Modeling Deviant Cyber Behaviors: Bots, Trolls, And Information Operations

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The Crowd

THE CROWD
A Study of the Popular Mind
Gustave Le Bon

- Gustav Le Bon (1895), *The Crowd: A Study of the Popular Mind*

- Expressed skepticism about the shift from an agrarian society to city living. Le Bon wrote, the urban crowd is marked by "impulsiveness, irritability, incapacity to reason" and "the exaggeration of the sentiments." A man on his own "may be a cultivated individual," but "in a crowd, he is a barbarian."

- Now, we have *Virtual/online mobs*

Vicious "Online" Mobs

TIMOTHY MCLAUGHLIN BACKCHANNEL 12.12.18 07:00 AM

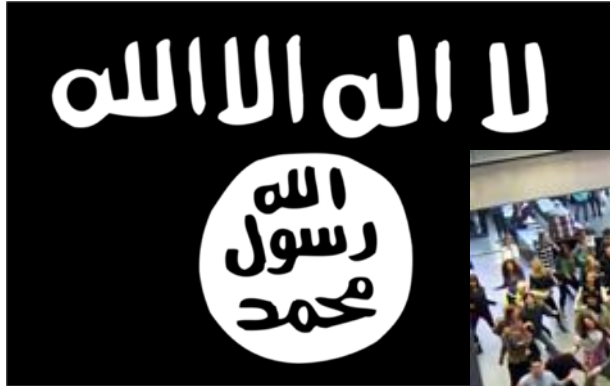## HOW WHATSAPP FUELS FAKE NEWS AND VIOLENCE IN INDIA

SHARE

BY THE TIME police arrived in the hamlet of Rainpada on July 1, 2018, the village council office was the scene of a massacre.

THE INTERPRETER

Where Countries Are Tinderboxes and Facebook Is a Match

False rumors set Buddhist against Muslim in Sri Lanka, the most recent in a global spate of violence fanned by social media.

Online Deviant Groups

Terrorist & Extremist Groups
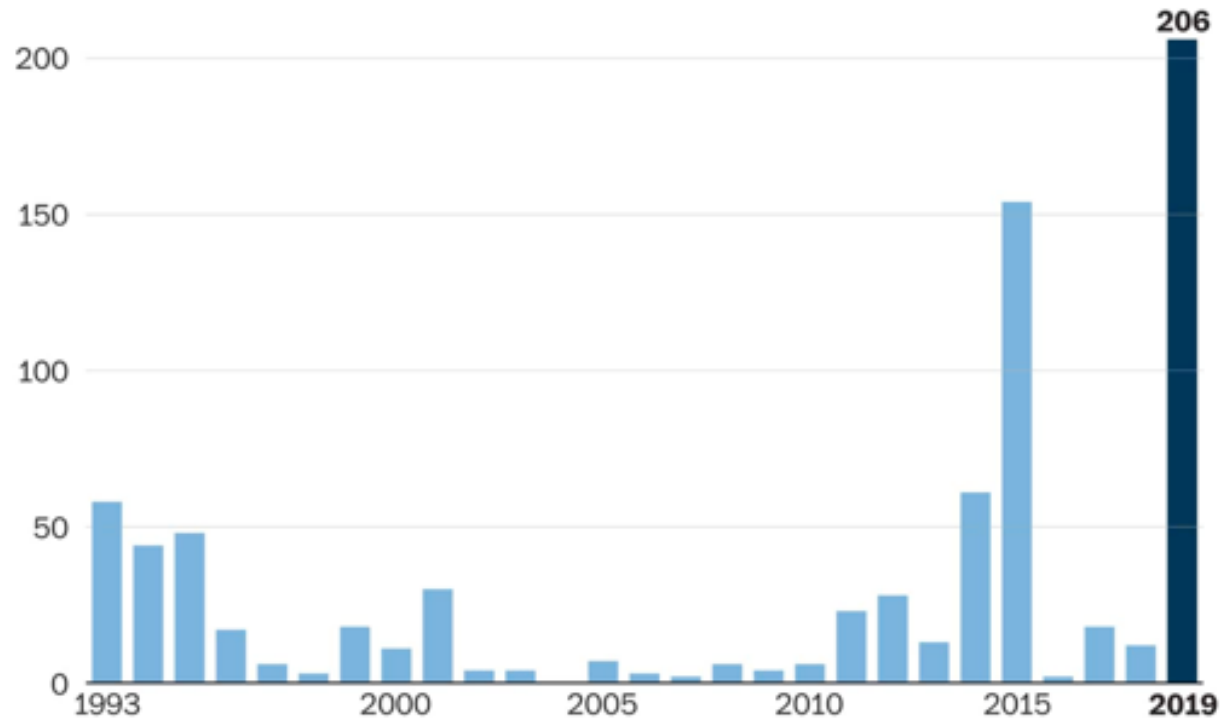

Anti-NATO Propagandist

Networks (DHNs)

Internet Trolls

Worst start to the year for measles in a quarter century

Confirmed measles cases in January and February of each year

206

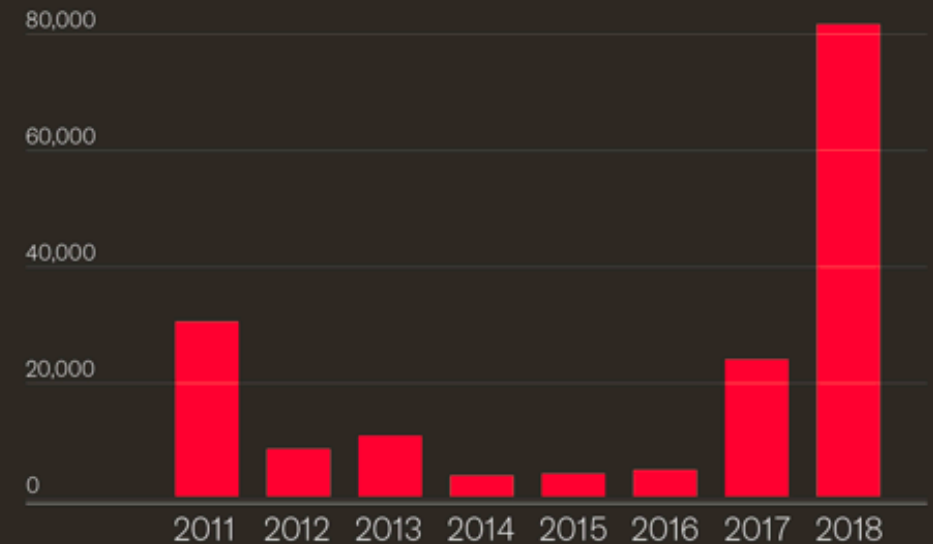Note: Monthly data for 2004 is not available.
Source: Centers for Disease Control

THE WASHINGTON POST

Measles is storming back in Europe

It is **shocking** that people are still dying of measles in Europe in 2019.

SOURCE: ECDC

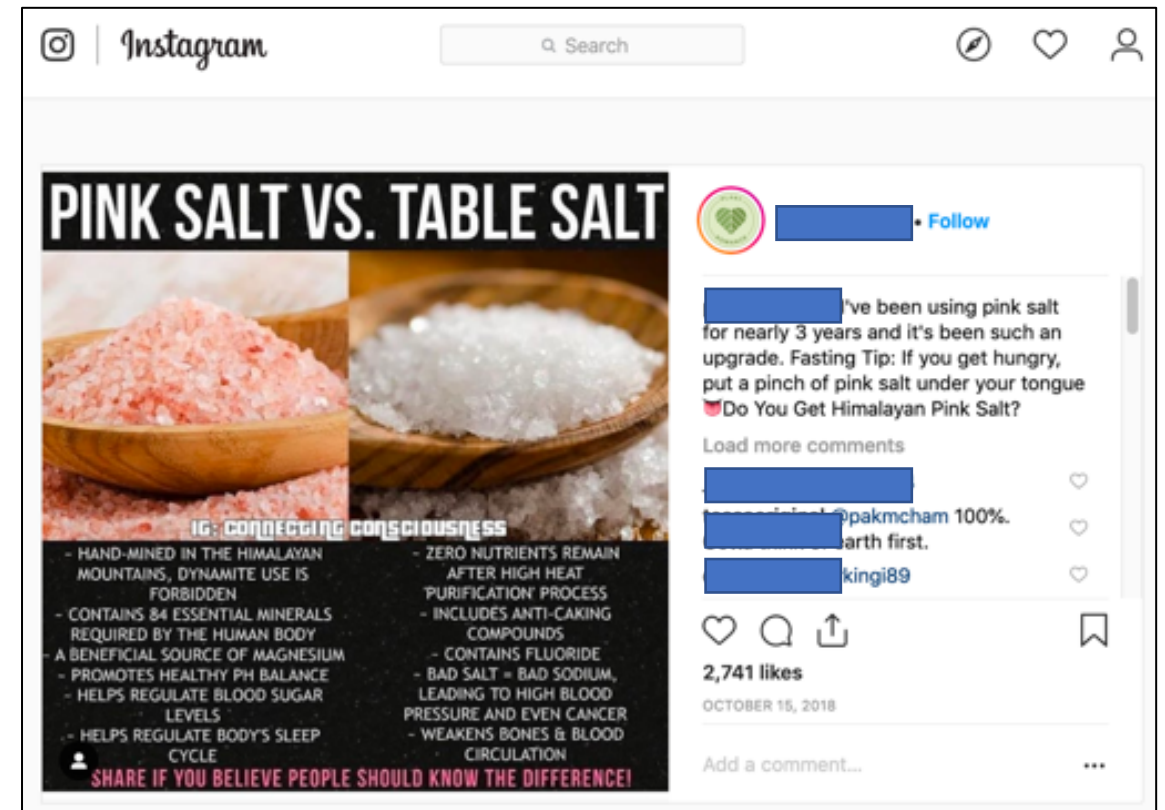The 206 cases in January and February already surpass annual the past decade.

IFRC Europe Regional Director, Simon Miss trend worldwide."

Health & Wellness Misinformation

"Statins cause Cancer!"

Pink salt will "regulate your blood sugar and sleep cycle."

Misinformation in Agriculture

Russian Trolls Tweeted Disinformation Long Before U.S. Election

Tweets about contaminated water, tainted turkey look to security experts like practice for the political season

By Rob Barry / Graphics by Shane Shifflett

Published Feb. 20, 2018 at 3:30 p.m. ET

Numerous fake reports of contaminated turkey in Walmart before Thanksgiving 2015. Within hours several hundred claims were reported on Twitter. Walmart ignored it as a hoax. Many of the claims came from accounts linked to a pro-Kremlin propaganda agency charged by Special Counsel Robert Mueller's office.

Anti-GMO articles tied to Russian sites, ISU research shows

Donnelle Eller, deller@dmreg.com   Published 8:42 p.m. CT Feb. 25, 2018

OBESITY
TYPE 2 DIABETES
AUTISM
INTESTINAL DISEASES
KIDNEY DISEASES

Genetically engineered crops are safe for humans and animals to eat and have not caused increases in cancer, obesity, gastrointestinal illnesses, kidney disease, autism or allergies, a report finds. USA TODAY

Misinformation in Disasters
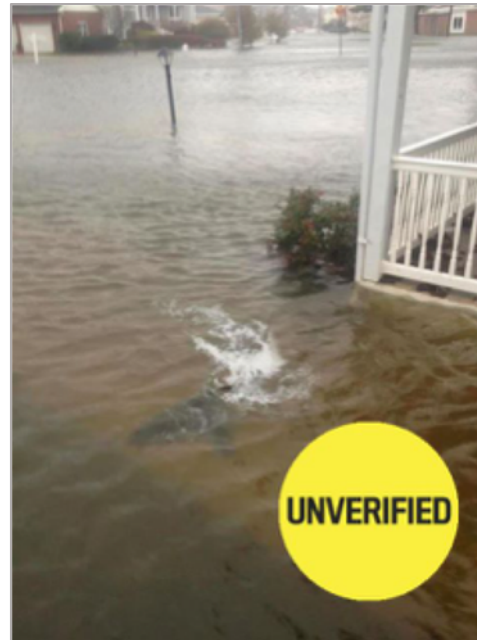
During **Hurricane Sandy in 2012,** the following rumors were floating on social media.
- Sharks swimming through waterlogged suburban neighborhoods,
- Statue of Liberty engulfed in ominous clouds, and
- Floor of the New York Stock Exchange flooded.

Source: http://www.nytimes.com/2012/11/01/technology/on-twitter-sifting-through-falsehoods-in-critical-times.html

During **Hurricane Harvey in 2017**, again the "shark on highway" hoax went viral.
Source: https://www.washingtonpost.com/news/the-intersect/wp/2017/08/28/no-the-shark-picture-isnt-real-a-running-list-of-harveys-viral-hoaxes/

"Shark on Highway" Hoax during Disasters

During crises events, misinformation is rampant. One of the most commonly spread hoaxes is "shark on highways". Timeline below illustrates this hoax as it is propagated during various hurricanes in the U.S.
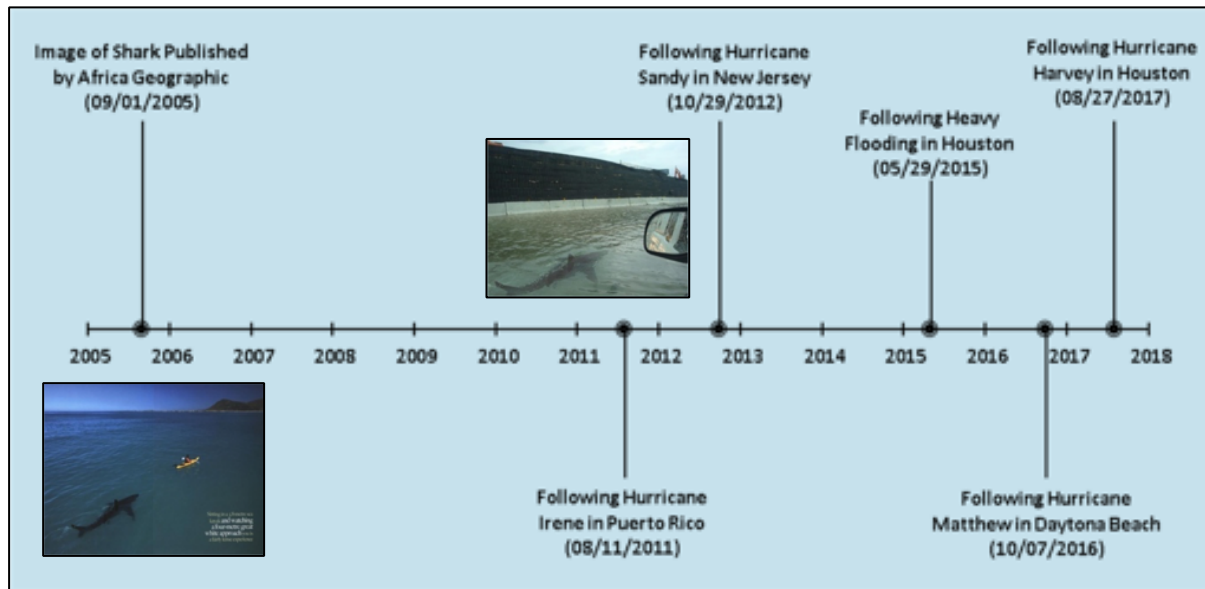

Original image was published in Africa Geographic magazine in September 2005.

Used as hoax during Hurricane Irene in 2011, Hurricane Sandy in 2012, Houston Flood in 2015, Hurricane Matthew in 2016, and finally in our collected datasets for Hurricane Harvey, Hurricane Irma, and Hurricane Maria in 2017.

A simple analysis about "shark on highways" using Google Trends shows the following... (next slide)

Shark Hoax over Time

Interest in the hoax, "shark on highways" has grown significantly over time. Illustrated below is the interest volume in the shark hoax over 2004 - 2017 period. Interestingly, spikes align with weather events, starting from Ernesto (2006) to Harvey (2017). Bigger spikes in the trend are observed in the recent years.
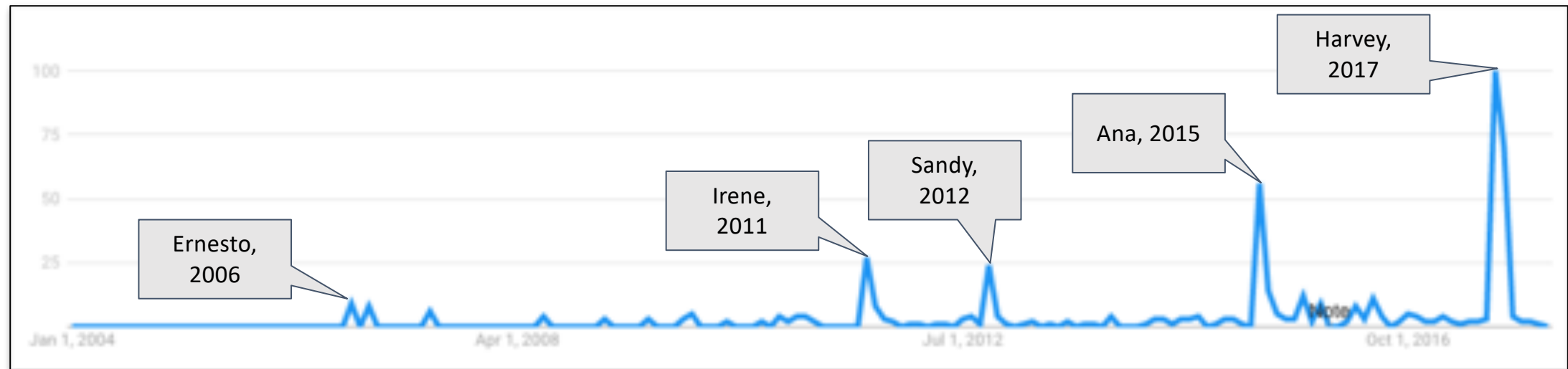
Computational (AI) Propaganda

New AI fake text generator may be too dangerous to release, say creators

The Elon Musk-backed nonprofit company OpenAI declines to release research publicly for fear of misuse

▲ The AI wrote a new passage of fiction set in China after being fed the opening line of Nineteen Eighty-Four by George Orwell (pictured). Photograph: Mondadori/Getty Images

The creators of a revolutionary AI system that can write news stories and works of fiction – dubbed "deepfakes for text" – have taken the unusual step of not releasing their research publicly, for fear of potential misuse.

OpenAI, an nonprofit research company backed by Elon Musk, Reid Hoffman, Sam Altman, and others, says its new AI model, called GPT2 is so good and the risk of malicious use so high that it is breaking from its normal practice of releasing the full research to the public in order to allow more time to discuss the ramifications of the technological breakthrough.

ThisPersonDoesNotExist.com uses AI to generate endless fake faces

Hit refresh to lock eyes with another imaginary stranger

By James Vincent | Feb 15, 2019, 7:38am EST

A few sample faces — all completely fake — created by ThisPersonDoesNotExist.com

Buzzfeed Created a 'Deepfake' Obama PSA Video

By Ryan Whitwam on April 18, 2018 at 12:30 pm | 23 Comments

We've seen neural network technology take off in recent years as companies like Google and IBM create ever-smarter machines. Computers can beat humans at Go and spot exoplanets now, but there's a potentially darker side to this technology. Several months ago, a group of developers released a power face-swapping neural network, which was, of course, used to make porn. Now, Buzzfeed has created a video that shows a more troubling side of this technology. The video shows former President Barack Obama saying things he never said, and it looks surprisingly believable.

The tool is known as FakeApp, but the videos are usually called "Deepfakes" because that's the handle used by the original developer on Reddit. You can download the code freely all over the internet, but it's not easy to set up — you need to configure Nvidia's CUDA framework to run the FakeApp TensorFlow code, so the app requires a GeForce GPU. The video you want to alter has to be split into individual frames, and you need a large number of high-resolution photos of the face you want to insert. In the case of Obama, there are plenty of photos online that can be used to generate a model.
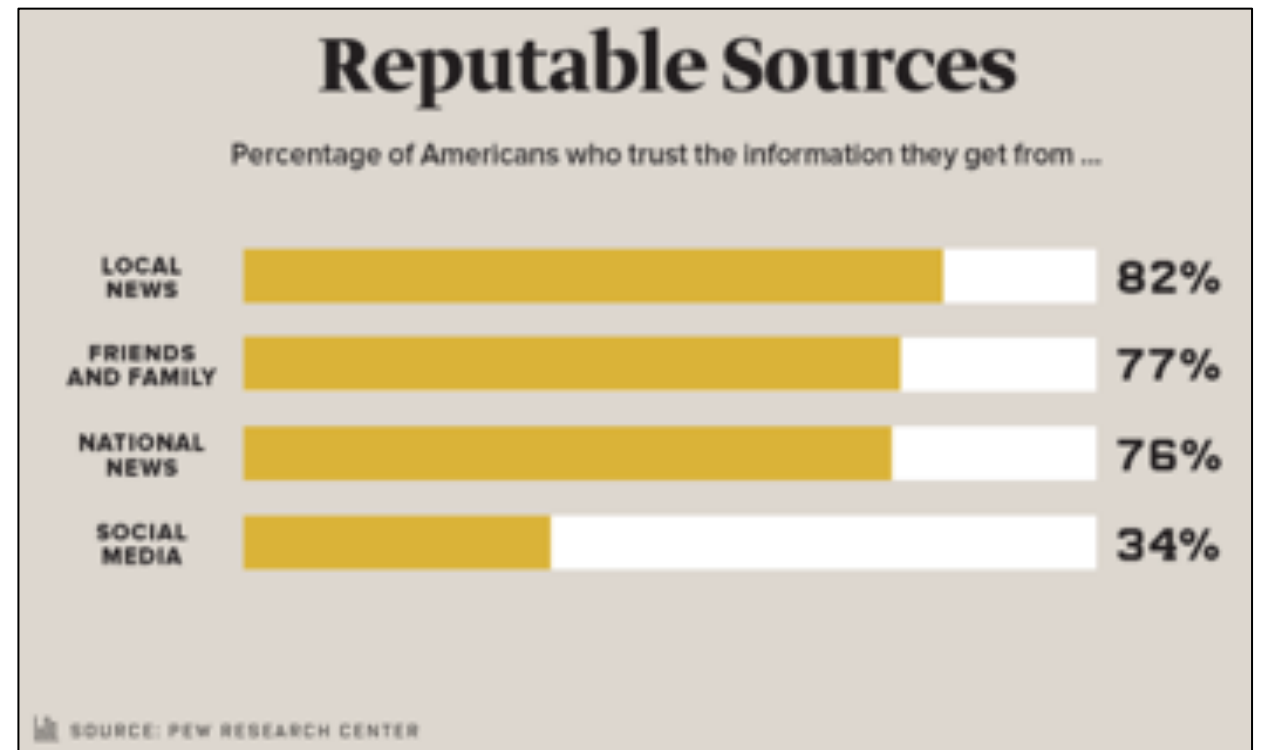
Fake text:
https://www.youtube.com/watch?v=XMJ8VxgUzTc

Fake images:
https://thispersondoesnotexist.com/

Fake videos:
https://www.youtube.com/watch?v=cQ54GDm1eL0

Manipulation & Monetization

- Many people trust news that comes from their friend circle on social media channels
  - 34% Americans <u>trust the information</u> from social media (Pew Research Center, 2016).
  - 14% Americans consider social media as <u>the most important source of information</u> (the National Bureau of Economic Research (NBER), 2017).

Reputable Sources

Percentage of Americans who trust the information they get from ...

LOCAL NEWS	82%
FRIENDS AND FAMILY	77%
NATIONAL NEWS	76%
SOCIAL MEDIA	34%

SOURCE: PEW RESEARCH CENTER

Manipulation & Monetization

- Running a fake-news campaign is cheap:
  - For $55,000 you could discredit a journalist;
  - For $200,000 you might instigate a street protest.
  - For $30 an 800-word fake news article, written by *Chinese* content marketer Xiezuobang
  - For $621 a video appears in YouTube's main page for two minutes, created by *Russian* firm SMOService
  - For $25 to have 2,500 Twitter followers all retweet a link for you
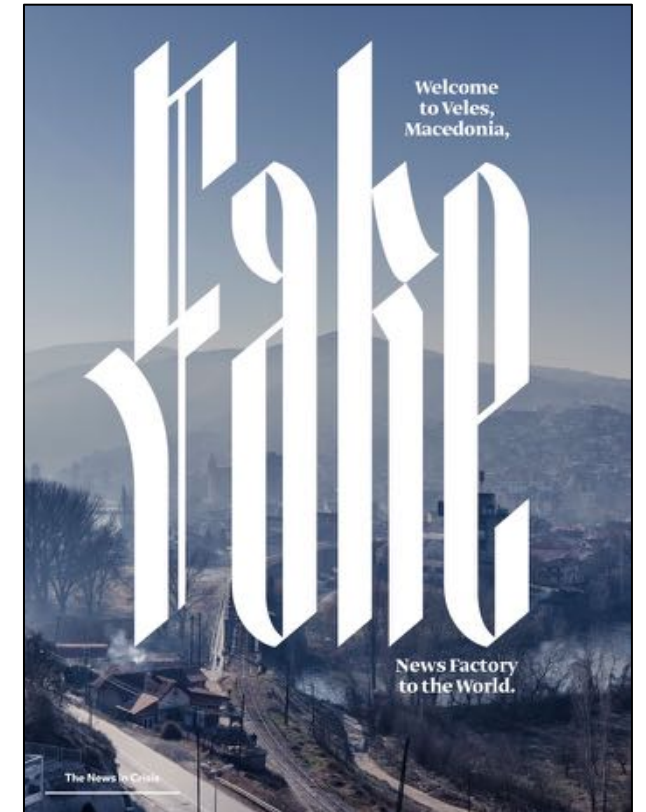
Source : Cyber security firm Trend Micro, 2017

Hysteria Propagation

THE SHIFT

YouTube Unleashed a Conspiracy Theory Boom. Can It Be Contained?

- Shawn Dawson, a prominent YouTuber released a 104-min documentary with bizarre hypotheses
  - Popular children's TV shows contain subliminal messages urging children to commit suicide
  - Recent string of deadly wildfires in California was set on purpose – to collect insurance or to test "directed energy weapon" by the military
  - Chuck E. Cheese recycles customers' uneaten pizza slices into new pizzas

- Over 30 million views in just one month

Radicalization and Recruitment

ISIS Twitter Recruitment Network

Top ISIS Twitter Actors' Geolocation Map
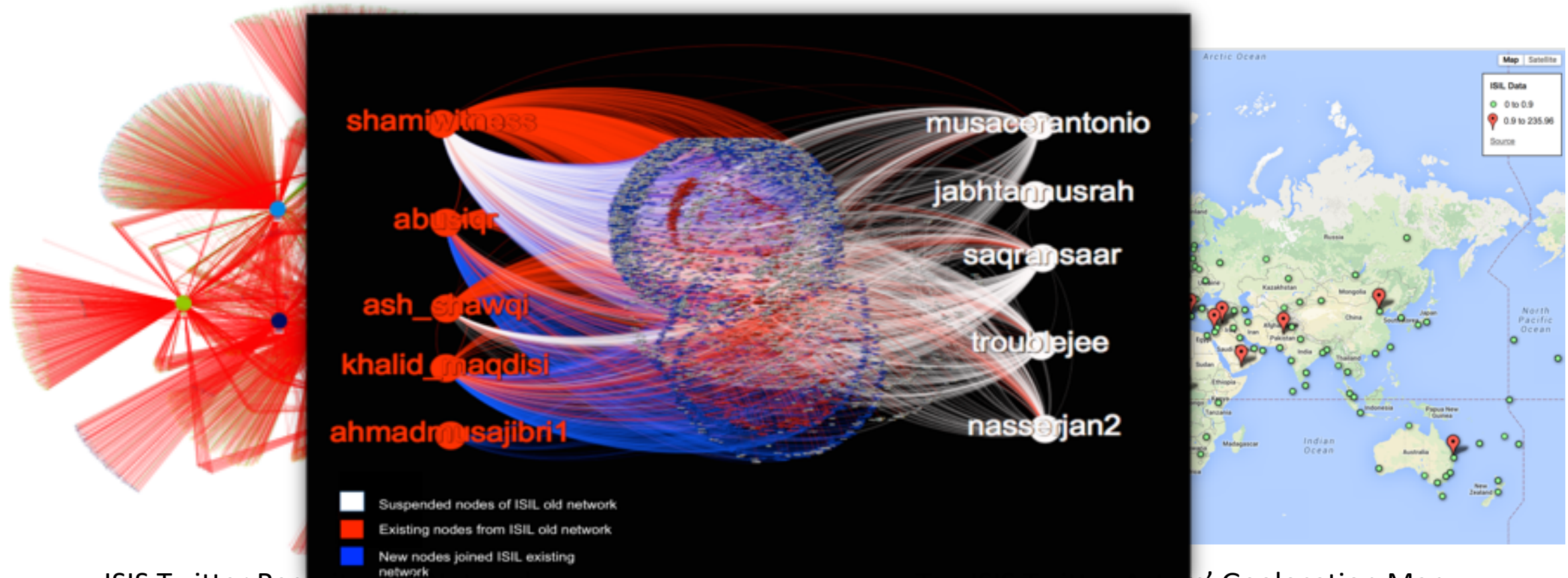
Ongoing Efforts

- Actively tracking anti-West, anti-EU, anti-NATO propaganda

- Participated in various NATO exercises to assist public affairs and social media monitoring

| Dragoon Ride 2015 | Trident Juncture 2015 | Brilliant Jump 2016 | Anakonda 2016 | Trident Juncture 2018 | Baltic Operations 2019 |

- Monitored groups like ISIS

- Monitoring disinformation campaigns in the Asia Pacific region

- Monitoring 2019 Canadian Elections

Trends in Disinformation Campaigns

- Cross platform orchestration
  - Growing use of niche platforms
- Communities and coordination
  - Blogger communities
  - Blog farms
  - Flash mob style coordination
- Algorithmic manipulation

Cross-Platform Orchestration

A YouTube channel with several Anti-NATO propaganda videos. The channel is called, "ANTI NATO".
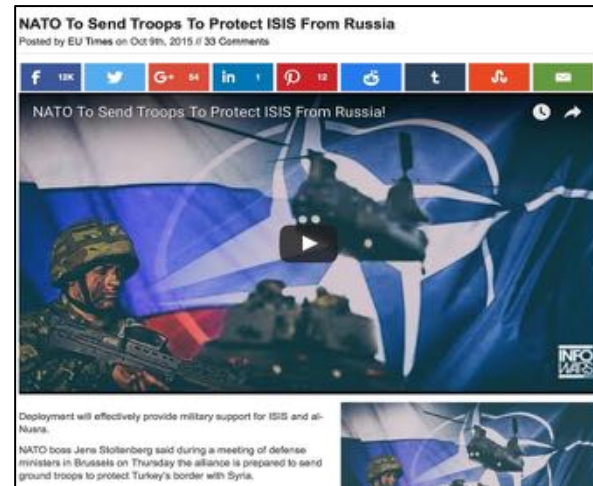
A blog using YouTube video to spread anti-NATO propaganda suggesting NATO's troops obstructing Russian operations in Syria thereby helping ISIS.

A blog using YouTube video to spread anti-NATO propaganda by suggesting NATO is waging war against Syrian refugees.
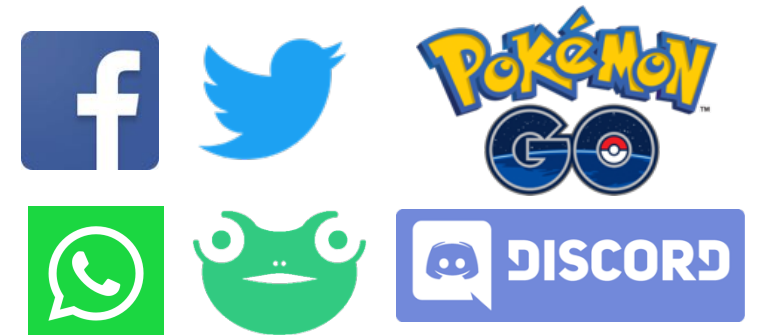
Why Blogs?

- Afford power and freedom to express opinion, frame narratives more effectively than any other social media platform

- No character limit

- No censorship

- Provide digital town halls

How do you use Twitter?
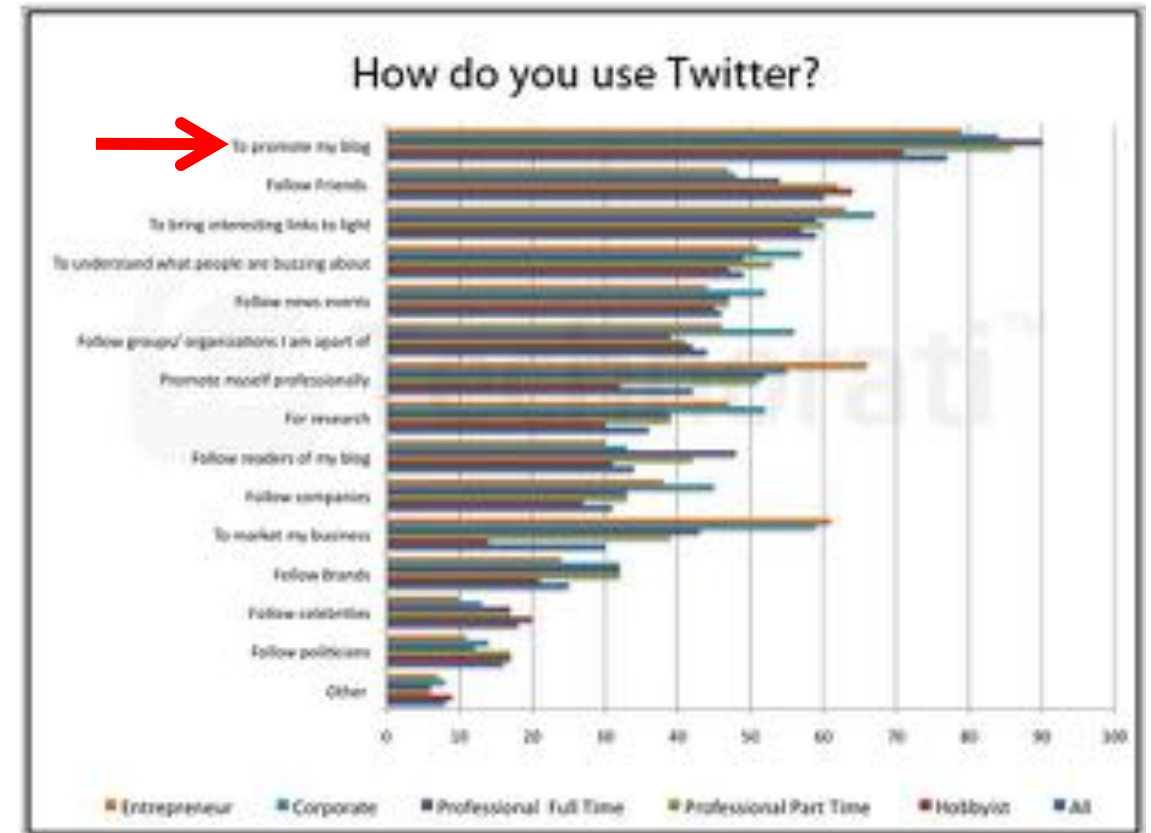
Cyber Forensic Analysis

Cyber forensic analysis helps extracting metadata, such as,
- Web traffic tracker codes (Google Analytics IDs)
- Email addresses
- IP address
- Contact details e.g., phone number
- Names under which the domain is registered
- Other digital/social presence e.g., Twitter handles, YouTube links, Facebook profile, other blogs, etc.
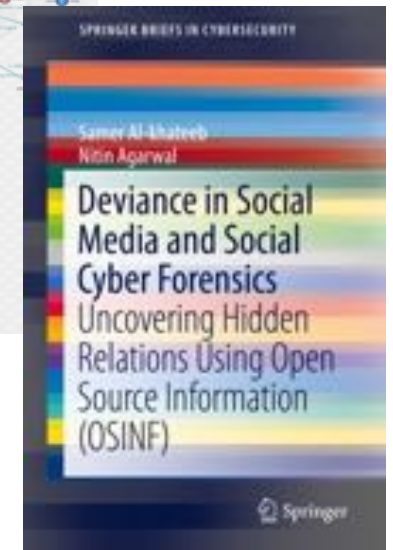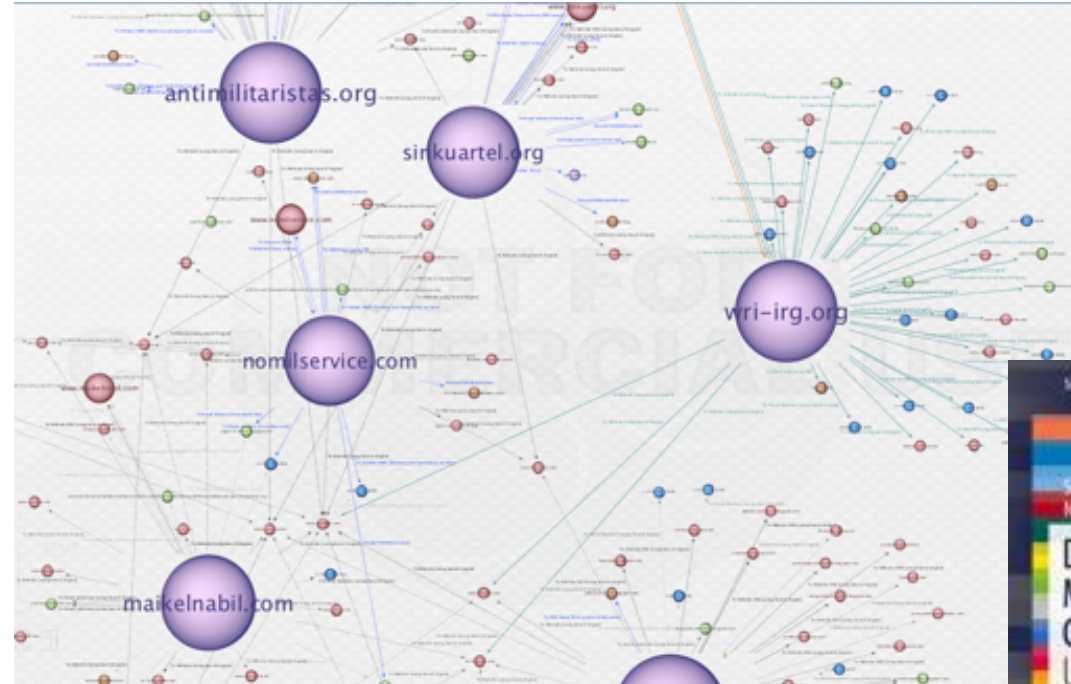
Cross Media Campaign Network

Founder of → @nomilservice

Founder of → No Military Service Facebook page

affiliated to

@warresistant

Cross Media Dissemination of Content

"US will provide weapons to NATO Commandos to attack Ukrainian separatists."
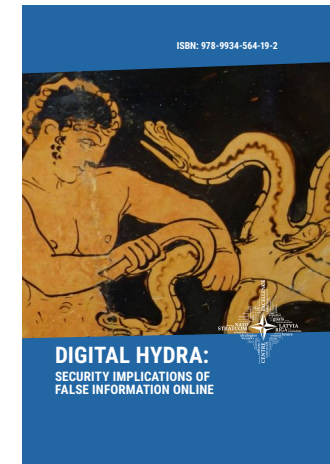
Blogs, Fake News, and Influence Operations. *Digital Hydra: False Information Online as a Weapon,* **NATO StratCom COE,** November 2017.

Examining Strategic Integration of Social Media Platforms in Disinformation Campaign Coordination. **NATO StratCom COE,** July 2018

Communities & Coordination

Pro-Duterte blogging community
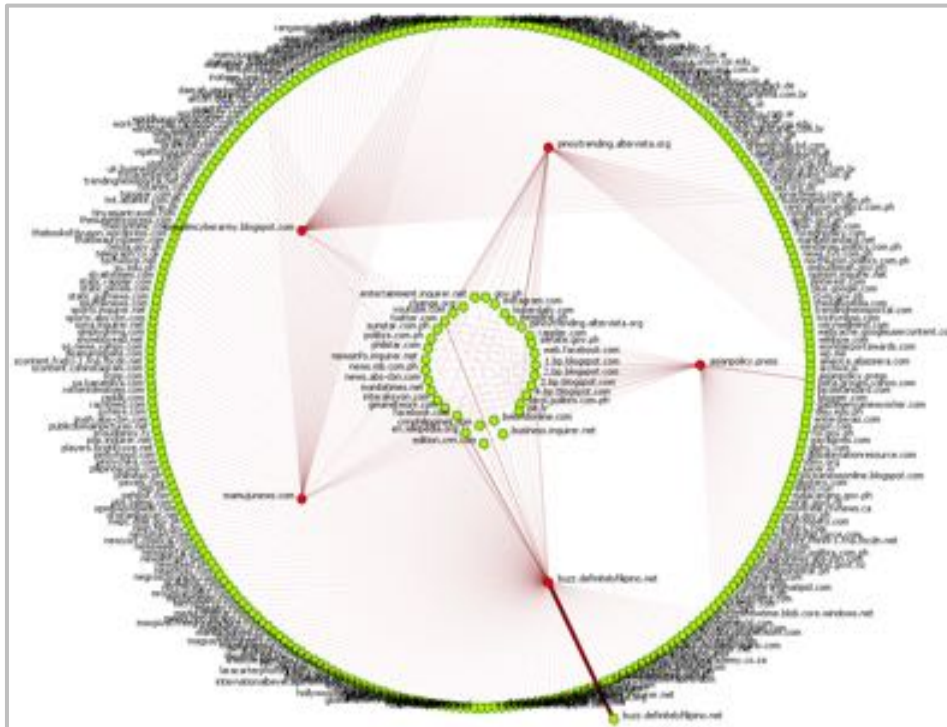
Coordination among bloggers detected
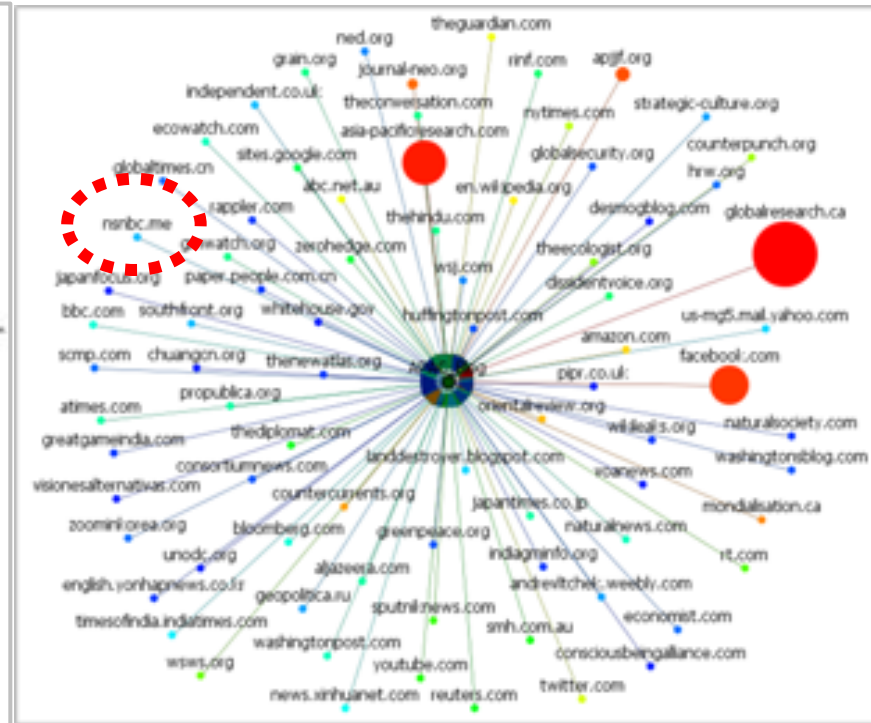
Suspicious sources referenced

Coordinated Clickbait (a.k.a. *Blog Farms)*

- Blog farms identified based on web traffic tracker codes

- Fabricate perception of a viral content

- Hypertargeting

- Search engine manipulation by traffic amplification

- Financing the operation
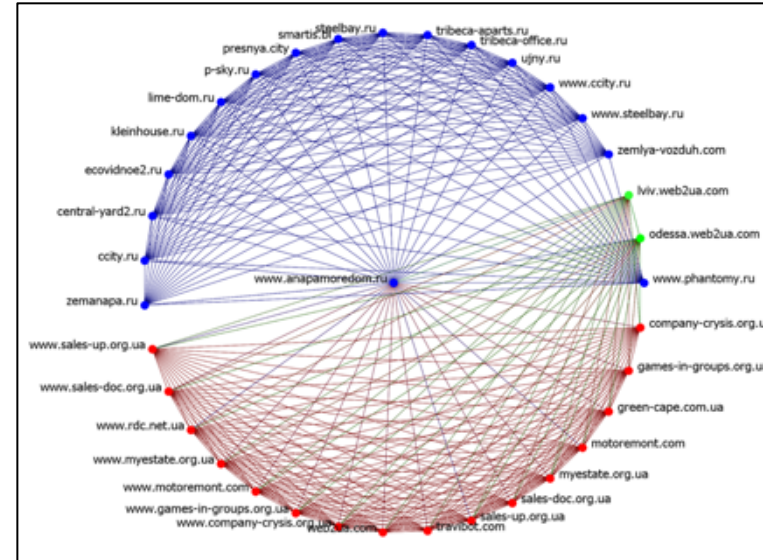
"At least six Swedish sites have received financial backing through advertising revenue from a Russian- and Ukrainian-owned auto-parts business based in Berlin, whose online sales network oddly contains buried digital links to a range of far-right and other socially divisive content."

NYTimes, August 10, 2019

Coordinated YouTubers - APAC

- These channels have similar/same video content
- Have similar/same robotic voice narration
- Appear in each others subscribed lists
- Suggested by YouTube as related channels

Hot News

US Military

PH TV

DOT COM US

Ultimate US Military

Coordinated YouTubers - APAC

China vs US The War in the South China Sea already Start
341,218 views

DOT COM US
Published on Apr 8, 2019

https://www.youtube.com/watch?v=OM5vaF2kzPA

China vs. America: How a W.a.r in the South China Sea Could Start
707 views

Hot News
Published on Apr 9, 2019

https://www.youtube.com/watch?v=e5WvJHG6aB4

- Different channels
- Similar/Same titles
- Same audio
- Same Robotic narration
- Different video playback

YouTube *'Commenter'* Flash Mobs

Comment mobs were
observed indicating signs of
algorithmic manipulation
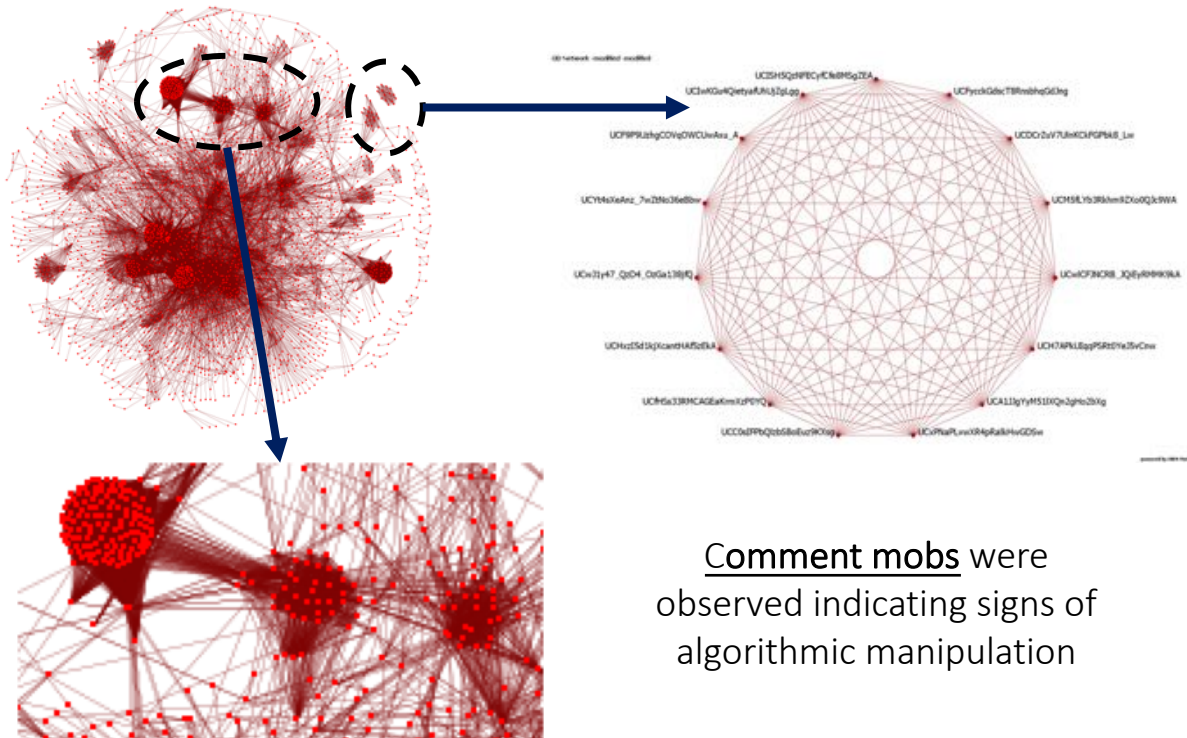
Exploiting biases of the
recommendation algorithms

Youtubers Conducting Botnet Operated Twitter Campaigns
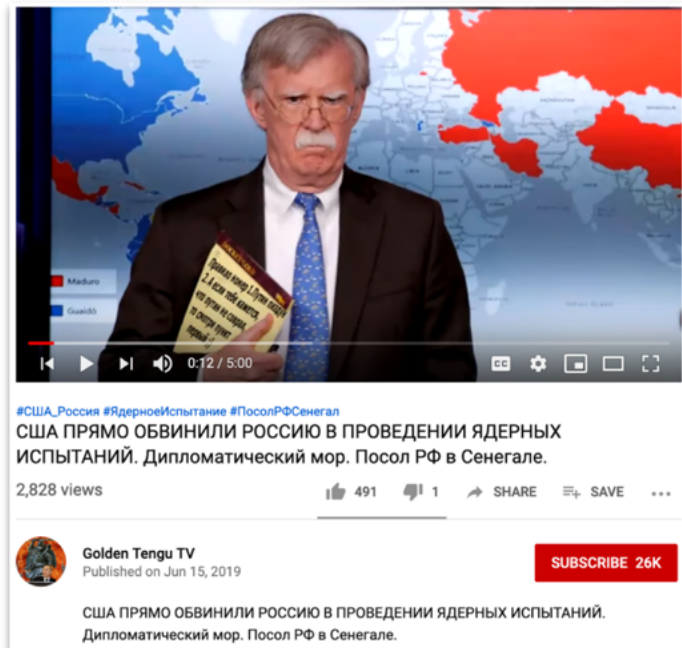
YouTube channel named "**Golden Tengu TV**" also has a Twitter account.

Tweets from its Twitter account are merely links to its YouTube videos, posted in a robotic style.
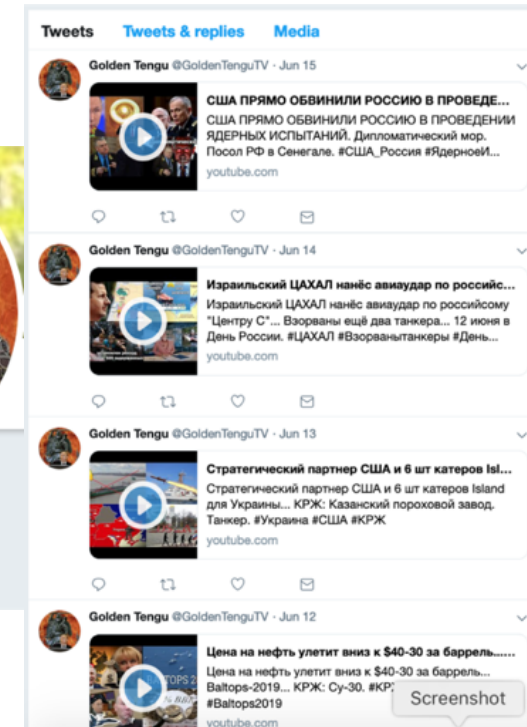
People who like these tweets (such as @Blackdo52395065, @nLqLGPh8F7JiHG9) are also robots.

It is a small botnet.

Algorithmic Manipulation

"Hot News" a prominent channel disseminating videos related "South China Sea" conflict.
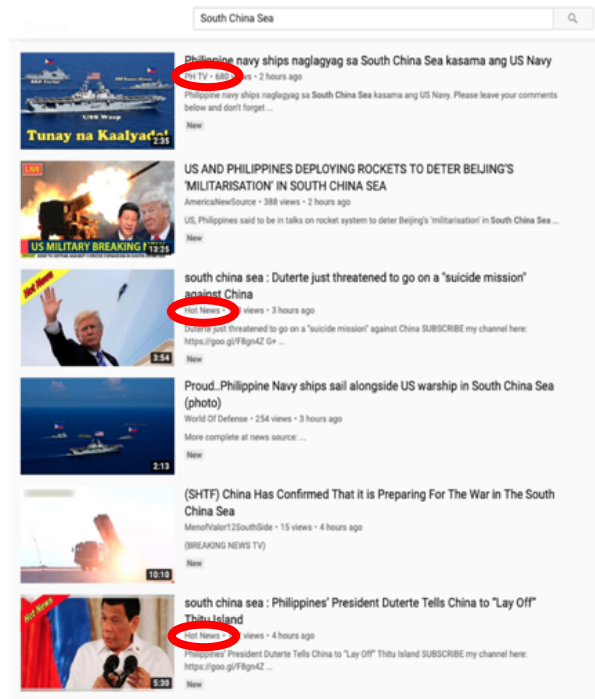
Videos have robotic voice/narration

Key Coordinating Groups - Collective Action Theory Based Model

P1.

Importance(Im) → Interest(I)

Interest(I) → Importance(Im)

∴ Importance(Im) ↔ Interest(I)

P2.

Utility(U) → Interest(I)

P3.

Utility(U) → Power(P)

P4.

Power(P) → Importance(Im)

Importance(Im) → Power(P)

∴ Power(P) ↔ Importance(Im)

P5.

Power(P) → Control(C)

Control(C) → Power(P)

∴ Power(P) ↔ Control(C)

Model showing all the factors that help in determining the outcome of a collective action, i.e., Success or Failure.
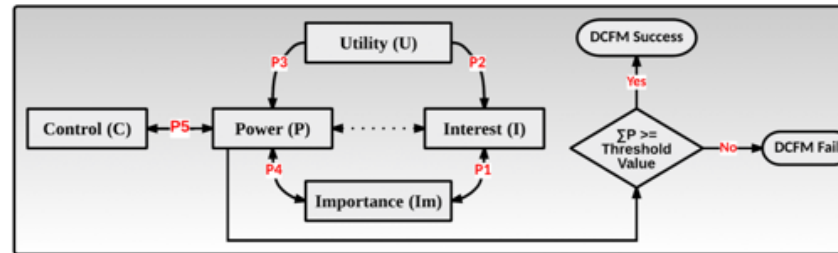
*Published in SBP, SNAM, AAAI, CASON

$$\because Power(P) = f(C,Im)$$
$$\because Importance(Im) = f(Interest)$$
$$\because Interest(I) = |U_{outcome1} - U_{outcome0}|$$
$$\therefore Power(P) = f(C, |U_{outcome1} - U_{outcome0}|)$$
$$Or$$
$$\therefore Power(P) = f(C,I)$$
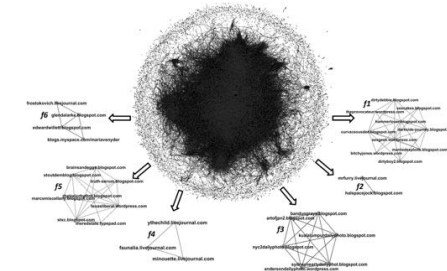
Technologies Used
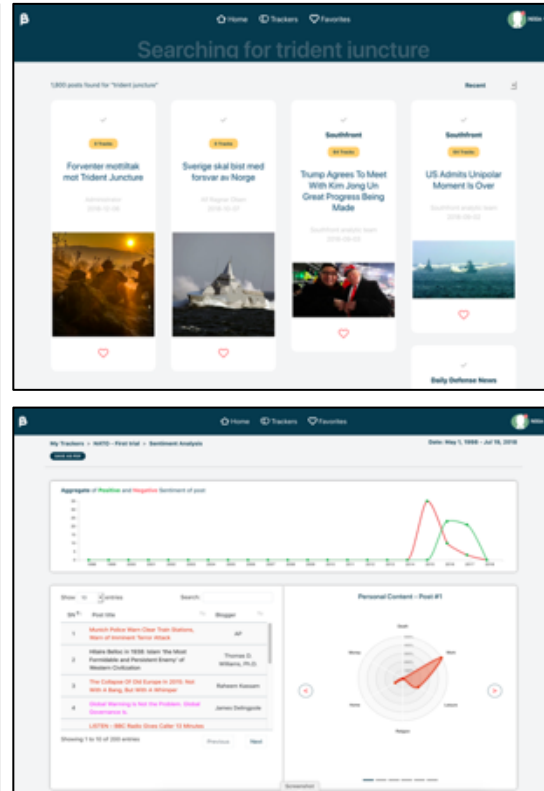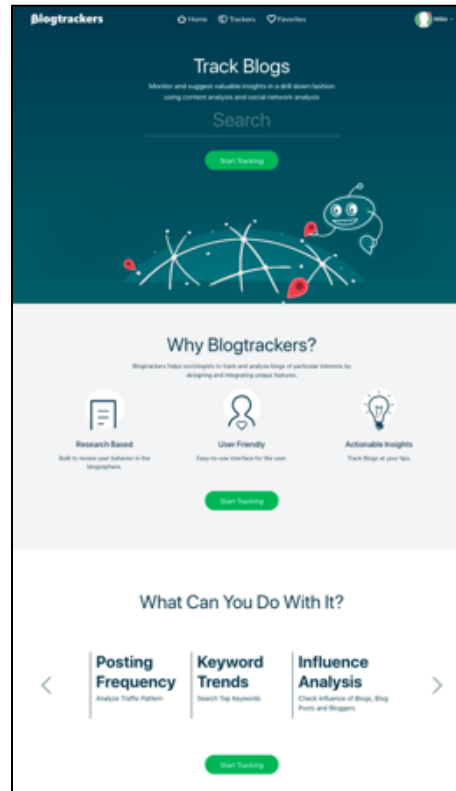
Blogtrackers
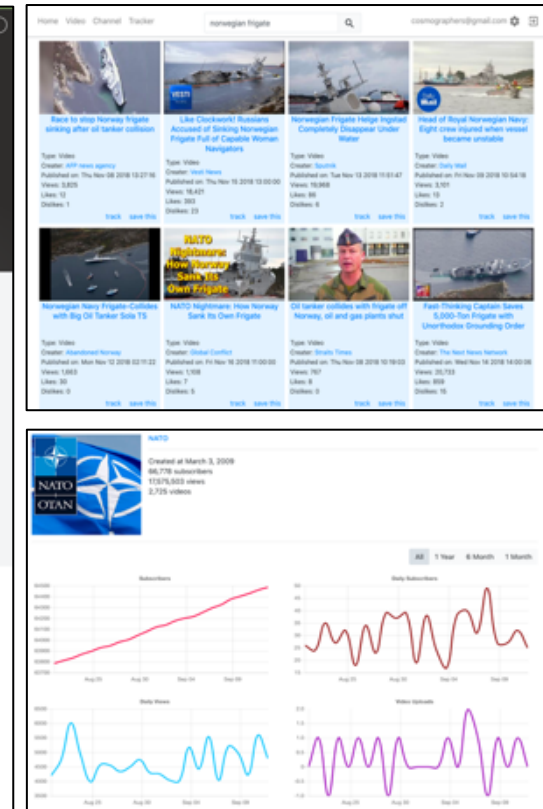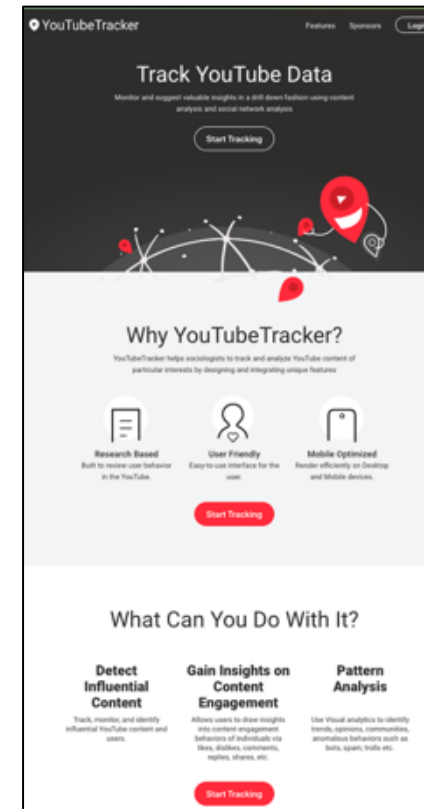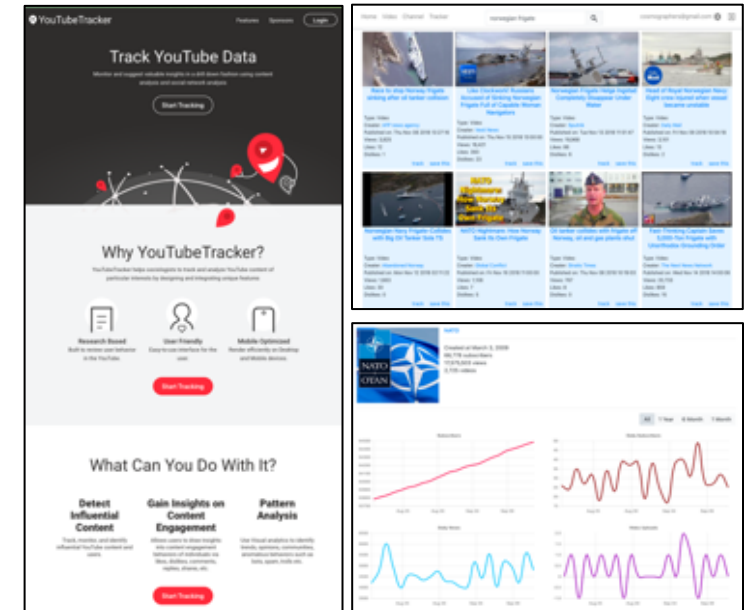

YouTubeTracker

Blogtrackers

- Blogtrackers is designed to explore the blogosphere and gain insights about events and how these events are perceived in the blogging community.
- Provides analyst with means to develop situation awareness.
- Extract insights like key influencers of the blogosphere.
- Comprehend trends and understand leading narratives
- Conduct sentiment analysis on a wide range of subjects.
- Identify any unusual patterns in blog postings.
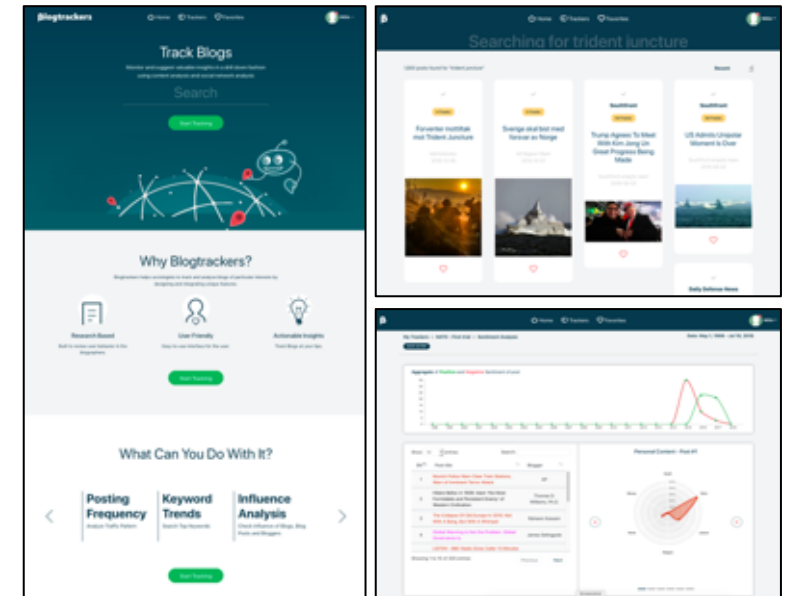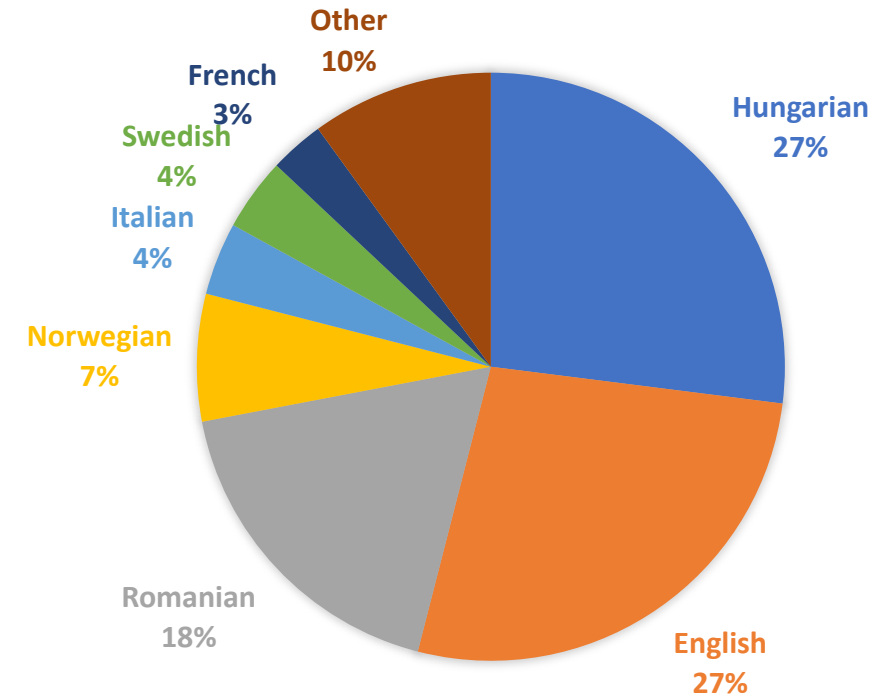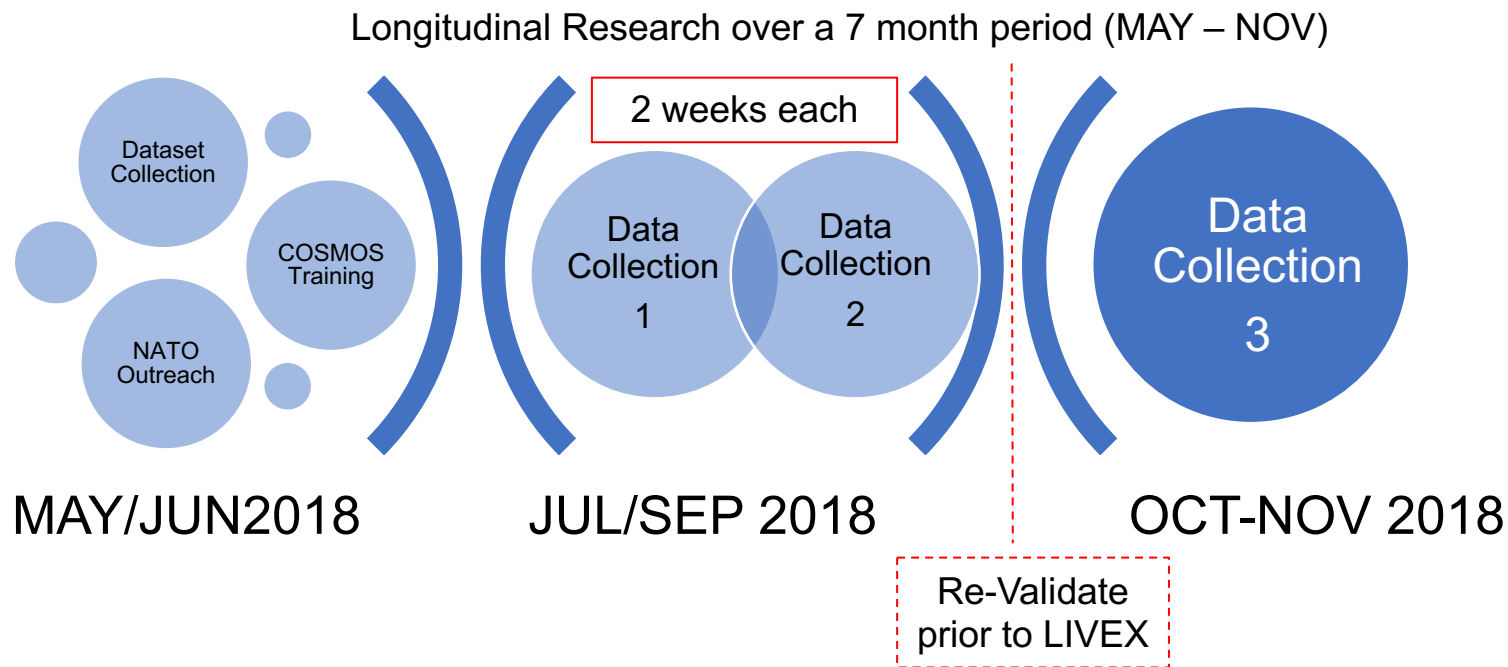
blogtrackers.host.ualr.edu/

YouTubeTracker

- YouTube is the second most popular website in the world with 5 billion videos watched every day. Yet little to no analysis is done. YouTubeTracker attempts to change that by providing the power of analytics into the hands of the users.

- With YouTubeTracker, a user can:
  - Visualize channel activity
  - Study networks of videos, channels, commenters, and more
  - Analyze content engagement trends
  - Identify influential actors/groups
  - Track content of interest
  - Detect inorganic behaviors (commenter mobs, etc.)

youtubetracker.host.ualr.edu/

Trident Juncture 2018 Data

Longitudinal Research over a 7 month period (MAY – NOV)

2 weeks each

Dataset Collection

COSMOS Training

NATO Outreach

Data Collection 1

Data Collection 2

Data Collection 3

MAY/JUN2018   JUL/SEP 2018   OCT-NOV 2018

Re-Validate prior to LIVEX

Other 10%
French 3%
Swedish 4%
Italian 4%
Norwegian 7%
Romanian 18%
Hungarian 27%
English 27%

YouTube Data
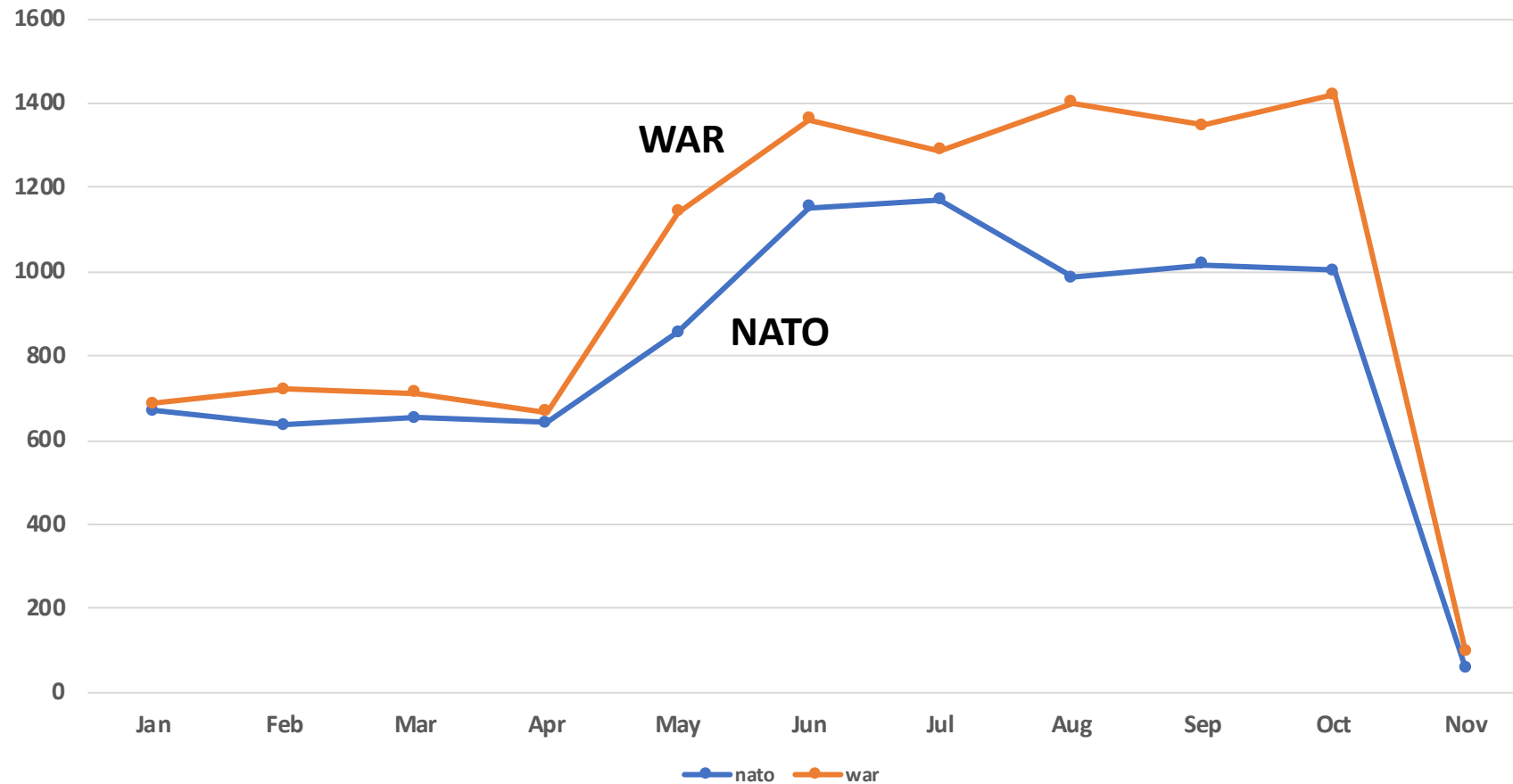- 169,296 videos
- 4,070,030 comments

Blog Data
- 419 blogs identified from various sources (SME, keywords, geofence, Facebook, analysts)
- 46 blogs scraped consisting of 52,295 posts
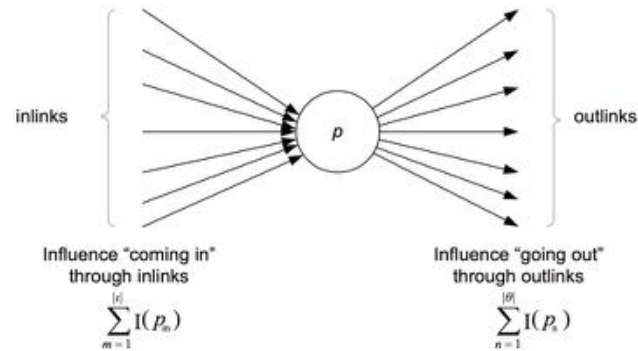
Blog Analysis – Posting Trend
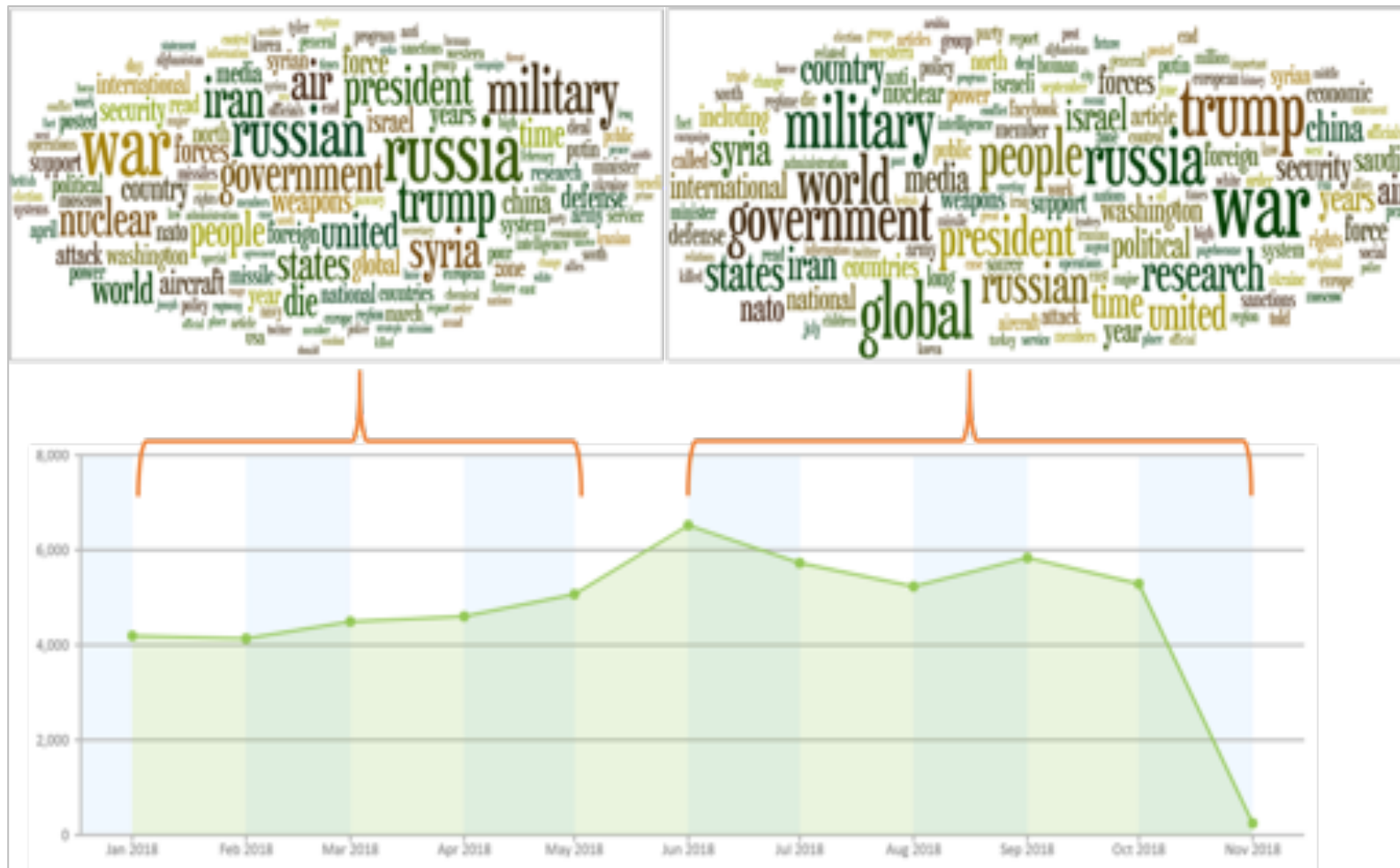
Blog Analysis – Keyword Trend
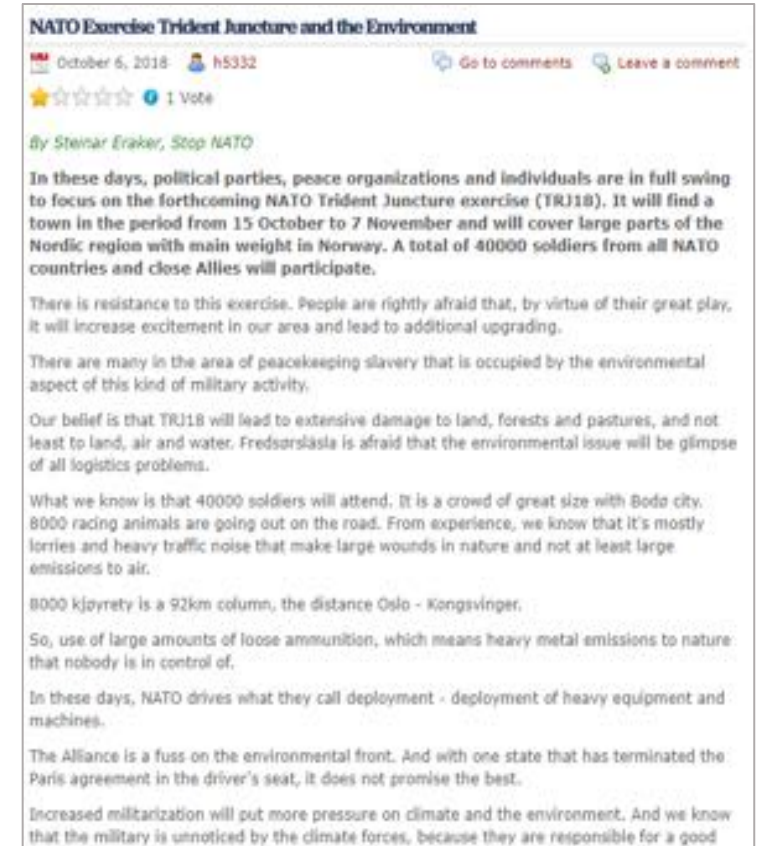
Influential Posts

$$InfluenceFlow(p) = w_{in} \sum_{m=1}^{|I|} I(p_m) - w_{out} \sum_{n=1}^{\theta} I(p_n)$$

$$I(p) \propto w_{com}\gamma_p + InfluenceFlow(p)$$

$$I(p) = w(\lambda) \times (w_{com} + InfluenceFlow(p))$$

$$iIndex(B) = \max(I(p_i))$$

Leading Anti-NATO Narratives

Environmental Impact	**Disturbs Local Economy**	**Mistreatment by NATO Troops**
Mocking/ridiculing NATO	**NATO is a joke – Not a real threat**	**'Stop NATO' Protests/Astroturfing**
Threatening Stability	**NATO poking 'Russian Bear'**	**NATO is aggressive**

Anti-NATO Imagery

YouTube Content – Location Analysis

- Most of the content was published from the United States

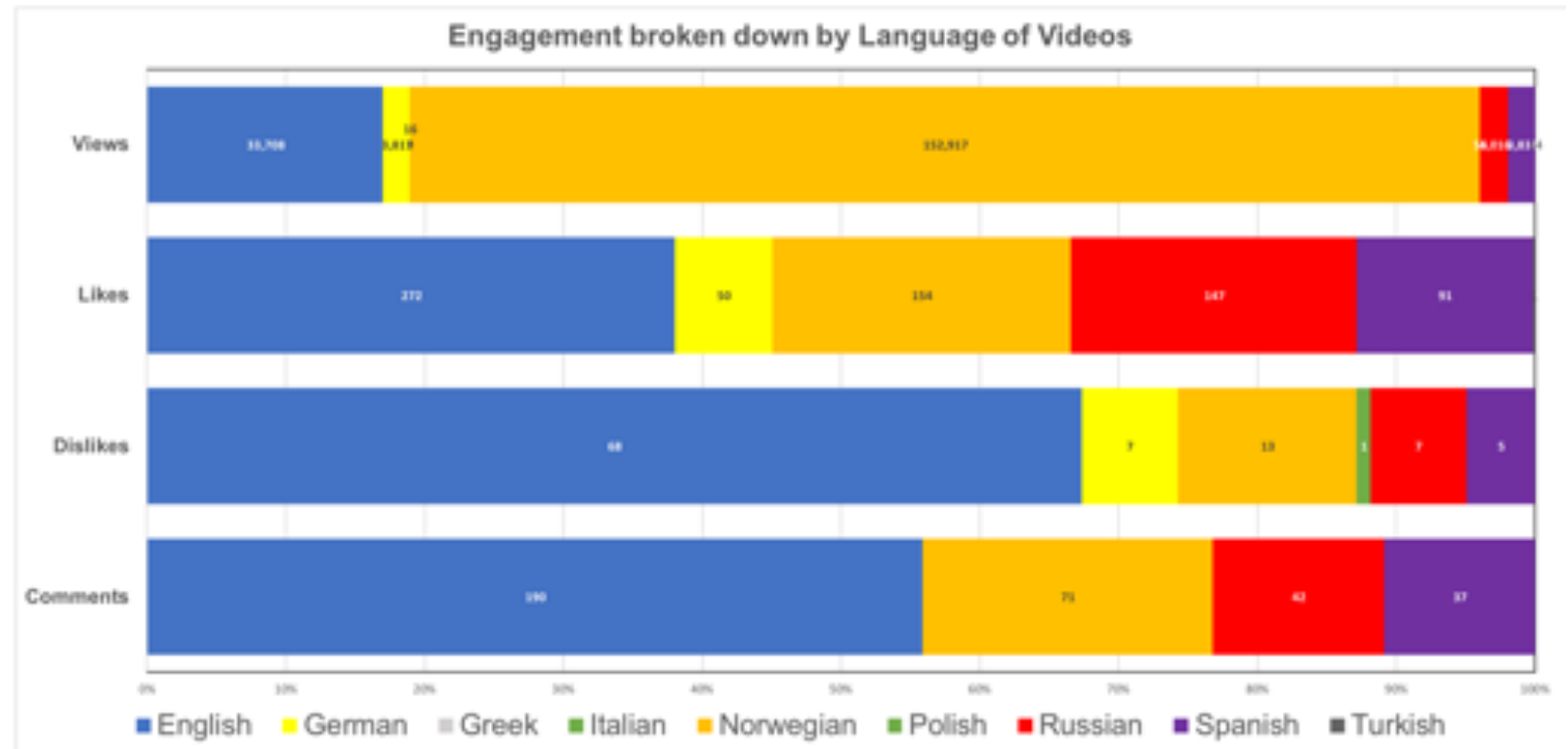- Russian hosted content was mostly hostile.
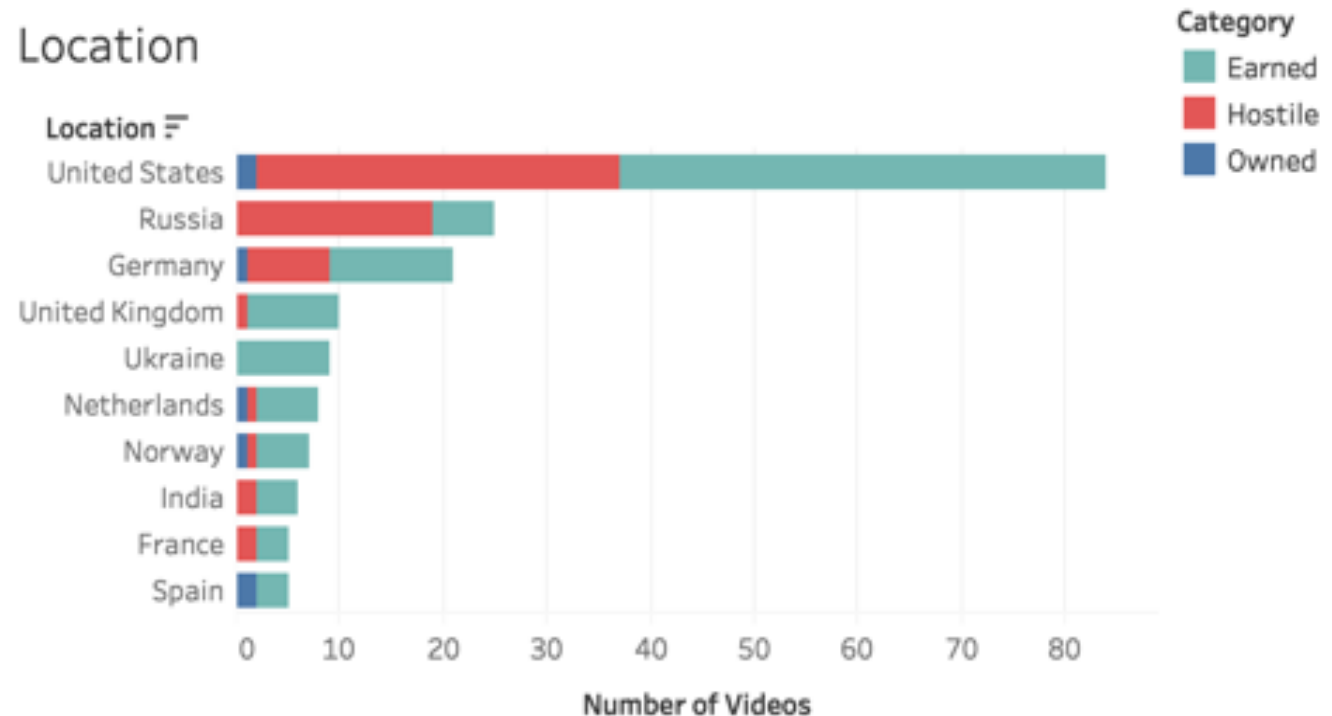
YouTube Content – Target Audience
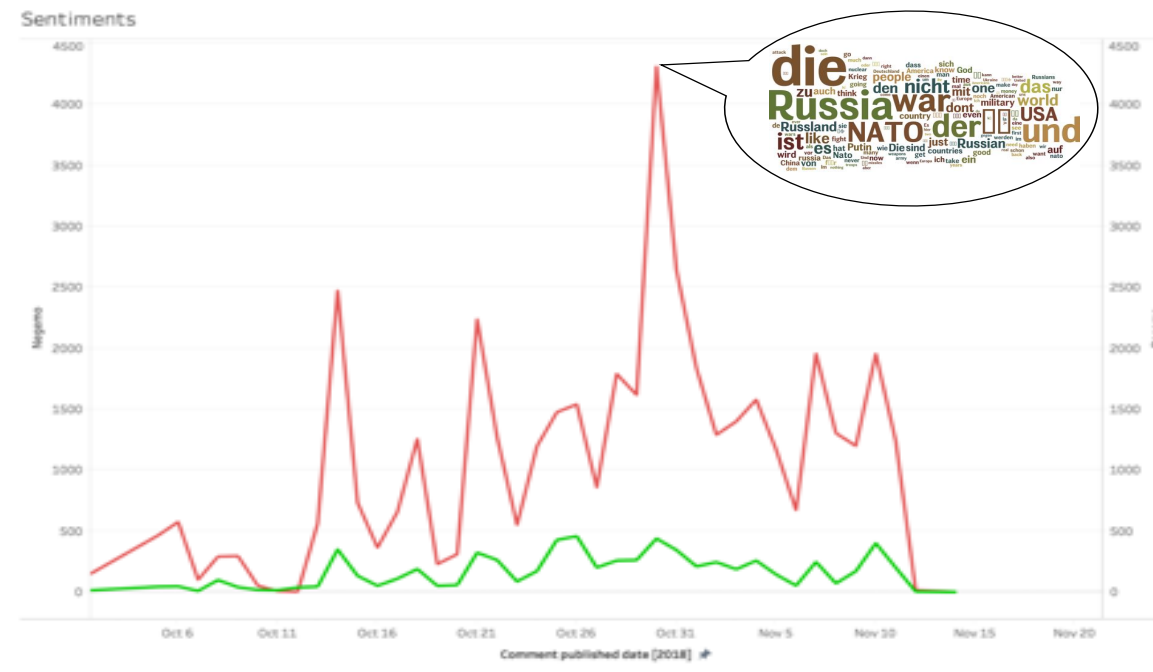
Target audience
- English
- Norwegian
- Russian
- Spanish
- German

speaking populations

YouTube Content – Sentiment Analysis

- Exceptionally high negative sentiment reflected in the online commentary. Especially during the exercise period

TRJE 18 - Publications & Briefings

- NATO Joint Warfare Center, Stavanger, Norway

- Cover Story for Three Swords Magazine – publication in March 2019

- Two pieces covering LOE 2.0 and TRJE 18

- Panel member for NATO Sr. Military leaders private planning meeting at CoE, March 25, 2019
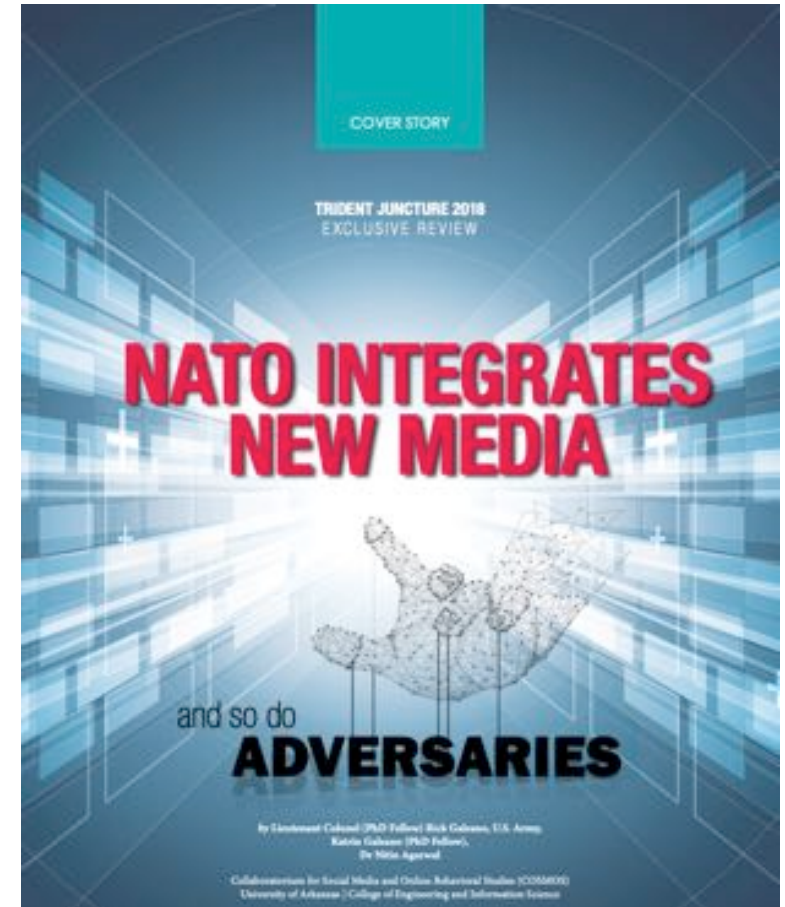
Social Media Training Course

- NATO Strategic Communications Center of Excellence. 25-29 March 2019.

- Marine Expeditionary Forces (2MEF). 28-31 August 2018 in CMU, Pittsburgh.

- NATO Strategic Communications Center of Excellence. 20-25 March 2017 in Riga, Latvia.

- US CyberCommand's CyberSchool, 3-6 August 2016.

Social Computing Conference, Washington D.C.

- Social Computing, Behavioral-Cultural Modeling and Prediction Conference, Washington D.C., July 9-12, 2019.

- Supported by several other federal agencies.

- http://sbp-brims.org/

Acknowledgments

Over 25 grants totaling > $20 million from:

- Air Force Research Lab
- Arkansas Research Alliance
- Army Research Office
- DARPA
- Department of State
- Department of Homeland Security
- Jerry L. Maulden/Entergy Endowment
- National Science Foundation
- Office of Naval Research

Thank You!

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