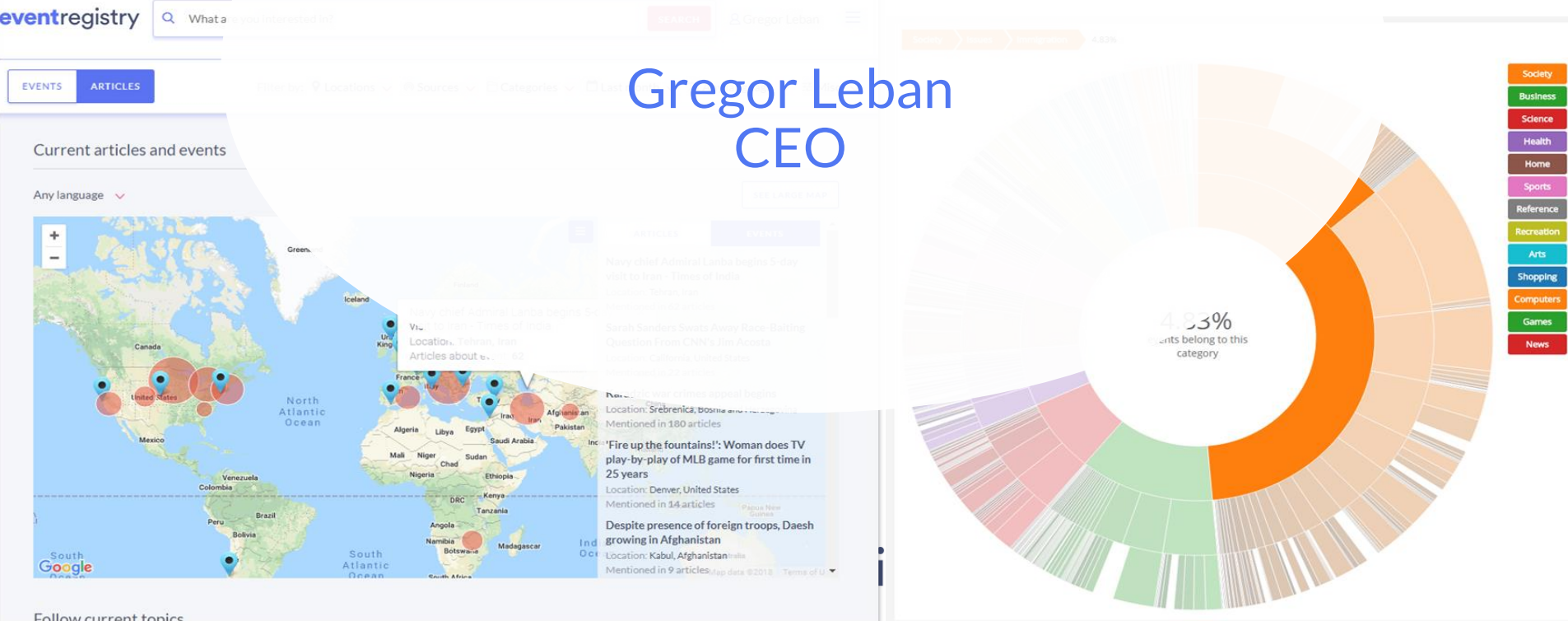


<http://eventregistry.org/>

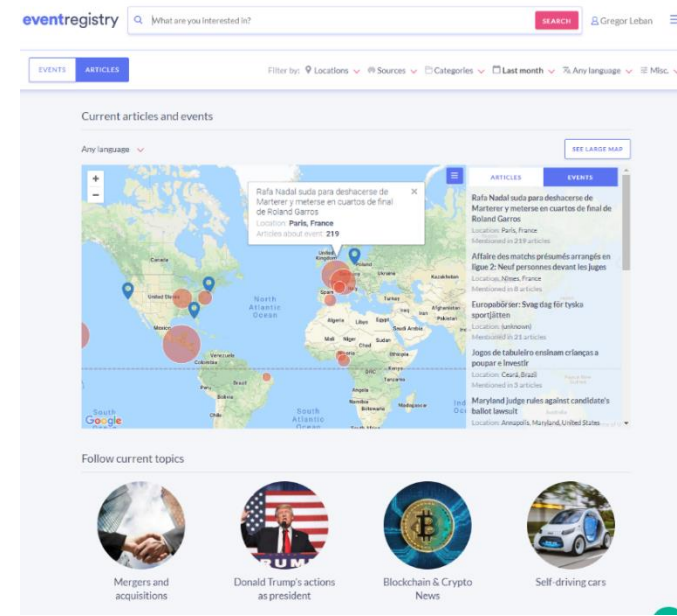


# Who are we

- Spin-off from Jozef Stefan Institute
  - Laboratory for Artificial Intelligence
- Started in 2017 through Google funding
- Experts in AI, machine learning, text understanding and information extraction
- Our top customers: Bloomberg, IBM, Nasdaq, Stratfor, Stanford, Harvard, ...

# What is Event Registry?

- Encyclopedia for world events
- Event registry is a system for
  - collecting news content published globally (35 langs, ~0.5M articles daily)
  - Analysis of news and automatic identification of world events
  - Extraction of core event information
- Extensive search and visualization options

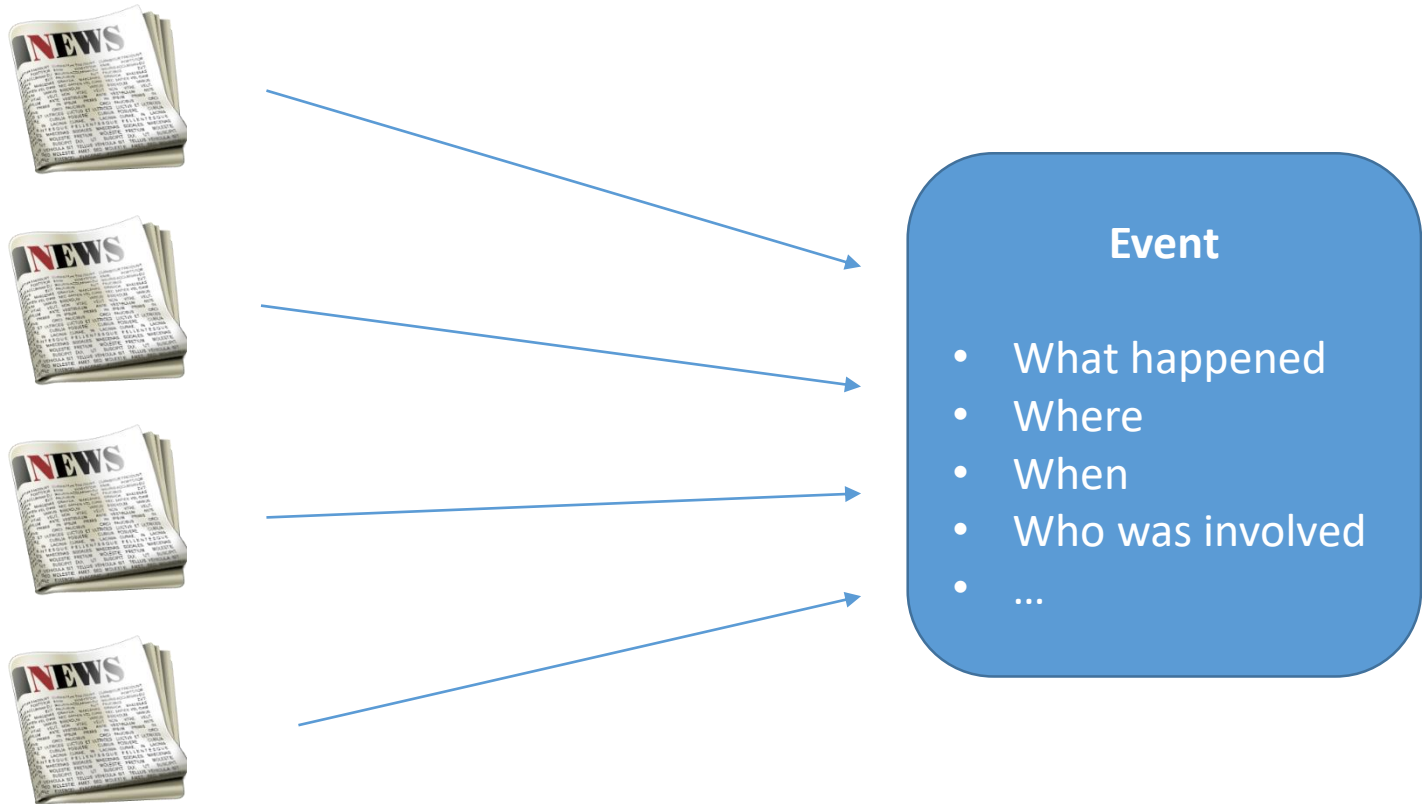


# Why?

- Huge amounts of news information generated daily
- News contain crucial information for decision making
- Problem: humans are limited in the amount of info we can process
- Can computers help?
- Yes...
  - But computers have problem understanding unstructured text
- Using various AI methods we extract knowledge in structured form
- Structured form allows use of various facets (time, locations, topics, ...) to isolate specific content of interest
- Used by: Risk analysts, policy makers, stock traders, think tanks, financial institutions, ...

# Our aim

- Extract from articles actionable insights (events)



# What is an event?

- Event = collection of news articles that discuss the same thing that happened
- Assumption: If something is significant → reported by various news publishers



## EVENT

Deutsche Bank offices raided in money laundering probe

### WHEN

Thu, November 29, 2018

### WHERE

Frankfurt, Germany

### ARTICLES

699

### VIRALITY

2,345

🏠 Deutsche Bank 📍 Frankfurt, Germany 💡 Money laundering 💡 Panama Papers 📍 Germany 💡 Tax haven  
💡 Public prosecutor's office 💡 Euro 💡 Bank 📍 British Virgin Islands 📍 Panama

FRANKFURT (Reuters) - Police raided six Deutsche Bank offices in and around Frankfurt on Thursday over money laundering allegations linked to the "Pan... ([Reuters](#))



# Examples of events



## EVENT

### Magnitude 7 Earthquake Shakes Anchorage

#### WHEN

Fri, November 30, 2018

#### WHERE

Anchorage, Alaska, United States

#### ARTICLES

1,180

#### VIRALITY

15,064

- Earthquake
- Anchorage, Alaska, United States
- Alaska, United States
- Tsunami
- United States Geological Survey
- Aftershock
- Twitter
- Moment magnitude scale
- United States
- Tsunami warning system
- Epicenter

A magnitude 7 earthquake struck about eight miles north of Anchorage, Alaska, on Friday morning, according to the United States Geological Survey, cau... ([The New York Times](#))



## EVENT

### George H.W. Bush dead at 94

#### WHEN

Sat, December 01, 2018

#### WHERE

Houston, United States

#### ARTICLES

3,361

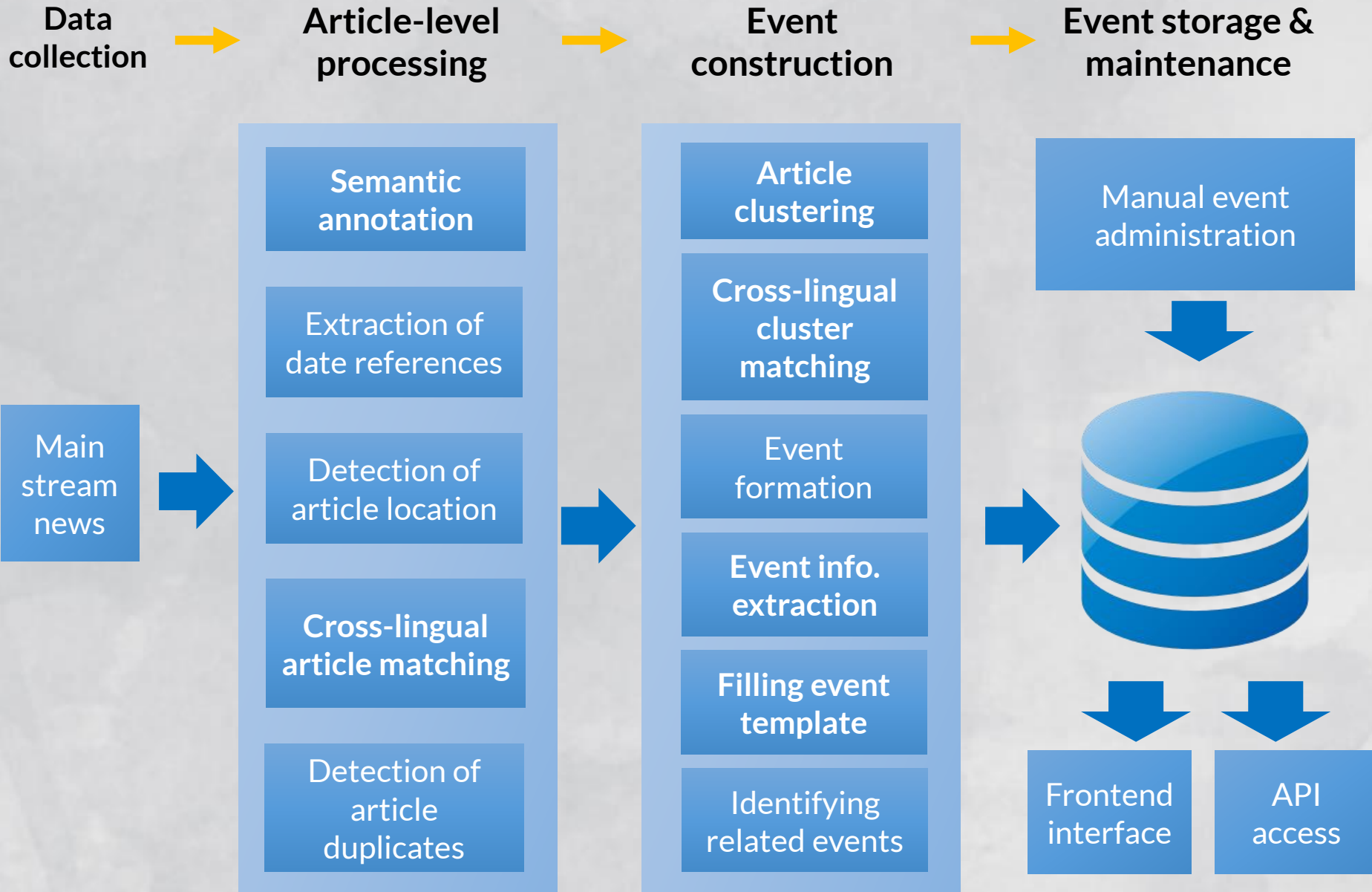
#### VIRALITY

46,940

- George H. W. Bush
- United States
- George W. Bush
- Donald Trump
- White House
- Cold War
- Barbara Bush
- Ronald Reagan
- Republican Party (United States)
- Bill Clinton
- World War II
- Gulf War

(CNN)Former US President George H.W. Bush has died at age 94 in Houston, according to his spokesperson. Born into privilege and a tradition of servic... ([CNN International](#))

# Event registry pipeline





# Understanding meaning of words

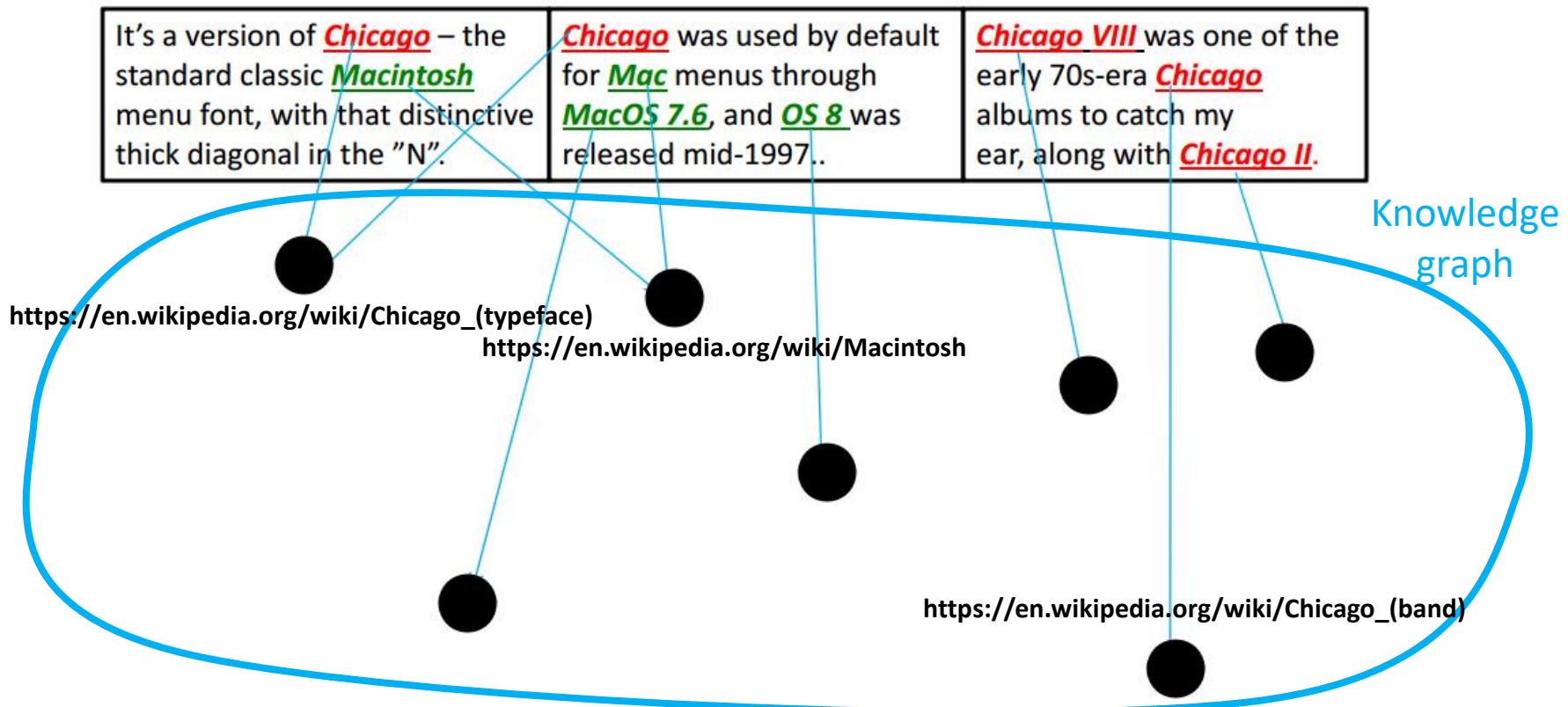
- We want to capture the meaning of the words mentioned in the text
- Semantic annotation

It's a version of <u>Chicago</u> – the standard classic Macintosh menu font, with that distinctive thick diagonal in the "N".	<u>Chicago</u> was used by default for Mac menus through MacOS 7.6, and OS 8 was released mid-1997..	<u>Chicago VIII</u> was one of the early 70s-era <u>Chicago</u> albums to catch my ear, along with <u>Chicago II</u> .
---	--	--

Example from: <http://nlp.cs.rpi.edu/paper/wikificationtutorial.pdf>

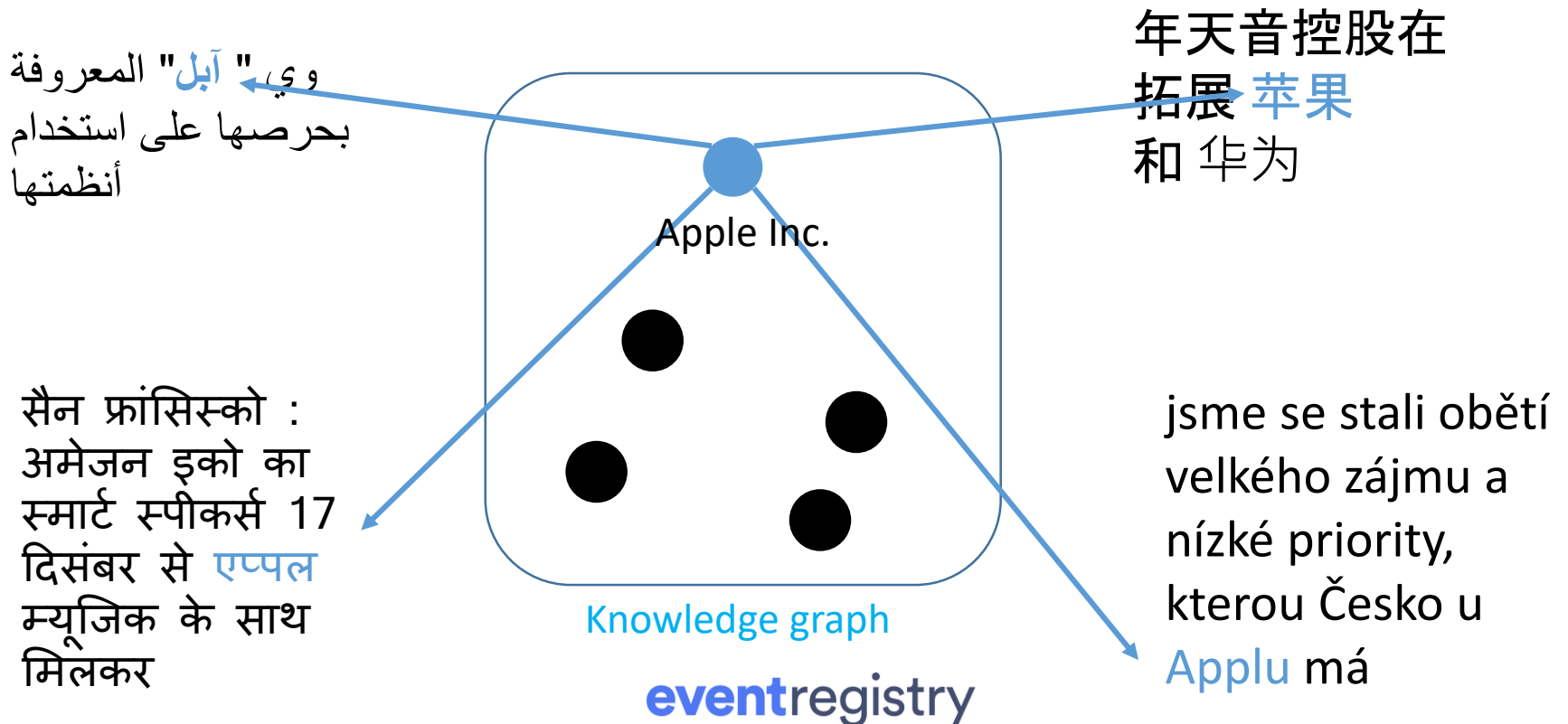
# Understanding meaning of words (2)

- **Ambiguity** – same word, different meaning (e.g. Chicago)
- **Variability** – different words, same meaning (Mac, Macintosh)
- Entity linking = mapping of phrases to nodes in a knowledge graph



# Understanding meaning in different languages

- The meaning has to be extracted from text in different languages and scripts



# Understanding words demo

(<http://eventregistry.org/documentation?tab=annotate>)

Johannesburg (AP) -- The South African schoolgirl leaned close to the Matisse painting.  
JOHANNESBURG SOUTH AFRICA HENRI MAT PAINTING

"I like the blue and yellow of the dress the woman is wearing. And then there is the bright red background," she said. "And the drawing of her face is simple but strong."

For the first time, Africa is hosting an exhibit devoted to Henri Matisse. The show in Johannesburg features more than 80 works, including a painting that points to how the continent inspired Matisse and his contemporary, Pablo Picasso.  
AFRICA HENRI MATISSE JOHANNESBURG PAINTING HENRI MATISSE PABLO PICASSO

The exhibit of bold line drawings and vibrantly colored stencils also includes one of Matisse's first drawings as a student and one of his final paintings, the portrait described by the student, completed shortly before his death in 1954.  
STENCIL HENRI MATISSE

"He collected many African art objects, particularly masks and figurines from Central and West Africa," said Federico Freschi, dean of art at the University of Johannesburg and co-curator of the show that runs through Sept. 17, "Henri Matisse : Rhythm and Meaning."  
AFRICAN ART MASK FIGURINE WEST AFRICA JOHANNESBURG HENRI MATISSE

"Matisse also collected a number of African textiles. He had a particular interest in textiles. So he collected many Kuba cloths, for example, and also various North African fabrics, particularly the sort of cotton appliqué work that is well-known in Africa. And those things find their way into his work in various ways," Freschi said.  
HENRI MATISSE TEXTILE TEXTILE KUBA KINGDOM NORTH AFRICA TEXTILE COTTON APPLIQUE AFRICA

# Article clustering

- For each language we try to identify groups of articles that describe a single event
- **Online clustering algorithm**
- Cluster based on
  - article title + content
  - detected named entities





# Joining clusters in different languages


- Each cluster only contains articles in the same language
- Clusters in different languages can describe the same event – how do we find them?
- Use machine learning to decide

## English cluster

 **SpaceX lands its third consecutive rocket on ship in Atlantic Ocean** PERFSCIENCE.COM  
Sat, 28 May, 08:45 **0.847**  
Yes, SpaceX has done it again. For the fourth time, it has managed to have a successful rocket landing. On Friday at 5:40pm Falcon 9 rocket blasted off from Cape Canaveral, Florida, carrying the Thaicom 8 satellite.  
The rocket returned to earth around 10 minutes later. It made a landing in an ...

 **SpaceX launches Asian satellite, attempts to land rocket** BUSINESS INSIDER  
Fri, 27 May, 22:33 **0.836**  
© SPACEX/AFP/FileThe Falcon 9 rocket on December 16, 2015 in Cape Canaveral -- SpaceX has managed to successfully land the first stage of its Falcon 9 rockets three times before  
Miami (AFP) - SpaceX on Friday launched an Asian communications satellite before trying for a fourth successful landing ...


 **SpaceX launches Asian satellite, attempts to land rocket** YAHOO  
Fri, 27 May, 22:04 **0.811**  
Miami (AFP) - SpaceX on Friday launched an Asian communications satellite before trying for a fourth successful landing of its Falcon 9 rocket.  
Under blue skies dotted with clouds, the shiny white rocket blasted off from Cape Canaveral, Florida at 5:40 pm (2140 GMT).  
The satellite, known as ...

 **SpaceX makes fourth successful rocket landing** MAIL ONLINE  
Sat, 28 May, 01:29 **0.807**  
That would make space deliveries - and travel - more economical  
Elon Musk's SpaceX company notched up another victory today when it managed to


?

=

## Spanish cluster

 **SpaceX lo ha vuelto a hacer** HIPERTEXTUAL  
Fri, 27 May, 22:12 **0.689**  
La empresa californiana de transporte aeroespacial logra poner en órbita otro satélite de comunicaciones y hacer aterrizar en medio del mar la primera fase de su cohete Falcon 9.  
Ya es la tercera vez y la compañía liderada por Elon Musk vuelve a anotar otro crucial tanto en su carrera ...

 **Hacer de lo imposible algo rutinario, nueva misión para SpaceX** HIPERTEXTUAL  
Thu, 26 May, 08:32 **0.747**  
El cohete Falcon 9 de la compañía privada SpaceX despegará desde la estación de las fuerzas aéreas de Cabo Cañaveral este jueves con el objetivo de poner en órbita satélites de comunicación. Un paso más para normalizar lo que hace un año se creía imposible: reutilizar cohetes.  
SpaceX, ...

 **SpaceX consigue recuperar otro cohete tras su lanzamiento** MICROSIERVOS.COM  
Sat, 28 May, 13:31 **0.593**  
Este es el vídeo (acelerado) del retorno al espaciopuerto autónomo flotante Of Course I Still Love You de la primera etapa del Falcon 9 FT de SpaceX que puso en órbita el satélite de telecomunicaciones Thaicom 8.  
El Thaicom 8 tiene como destino final una órbita geoestacionaria, por lo que el ...




 **Se aplaza por 24 horas lanzamiento de satélite tailandés** ELESPECTADOR  
Fri, 27 May, 04:30 **0.839**  
El director de SpaceX, Elon Musk, anunció que su empresa









# Extracting event information

- Use articles assigned to the event to extract event information
- Information to extract:
  - Location
  - Event date
  - Main event entities and keywords
  - Event categories
  - Event title and snippet


# DEMO (<http://eventregistry.org/>)


SEARCH

EVENTS ARTICLES

Filter by:  Locations  Sources  Categories  Last month  Any language  Misc.

### Current articles and events

Any language 

SEE LARGE MAP

ARTICLES EVENTS

**FIFA Best Men's Player Award For 2018 Announced**  
Location: London, United Kingdom  
Mentioned in 3431 articles


**Greek Journalists Walk Free Following Minister's Lawsuit**  
Location: Athens, Greece  
Mentioned in 40 articles

**Bakala podal u amerických soudů žalobu na Krápu kvůli vydírání**  
Location: (unknown)  
Mentioned in 6 articles


**Clay Matthews: NFL Is 'Going in a Direction ... a Lot of People Don't'**  
Location: (unknown)  
Mentioned in 94 articles

**Nelson Mandela's legacy lives on at the UN in New York**  
Location: (unknown)  
Mentioned in 459 articles


### Follow current topics




Mergers and acquisitions



Donald Trump's actions as president



Blockchain & Crypto News



Self-driving cars

# #1: Following a broad topic

- Media monitoring - find news and events related to some topic of interest
  - 4<sup>th</sup> industrial revolution
  - Latest developments in biogenomics
  - Monitoring cybersecurity
- Users: geopolitical organizations (Stratfor), companies monitoring their area of development

# #1: Following a broad topic (2)

[Home](#) > /themes/4th-industrial-revolution

Options ▾

Configure topic page ^

## Add conditions

Interests ?

What are you interested in?



Source ?

Name of the news source

By name ▾

Category ?

Pick ▾

Category name

Location ?

Article/event location name

## Filters

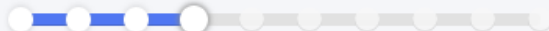
Article duplicates ?

Hide article duplicates ▾

Content at most ?

5 days old ▾

Source ranking ?



Limit to languages ?

English ▾

Data type ?

☒ News ☐ PR ☐ Blogs

## Topic definition

Interests

☐ Required ?

Artificial intelligence	LOW	<input type="range"/>	HIGH	▾	✕
Robotics	LOW	<input type="range"/>	HIGH	▾	✕
Autonomous car	LOW	<input type="range"/>	HIGH	▾	✕
Internet	LOW	<input type="range"/>	HIGH	▾	✕
Computing	LOW	<input type="range"/>	HIGH	▾	✕
Supply chain	LOW	<input type="range"/>	HIGH	▾	✕
Automation	LOW	<input type="range"/>	HIGH	▾	✕
Unmanned aerial vehicle	LOW	<input type="range"/>	HIGH	▾	✕
Robot	LOW	<input type="range"/>	HIGH	▾	✕
Geopolitics	LOW	<input type="range"/>	HIGH	▾	✕
Agriculture	LOW	<input type="range"/>	HIGH	▾	✕
Digital data	LOW	<input type="range"/>	HIGH	▾	✕
Developed country	LOW	<input type="range"/>	HIGH	▾	✕
Silicon Valley	LOW	<input type="range"/>	HIGH	▾	✕
Electronics	LOW	<input type="range"/>	HIGH	▾	✕

# #1: Following a broad topic (3)



## EVENT

### Robots in the field: Farms embrace autonomous technology

#### WHEN

Fri, November 30, 2018

#### WHERE

England, United Kingdom

#### ARTICLES

14

#### VIRALITY

8

Robot Artificial intelligence England, United Kingdom Startup company United Kingdom Commodity Digital data Winter wheat Environmentally friendly Global Positioning System Smartphone Automation Agriculture Pest (organism)

'Agri-tech' startups aim to transform production in a field under economic strain Faced with seesawing commodity prices and the pressure to be more e... ([Daily Mail Online](#))

## EVENT

### Lil Durk Talks New Album, Which Rappers Can Hoop and More 🏆

#### WHEN

Tue, November 27, 2018

#### ARTICLES

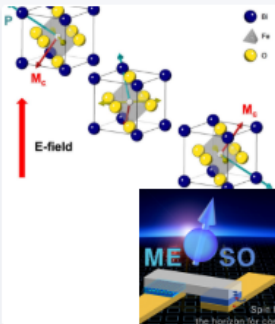
5

#### VIRALITY

0

Simultaneous localization and mapping Virtual reality Mobile robot Unmanned aerial vehicle Navigation United States dollar Vehicular automation Augmented reality Google Autonomous robot Real-time computing Internationalization and localization

Since leaving Def Jam and signing with Alamo Records, rapper Lil Durk has been busy in the studio. He just released a new album called Signed to the S... ([SLAMonline](#))



## EVENT

### New quantum materials could take computing devices beyond the semiconductor era

#### WHEN

Mon, December 03, 2018

#### WHERE

Hillsboro, Oregon, United States

#### ARTICLES

6

#### VIRALITY

8

Computing CMOS Intel Energy Multiferroics Transistor Voltage University of California, Berkeley Nature (journal) Logic Topology Binary number Magnetism Volt Bit Computer Lawrence Berkeley National Laboratory

Researchers from Intel Corp. and the University of California, Berkeley, are looking beyond current transistor technology and preparing the way for a ... ([phys.org](#))



## EVENT

### Use of drones, AI will change the face of agriculture sector: Devendra Fadnavis

#### WHEN

Thu, November 29, 2018

#### WHERE

Navi Mumbai, India

#### ARTICLES

7

#### VIRALITY

0

Artificial intelligence Industrial Revolution Irrigation Agriculture Memorandum of understanding Unmanned aerial vehicle

# #1: Following a broad topic (4)



## In the Coming Automated Economy, People Will Work for AI

A new role for humans: prepping data so AI can learn to do our jobs

In Texas, a company called Alegion is helping disabled veterans take part in the new digital economy. The vets' job: preparing data so that an artificial intelligence (AI) system can learn from it.

IEEE SPECTRUM: TECHN...

Fri, 30 Nov 2018, 15:24

f 36



## The ultimate guide to gifting STEM toys: tons of ideas for little builders

Welcome to TechCrunch's 2018 Holiday Gift Guide! Need more gift ideas? Check out our Gift Guide Hub.

The holiday season is here again, touting all sorts of kids' toys that pledge to pack 'STEM smarts' in the box, not just the usual battery-based fun.

TECHCRUNCH

Wed, 28 Nov 2018, 21:01

f 558



## Robots in the field: farms embracing autonomous technology

EAST MEON, England (AP) -- Faced with seesawing commodity prices and the pressure to be more efficient and environmentally friendly, farmer Jamie Butler is trying out a new worker on his 450-acre farm in England's Hampshire countryside.

SAN FRANCISCO GATE

Fri, 30 Nov 2018, 03:59



## 60 Cybersecurity Predictions For 2019

I've always been a loner, avoiding crowds as much as possible, but last Friday I found myself in the company of 500 million people. The breach of the personal accounts of Marriott and Starwood customers forced us to join the 34% of U.S. consumers who experienced a compromise of their personal ...

FORBES

Mon, 03 Dec 2018, 09:00

f 44



## The center is not holding -- and Trump is our proof

As the world's pre-eminent heads of state gather in Buenos Aires, Argentina, this weekend for the annual G-20 summit, the postwar order has never looked more fragile. War threatens to break out at any moment between Russia and Ukraine, Britain is staring into the abyss of a failed Brexit negotiation ...

ALTERNET

Sat, 01 Dec 2018, 07:47

f 32




## #2: brand monitoring and comparison

- Compare how is your brand perceived in the media and comparison with other brands
- Users: consulting companies (Bloomberg), PR departments

## #2: brand monitoring and comparison (2)









 Chevron Corporation


What are you interested in?

EVENTS

ARTICLES

Filter by:  Locations   Sources   Categories   Last year 











 Statoil

What are you interested in?

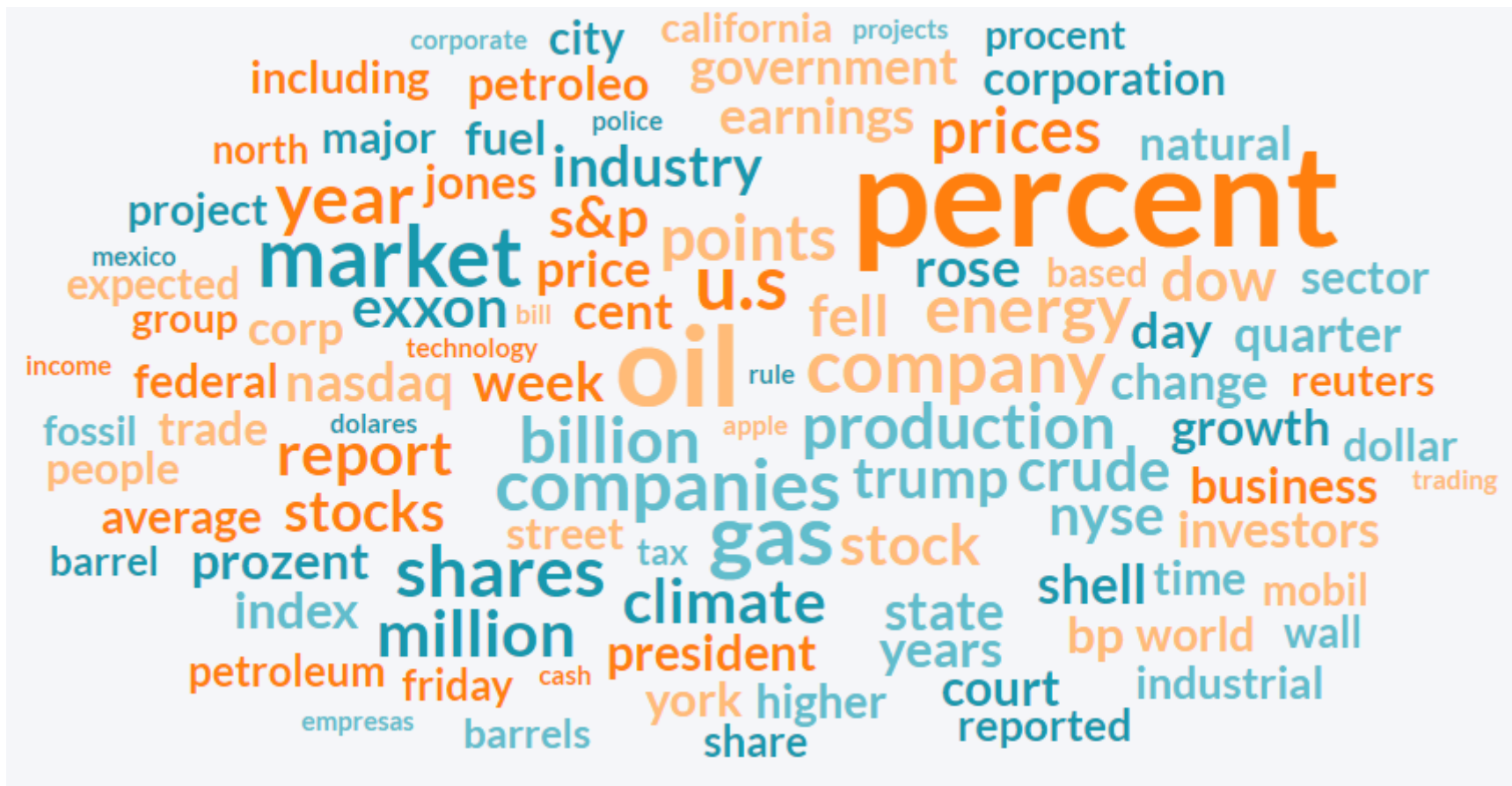
EVENTS

ARTICLES

Filter by:  Locations   Sources   Categories   Last year 

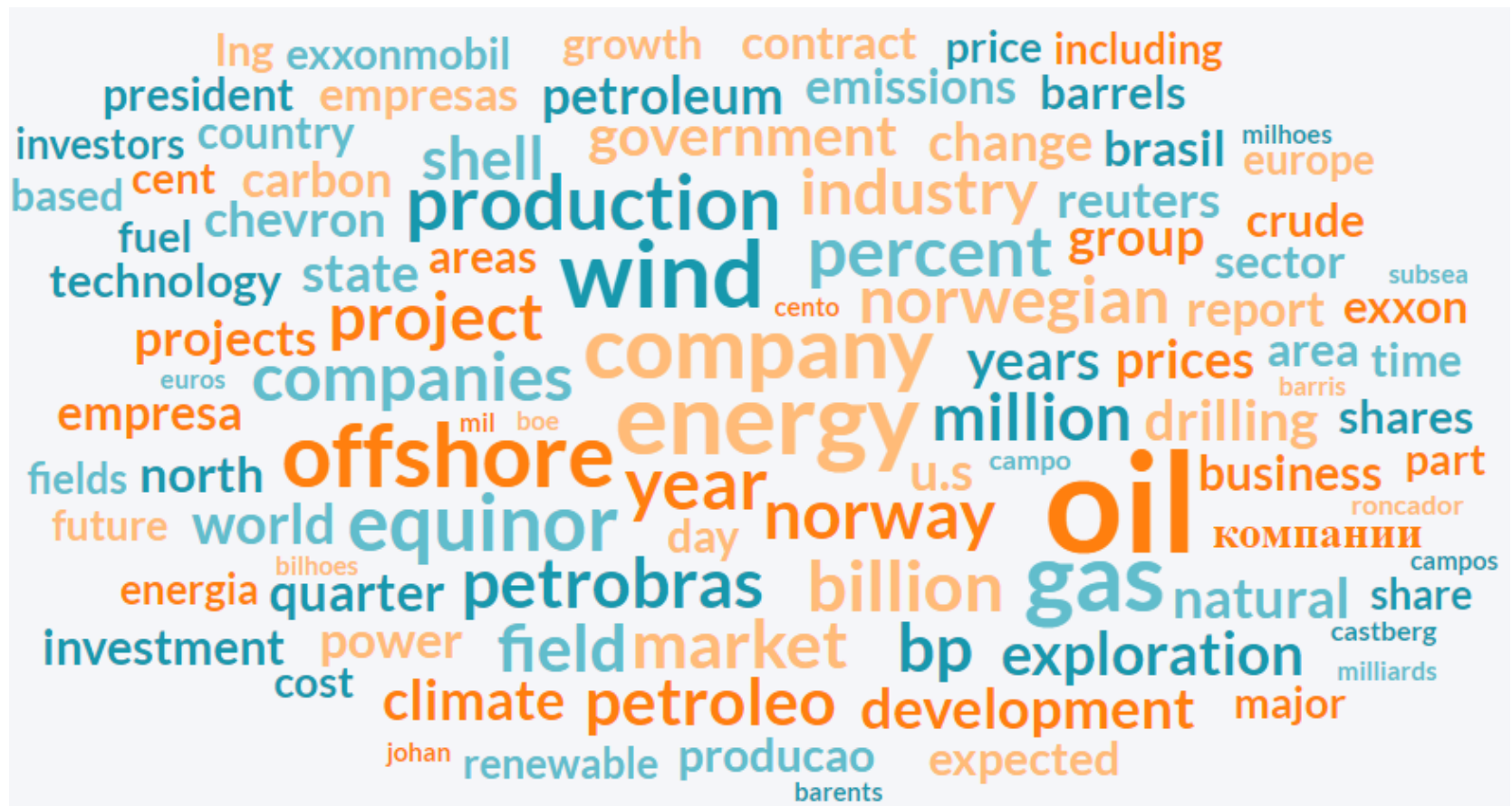
## #2: brand monitoring and comparison (3)

## Tag cloud for Chevron Corporation



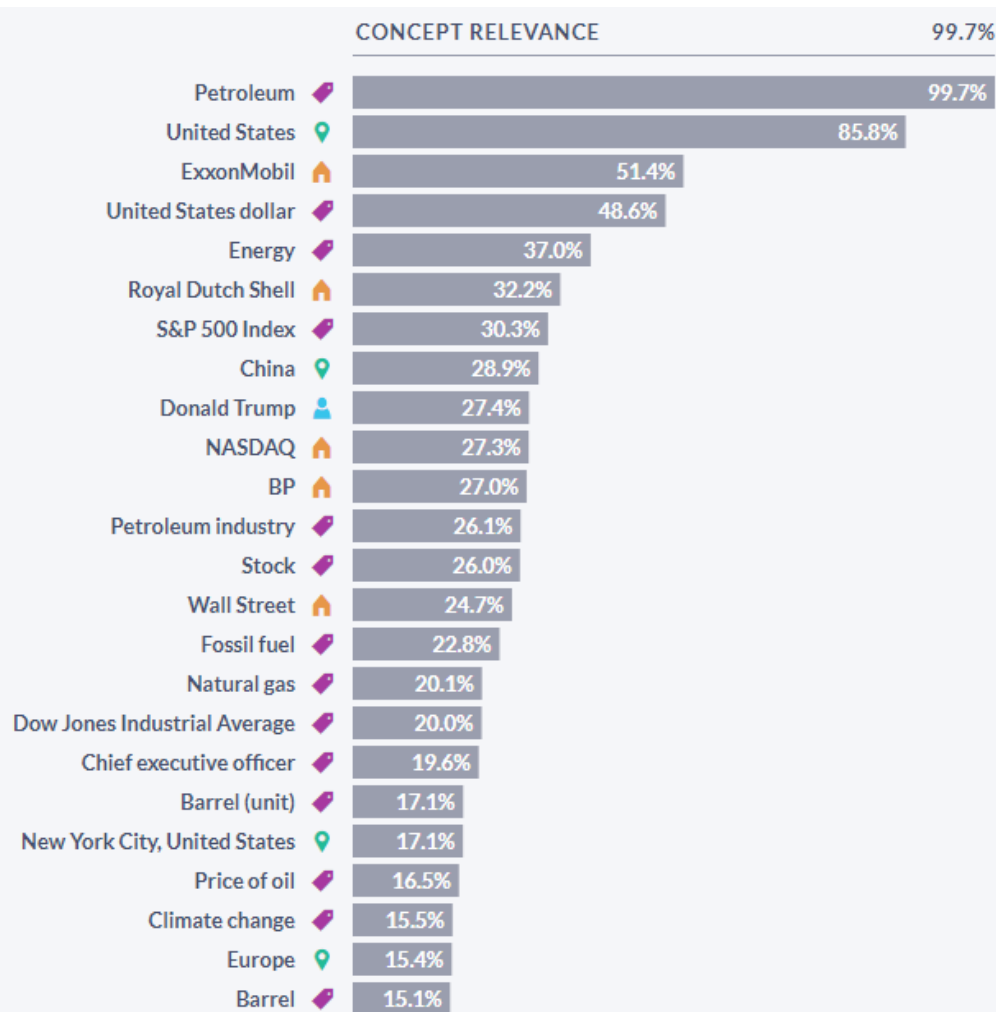
## #2: brand monitoring and comparison (4)

## Tag cloud for Statoil

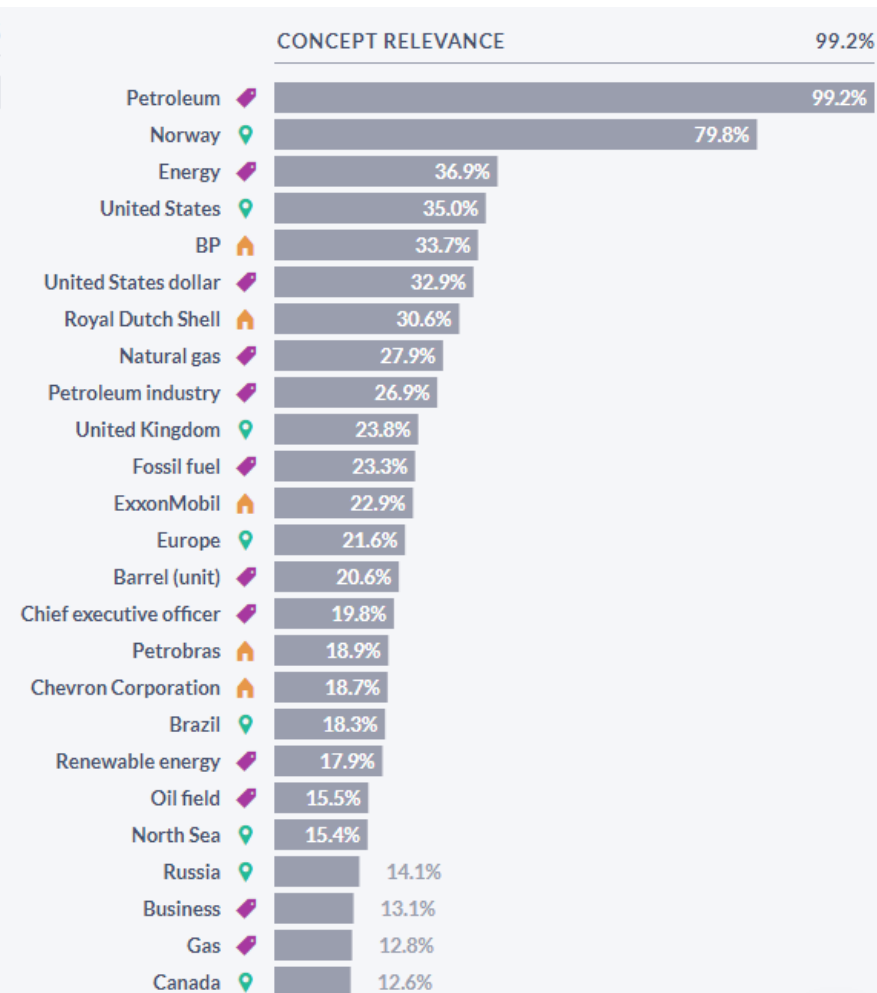


## #2: brand monitoring and comparison (4)

### Top concepts for Chevron



### Top concepts for Statoil



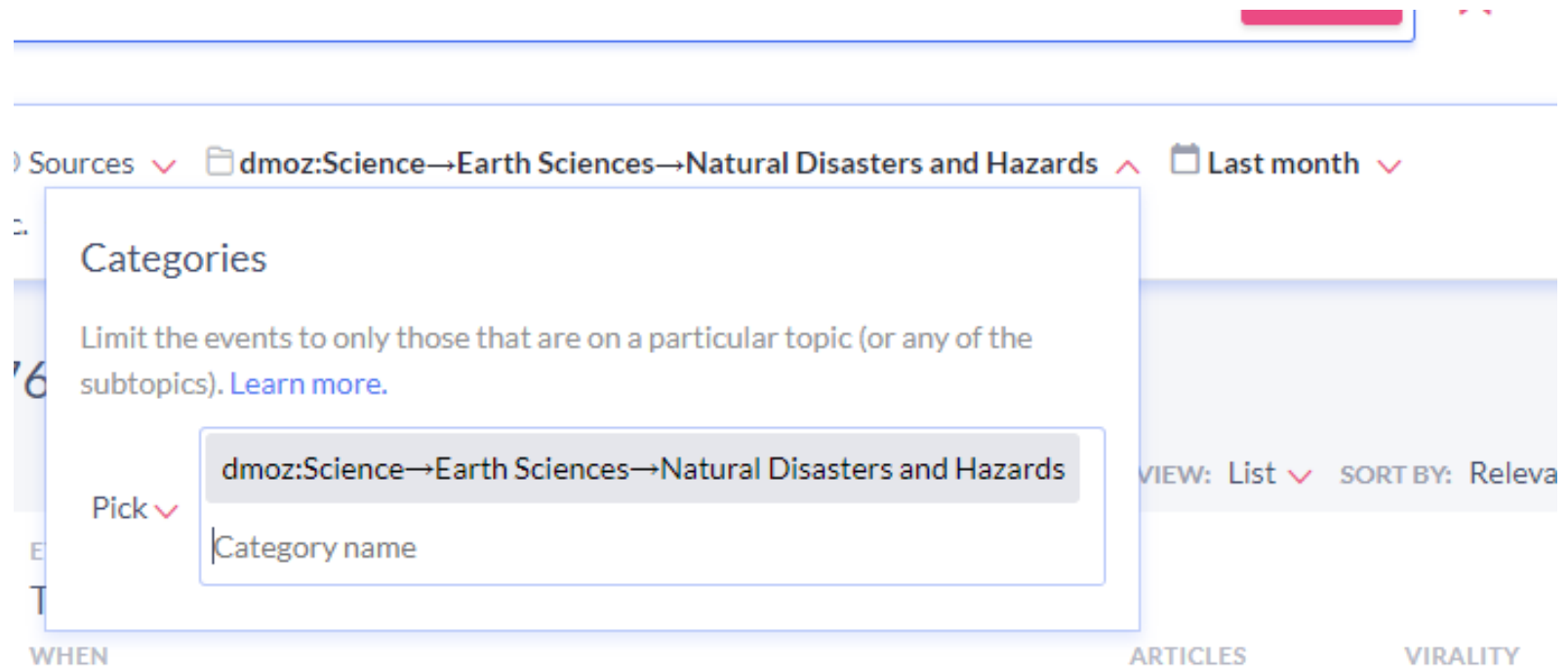
# #3: risk management

- Identification of events that can disrupt supply chains and have socio-economic influence
  - Earthquakes and other natural disasters
  - Manmade disruptions (strikes, bankruptcies, ...)
- Users: companies depending on a supply chain



# #3: risk management

## Monitoring natural disasters



The screenshot shows the Event Registry interface. At the top, there's a navigation bar with "Sources" and a breadcrumb trail: "dmoz:Science→Earth Sciences→Natural Disasters and Hazards". A date filter "Last month" is also visible. A "Categories" dropdown menu is open, showing the selected path and a text input field for "Category name". Below the dropdown, there are tabs for "WHEN", "ARTICLES", and "VIRALITY". The "ARTICLES" tab is active, showing a list of events. The "VIRALITY" tab is also visible.

Sources ▾ dmoz:Science→Earth Sciences→Natural Disasters and Hazards ^ Last month ▾

Categories

Limit the events to only those that are on a particular topic (or any of the subtopics). [Learn more.](#)

Pick ▾


dmoz:Science→Earth Sciences→Natural Disasters and Hazards

Category name

VIEW: List ▾ SORT BY: Releva

WHEN ARTICLES VIRALITY

# #3: risk management



VIEW: LIST ▾ SORT BY: Relevance ▾

EVENT

## Thursday 'danger to life' warning now covers whole of Devon

WHEN  
Tue, November 27, 2018


ARTICLES  
348

VIRALITY  
401

Met Office Diana, Princess of Wales United Kingdom Scotland, United Kingdom Ireland Flood

Cork (city), Ireland Counties of Ireland Gale Galway, Ireland Wales, United Kingdom

Neil ShawHead of Digital, live and trending for PlymouthLive, DevonLive and CornwallLiveGet Daily updates directly to your inboxSubscribeSee our priva... ([Exeter Express and Echo](#))



EVENT

## Thousands evacuated as flash floods, mudslides hit wildfire-ravaged California

WHEN  
Wed, November 28, 2018

WHERE  
San Francisco, United States

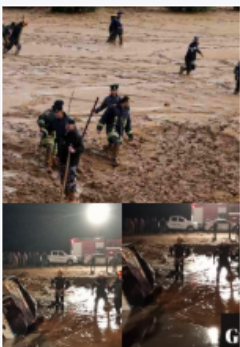
ARTICLES  
169

VIRALITY  
1,680

Wildfire Flash flood Butte County, California, United States National Weather Service Northern California

Debris flow Chico, California, United States Paradise, Nevada, United States Southern California

MALIBU, Calif. -- Thousands of people in California were under evacuation orders Friday morning because of rushing floodwaters and mudslides. Some are... ([CBS News](#))



EVENT

## Jordan Flash Flood Caused 11 Death And Tourist Evacuate

WHEN  
Fri, November 09, 2018

WHERE  
Amman, Jordan


ARTICLES  
136

VIRALITY  
142

Jordan Petra Flash flood Flood Madaba, Jordan Amman, Jordan Civil defense Dead Sea

Ma'an, Jordan Desert Israel Canyon Rock (geology) Tourism Tourist attraction


Just two weeks after the incident of a flash flood in Dead sea Area that killed 21 people, mostly children, a flash flood was followed in Jordan that ... ([z6mag.com](#))



EVENT


# #3: risk management

Monitoring socio-political events



A screenshot of a search interface. On the left is a magnifying glass icon. To its right are four filter buttons, each with a purple diamond icon and text: "Strike action", "Terrorism", "Political corruption", and "Corruption". These buttons are separated by "OR" labels. To the right of the filters is a text input field containing the text "What are". Below the search bar is a horizontal line, and under that line is a blue rectangular bar.

# #3: risk management

VIEW: List  SORT BY: Relevance 



## EVENT

Acting PG Hodzi grilled for failure to prosecute high profile corruption cases - Nehanda Radio

### WHEN

Thu, November 01, 2018

### WHERE









Harare, Zimbabwe

### ARTICLES

4

### VIRALITY

0

-  Political corruption
-  Harare, Zimbabwe
-  Magistrate
-  Acquittal
-  Attorney general
-  Chief Justice
-  Accountability
-  Prosecutor
-  Joint-stock company
-  Corruption
-  Independent politician

Acting Prosecutor General Mr Kumbirai Hodzi was yesterday grilled for allegedly not doing enough to effectively prosecute high profile corruption case... ([Nehanda Radio](#))



## EVENT

MACC chief: Corruption in Malaysia getting worse | Malay Mail

### WHEN

Tue, November 13, 2018

### WHERE












Putrajaya, Malaysia

### ARTICLES

10

### VIRALITY

39

-  Putrajaya, Malaysia
-  Corruption
-  Malaysian Anti-Corruption Commission
-  Malaysia
-  Malay styles and titles
-  Political corruption
-  Indonesia
-  1Malaysia Development Berhad
-  Kleptocracy
-  Civics
-  Bribery

PETALING JAYA, Nov 13 -- Malaysian Anti-Corruption Commission (MACC) chief Datuk Seri Shukri Abdull said today the local graft menace was worsening. ... ([malaymail.com](#))



## EVENT

منظمة الأعراف تدعو إلى التهدئة والحوار لتجنب الإضراب في الوظيفة العمومية

### WHEN







Mon, November 19, 2018

### ARTICLES

6

### VIRALITY

0

-  Tunisian General Labour Union
-  Strike action
-  Tunisia
-  Government
-  State (polity)
-  Terrorism

## #4: understanding current events and their context

- Deep understanding of some current event and it's context to previous events
- Users: journalists

# #4: understanding current events and their context

## Russia launches first manned voyage to ISS since rocket accident

### WHEN

Sun, December 02, 2018

### LOCATION

Baikonur, Kazakhstan

### CATEGORIES

Science→Technology→Space , Business→Aerospace and Defense→Space , Science→Astronomy→News and Media

The launch was closely scrutinized because of the abortive mission to the ISS on Oct. 11, which ended two minutes after take-off when a rocket failure forced its two-man crew to perform an emergency landing.

A Russian-made Soyuz rocket blasted a three-man crew into orbit on Monday, beginning the first manned voyage to the International Space Station since a mission in October was aborted in midair because of a rocket malfunction.

The Soyuz lifted off at 1131 GMT from Baikonur cosmodrome in

Title and summary extracted from: [The Asian Age](#)



# #4: understanding current events and their context

## Articles

Below is a list of articles describing the event.

Event is reported in **11 languages**. Currently showing: [English \(224 articles\)](#) ▾

SORT BY: Shares on social media ▾



### Russia launches first manned voyage to ISS since rocket accident

The launch was closely scrutinized because of the abortive mission to the ISS on Oct. 11, which ended two minutes after take-off when a rocket failure forced its two-man crew to perform an emergency landing.

[THE ASIAN AGE](#)

1h 50min ago

f 6,655



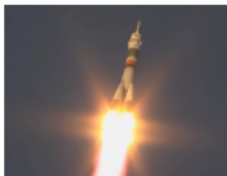
### Astronaut and Spokane native Anne McClain blasts off Monday

When Lt. Col. Anne McClain was a child, her dream was to become an astronaut. Now, that dream is becoming reality. On Monday, the Spokane native and Gonzaga Prep alumna will leave Earth as a crew member of NASA's Expedition 58 to the

[SPOKESMAN.COM](#)

Sun, 02 Dec 2018, 09:21

f 329



### Liftoff! Russia Launches 1st Crewed Soyuz Rocket to Space Station Since Dramatic Abort

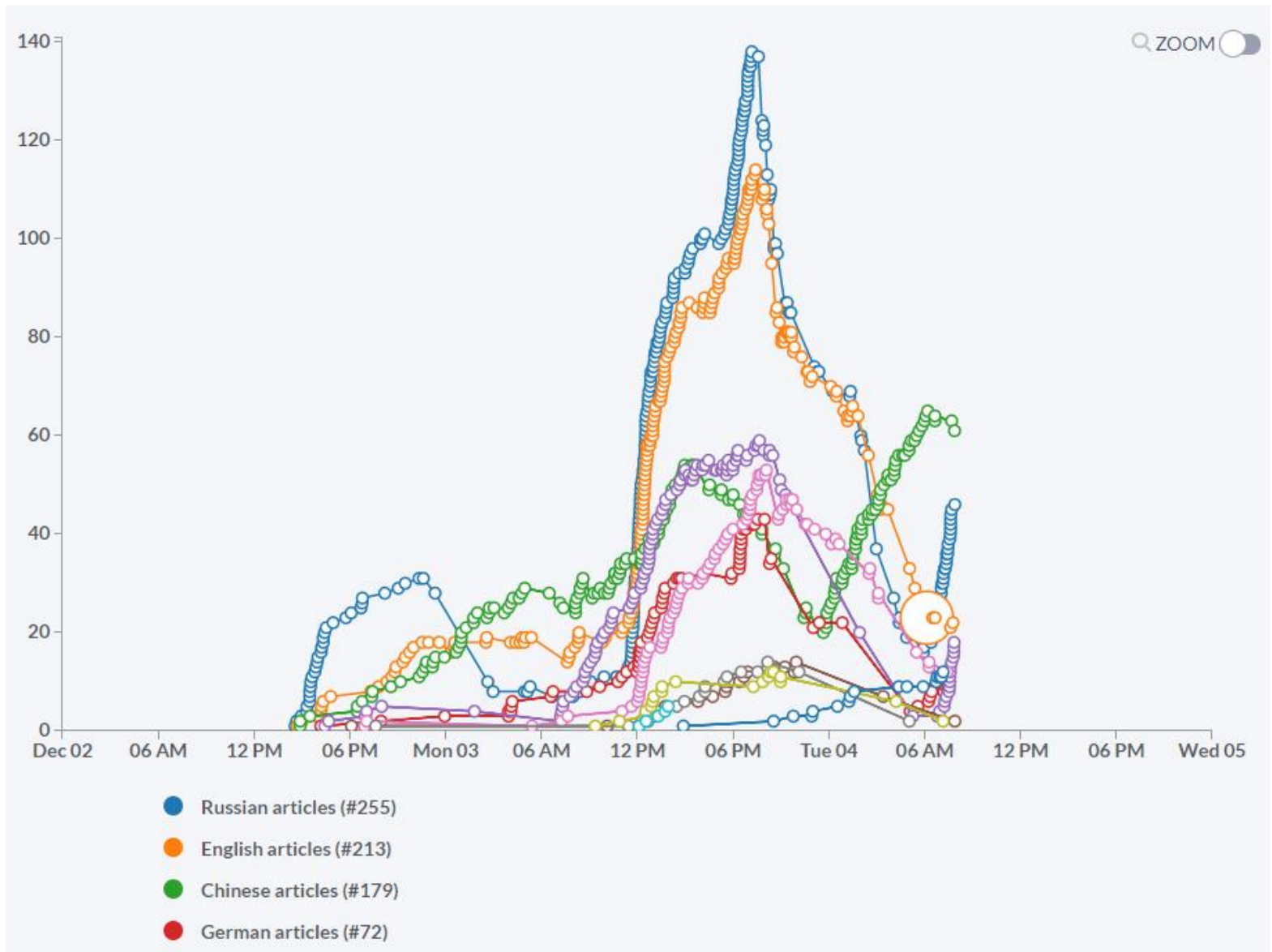
Hundreds of spectators and media representatives gathered on cold metal stands to watch the launch here at the Baikonur Cosmodrome in Kazakhstan, bundling up cameras and bodies against the bone-chilling cold. But the weather did not dampen

[SPACE.COM](#)

Mon, 03 Dec 2018, 13:17

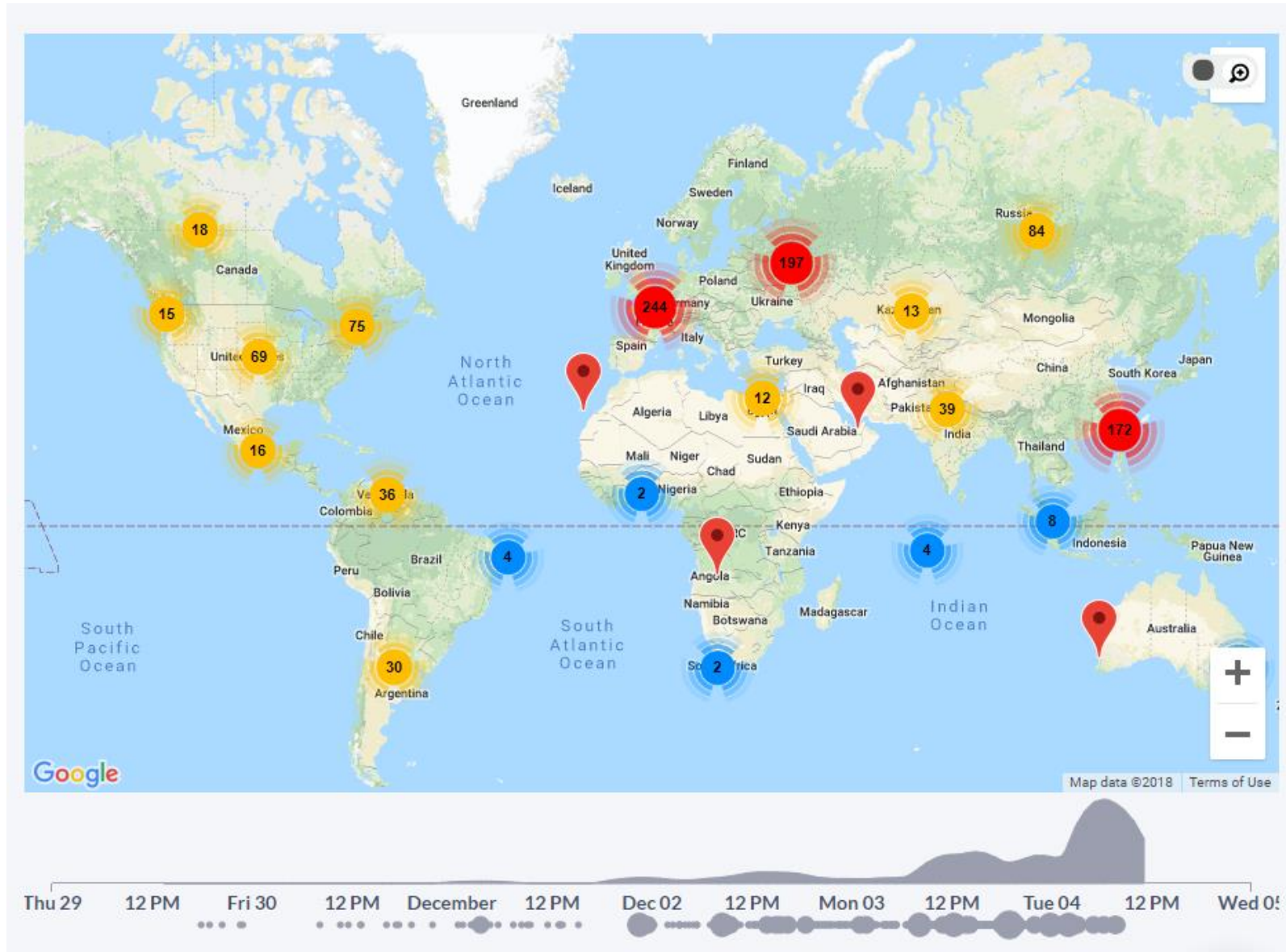
f 190 p 3

## #4: understanding current events and their context

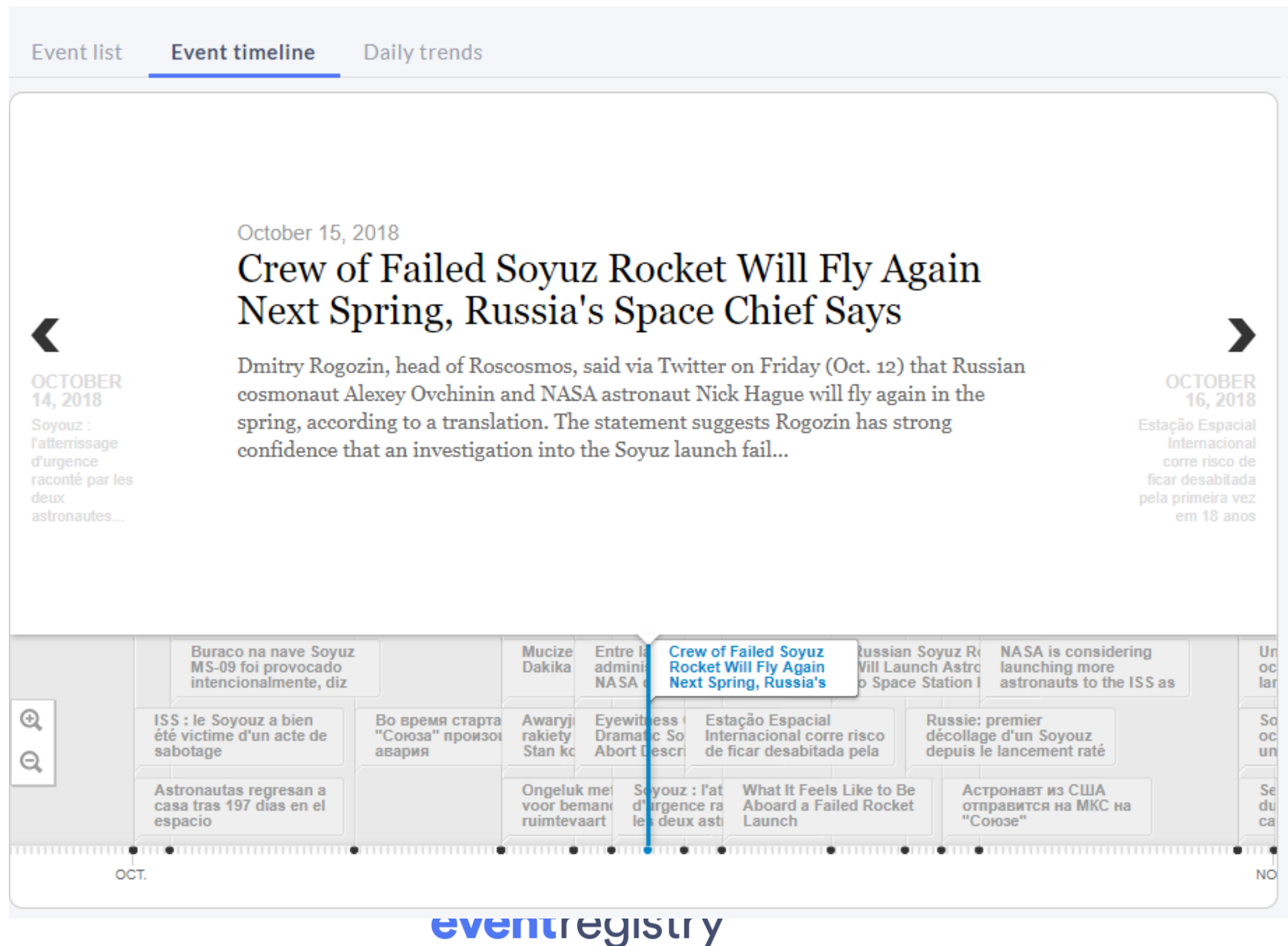




# #4: understanding current events and their context



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# Questions?