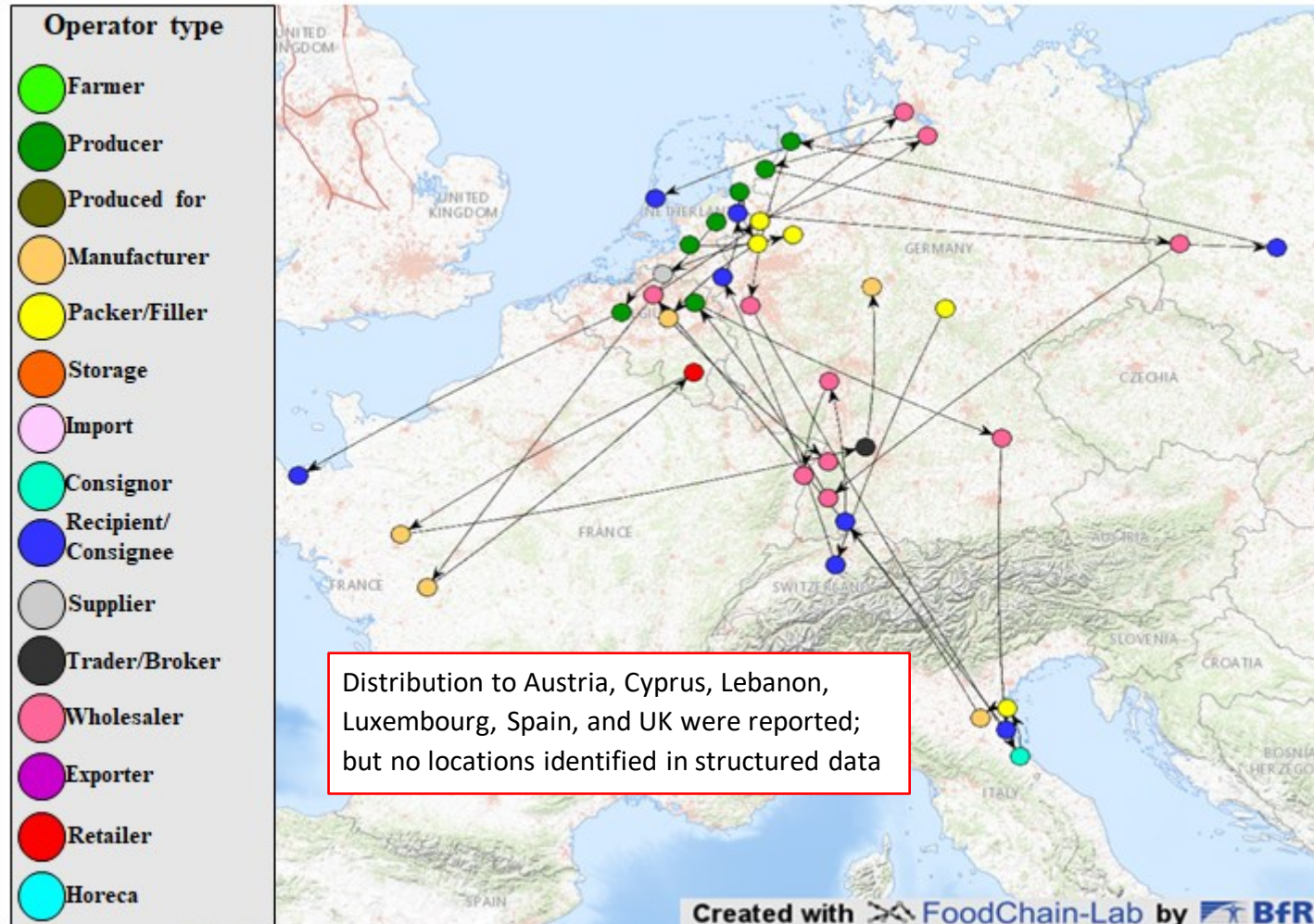
„Konstanz Information Miner“,
<https://www.knime.com/>

Low-code platform for data
analytics and reporting

free and open-source, and
locally hosted

Structured
RASFF data to
tabular format

Where do we come from? Fipronil contamination in the egg supply chain



Source: gstatic.com

Single notification containing **700** follow-ups notifications,

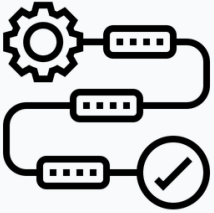
yet **only 40 locations** were identified in the structured data.

Significantly more data in the attachments.

Need more advanced tools

If RASNEX 1.0 is like an X-Ray into the supply chain incident, then we need MRI

Upgrade to RASNEX 2.0 – EFSA-BfR FPA Project SA 07 & SA 10



- Text Mining through AI
- Optical Character Recognition (OCR)



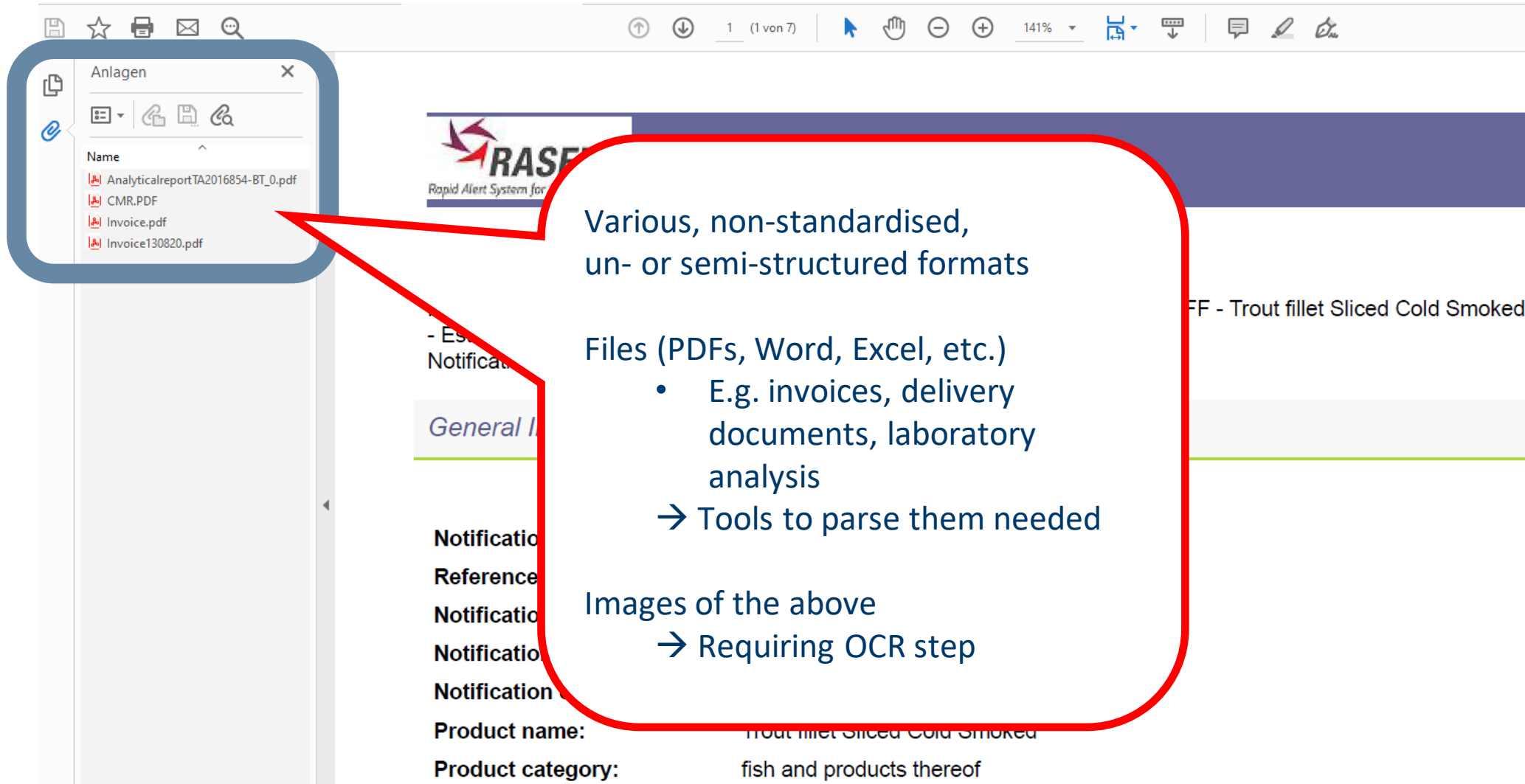
1. Extract relevant information from fups & attached documents

- Extract recognized addresses
- Operators (names) of supply chains
- Intent of the fup
- Products
- Analytical results
- Date of production
- Billing dates
- Delivered quantities

2. Linking RASNEX with the FoodChain-Lab data extraction workflow (UTX format)

Icon made by Eucalyp from www.flaticon.com
Icon made by Freepik from www.flaticon.com

RASFF notifications – attached documents



The screenshot shows a web interface for RASFF (Rapid Alert System for Food and Feed). On the left, a sidebar titled 'Anlagen' (Attachments) lists several PDF files: 'AnalyticalreportTA2016854-BT_0.pdf', 'CMR.PDF', 'Invoice.pdf', and 'Invoice130820.pdf'. A red callout box points to this list, containing the following text:

Various, non-standardised, un- or semi-structured formats

Files (PDFs, Word, Excel, etc.)

- E.g. invoices, delivery documents, laboratory analysis




→ Tools to parse them needed

Images of the above

→ Requiring OCR step

The background interface shows the RASFF logo and a notification entry for 'Trout fillet Sliced Cold Smoked'. The notification details include 'Product name: Trout fillet Sliced Cold Smoked' and 'Product category: fish and products thereof'.

RASFF notifications – data extraction methods

  	
Additional information:	Additional analytical reports attached. Additional analyzes were commissioned by Dunrin Polska Sp. z o.o.: - "Bio almond milk" purchased from Almondina GmbH Schillerstraße 9, Bad Dürkheim, 69345, Rheinland-Pfalz - test result correct, ethylene oxide content # 0.01 mg / kg. - two batches of baking mixes called Whole & Tasty Bio produced in January 2021 by Dunrin Polska Sp. z o.o. - test result correct, ethylene oxide content # 0.01 mg / kg
Follow-up type:	additional information
<hr/>	
#357488 - rg validated - N_AAC_RASFF - AAC/RASFF	
CP Reference:	1-2
Organisation / ministry:	German Ministry of Test Notification
Contact person:	TOM TRACING
Additional information:	In the outcome of the investigations at the company FURMA - Via Fogorina 19 - BARLETTA, it was found that the same had received a package of the product subject to the alert. The product has not been marketed, and is put aside, pending withdrawal by the manufacturer
Follow-up type:	additional information
<hr/>	
#357489 - rg validated - N_AAC_RASFF - AAC/RASFF	
CP Reference:	1-3
Organisation / ministry:	German Ministry of Test Notification
Contact person:	OLGA OUTBREAK
Additional information:	The company WOB from Maastricht (NE) is included in the distribution list of the company Magic Herbs. In reality the product was delivered to: WOB Sudo srl - Van Brakelstraat 58 - 3514 HH Utrecht
Follow-up type:	additional information
<hr/>	
#357491 - rg validated - N_AAC_RASFF - AAC/RASFF	
CP Reference:	1-5
Organisation / ministry:	German Ministry of Test Notification
Contact person:	LAURA LABORATORY
Additional information:	With reference to -fup32, it is reported that the withdrawal was not known at the company A & O, Bundesstr. 19, 74465 Dresden, Germany. The goods found on site were voluntarily taken out of circulation.
Follow-up type:	additional information
<hr/>	
#357492 - rg validated - N_AAC_RASFF - AAC/RASFF	
CP Reference:	1-4
Organisation / ministry:	German Ministry of Test Notification
Contact person:	ANTONIA ANALYSIS
Additional information:	With reference to fup11: During the investigation of one of the recipients it was found that Freshmarket Klaus Hohn, Weißenseeufer 34, 55930 Sonnersdorf does not have the questioned product in stock. to the statement of the operator, Mr. Klaus Hohn, the product was sold to individual customers on a receipt. Mr. Klaus Hohn also stated that there was no product in question on the market in his stationary store. Moreover, as established, the trader was not informed by Ganz Biohandels GmbH about the non-compliance.
<hr/>	
<small>Notification reference: (348541) Document reference: 348541_1693910790350</small>	
<small>05/09/2023 12:46:30</small>	
<small>Page 14 of 16</small>	

Challenges:

- Legal:
 - Sensitive data
→ Only local, open source models (no ChatGPT)
- Technical:
 - Various formats and data sources
 - Processing capabilities

Frontend methods:

- Dashboard: streamlit

Backend methods (swappable components):

- LLM Engine: llama3.2, LangChain
- Document-parsing: Docling with OCR (Easy OCR, Tesseract)

RASNEX App: Dashboard

Upload a document

Enter the folder path of the notification

/home/savvateeva/Downloads/ocr 5


You selected: /home/savvateeva/Downloads/ocr 5

Choose an option:

fup30 Oficio815seguimientoreporte512RASFF.pdf

You selected: /home/savvateeva/Downloads/ocr 5/fup30 Oficio815seguimientoreporte512RASFF.pdf

[Open summary table](#)



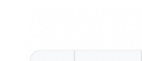
Bundesinstitut für Risikobewertung

Bundesinstitut für Risikobewertung (BfR) | Max-Dohrn-Straße 8-10 | 10589 Berlin

vertraulich
(Nur) per E-Mail an:
cc:

Julius van Flocksbum
Leiter der Abteilung für Lebensmittelhygiene
Hauptbehörde für Lebensmittelsicherheit (HBL)
Rue de Livourne 54a, 4983
Brüssel, Belgien

Im Geschäftsbereich



Bundesinstitut für Risikobewertung (BfR)
Max-Dohrn-Straße 8-10
10589 Berlin
T +49 30 18412-0
bf@bfr.bund.de
bfr.bund.de

save changes

Ihre Zeichen und Nachrichten vom: 5635

Geschäftszeichen:
Bitte bei Antwort angeben
56.00

Telefondurchwahl: 12435

Datum: 23.01.2025

Organisationseinheit/
Ansprechperson
Herr Müller

Standorte

Berlin-Jungfernheide
Max-Dohrn-Straße 8-10
10589 Berlin
T +49 30 18412-0
F +49 30 18412-99099

Berlin-Marienfelde
Diedersdorfer Weg 1
12277 Berlin
T +49 30 18412-0
F +49 30 18412-99099

Berlin-Abt. Marienfelde
Abt. Marienfelde 17/21
12277 Berlin
T +49 30 18412-0
F +49 30 18412-99099

Berlin-Nahmitzer-Damm
Nahmitzer Damm 12
12277 Berlin
T +49 30 18412-0
F +49 30 18412-99099

Datenschutzhinweise
einschließlich Informa-
tionen zu Ihren Rechten
finden Sie unter:
bfr.bund.de/de/daten-
schutz/klarung.html

**BfR | Risiken erkennen –
Gesundheit schützen**

Lieber Herr van Flocksbum,

In Bezug auf die Berichte Nr. 2024/8943fup23, die vom Schnellwarnsystem für Lebens- und Futtermittel (RASFF) der Hauptbehörde für Lebensmittelsicherheit (HBL) herausgegeben wurden und die sich aus der Untersuchung eines Ausbruchs einer Lebensmittelvergiftung durch Methylquecksilber ergeben, das in Spanien von der COLFI SA aus gefrorenem Thunfisch (*Thunnus atlanticus*) des Betriebs **Thuna Congelados, S.A. de C.V.** (Zulassungsnummer 93875) verarbeitet wurde.

Nach der von der Gesundheitsbehörde durchgeführten Untersuchung teile ich Ihnen mit, dass Thuna Congelados für die Lose T736, T773 und T938 Unterlagen über die Temperaturkontrolle und Laboregebnisse vorgelegt hat.

Mit freundlichen Grüßen

im Auftrag

Unterschrift

Anlage(n)

	Dis	Company	Country	Col	City	Postal code	Street	House Nr
0	<input type="checkbox"/>	Thuna Congelados						
1	<input type="checkbox"/>	COLFI SA	Spain					
2	<input type="checkbox"/>	Bundesinstitut für Ri	Germany		Berlin	10589	Max-Dohrn-Straße	8-10
3	<input checked="" type="checkbox"/>		Germany		Berlin-Marienfelde	12277	Diedersdorfer Weg	1
4	<input type="checkbox"/>		Germany		Berlin-Jungfernheide	10589	Max-Dohrn-Straße	8-10
5	<input type="checkbox"/>		Germany		Berlin-Nahmitzer-Damm	12277	Nahmitzer Damm	12

RASNEX Workflow

Input documents

 	
Additional information:	<p>Wittgenstein-Belvedere District, Österreich Straße 150 in 10000 Leuchtenbach Wittgenstein-Belvedere District 750 kg of "treated" material, ex no. 200902 from Düsseldorfer Eisen- und Stahlwerke AG in TAST 12 (Exhaustive Performance). However: goods with best before date 1-2-2002 were delivered here and not with best-before date 1-5-2002(21) as stated in the notification. The delivery note supported.</p>
Follow-up type:	
CS55191 - rg validated - AACRAFF - Germany - BFR	
CP Reference:	
Organisation / industry:	German Ministry of Test Notification
Contact person:	RALG RASFF
Additional information:	The information was provided to the information department concerning the companies WILKEMANN SA and MONCKEDELLE. No insolvency proceedings were opened/declared.
Follow-up type:	
CS55191 - rg validated - AACRAFF - Germany - BFR	
CP Reference:	13
Organisation / industry:	German Ministry of Test Notification
Contact person:	RALG RASFF
Additional information:	The UK, FPO, whisky fumes, were notified by Test Dutch supplier that they had received material with the value of 5.52 mg/kg for ethylene oxide. The supplier stated that the material was not intended for human consumption and was withdrawn from several batches of affected wines and have contacted their customers to inform them of the situation. The responsibility for the withdrawal of the material was taken by the supplier. The responsibility for Glasfaser Fibre was attached separately but further information on the batch numbers awaited.
Follow-up type:	
CS55191 - rg validated - AACRAFF - Germany - BFR	
CP Reference:	14
Organisation / industry:	German Ministry of Test Notification
Contact person:	RALG RASFF
Additional information:	During the investigation at BODESEN, StraÙe 457, 17 June 13, 10623 Berlin, the material produced was not in place. It was fully sold and most of the batch was not in place. The material was not in place. The material was found that the essence in question was delivered in plastic in the amount of 25 kg, which was not transported in 250 g packages, and then sold to several customers.
Follow-up type:	
CS55191 - rg validated - AACRAFF - Germany - BFR	
CP Reference:	15
Organisation / industry:	German Ministry of Test Notification
Contact person:	RALG RASFF
Additional information:	From the statement of the company FURER, we are transcribing to our internal files: RALG RASFF, material 417547000, organic waste mass. A total of 500 kg (25 kg) was delivered from this consignment. The batch was delivered in

Document released under (2009/4)

Document released under (2009/4)

07/2020-2010-10-22

Page 14 of 14

RASNEX Dashboard

Upload a document

Enter the folder path of the notification
/home/sandm/Downloads/

You selected: /home/sandm/Downloads/

Choose an option:

RASFF-test_14.pdf

You tested: /home/sandm/Downloads/RASFF-test_14.pdf

Open summary table

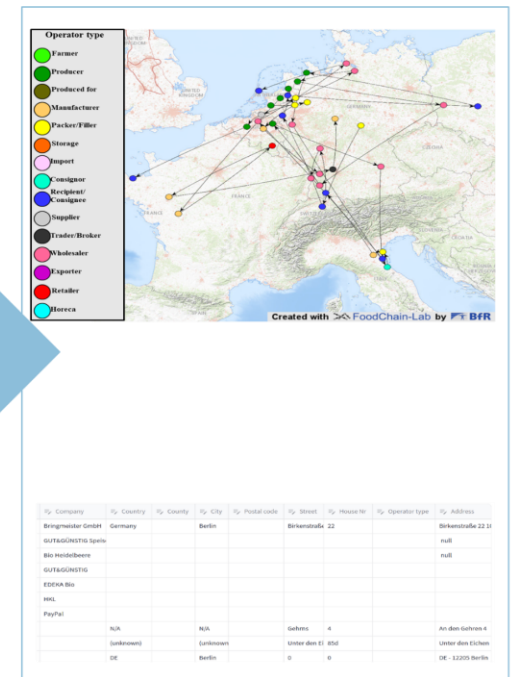
Document Viewer

PREVIOUS PAGE
NEXT PAGE

Extracted UTX data

Display in doc	Company	Country	City	Port
<input type="checkbox"/>	Wittenberger Bäckerei			
<input type="checkbox"/>	Dipsa Europa B.V.			
<input type="checkbox"/>	MILLBAKER SAS			
<input type="checkbox"/>	MONDELEZ FRANCE			
<input type="checkbox"/>	Infinity Foods			
<input type="checkbox"/>	Fuchs			
<input type="checkbox"/>		Germany (Noter Germ)	Berlin	10623
<input type="checkbox"/>		Germany (Noter Germ)	Berlin	10623
<input type="checkbox"/>		Ireland		
<input type="checkbox"/>	Gibraltar			

Output and Analysis

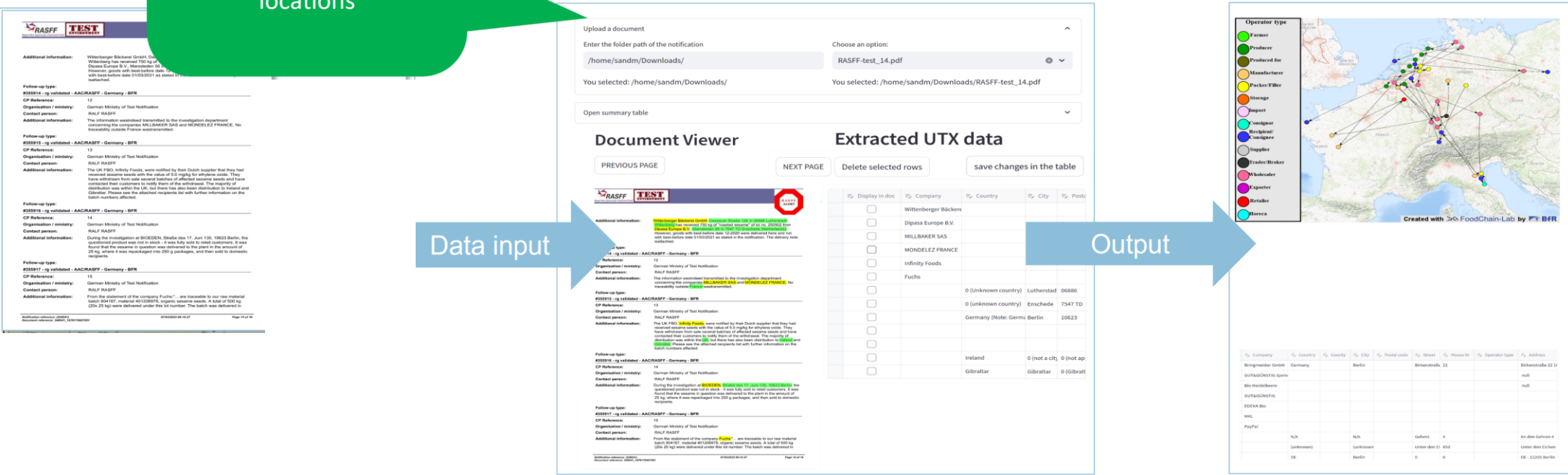


RASNEX Workflow

RASNEX 2.0 uses language models to search for and extract relevant information such as operators and locations

RASNEX Dashboard

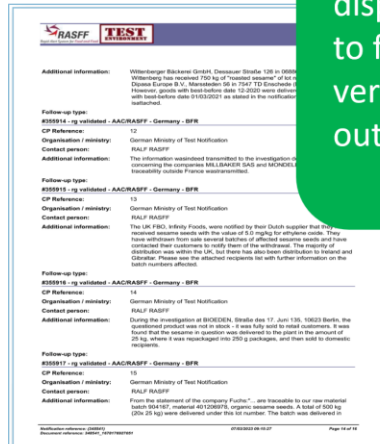
Output and Analysis



RASNEX Workflow

Input documents

Processed document is displayed with mark-up to facilitate the verification of the model output



RASNEX Dashboard

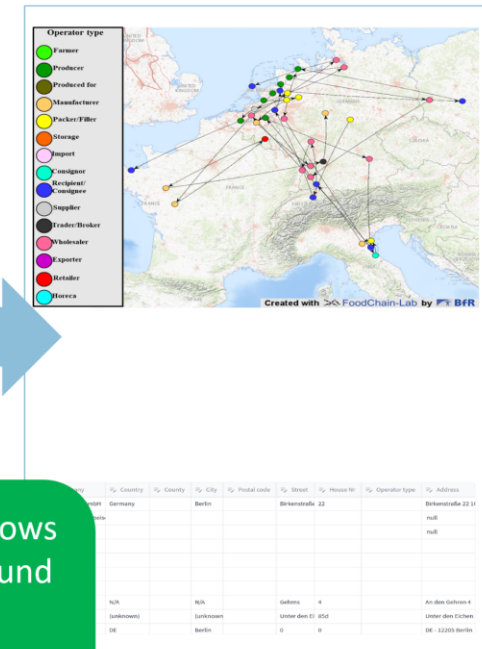
[illegible]

Data input

Output

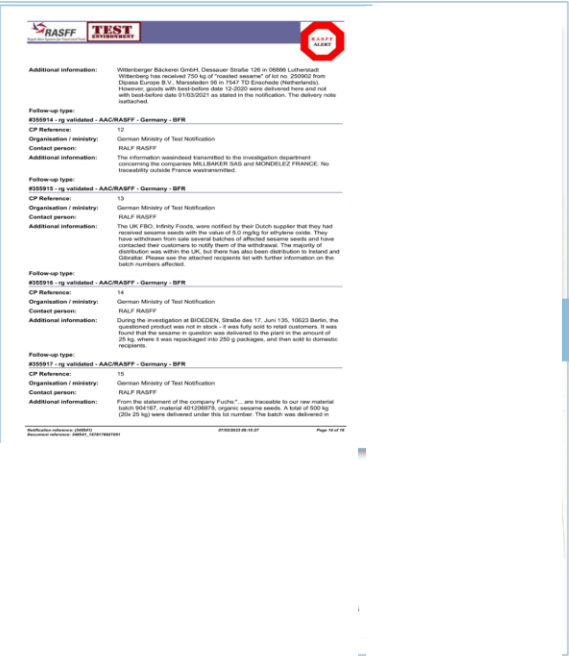
Interactive table allows users to validate found information before downstream processing

Output and Analysis

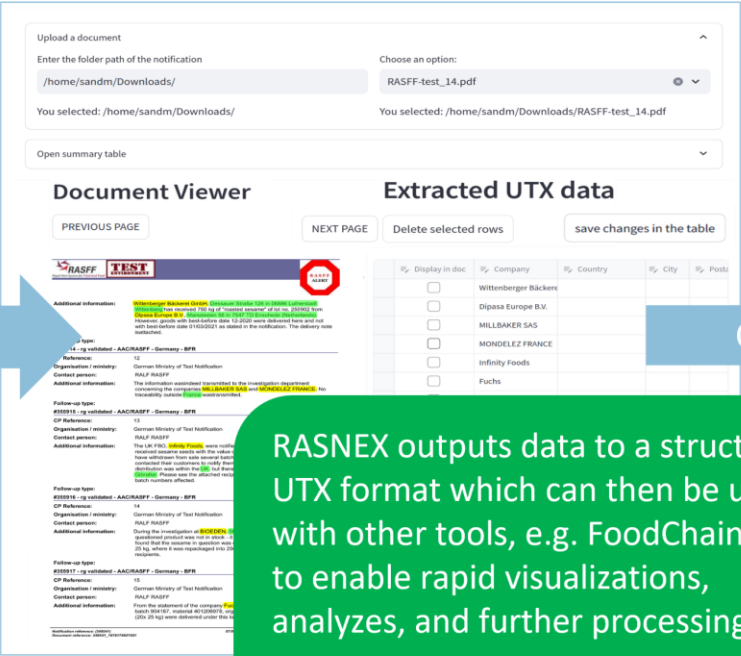


RASNEX Workflow

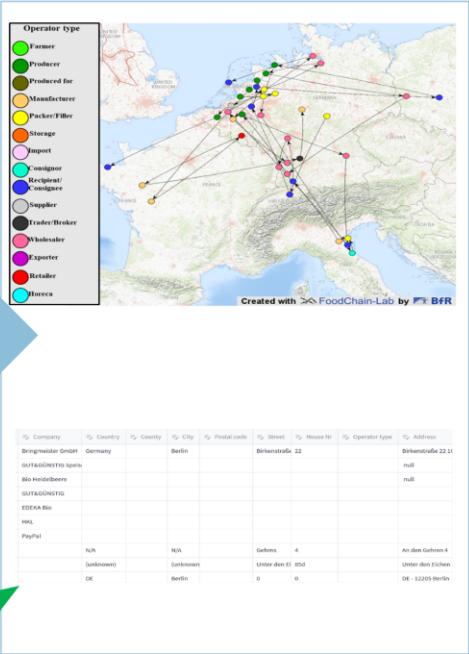
Input documents



RASNEX Dashboard



Output and Analysis



Live-Demo

Extraction from attachments - GPT4 (Large model) workflow: Accuracy and perspectives Live-Demo

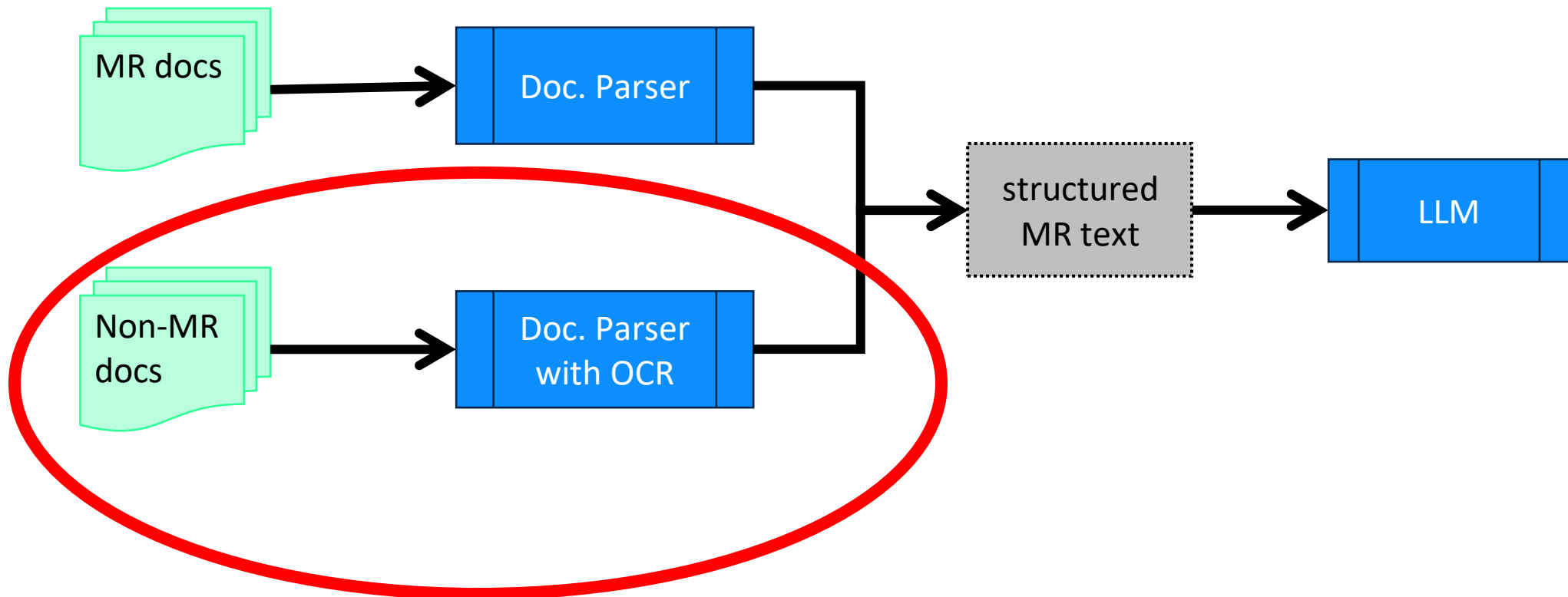


Document parsing
with Docling

Optical character
recognition

Structured output of
required info (with
the large model)

Extraction from attachments - GPT4 (Large model) workflow: Accuracy and perspectives Live-Demo



Conclusion

Limiting factors:

- accuracy of doc. parsing
- accuracy of OCR
 - doc/image resolution
- Text to Markdown
- size of the LLM
 - accuracy LLM

Additional concerns:

- Privacy
 - Local models can provide the same accuracy but require similar infrastructure

Rapid advances in technology during RASNEX development

RASNEX 1.0: deterministic extraction of structured text

RASNEX 2.0

When	What	How
2021	only FUP report text	NER-based
2022	only FUP report text	NER-based with pattern-matching, supervised fine-tuning
2023	FUP report text machine readable attachments (.doc, .xls, some PDFs)	LLM-based, prompting
2024	FUP report text most attachments (.doc, .xls, some PDFs, Images)	LLM-based, prompting, document parsers based on Computer Vision (CV) and Optical Character Recognition (OCR)

Group discussion

Limitations of the proof-of-principle:

1. data quality -> scans, etc.

2. processing capabilities

-> small models with limited accuracy, showing promising results

-> server solution tested currently with dummy data

1. How are you dealing with data extraction?

2. Usage of the RASFF System?

3. Where could you see advantages of RASNEX in your daily work?

4. What would you need to be able to apply RASNEX?

5. Limitations for using AI for outbreak investigation in the UK?

Thank you for your attention!

RASNEX Team: Daria Savvateeva, Matthew Salewski & Marc C. Lorenzen

German Federal Institute for Risk Assessment (BfR)

Max-Dohrn-Str. 8-10 □ 10589 Berlin

Tel. 030 - 184 12 - 28314 □ Fax 030 - 184 12 - 47 41

marc.lorenzen@bfr.bund.de □ www.bfr.bund.de

Sources

Source Slide 4: <https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRLkLS-C3wWyFiFxTi9hBpGBb-pZAuDxAKXXQ&usqp=CAU> (accessed 21.01.2025)