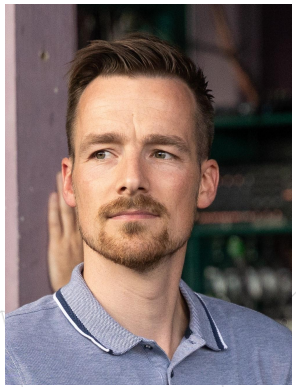
Increasing relevant product recall through smart use of customer behavioral data

Haystack 2022

Eric Rongen & Jelmer Krauwer

Intro



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Product manager

Kramp Hub

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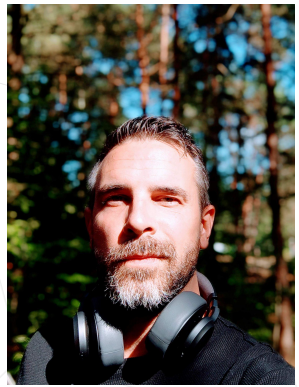

Jelmer Krauwer

Architect for Data & ML

Kramp Hub

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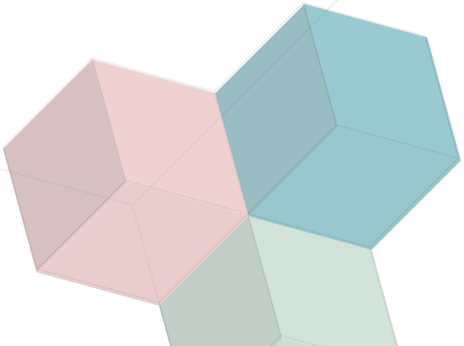
Today

- About Kramp & Kramp Hub
- Our challenges
- The solution
- The results



About Kramp

1031M
2021 € TURNOVER

50K
CUSTOMERS

>3000
EMPLOYEES

30
COUNTRIES

>500K
PRODUCTS (1.7 mln total)

11
DISTRIBUTION CENTRES

About Kramp Hub

Kramp e-commerce tech start-up

- Founded in 2017
- Located in the heart of Utrecht
- ~75 colleagues, 25+ nationalities
- 10+ agile teams

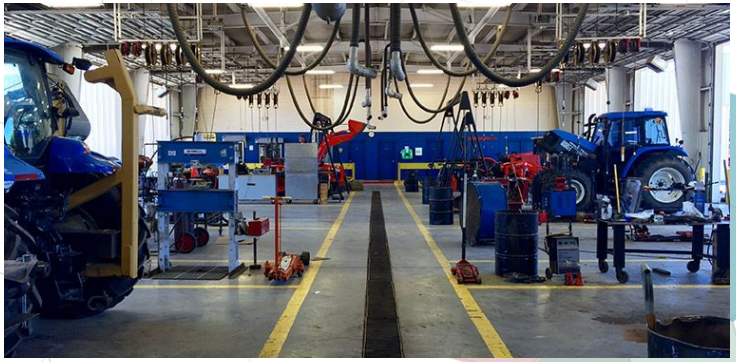
Platform

- Microservice e-commerce platform
- Powering multiple channels
- Elastic core with microservices on top

Why is product findability important for Kramp?

A typical customer:

- Tractor dealership
- Purchaser
- Active during the whole day
- Loyal, persistent
- Knowledgeable
- Searches for specific part
- Trusts expertise of Kramp



Some numbers on search at Kramp

3.9 mio search queries a month in **20** languages

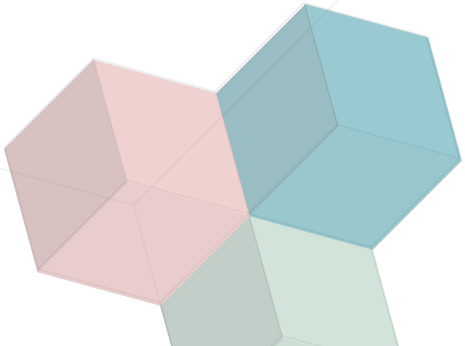
+80% of add to carts start with typing a search query in the search box

60% of search do not lead to any product interaction

A look back to 2018

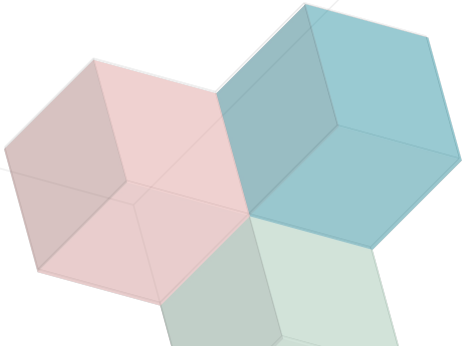
Search was the first service of our e-commerce platform that we rolled out to customers ~4 years ago

While doing so, we encountered some challenges



Our challenges ... and their implications

- Product data won't improve overnight
- We can't fix search results manually
  - *Even though we tried*
- Even good product data won't match all possible search terms syntactically
  - *And vector search wasn't a thing yet*
- Our entire landscape was heavily under construction
  - *Early startup phase: there was nothing there*



Conclusion

“There is no way we can possibly improve search beyond what we’re currently doing”

But wait...

Epiphany 1

“The customer is always right”

- B2B customers are special
- Loyal, frequent
- Strong intent to buy
- Technical parts, not Pinterest
- Deep knowledge

There must be some value in this…

Epiphany 2

“Our entire landscape was heavily under construction”

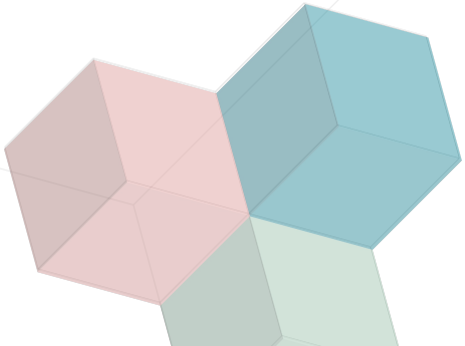
- Early startup phase
- There was nothing there…

This meant we could do anything!

Solution

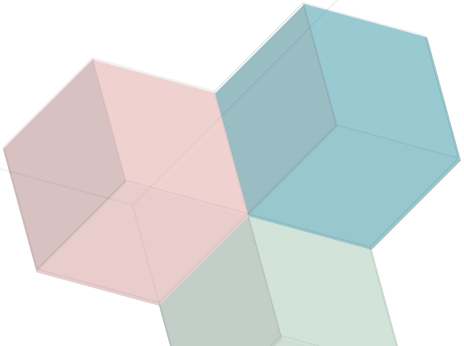
Let our customers tell us what's relevant

- Observe their behavior
- Leverage their knowledge
- Incorporate new knowledge in search

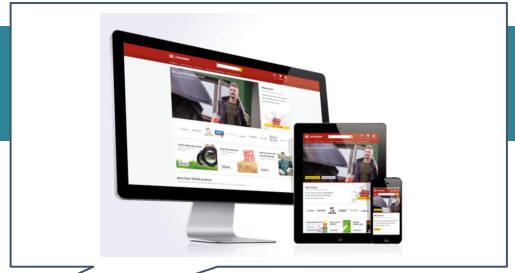


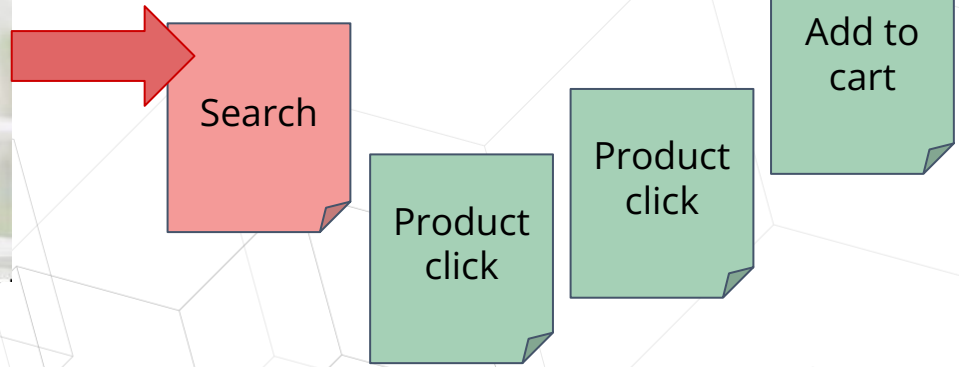
Starting points

- Customers produce events
- Events can be grouped into sessions
- Sessions can give us insights
  - Metrics
  - Interactions with search



Events

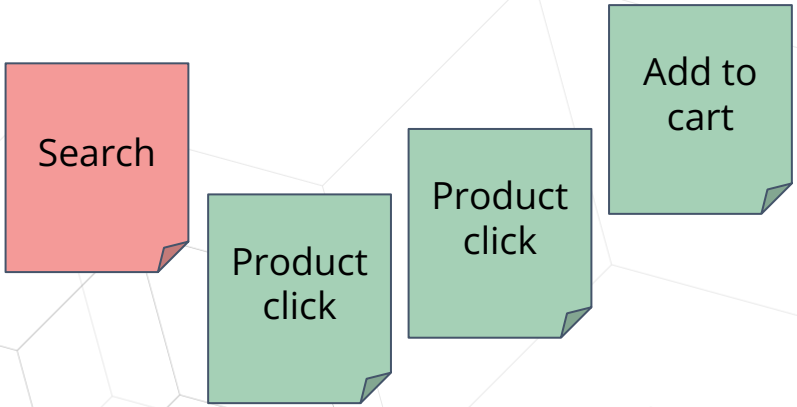




- Produced by customers
- Not random
- There is intent
- There is meaning
- There are patterns

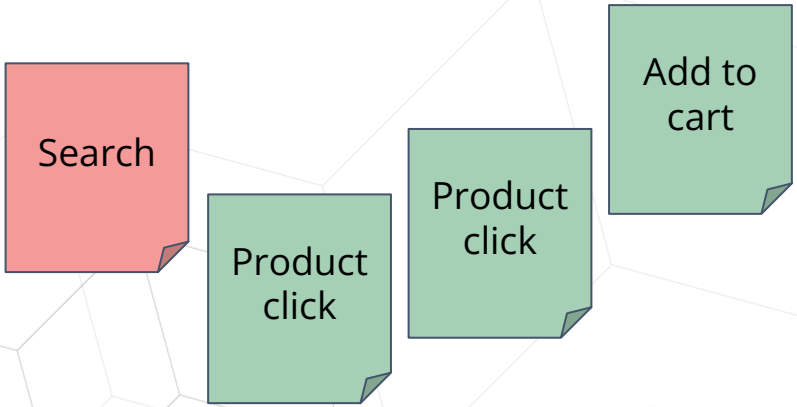
Sessions

- Groups of events
- Micro-sessions
- Focused around a single search
- Small gap between events
- Session ends after short time idle



Metrics

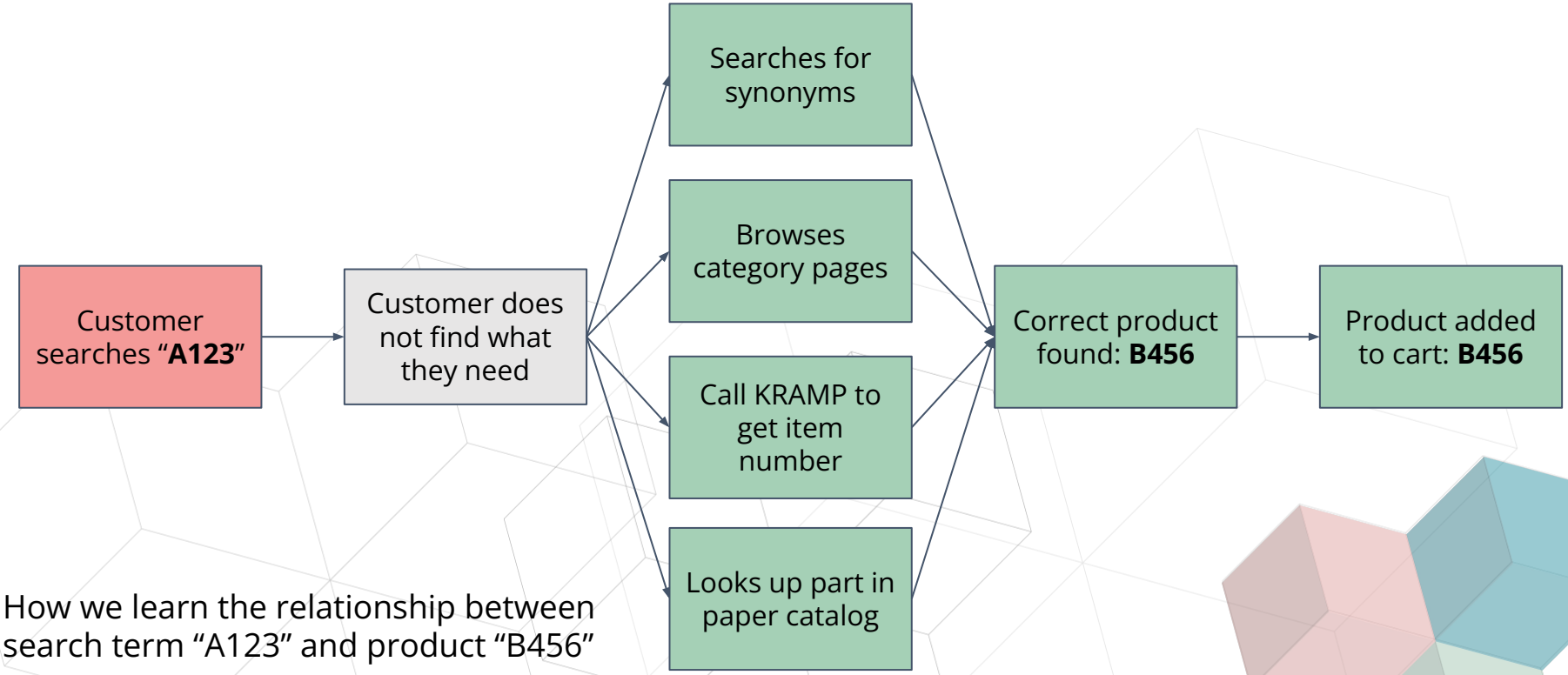
- Calculated on sessions
- Scoring the outcome of a session
- To evaluate a single search event



Example metrics:

- has_add_to_cart
- has_interaction
- has_results
- ndcg_at_10 (or 5, or 30)

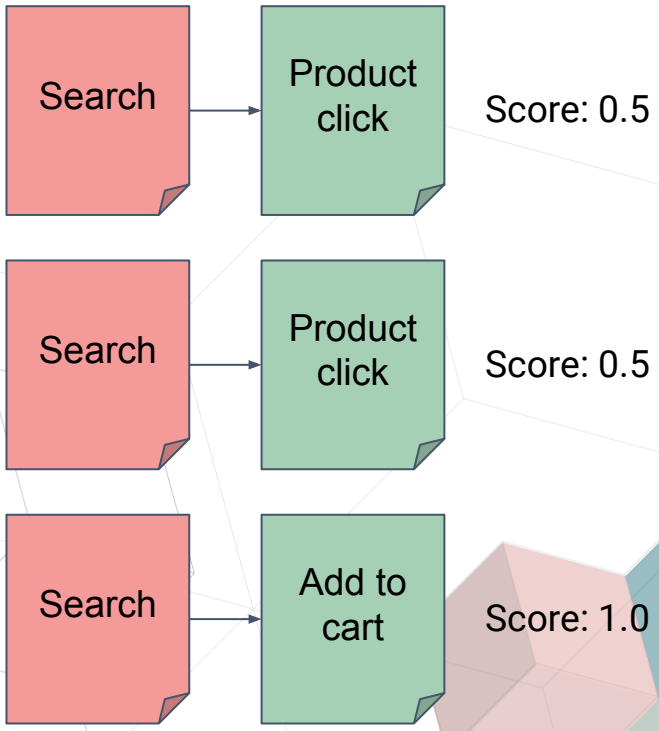
Session: patterns



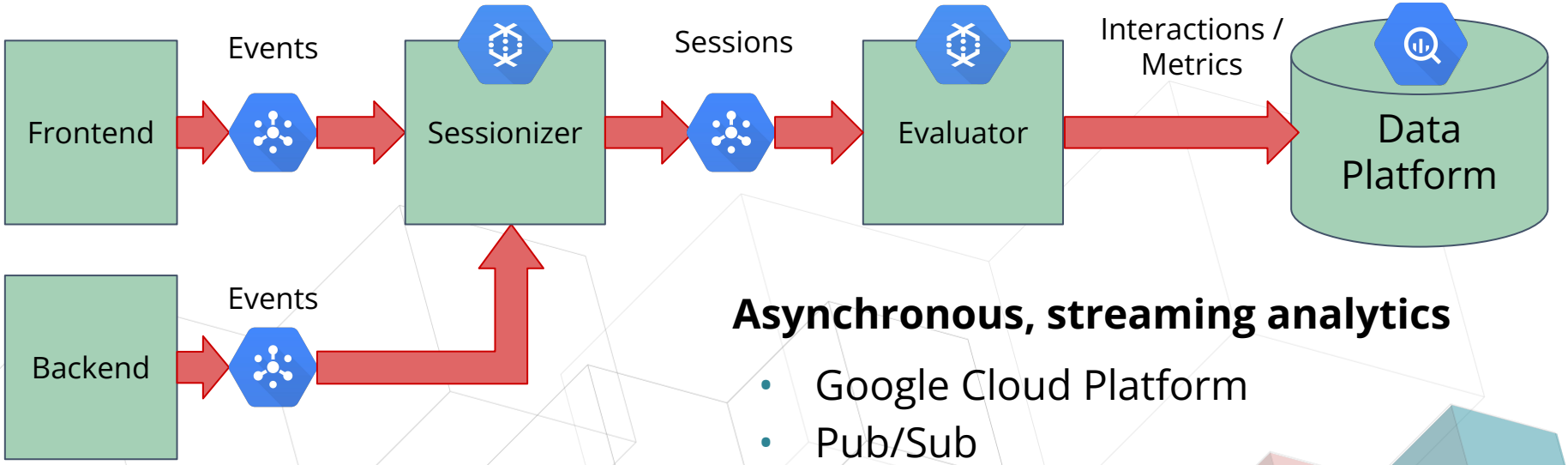
How we learn the relationship between search term “A123” and product “B456”

Interactions

- Micro session
- Split into tuples
- Search + other event
- Interaction score



Data collection setup



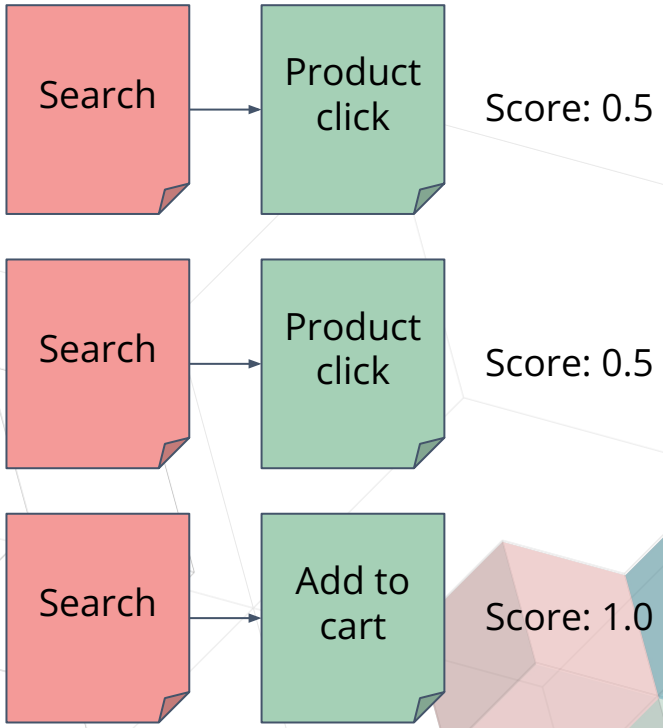
Asynchronous, streaming analytics

- Google Cloud Platform
- Pub/Sub
- Apache Beam/DataFlow
- BigQuery sink

beam

Interpretation of the data

- Search term X…
- …leads to interaction with Product Y…
- …And score Z indicates the relevance of the interaction



Aggregation (drawing conclusions)

IF we observe that:

Search term X

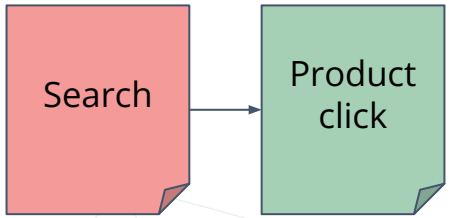
Leads to interaction with

Product Y

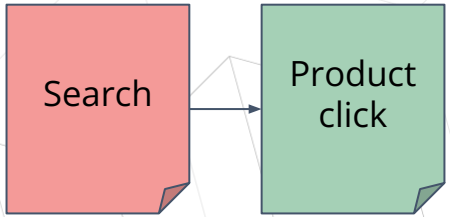
*More than **N** times*

...

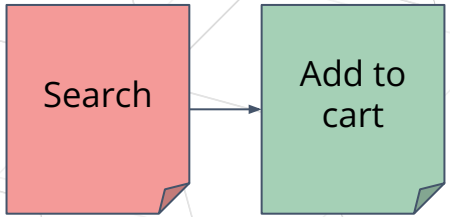
We feel confident that we can use this mapping in search!



Score: 0.5 Frequency: 2

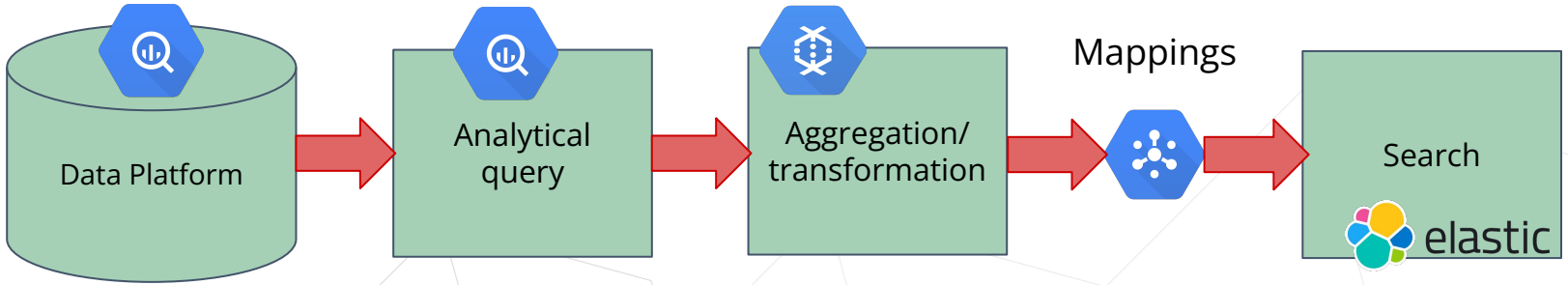


Score: 0.5 Frequency: 234



Score: 1.0 Frequency: 116

Insights creation setup



Feeding our insights back into the Search service

- Interaction tuples
- Analyzed/filtered
- Dataflow to aggregate & transform
- Mappings added to Elastic index

A/B test on initial roll-out

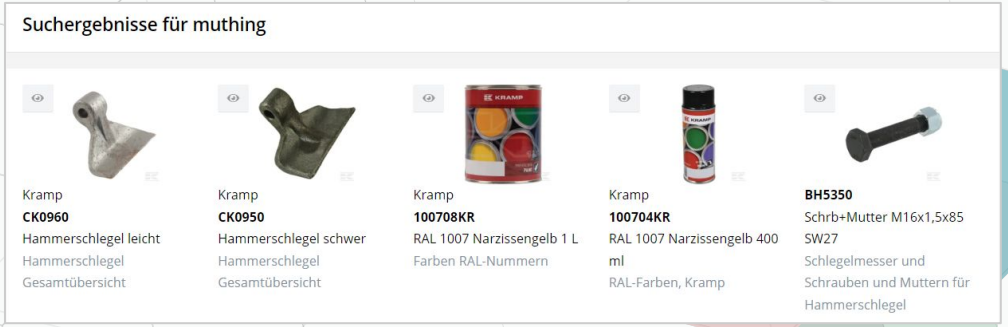
- Pre-tested on simulated customer behavior (markov-style synthetic sessions)
- Tested for real using Multi Armed Bandit Service (epsilon greedy method)
- New variation with new mappings was successful
- Automatically rolled out to 90% of all traffic

An example: query “Muthing” in Germany

Customer searches for

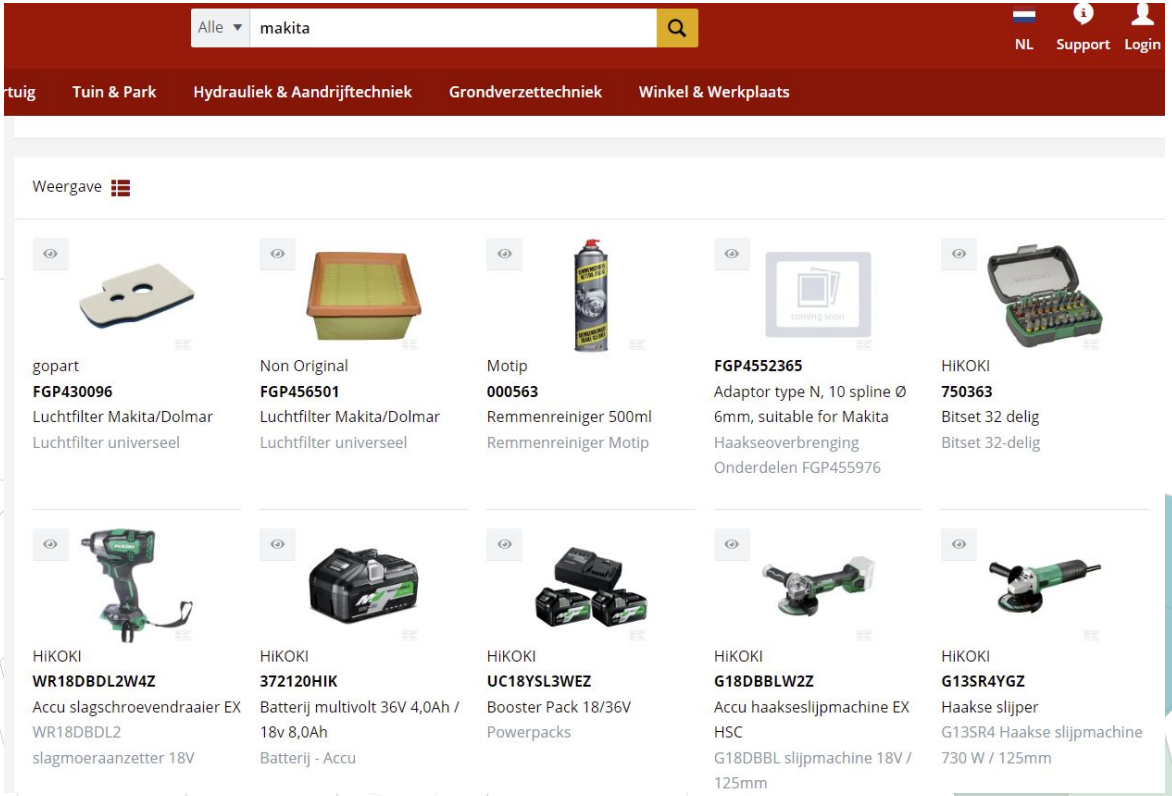
Without Relevance mappings

With Relevance mappings



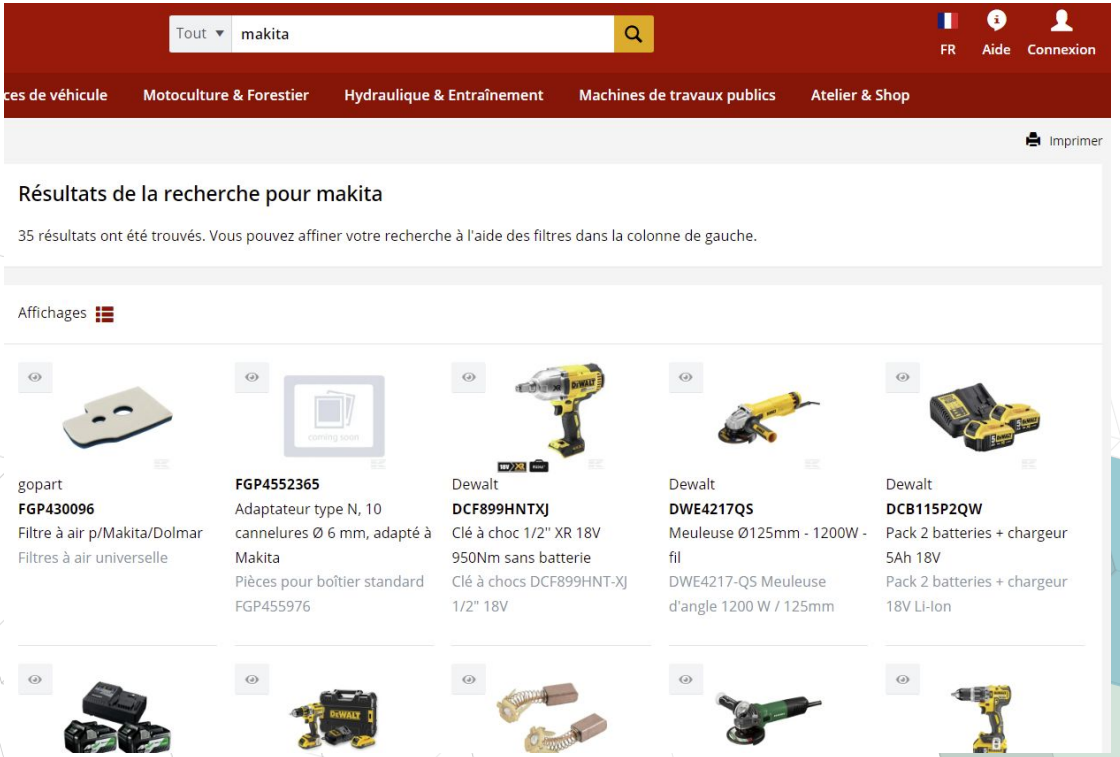
An example: query “Makita” in Netherlands

The Dutch love HiKOKI



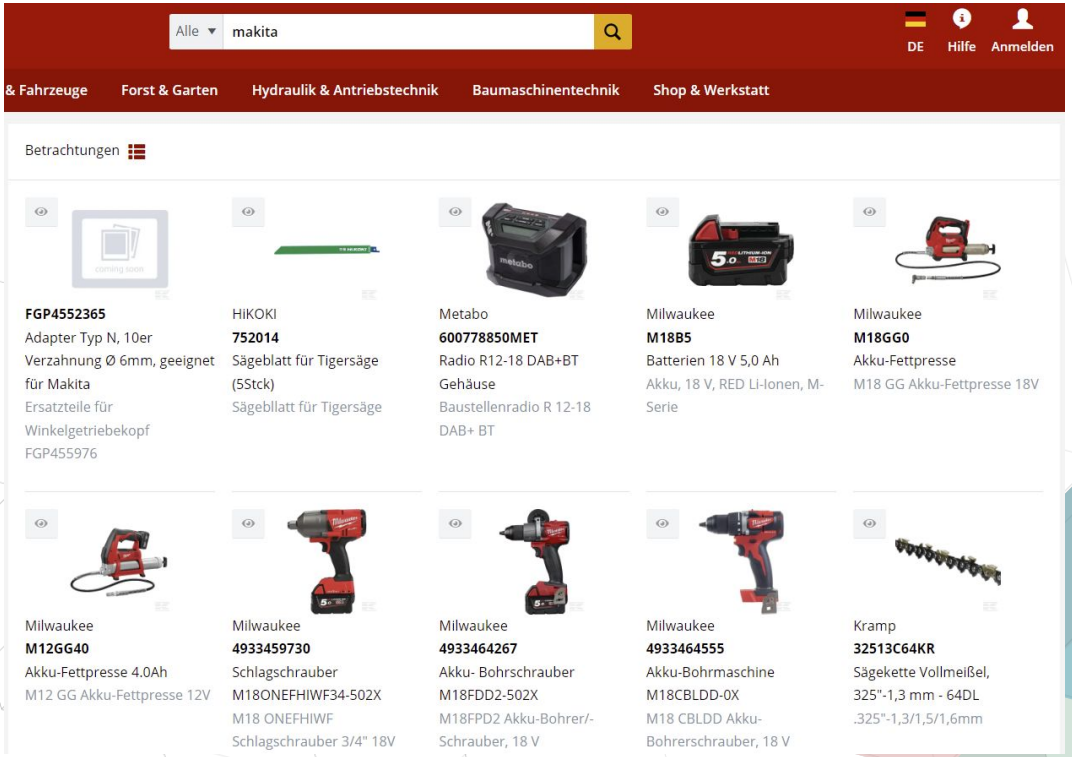
An example: query “Makita” in France

French people prefer Dewalt



An example: query “Makita” in Germany

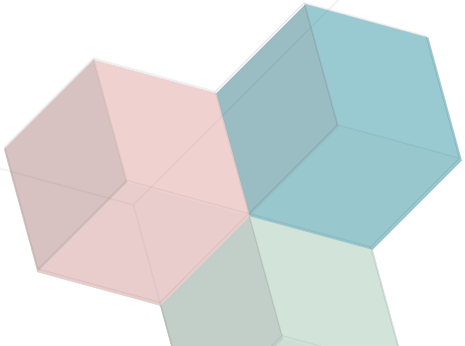
Germans like Milwaukee



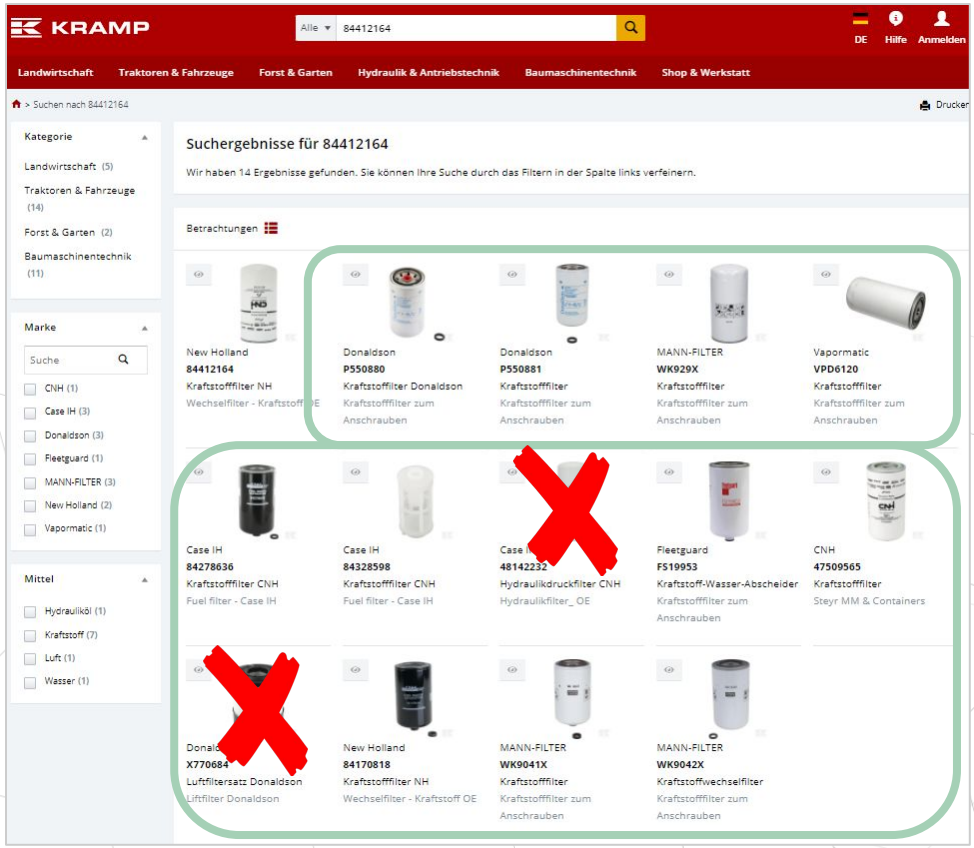
However, we are not right 100% of the time

There were complaints

- Incorrect products in search results
- Calls to our specialists
- Product being returned



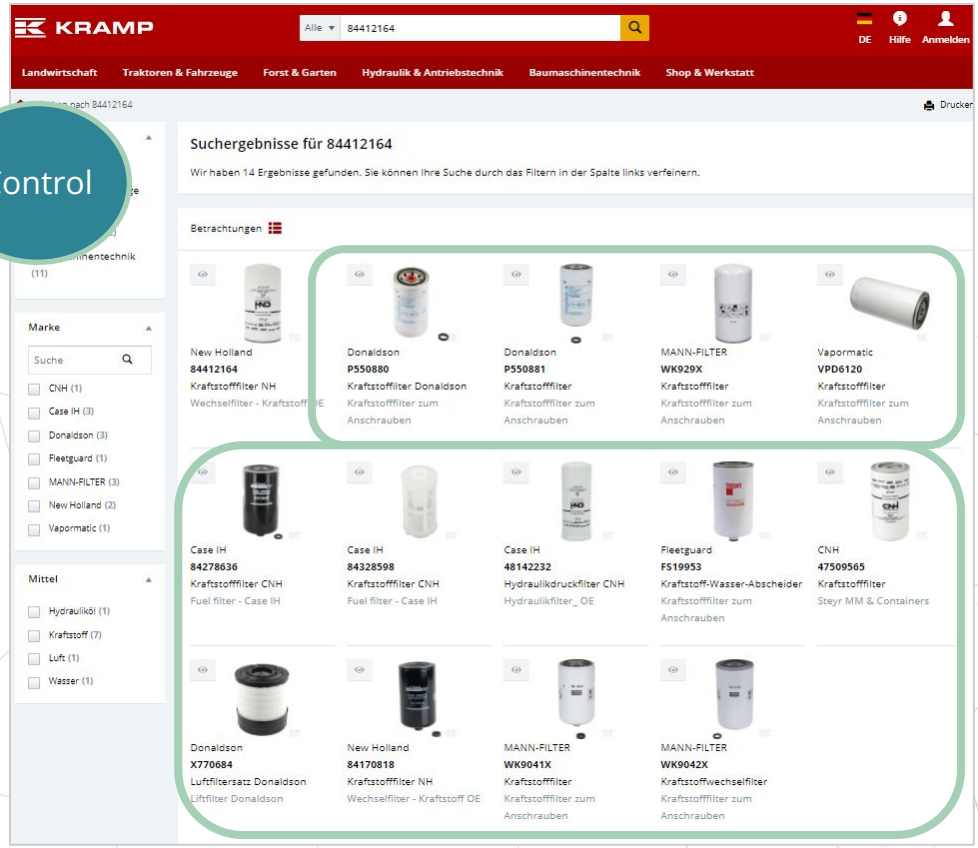
AB-test to reaffirm impact



Products in search results because of product data

Products in search results because of “Relevance mappings”

Test scenario Control

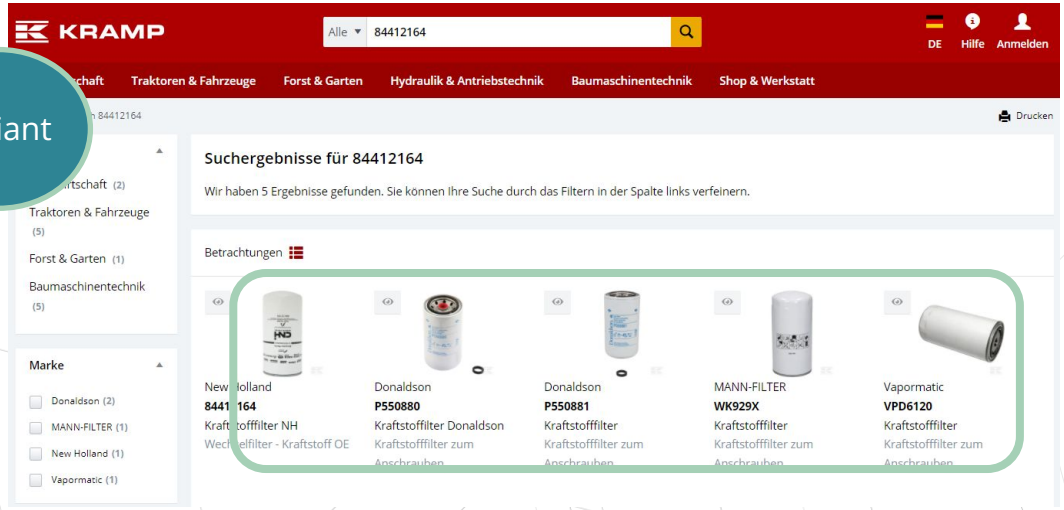


Products in search results because of product data

Products in search results because of “Relevance mappings”

Test scenario Variant

Variant



Only products in search results because of product data

AB-test results

Product Interactions

This is a difference of **-5,09**%
Result is significant*

Add to cart after search

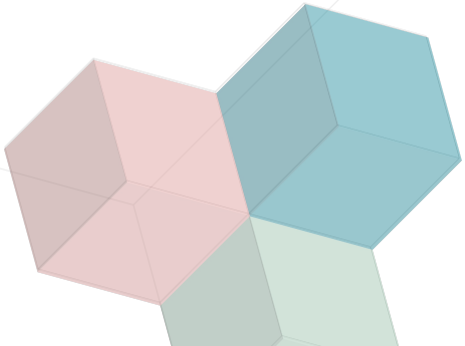
This is a difference of **-3,49**%
Result is significant*

0-result searches

20.000 extra searches with 0-results when we switched off ‘Relevance mappings’

Conclusion

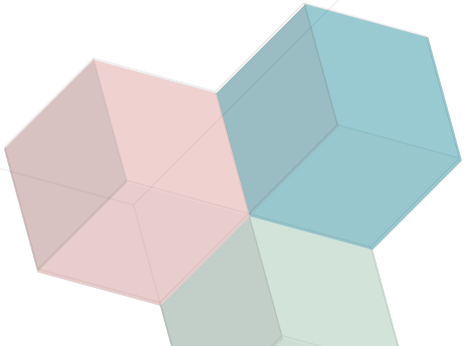
- There is a lot of value in insights from customer behavior
- Relevance Mappings improve search relevance
- We can’t afford to switch it off
- But we should fine-tune the algorithm



Next steps

- Modifications to the algorithm
  - Exclude incorrect mappings
  - Fine-tune criteria

- We have billions of behavioral examples
  - We can leverage them to improve relevance
  - Vector search
  - Real time insights



Thank you!

Thank you for your attention!

Questions?

Feel free to contact us:

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