SoloSegment

AI Content Prediction for Large Websites

Mike Moran

June 2020

Think of a company with an *awesome* customer experience.

When you go to their website, you get what you want.

Was it...

What's Amazon's secret?

Site Search

When you've visited Amazon, have you ever *not* searched?

Related Products

Customers who viewed this item also viewed...

Both techniques are *content prediction*

Site Search

When you've visited Amazon, have you ever *not* searched?

Related Products

Customers who viewed this item also viewed...

What results from a strong digital CX?

- **Higher sales**. More leads and shorter sales cycles
- **Higher profit**. Lower cost of sales and customer acquisition costs
- **Higher growth**. More to invest to scale faster—with digital

Increase your marketing yield

The challenge for websites

Who wants to be like Amazon?	How many websites succeed?
Every website	**Few, if any**

Why is it hard for them?

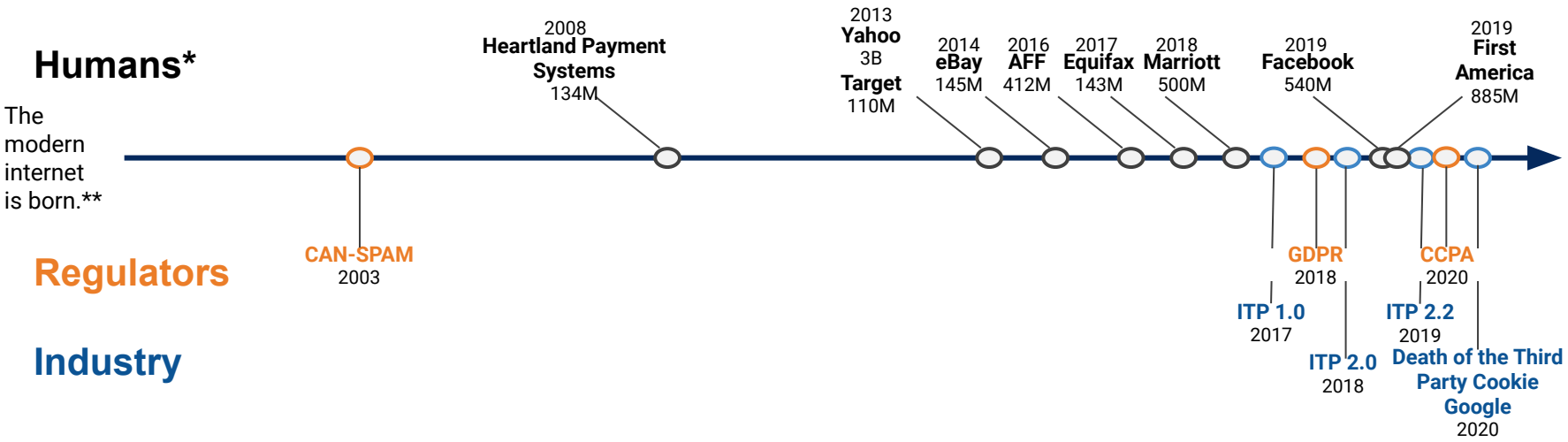
They need personal information to fuel traditional tech

The vast majority of their visitors are anonymous

The world has turned against personal data

Why now? The world has changed

Personal data—the traditional fuel for personalization—is drying up. Regulators and industry are responding to customer frustration over the use (and misuse) of their personal information.



* Accounts compromised. Only incidents >100M Accounts
** 1994ish

How do we know this?

147 Conversations

with large enterprise executives responsible for marketing or customer experience

Competitive software doesn't deliver enough value	Content demands are costly and difficult to meet	Long time to value—it takes the IT team forever to implement

Source: SoloSegment market research interviews, 1H2019

What makes CX so difficult for large sites?

Anonymous visitors

Few websites know anything about who visits

Massive content

Tens of thousands to even millions of pages

So what do you have to work with?

Anonymous visitors	Massive content
Visitor behavior analysis	**Content topic analysis**

Relevance is at the intersection

The secret of CX is to provide what customers want with the content you have

People ▸ **Content Prediction Engine** ▸ Content

Relevance is at the intersection

The secret of CX is to provide what customers want with the content you have

People

Pages Visited
Keywords Searched
Forms Submitted

Content Prediction Engine

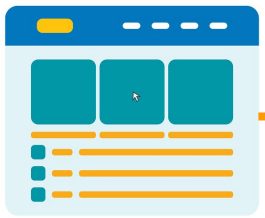
Content

Site Structure
Content Topics
Content Journeys

SoloSegment

AI Using Behavioral Data

How do you collect the behavioral data?



JavaScript on every page

JavaScript Collector

All clicks, mouse movements, timings

Python Aggregator

Page, session, user activity history

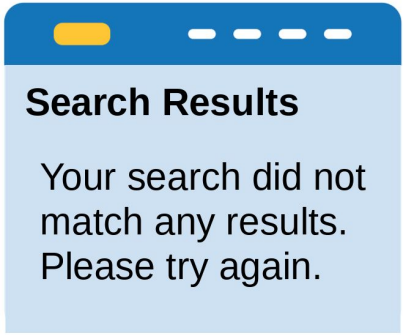
Postgres

All data anonymized: privacy compliant

Are site searchers finding what they look for?

Sometimes it's easier to identify failures

No results



The search shows no results for the keyword

No clicks

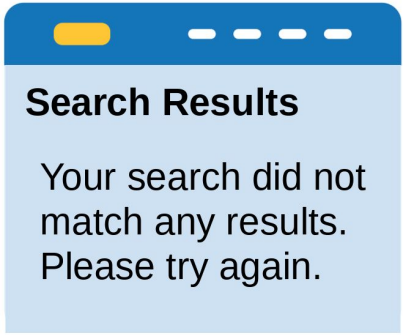
The search shows results but the searcher doesn't click on any

- It's easy to agree that these outcomes are failed searches
- But is every other search a success?
- Hardly...

Some searches fail, even when clicked...

...but how do you know which ones?

No results



The search shows no results for the keyword

No clicks

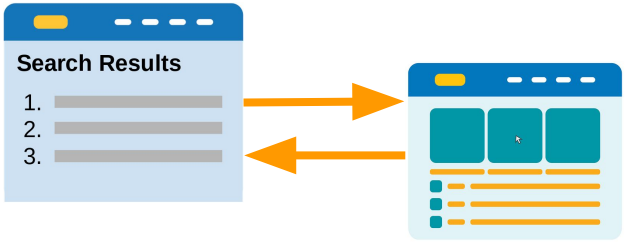
The search shows results but the searcher doesn't click on any

Failed Clicks

The searcher clicks but interacts with content in a manner that indicates failure.

Exhibit A: Pogosticks

Is a pogostick always a failed click?



The searcher clicks but returns to the search results page

- **YES** it's a failure

  If the searcher found the right page, why would he return to the results page?

- **NO** it's not a failure

  Maybe the searcher is researching a deep topic and needs to review several pages.

Exhibit B: Exits

Is an exit always a failed click?

The searcher clicks but exits the site from the next page.

- **YES** it's a failure

  If the searcher found the right page, why would she exit the site when she saw it?

- **NO** it's not a failure

  Maybe the searcher found her answer and has completed her task successfully.

Exhibit C: New search

Is a new search always a failed click?

The searcher clicks but searches for something else from the next page.

- **YES** it's a failure

  If the searcher found the right page, why would she search again?

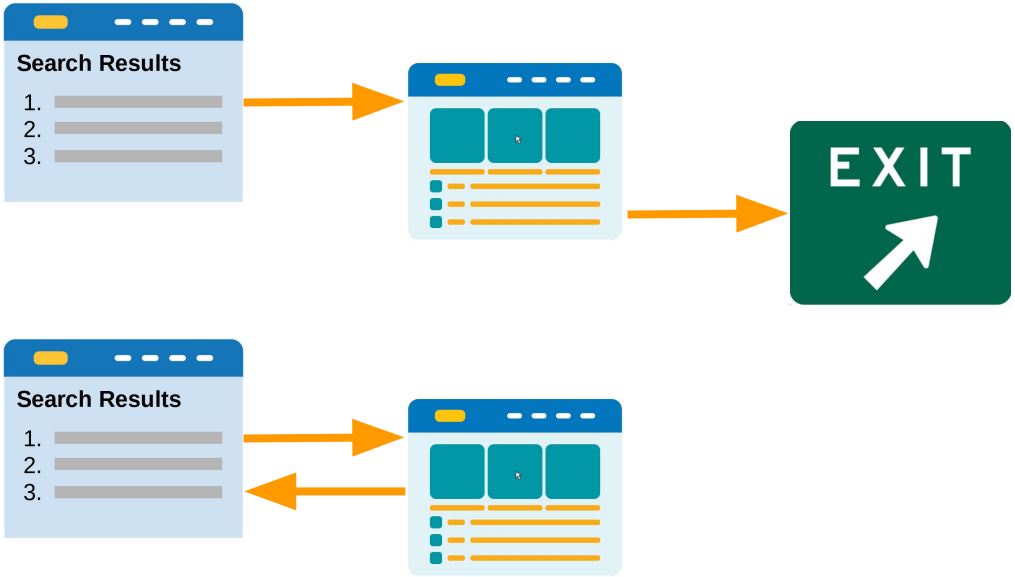
- **NO** it's not a failure

  Maybe the searcher found her answer and is looking for something else now.

With enough data, AI can detect "intent shifts"

Search experiences are not black and white

The measurements can't be black and white, either



- **MAYBE** it's a failure

  The searcher found the wrong page and pogosticked or exited.

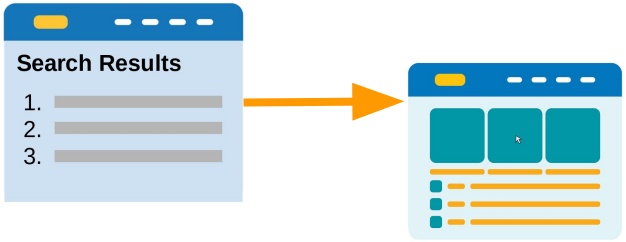
- **MAYBE** it's not

  The searcher found the answer, or is looking for more than one answer.

How do we tell the difference?

It’s all about reading the signals

What happens on the journey after the search?



Success Signals

- Completed a task
- Clicked a content link
- Spent time on the page
- Scrolled down the page

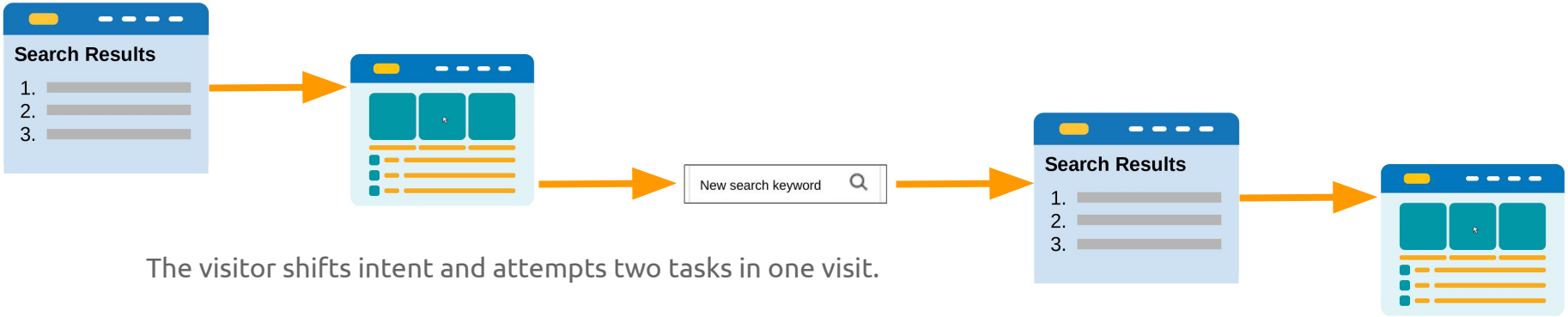
Failure Signals

- Took no action
- Clicked on site navigation
- Short time on the page
- Never scrolled

AI can weigh all of these signals to task completion

More success involves task completion

Detecting form submissions augments knowing when answers are found

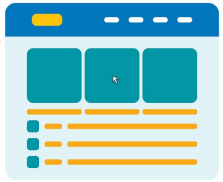


The visitor shifts intent and attempts two tasks in one visit.

Search data reveals intent

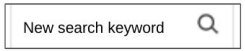
That intent can be generalized to navigational data

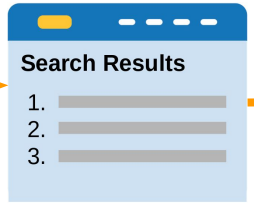
Visitor 1

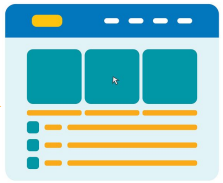


Page 1

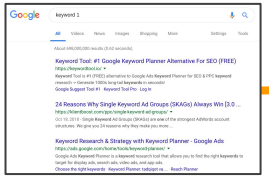
One session on your site, attempting two tasks using site search



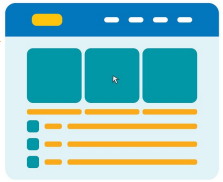




Page 2

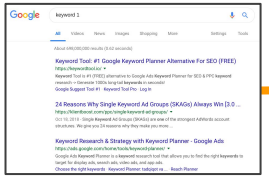


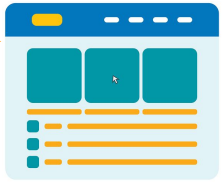
Visitor 2



Page 1

Two sessions on your site, attempting the same two tasks using Google

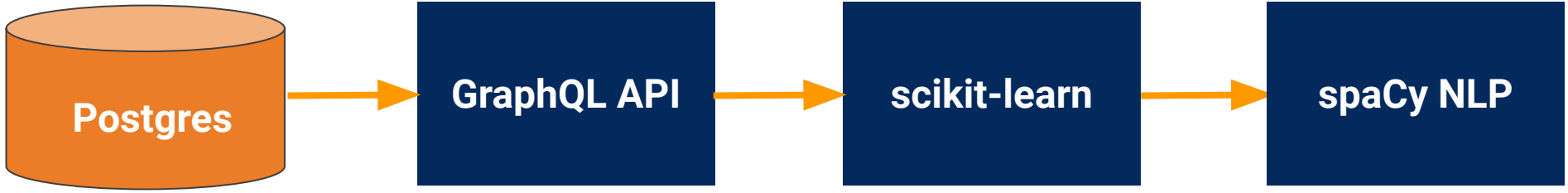




Page 2

How can that be done?

Predictive Analytics and AI



All data anonymized: privacy compliant

Available to developers of all clients

Pattern analysis for behavioral data

Pattern analysis for keyword data

A GraphQL API provides behavioral data

Site Searches

- Originating URL
- Keyword
- Facets
- Results flag
- Click flag
- Success flag

Site Search Results

- Originating URL
- Keyword
- Facets
- Results URL
- Results URL rank
- Success flag

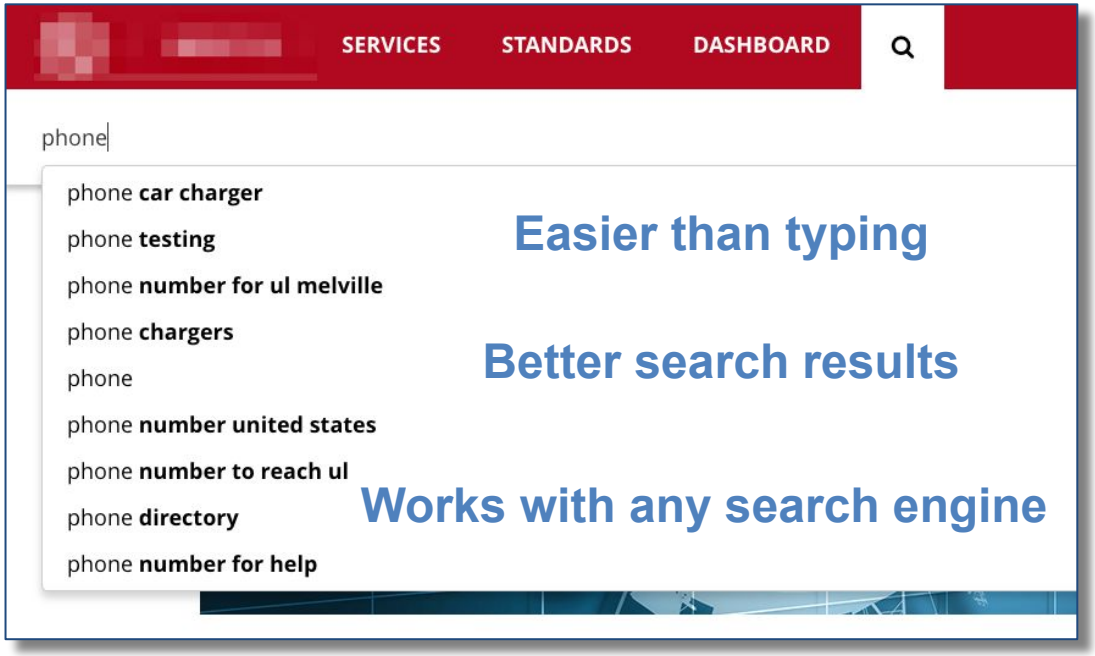
Page Navigation

- Session ID
- URL viewed
- Page events (scroll, resize, etc.)
- Time on page
- Channel type

Using the data to suggest better keywords

Success-based search suggestions yield more success

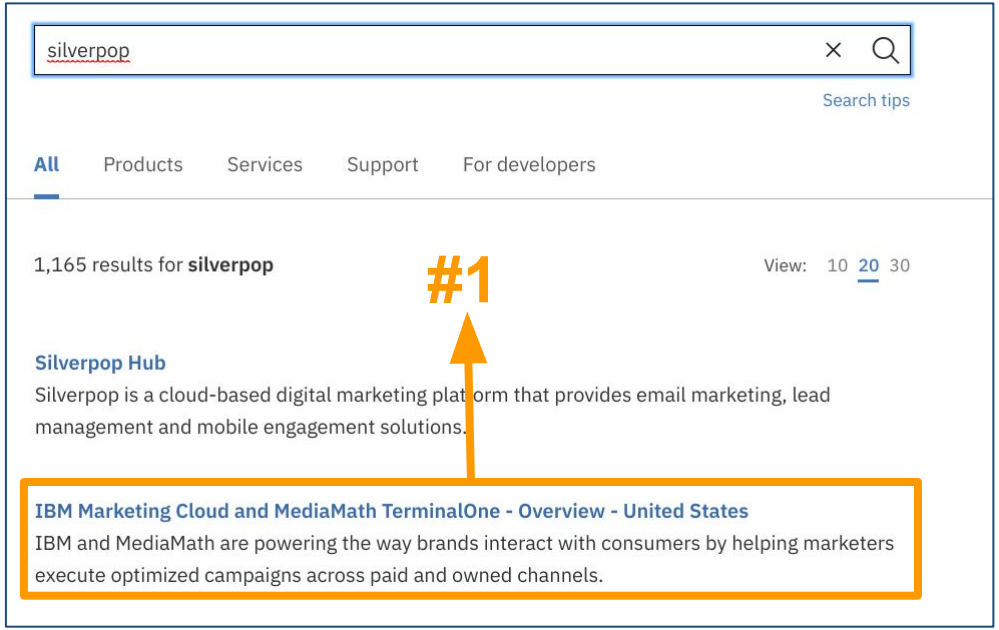
- Instead of searching for *phone*, they can immediately select what they really want.
- Most suggestion tools suggest frequent or recent keywords—we can suggest frequent and *successful* keywords



Use the data to “auto-curate” the right results

Prior successes drive the right results to the top

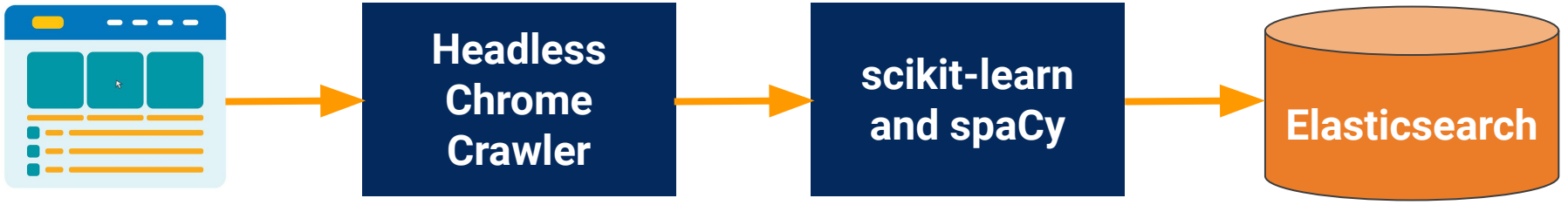
- When your search engine doesn’t find the right answer, you can *manually curate* the right answer, but only for the most popular keywords
- Success data API allows your search engine to *automatically* curate *all* keywords with the successful pages



SoloSegment

AI for Website Topics

How do you collect the content data?



Pages on client website

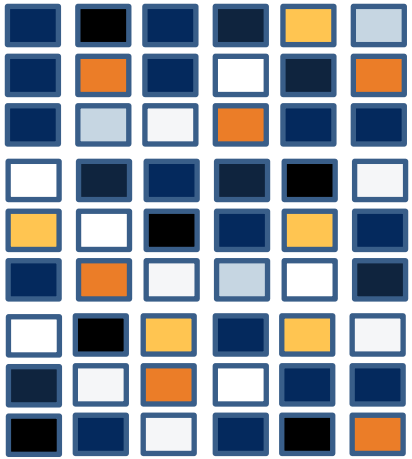
Sitemap or Discovery crawls

Document pipeline extracts insights

Content stored for fast retrieval

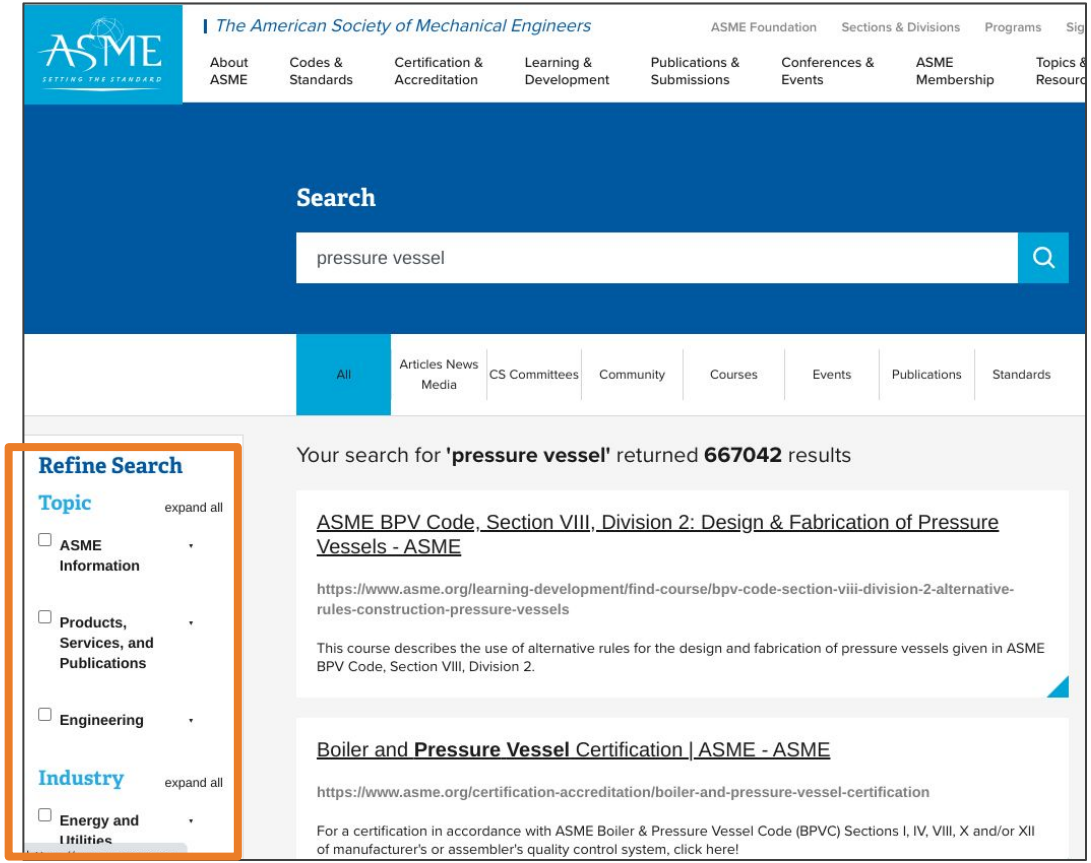
A multi-purpose insight is the content's topics

- **Site Search**: Facets improve site search success by allowing easy drill-down to find needed content
- **Personalization**: Content can be dynamically selected based on the visitor and the context
- **CMS and SEO**: Coverage of topics, industries, and more can be constantly assessed and adjusted in content strategy, related content
- **Standardization of Nomenclature**. It can help to have one central group naming terms of art

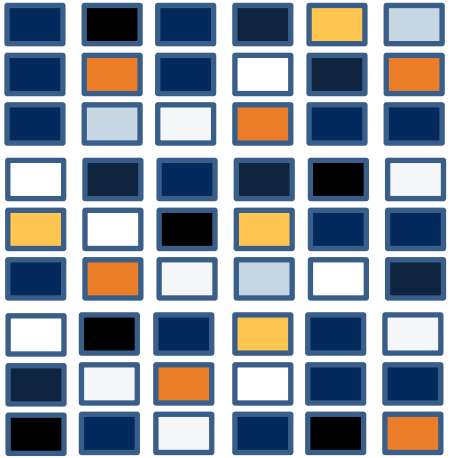


Topics allows searchers to drill down

Faceted search is powered by topics

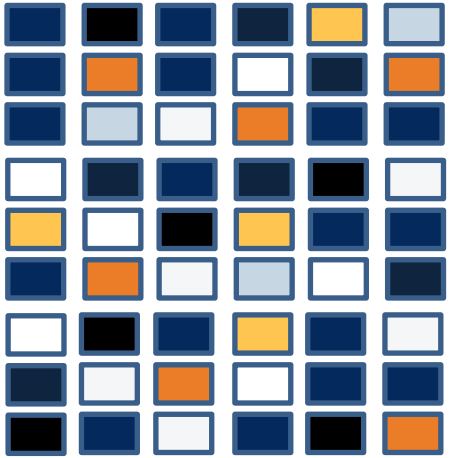


What's wrong with existing topic modeling?



- **Clustering isn't good enough.** Machines can automatically group topics, but the resulting topics often don't make sense to humans. Some are OK, but others cause head-scratching.
- **Manual taxonomies take time.** If you lay five SMEs end to end, they all point in different directions. It can take months to get agreement on the "right" topics.
- **Taxonomies must reflect the documents**. Often, manually-created taxonomies aspirational topics that are important, but they hinder retrieval because documents about those topics are rare.
- **Manual taxonomies are hard to classify**. We'd like to automatically label all documents, but taxonomies with lots of topic overlap are hard to label accurately.

What can you do instead? Human-in-the-loop



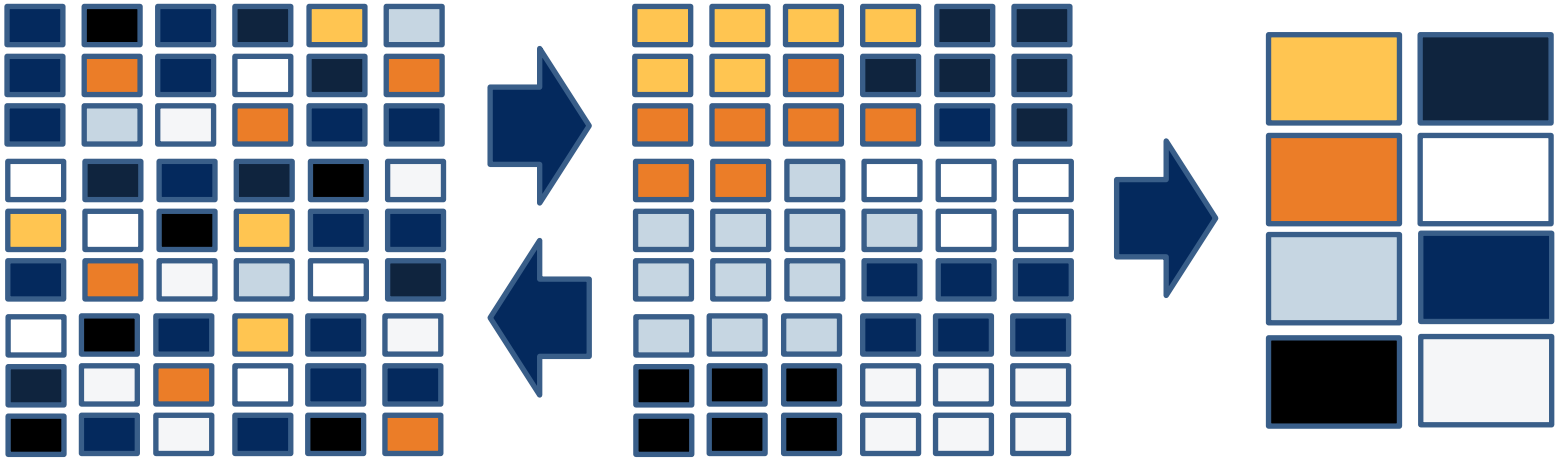
- **First, the machine identifies topics.** It starts with messy, raw data that the machine has grouped together. The topics look awkward because they haven't yet had human grouping or feedback.
- **SMEs analyze the topics.** SMEs look at the language and help answer questions about what the topics should look like and how they might be grouped together using their expertise.
- **SMEs provide feedback**. SMEs provide information about which topics are appropriate and desired, and which ones to remove, as well as which ones might be merged with others.

The SME identifies the right topics

Identify topics from documents

Re-run the model to refine topics

Finalize the topics

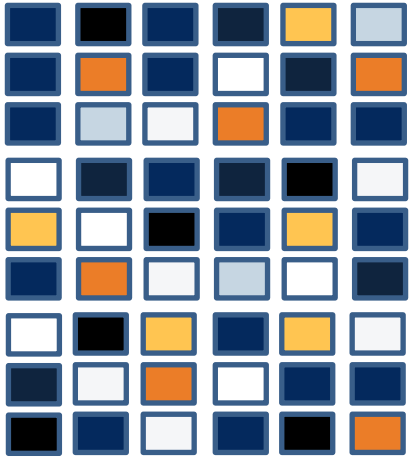


Why shouldn’t we tag documents by hand?

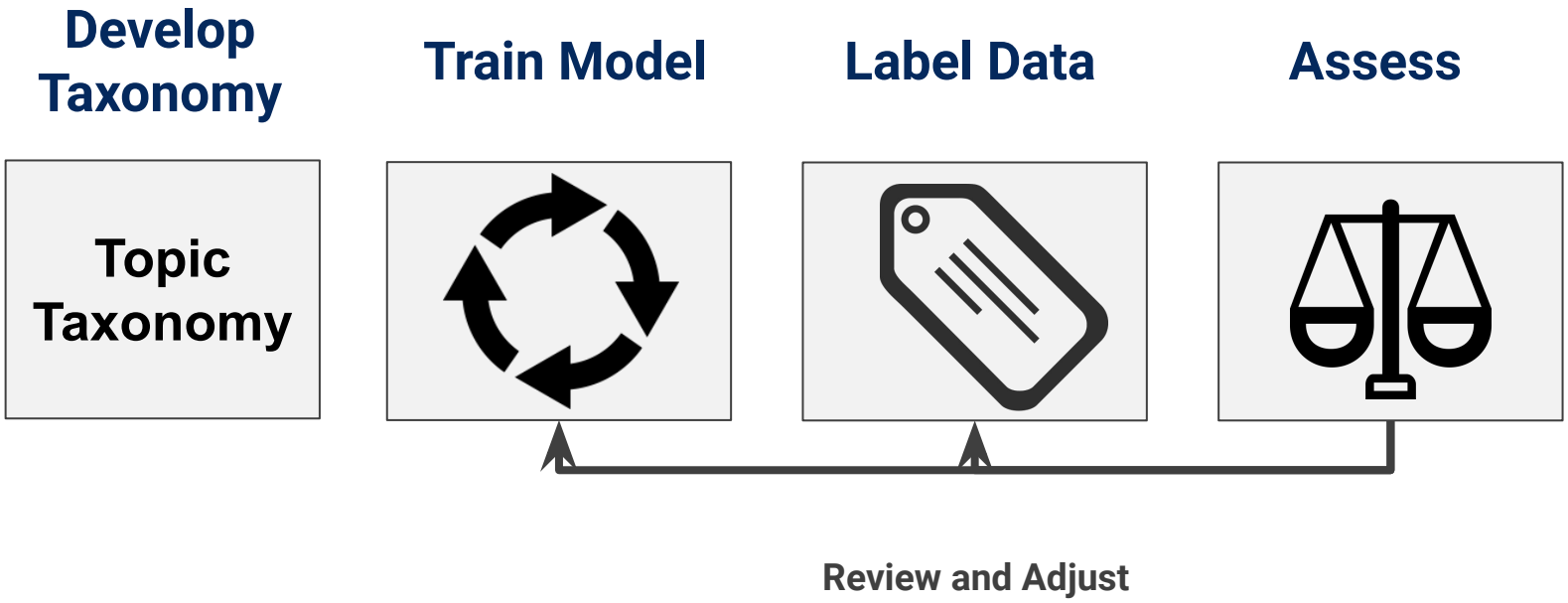
Automatic classification increases consistency

- **Too many categories.** Manual classification is error prone, because consistently deciding the right classification among dozens of choices is very hard for people

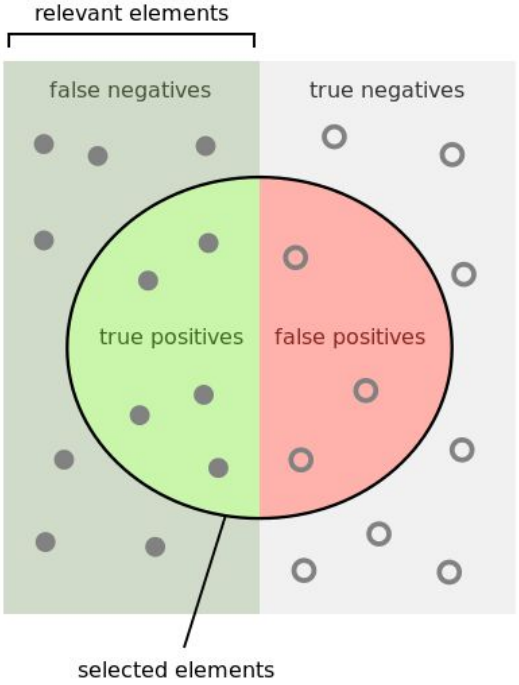
- **People are inconsistent.** Even the same people disagree with themselves—35% of document coders disagree with themselves when given the same task a few days later



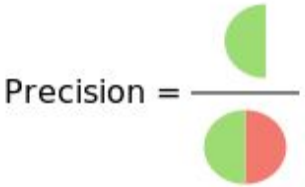
How does auto-tagging work?



Measure accuracy with precision and recall

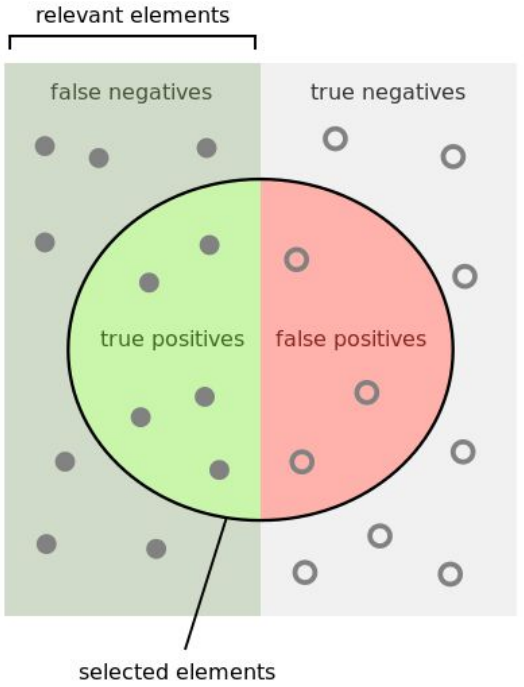


- **Precision**: How many of the selected elements are true positives?
- **Recall**: How many of the relevant elements are selected?



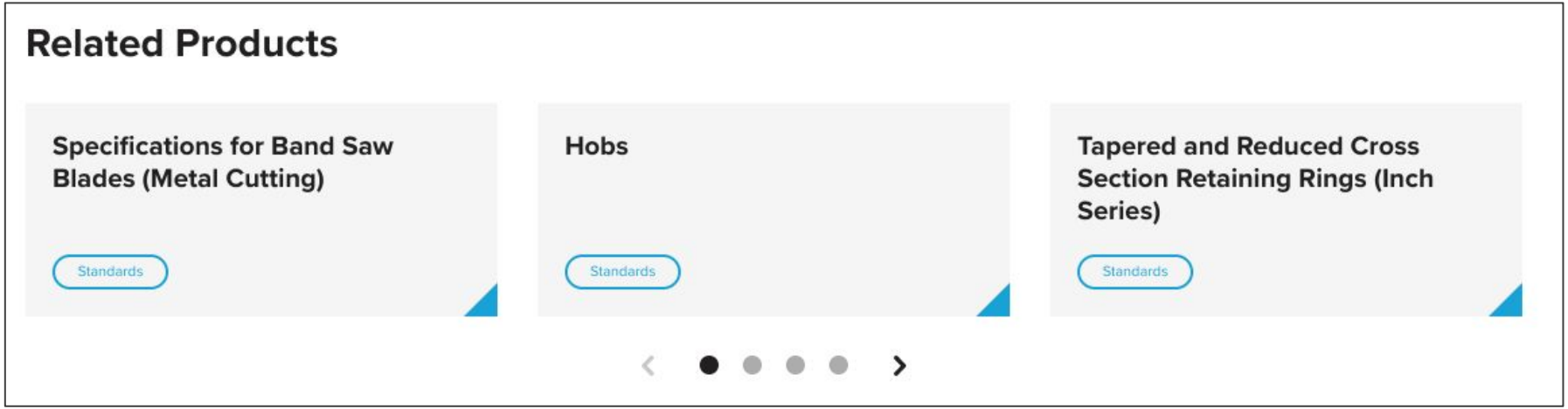
What's good? F-Measure tells you.

- F-Measure trades off precision and relevance
- Higher F-Measure are better
- You can weight precision and recall differently
- When in doubt, weight them the same



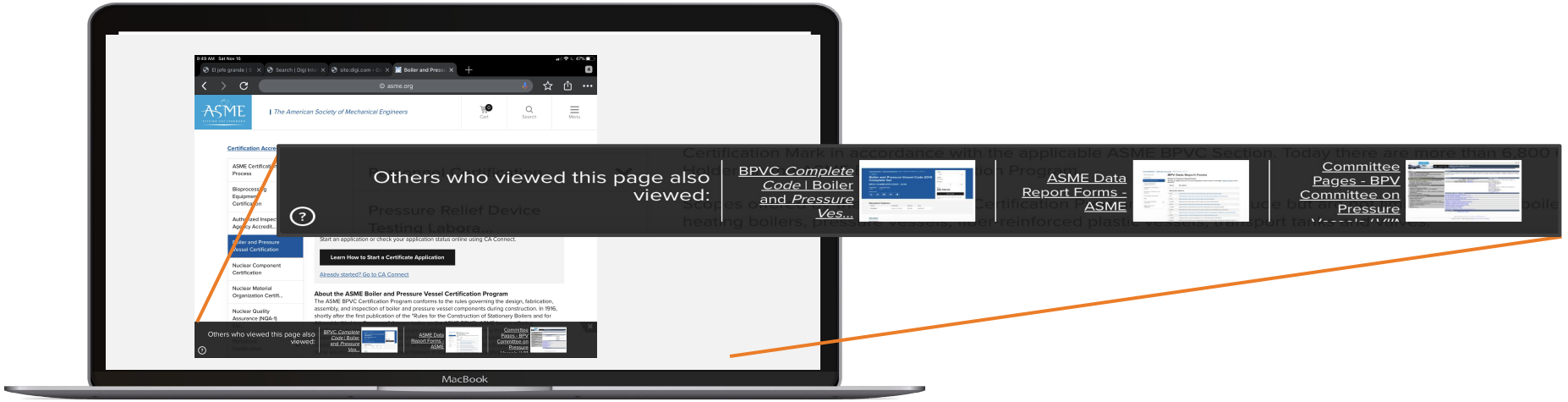
Topics also can be used programmatically

- APIs can add topics to your CMS
- APIs can embed recommendations into your page template



Topics fuel content recommendation

Present the next best action so each user succeeds



Presented as a modal, but can be embedded on the page by your CMS. using an API

Questions?

Mike Moran (Mike@SoloSegment.com)