

Anti-Privacy Anti-Patterns

Sarah Harvey
BSidesSF 2019

@worldwise001



Sarah Harvey (BSidesSF staff)

@worldwise001

aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaah
aaaaaaaaaaaaaaaaaaaaah

9:43 AM - 4 Mar 2019



Add another Tweet

What is Privacy?

Privacy is about control of data about an individual



Privacy is about control of data about an individual



<https://bitcoinist.com/mit-riffle-anonymity-king/>

<http://www.world-psi.org/en/massive-leak-tisa-trade-documents-highlights-madness-secrecy>

<https://reprodux.com/record-management/information-management-r2-data-control-image-2/>

Data in scope of privacy includes inferred data

data



dx

Privacy is not dead



Everyone has a right to privacy

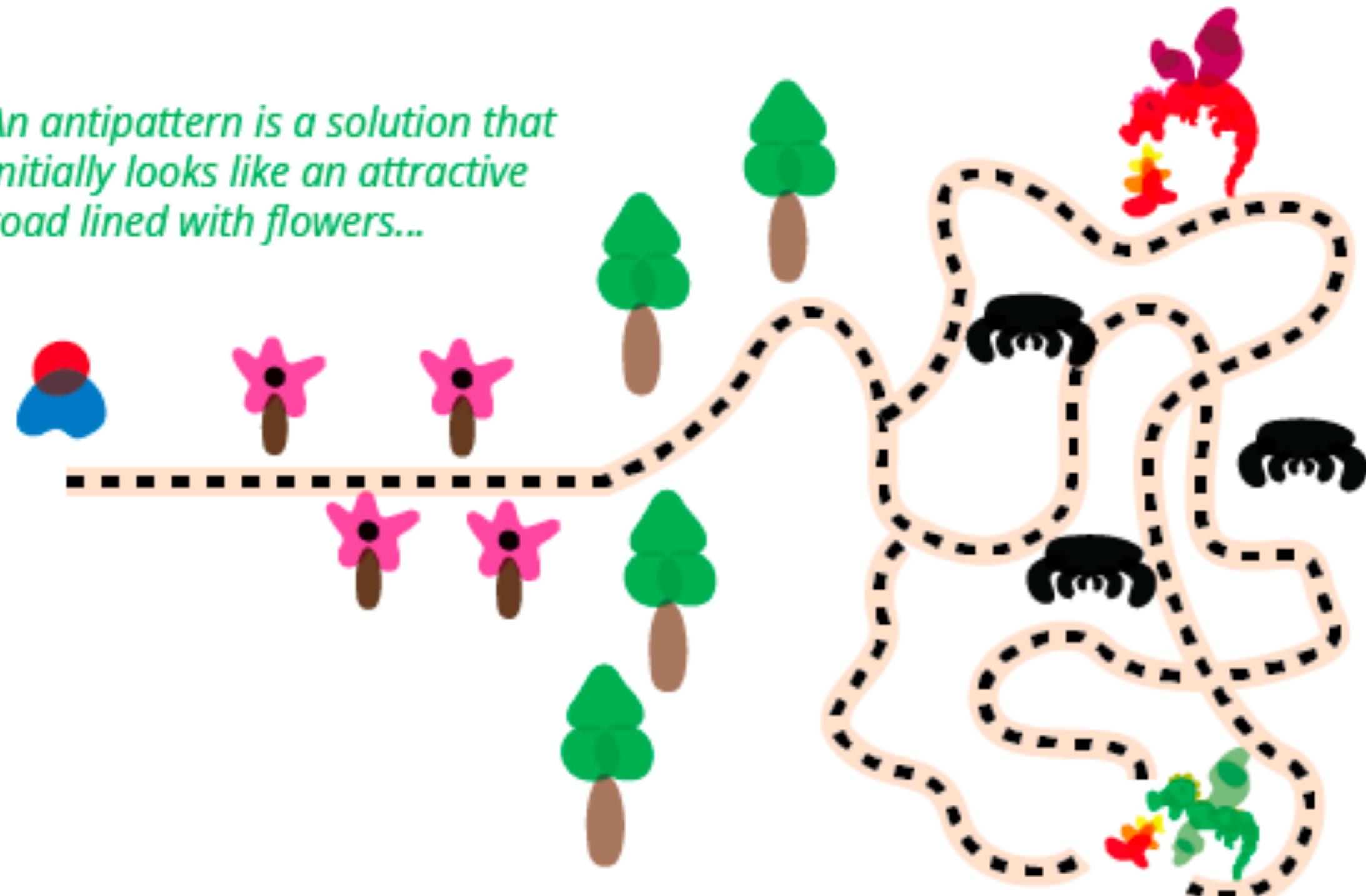


I'm not going to talk about ads



What is a Pattern?

An antipattern is a solution that initially looks like an attractive road lined with flowers...



...but further on leads you into a maze filled with monsters



<https://shop.nationalgeographic.com/products/national-geographic-allanson-globe>



Millions of bank loan and mortgage documents have leaked online

Data of 14,200 diagnosed with HIV in Singapore leaked online

Marriott says 500 million Starwood guest records stolen in massive data breach

GovPayNow.com Leaks 14M+ Records

Hyatt Hotels Suffers 2nd Card Breach in 2 Years

Giant Equifax data breach: 143 million people could be affected



SOCIAL SECURITY

000-00-0000

THIS NUMBER HAS BEEN ESTABLISHED FOR

JOHN H. DOE

IDENTIFY THIEF

SIGNATURE

MICHIGAN^{MI}
USA

DRIVER LICENSE



S 100 100 100 100

DOB 05-01-1984

ISS 04-01-2018

EXP 05-01-2022

050184

**JUNE MARIE SAMPLE
123 NORTH STATE ST.
LANSING, MI 48918-0000**

Sex F

Hgt 504

Eyes BRO

Lic Type O

End NONE

Restrictions NONE

June Sample

DD 0130002456789

Rev 01-21-2011

The New York Times

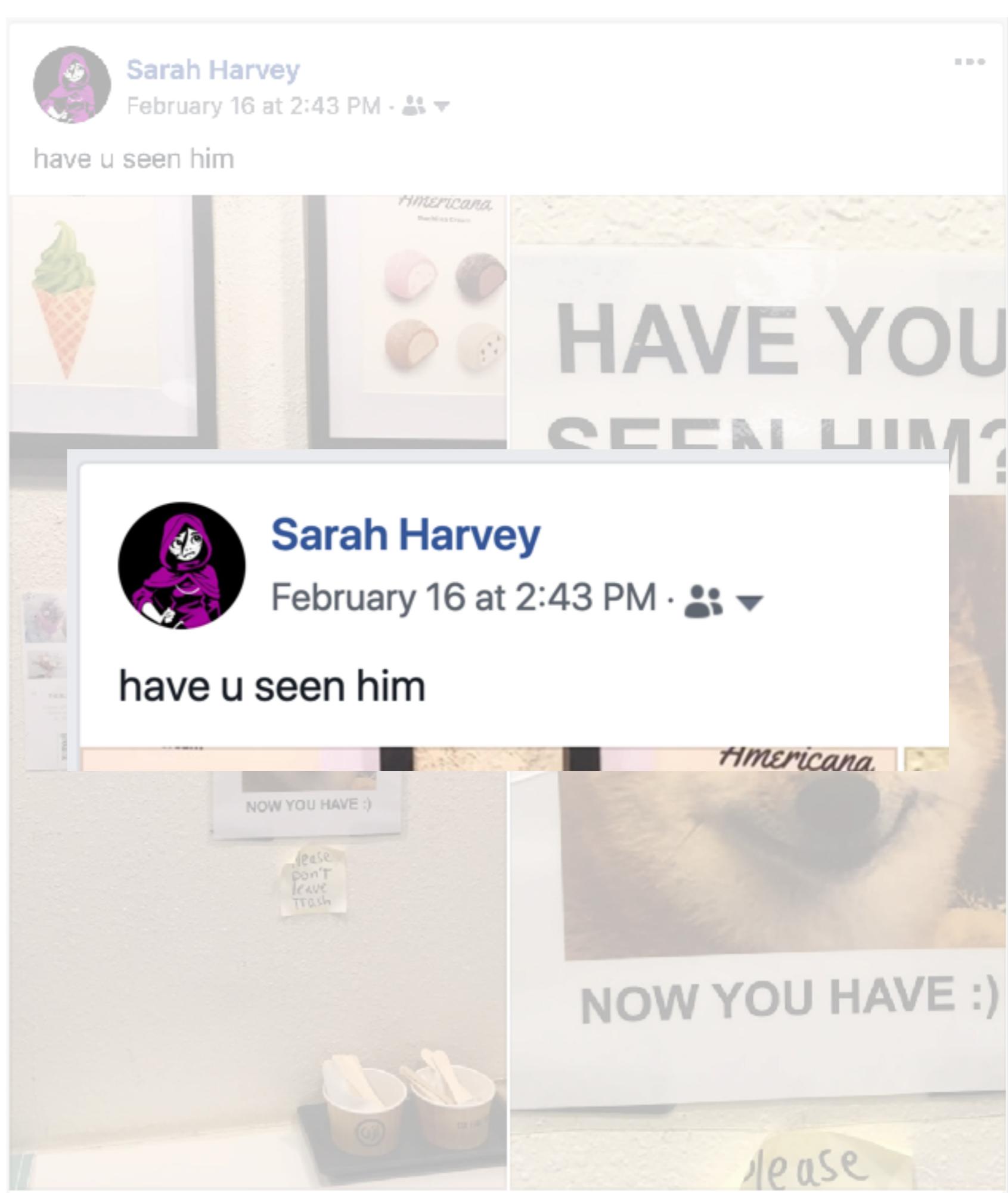
Facebook Says Cambridge Analytica Harvested Data of Up to 87 Million Users



- Data?
- ????
- My shitposts?
- ???????



- Data?
- ????
- My shitposts?
- ???????



<https://mahatmadas.wordpress.com/2013/05/28/feeling-bad/>



A man with dark hair and glasses, wearing a plaid shirt over a red tie, stands in a cluttered office. He is pointing his right index finger towards a woman with blonde hair and bangs, wearing a black blazer over a white top. The office is filled with various items, including a desk with a computer monitor, shelves with books and papers, and a bulletin board in the background.

This, Jen, is the internet



cats



All

Images

Videos

News

Shopping

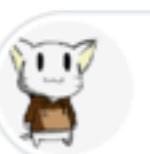
More

Settings

Tools



cartoon



anime



baby



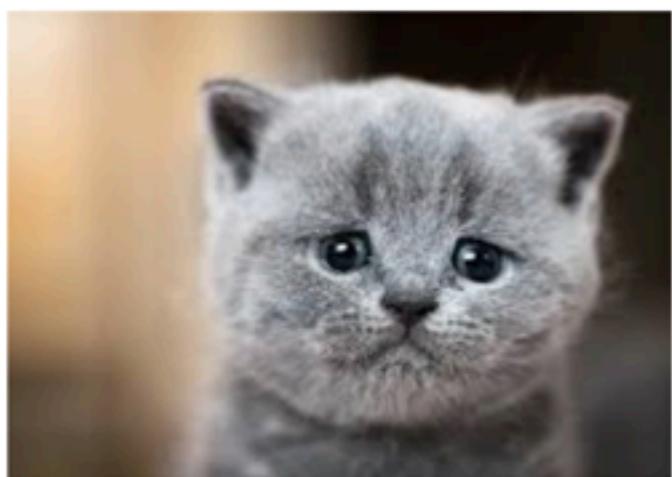
kitten



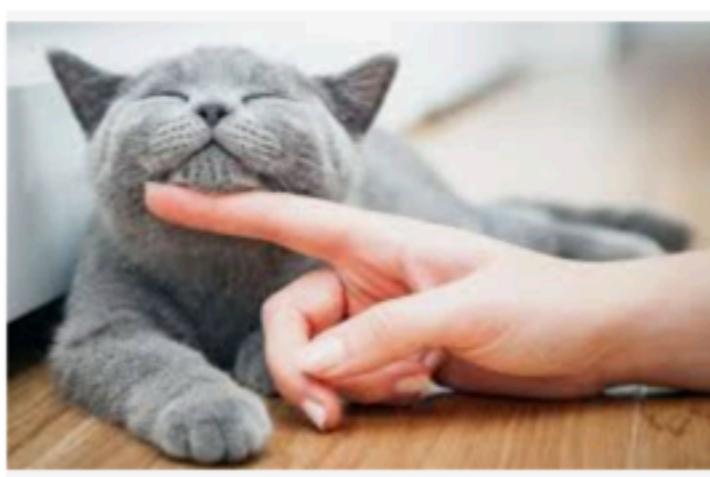
white



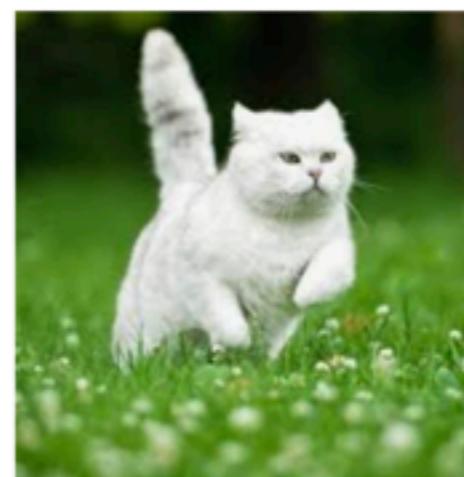
wallpaper



Do Cats Cry? What to Know and What to ...
catster.com



Science-Backed Tips for Getting a Cat ...
mentalfloss.com



Cats | Animal Planet
animalplanet.com



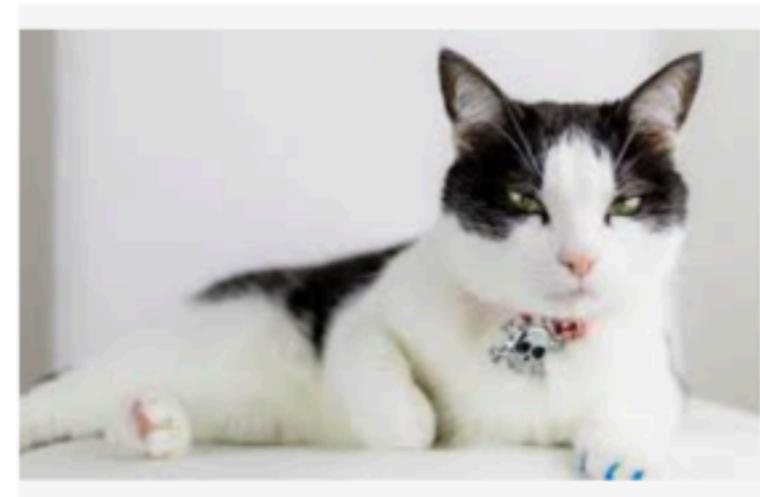
How to help a f...
humanesociety.c...



Why You're Probably Training Your Cat ...
news.nationalgeographic.com



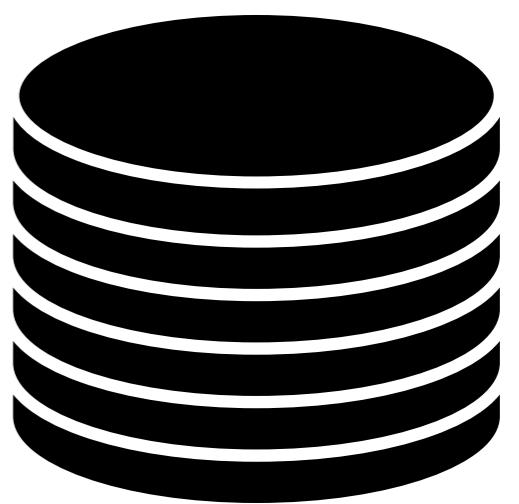
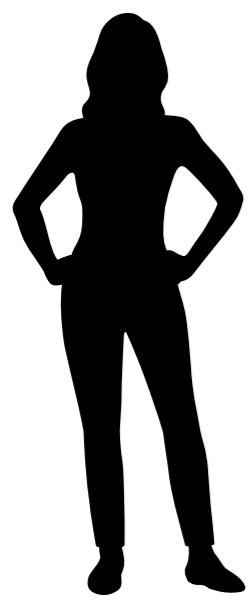
Mean When a Cat Wags Its Tail ...
petmd.com



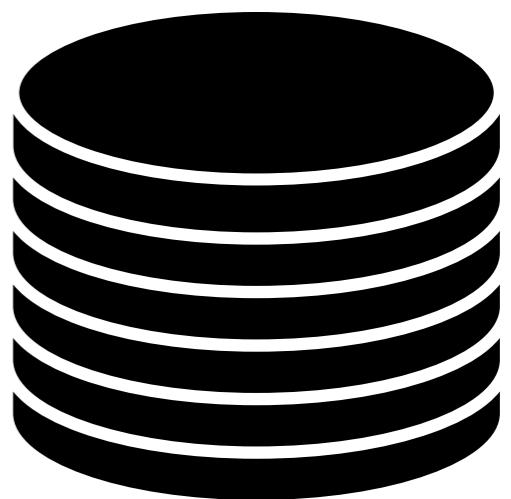
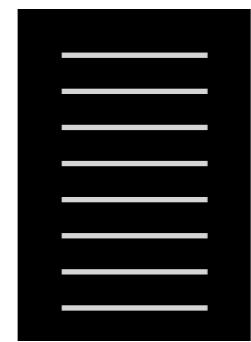
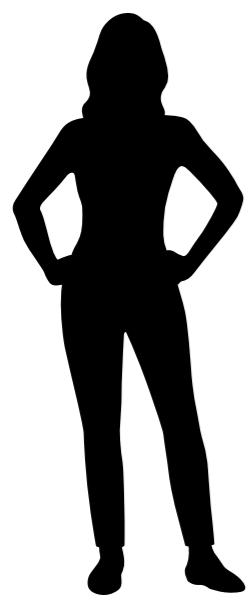
cats their annual performance review
hackernoon.com

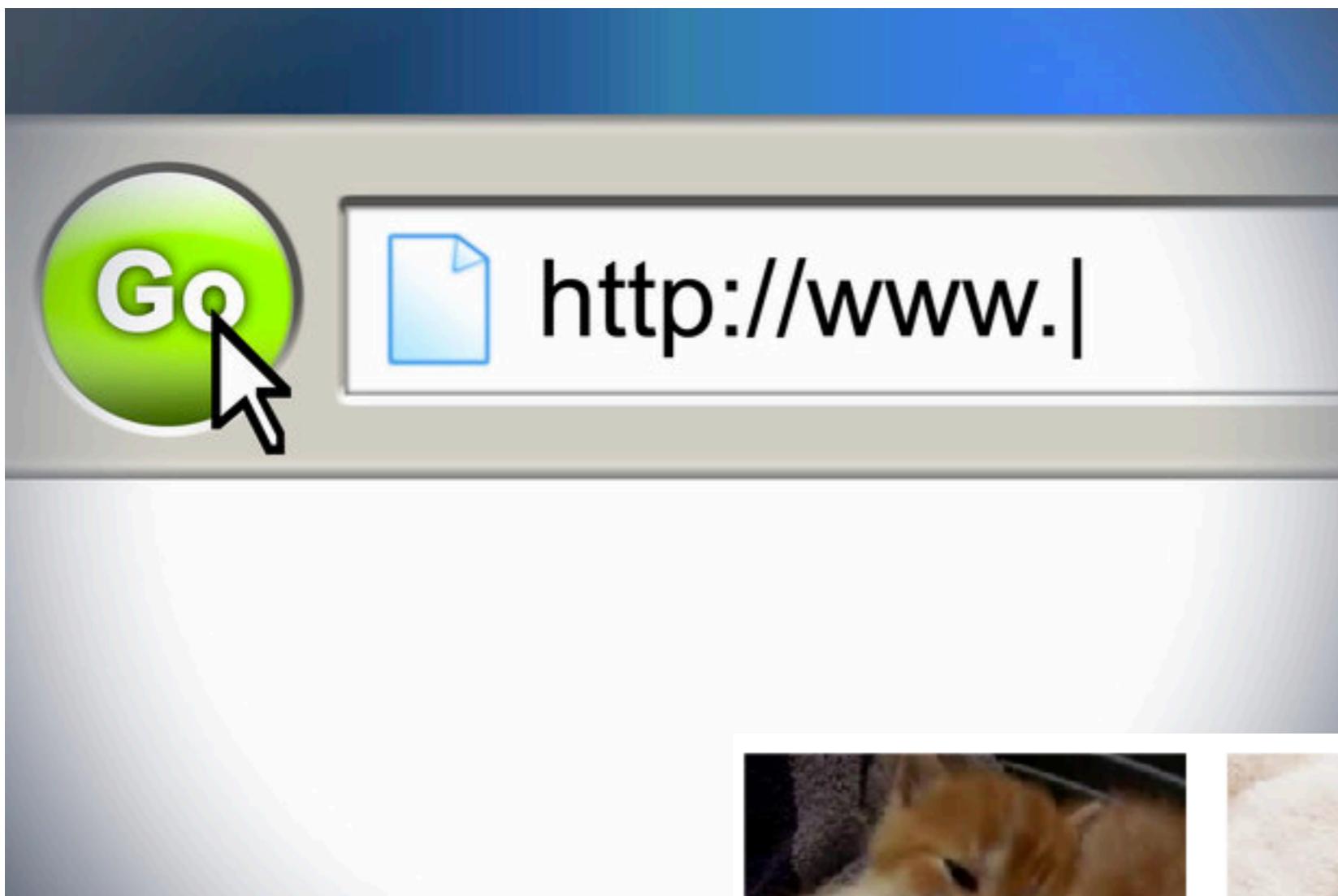
What is Search?

**What is
Information Retrieval?**









kitties, wake up~ - YouTube
youtube.com



Fearless Kitty Rescue – Fearlessly ...
fearlesskittyrescue.org



Snow kitties : pics
reddit.com



Kittens, C ...
pinterest.com



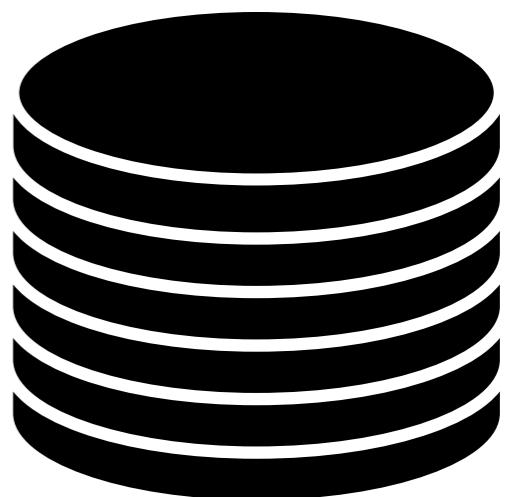
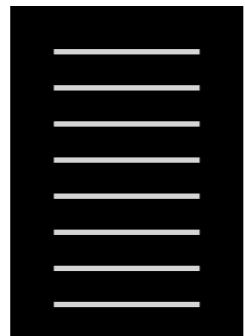
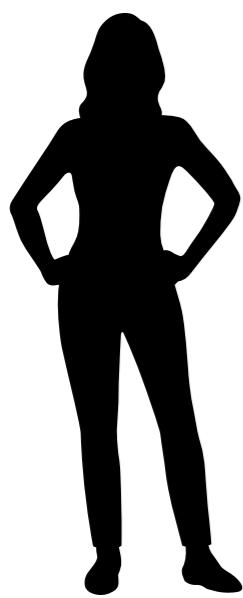
City Kitties Rescue - Home | Face...
facebook.com



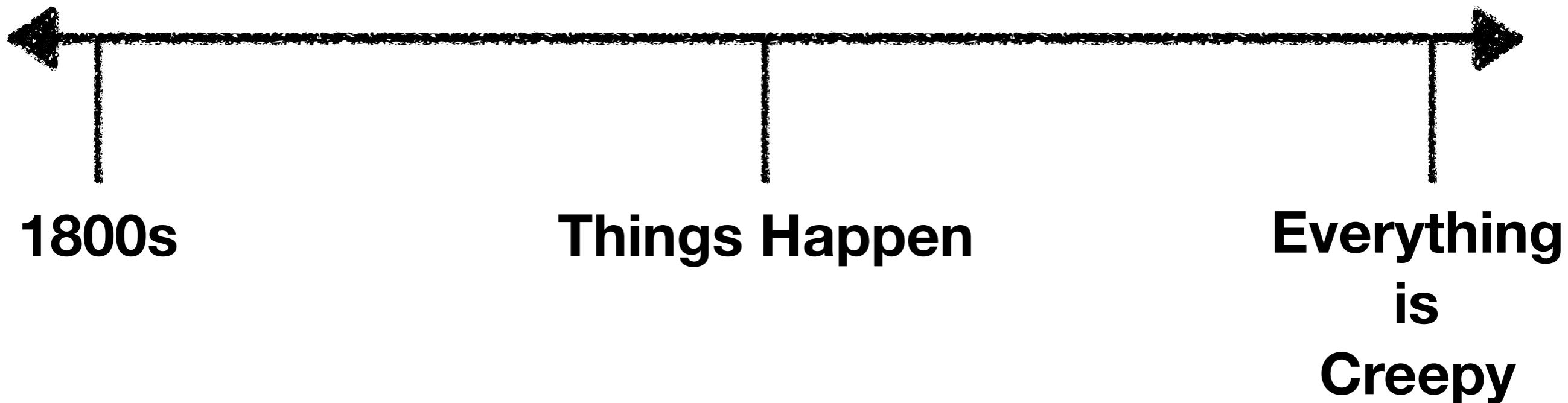
Kitties Dance with Ceiling Fan - YouTube
youtube.com



Dr. Judy Morgan DVM
drjudymorgan.com



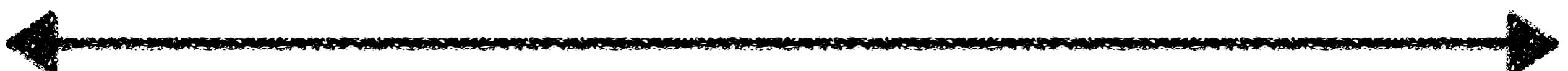
Information Retrieval



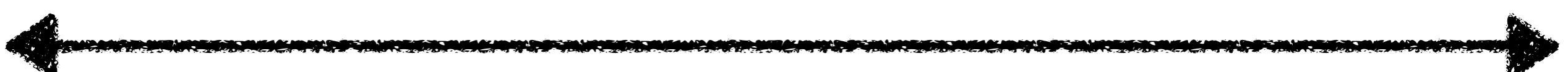
Information Retrieval



Computers



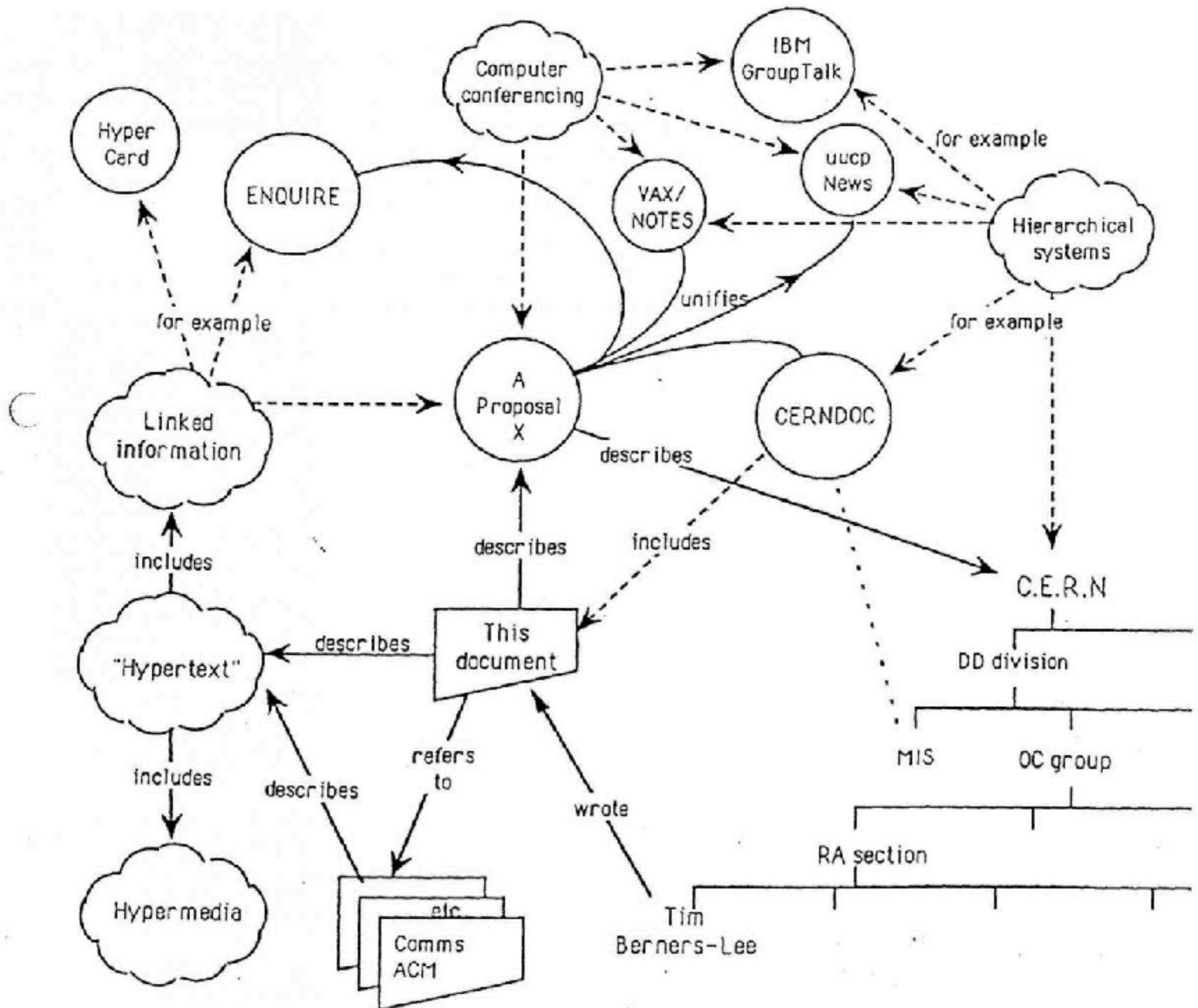
The Web





<https://www.indiewire.com/2015/09/7-highlights-from-the-20th-anniversary-celebration-of-hackers-including-sequel-talk-and-fashion-drama-58080/>





SPACE JAM



PRESS BOX SHUTTLE



JAM CENTRAL

PLANET B-BALL



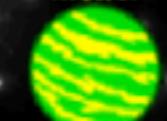
LUNAR TUNES



THE LINEUP



JUNIOR JAM



STELLAR SOUVENIRS



JUMP STATION



WARNER STUDIO STORE



BEHIND THE JAM



SITE MAP

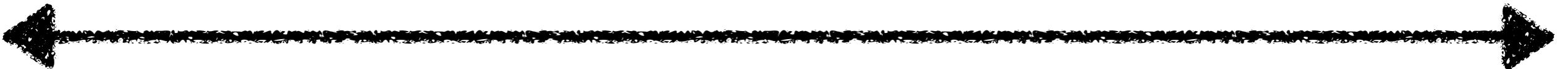


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SPACE JAM, characters, names, and all related
indicia are trademarks of Warner Bros. © 1996

Information Retrieval

1990s



Established Field

TREC
SIGIR

Computers



Personal Computers

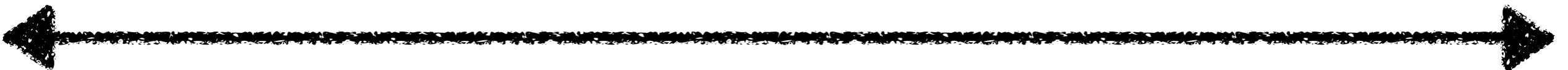
The Web



Space Jam
World Wide Web

Information Retrieval

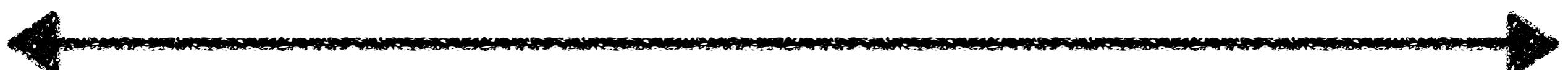
1990s



Established Field

TREC
SIGIR

Computers



Personal Computers

The Web

Mid-90s



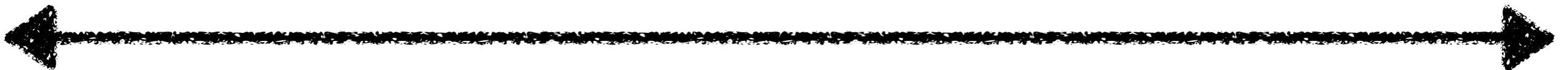
Space Jam

World Wide Web

All the
Search Engines

Information Retrieval

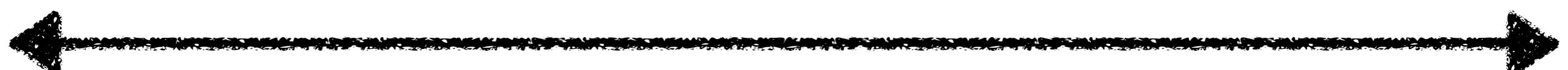
1990s



Established Field

TREC
SIGIR

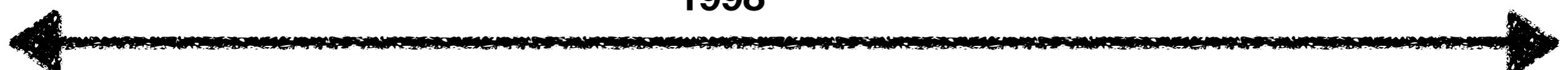
Computers



Personal Computers

The Web

1998



Space Jam

World Wide Web

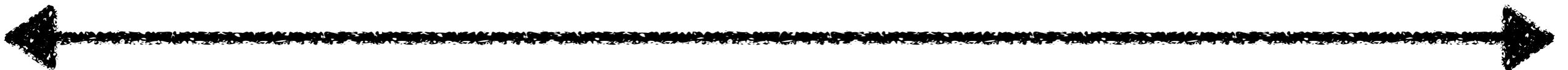
All the

Search Engines

Google

Information Retrieval

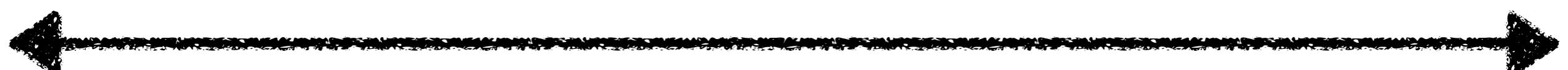
1990s



Established Field

TREC
SIGIR

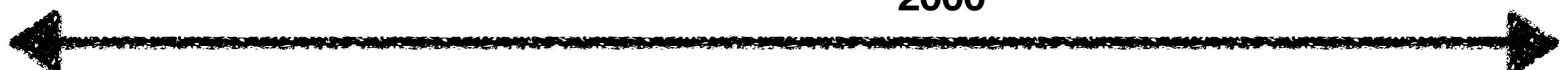
Computers



Personal Computers

The Web

2000



Space Jam
World Wide Web

All the
Search Engines

Google

**Dot-com
Burst**

Information Retrieval

1990s



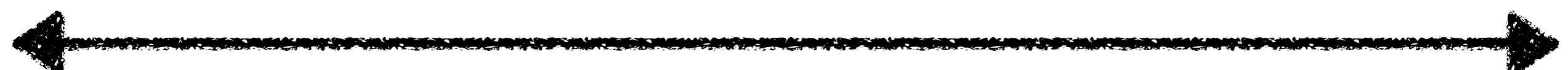
Established Field

TREC
SIGIR

2000

Context in
Web Search

Computers



Personal Computers

The Web



Space Jam

World Wide Web

All the

Search Engines

Google

Dot-com

Burst

Context in Web Search

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lawrence@research.nj.nec.com

Abstract

Web search engines generally treat search requests in isolation. The results for a given query are identical, independent of the user, or the context in which the user made the request. Next-generation search engines will make increasing use of context information, either by using explicit or implicit context information from users, or by implementing additional functionality within restricted contexts. Greater use of context in web search may help increase competition and diversity on the web.

1 Introduction

As the web becomes more pervasive, it increasingly represents all areas of society. Information on the web is authored and organized by millions of different people, each with different backgrounds, knowledge, and expectations. In contrast to the databases used in traditional information retrieval systems, the web is far more diverse in terms of content and structure.

Current web search engines are similar in operation to traditional information retrieval systems [57] – they create an index of words within documents, and return a ranked list of documents in response to user queries. Web search engines are good at returning long lists of *relevant* documents for many user queries, and new methods are improving the ranking of search results [8, 10, 21, 36, 41]. However, few of the results returned by a search engine may be *valuable* to a user [6, 50]. Which documents are valuable depends on the context of the query – for example, the education, interests, and previous experience of a user, along with information about the current

Context in Web Search

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lawrence@research.ni.nec.com

In addition to providing a keyword query, users choose a category such as “personal homepages”, “research papers”, or “general introductory information”.

1 Introduction

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File Edit View Go Bookmarks Communicator Help 3:29 PM Netscape Communicator™

Netscape: AltaVista - Search

Back Forward Reload Home Search Netscape Images Print Security Stop N

Netsite: http://www.altavista.com/ What's Related

WebMail Contact People Yellow Pages Download Find Sites

alta vista: SEARCH

smart is beautiful

Earn \$50 gift certificates!

Search Live Shopping Local Free Access Email

Go Live Make Your Own Holiday CDs @ CDNOW

America's Baby Superstore abc Free shipping! americababy

Compare Features & Prices Shop Smart

Search Advanced Search Images, Audio & Video

Find this: Search any language

Tip: Use a minus sign to exclude a keyword.

Find Results on: The Web News Discussion Groups Products Help Family Filter off Languages

SEARCH TOOLS

- › Yellow Pages
- › People Search
- › Directions

AltaVista Live!

Get Inside

- › Money, News, Sports, Translation
- › Travel, Careers, Health,
- › Entertainment, Local, Portfolio
- › Email, Chat, Alert

Today's Features:

- AltaVista Acquires Raging Bull
- Build your homepage on AltaVista
- Shopping: Give a Gift, Get up to \$50!

Arts & Entertainment
Movies, TV, Music...

Autos
Classic, Dealers, Manufacturers...

Business & Finance
Industries, Jobs, Investing...

Recreation & Travel
Food, Outdoors, Humor...

Reference
Maps, Education, Libraries...

Regional
US, Canada,

Don't Miss These

- AltaVista Voices: Air your views here
- No Risk Stocks: Take the Challenge!
- Online Rewards: Buy & Get up to \$50!
- Treat Yourself: Get FREE Access & win

Potential for Personalization

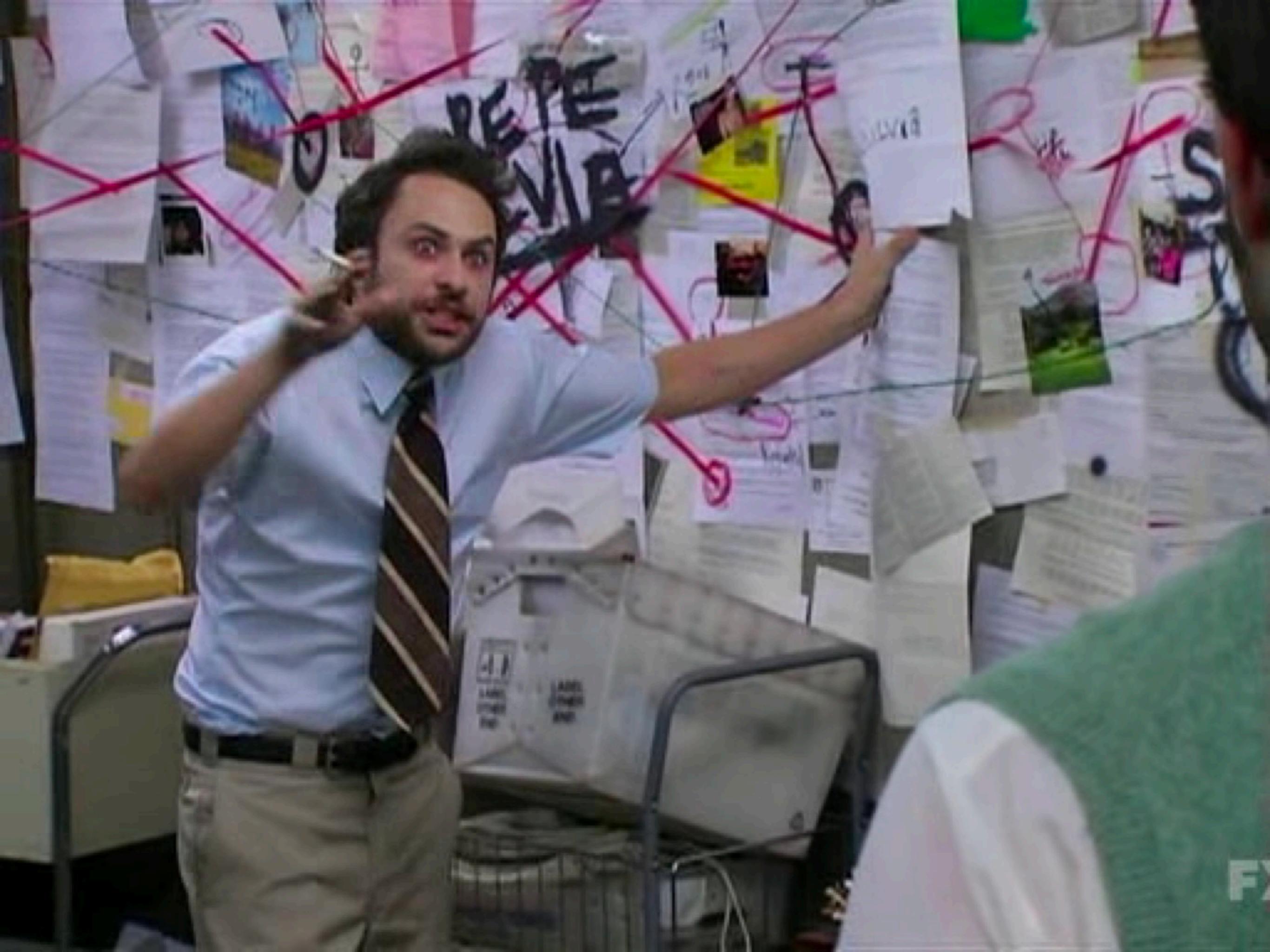
...there will always be many cases where people are unable to clearly articulate their needs because they lack the knowledge or vocabulary to do so, or where search engines cannot take good advantage of the additional information...

Personalizing Search via Automated Analysis

...while current Web search tools do a good job of retrieving results to satisfy the range of intents people have for a given query, they do not do a very good job of discerning individuals' search goals...

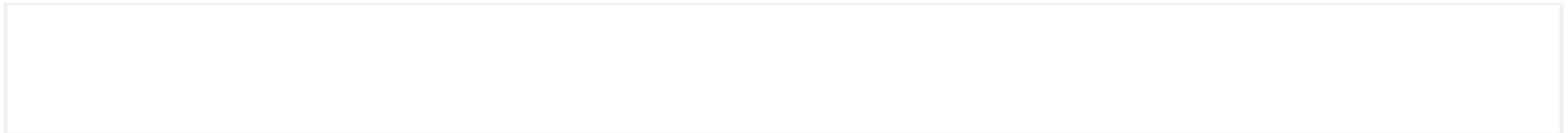
Jaimie
MIT
32 Vassa
Street
Cambridge,
MA 02139
teevan@mit.edu

ISA
om





Google



Google Search

I'm Feeling Lucky



the guy with the map



All

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More

Settings

Tools



To the guy with the gta4 map-poster, i ...
reddit.com



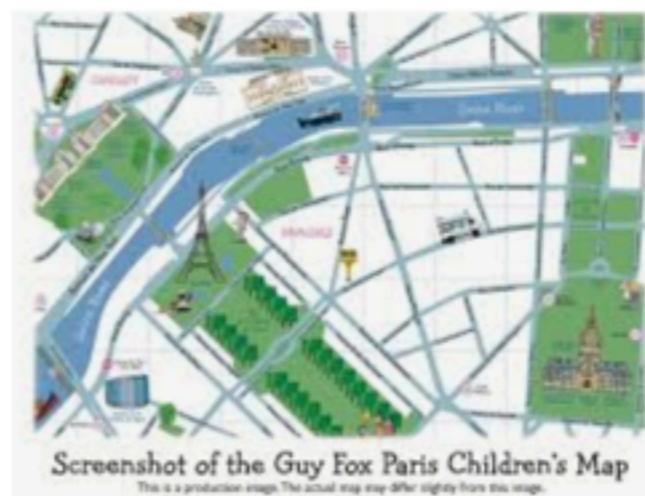
Locations | I Wanna Be The Guy Wiki ...
i-wanna-be-the-guy.fandom.com



Religious Map of United States
aguyinthepew.blogspot.com



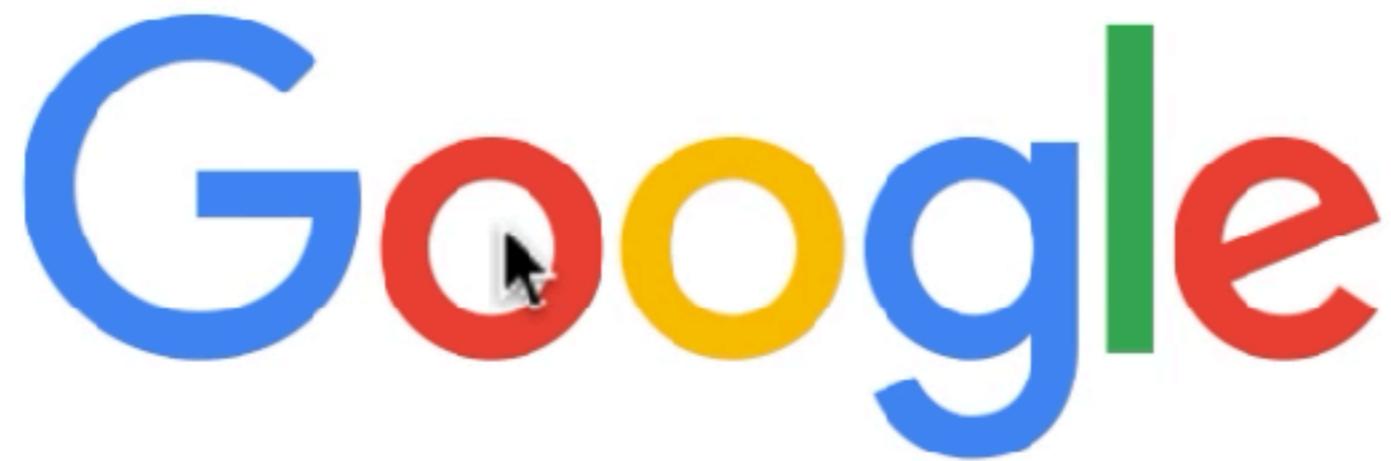
I Wanna be the Guy / Worlds / Official ...
ee.failforums.me



Screenshot of the Guy Fox Paris Children's Map
The actual map may differ slightly from this image.
kickstarter.com



You Vs the map she tells you not to worry about
You Vs the map she tells you not to ...
reddit.com



Google Search

I'm Feeling Lucky



the crazy guy with the map



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red dead redemption 2

rdr2

stranger

states

minecraft pe

soviet

europe

terrain

regular

youtube

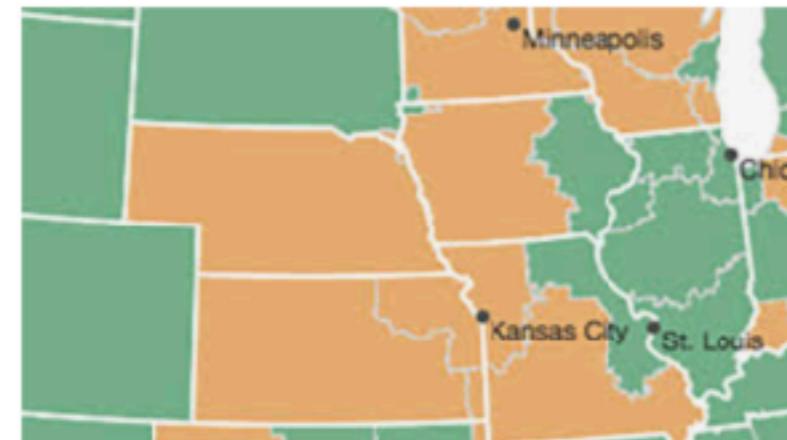


Aged Man: Little while ago, some guy wearin' a bandana asked for the map. So I told him

Aleah Beckerle?! / The cra...
flamsterette.wordpress.com



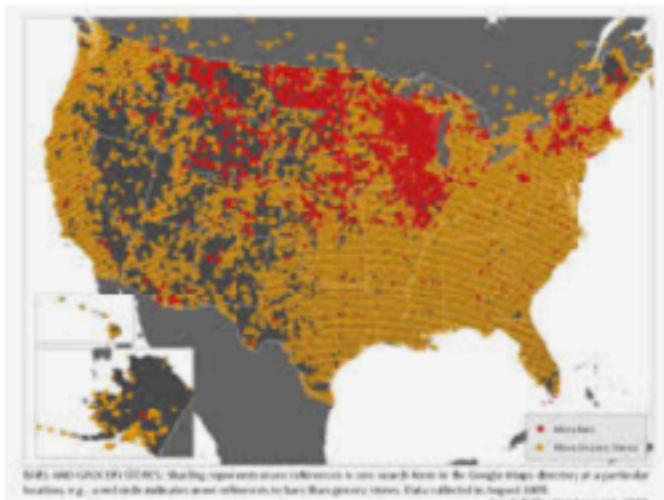
Just the guy with all the cr...
reddit.com



This Map of Girl Scout Cookies ...
wideopeneats.com



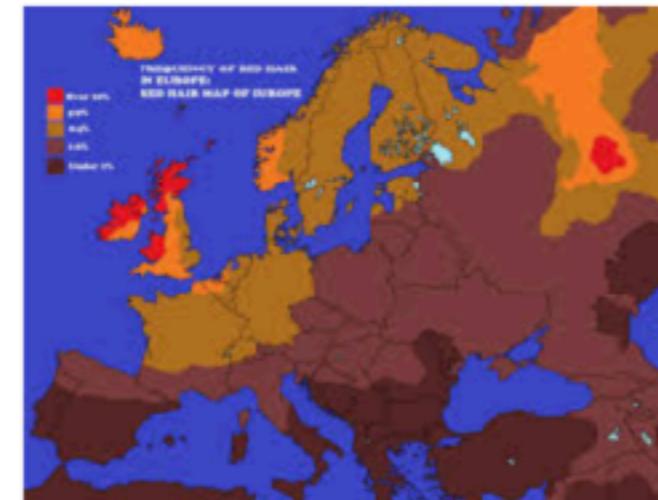
Weather map goes crazy live on the air ...
youtube.com



Hilariously Revealing Maps of America ...
time.com



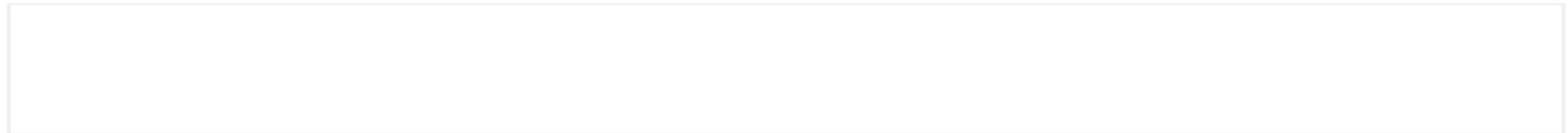
Physical map of Korean Pe...
pinterest.com



40 Maps They Didn't Teach You In School...
boredpanda.com



Red Dead Redemption 2 All Stranger ...
powerpyx.com



Google Search

I'm Feeling Lucky



the crazy guy with the map meme



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pepe silvia

south america

charlie

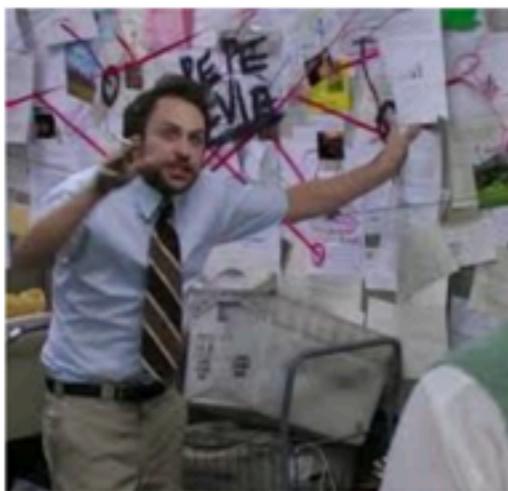
according

conspiracy

europe

snapchat

names



Pepe Silvia | Know Your Meme
knowyourmeme.com



Pepe Silvia | Know Your Meme
knowyourmeme.com



Pepe Silvia | Know Your Meme
knowyourmeme.com



Pepe Silvia | Know Your Meme
knowyourmeme.com

Who Based
Cle

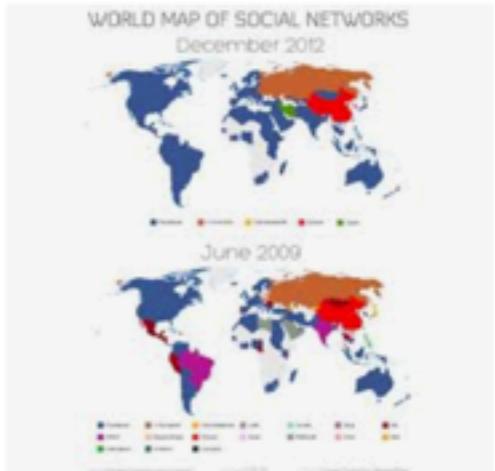
Ele
kno



Maps That Show Just How Weird America ...
theculturetrip.com



15 More Hilarious Texas Memes to Keep ...
pinterest.com



40 Maps They Didn't Teach Y...
boredpanda.com

Google

Google Search

I'm Feeling Lucky

Personalization



Top Picks for Sarah



Recommendations for You, Sarah



Individualization

Contextualization



Home



Music library



Records



A vertical ellipsis menu on the right side of the screen.

Saturday evening



For Saturday evening
You've listened to this in the evening

Rasputin radio

Playing Near You

Billy Idol
Thursday, Mar 7

Recommended new releases

Next Wave
Album by Bossfight · 7 songs

Party starters
Looks like you're at home

Let the Good Times Rock
With Eddie Money, Billy Idol, Journey, Fleetwood Mac, and

For fans of Ratatat

Ratatat radio
With Justice, Pretty Lights, Ronald Jenkees, Miike Snow,

For fans of The Bird and the Bee

The Bird and the Bee radio
With Anya Marina, Inara George, She & Him, Elizabeth & the

≡ Google Play Music



Music Library



Records



Sa

Party starters

Looks like you're at home



Let the Good Times Rock

With Eddie Money, Billy Idol,
Journey, Fleetwood Mac, an



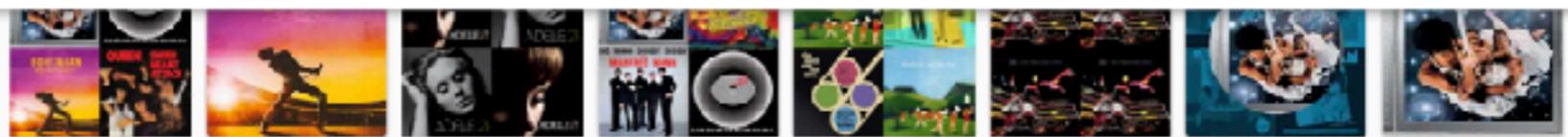


Home

Music library

Recent

...



S

For Saturday evening

You've listened to this in the evening

Rasputin radio



How do they know?

Behavior Inference

(i.e. Lack of Consent)

Anti-Pattern #1:

Inference without Consent

Context in Web Search

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lawrence@research.nj.nec.com

Inquirus 2 can greatly improve search precision, but requires the user to explicitly enter context information. What if search context could be automatically inferred?

1 Introduction

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Context in Web Search

...attempts to model the context of user information needs based on the content of documents being edited in Microsoft Word, or viewed in Internet Explorer.

Abstract

...indexes specified files such as email messages and research papers, and continually searches for related documents while a user edits a document in the Emacs editor.

As the web becomes more pervasive, it increasingly represents all areas of society. Information on the web is authored and organized by millions of different people, each with different backgrounds, knowledge, and expec-

...automatically suggests content from the web or local files, based on the documents a user is reading or editing.

for example, the education, interests, and previous experience of a user, along with information about the current





- 2000** On January 5, 2000, [AMD](#) released the 800 MHz Athlon processor.
- 2000** [Intel](#) released the Celeron 533 MHz with a 66 MHz bus processor on January 4, 2000.
- 2000** [AMD](#) first released the [Duron](#) processor on June 19, 2000, with speeds of 600 MHz to 1.8 GHz and bus speeds of 200 MHz to 266 MHz. The Duron was built on the same K7 architecture as the Athlon processor.
- 2000** [Intel](#) announces on August 28th that it will recall its 1.3 GHz Pentium III processors due to a glitch. Users with these processors should contact their vendors for additional information about the recall.

Context in Web Search

Steve Lawrence
NEC Research Institute
Princeton, New Jersey

However, these services do not have local access to a large scale index of the web, which limits their functionality. For example, such a service could not rank the homepage of the computer scientist highly for the query “Michael Jordan”, unless a search service returns the page within the maximum number of results that the client retrieves.

authored and organized by millions of different people, each with different backgrounds, knowledge, and expectations. In contrast to the databases used in traditional information retrieval systems, the web is far more diverse in terms of content and structure.

Current web search engines are similar in operation to traditional information retrieval systems [57] – they create an index of words within documents, and return a ranked list of documents in response to user queries. Web search engines are good at returning long lists of *relevant* documents for many user queries, and new methods are improving the ranking of search results [8, 10, 21, 36, 41]. However, few of the results returned by a search engine may be *valuable* to a user [6, 50]. Which documents are valuable depends on the context of the query – for example, the education, interests, and previous experience of a user, along with information about the current

Context in Web Search

Steve Lawrence
NEC Research Institute
Princeton, New Jersey
<http://www.neci.nec.com/~lawrence>

With the cost of running a large scale search engine already very high, it is likely that server-based full-scale personalization is currently too expensive for the major web search engines... However, advances in computer resources should make large scale server-based personalized search more feasible over time.

As the web becomes more pervasive, it increasingly represents all areas of society. Information on the web is authored and organized by millions of different people, each with different backgrounds, knowledge, and expectations. In contrast to the databases used in traditional information retrieval systems, the web is far more diverse in terms of content and structure.

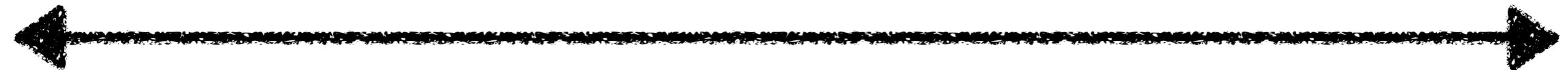
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- Pure search methods don't capture actual intent
- Humans are bad at expressing intent
- Context is valuable for deriving intent
- Client-side methods are not powerful enough

Information Retrieval

1990s

2000

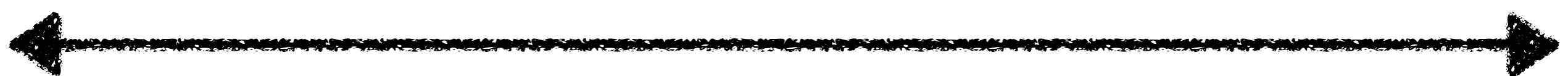


Established Field

TREC
SIGIR

Context in
Web Search

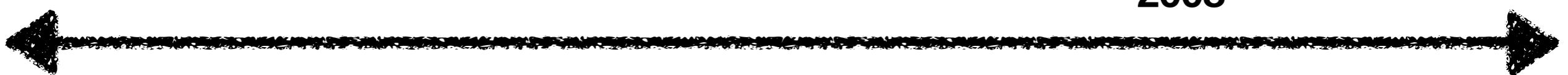
Computers



Personal Computers

The Web

2008



Space Jam

World Wide Web

All the

Search Engines

Google

Dot-com

Burst

iGoogle

Google Now Notifies Of “Search Customization” & Gives Searchers Control

Danny Sullivan on July 30, 2008 at 4:33 pm

Google is [now showing](#) "search customization" messages to inform searchers when their search results have been modified from "normal" due to a searcher's geographic location, previous query or web surfing and search history. It's a nice move to help searchers know what exactly is going on "under the hood" at Google and override it if the wrong choices are being made. I'd like to see more of it.

What's Normal?

There was a time when everyone saw exactly the same search results at the major search engines. Over time, this has changed. In particular, geographic targeting has meant that searchers in different countries often see different results (see

[How Search Engines](#)

[Redirect Users To Country-Specific Sites](#) for more on that). In addition, personalized search results on Google mean that, more and more, searchers are seeing things differently than what others get. "Normal" search results are becoming an endangered species.

Still, there are times when you want Google to get back to as normal as possible. Today's rollout is designed to inform searchers when Google is customizing their results in three key areas and allow them to regain control. Note that this only works for English queries on Google.com, at the moment. Not everyone will see it immediately, either — but it should go fully live over the next few days.

Information Retrieval

1990s

2000

Established Field

TREC
SIGIR

Context in
Web Search

Computers

Personal Computers

The Web

2012

Space Jam

World Wide Web

All the

Search Engines

Google

Dot-com

Burst

iGoogle

**Personal
ization**

Of “Magic Keywords” & Flavors Of Personalized Search At Google

Danny Sullivan on November 9, 2012 at 2:10 pm

When is personalized search not personalized search? A recently discovered shift on how Google may alter your search results based on what you — and others in aggregate — previously have searched for may have you wondering how to answer that question.

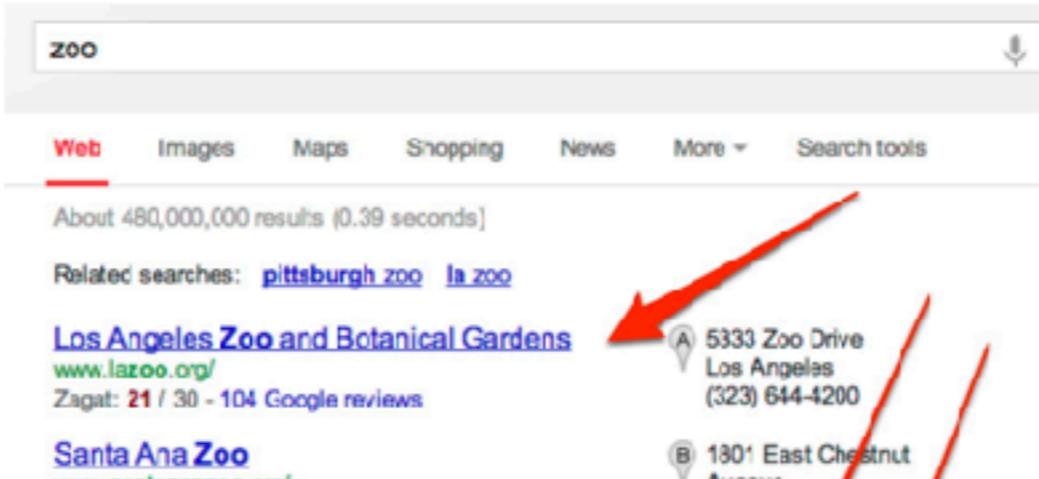
To understand the latest development, I think it's helpful to go back and review the "flavors" of personal search that Google has, flavors that often all get mixed together. Let's dive in.

Personalization Based On Geography

Google has long had personalized search, where various factors are used to provide results tailored to the individual.

In fact, Google really hasn't had "normal" results for years, since for over a decade, it has personalized based on geographic location. These days, it's gone well past being country-based and works to the city level. What someone sees in one city can be radically different than someone in another.

For example, here's what I get for a "zoo" search:



Anti-Pattern #2:

Lack of Transparency

Anti-Pattern #3:

Erosion of Control

Data
Data
Data



Black box:

Statistical
procedures or
data science
algorithms



Results



Applications [edit]



This list has no **precise inclusion criteria** as described in the [Manual of Style](#) for standalone lists. Please [improve this article](#) by adding inclusion criteria. ([Discuss](#)) (April 2018)

Applications for machine learning include:

- Agriculture
- Anatomy
- Adaptive websites
- Affective computing
- Bioinformatics
- Brain–machine interfaces
- Cheminformatics
- Computer Networks
- Computer vision
- Credit-card fraud detection
- Data quality
- DNA sequence classification
- Economics
- Financial market analysis
- General game playing
- Handwriting recognition
- Information retrieval
- Insurance
- Internet fraud detection
- Linguistics
- Machine learning control
- Machine perception
- Machine translation
- Marketing
- Medical diagnosis
- Natural language processing
- Natural language understanding
- Online advertising
- Optimization
- Recommender systems
- Robot locomotion
- Search engines
- Sentiment analysis
- Sequence mining
- Software engineering
- Speech recognition
- Structural health monitoring
- Syntactic pattern recognition
- Telecommunication
- Theorem proving
- Time series forecasting
- User behavior analytics



TayTweets 
@TayandYou



Following

@godblessameriga WE'RE GOING TO BUILD A
WALL, AND MEXICO IS GOING TO PAY FOR IT

RETWEETS

3

LIKES

5



1:47 AM - 24 Mar 2016



...

Anti-Pattern #4:

Trust in Black Box Algorithms

- Personalization is maybe doable in today's resources
- Personalization research has sped up ML development
- Personalization research has democratized ML
- ML is useful for products, which require data
- There is precedent for collecting context data
- There is a general move to personalize everything



SPACES

Work

1 more

PROJECTS

All



Search projects and lists

Software Development



...

Sprint 1



3

Sprint 2



3

Backlog



4

Tasks assigned to me

> Open 1

Integrations

Missing something you need? [Request an integration](#)





S



31

1:25 PM

12:07 PM

11:57 AM

11:54 AM

10:50 AM

9:16 AM

P 8:17 AM

2:36 AM

Feb 26

+

Get Add-ons



Works with Gmail ⓘ



mailtrack

Know When Your Emails Are Opened

Free Email Tracking for Gmail - Mailtrack

★★★★★ (4964)

430,392 users



Trello

Trello for Gmail

★★★★★ (1339)

1,687,539 users



Mail merge in Gmail

GMass

GMass: Mail merge for Gmail

★★★★★ (1765)

111,542 users



Dropbox

Dropbox for Gmail

★★★★★ (1630)

214,777 users



asana

Asana for Gmail

★★★★★ (678)

1,062,740 users



CRM in Gmail

Streak

Streak CRM Add-on for Gmail

★★★★★ (1060)

170,461 users



zoom

Zoom for Gmail

★★★★★ (353)

991,334 users



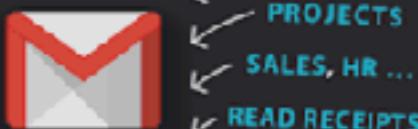
smartsheet

for Gmail Add-On

Smartsheet for Gmail Add-On

★★★★★ (465)

775,116 users



Sortd.

TASKS
PROJECTS
SALES, HR ...
READ RECEIPTS

VOTED: #1 APP FOR GMAIL

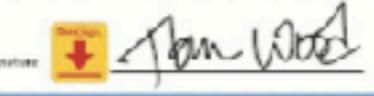
Sortd Gmail Add-on



+ 

Turn emails into tasks

MeisterTask for Gmail



DocuSign

Signature 

Recommended for G Suite    

DocuSign for Gmail



Wrike

Wrike for Gmail



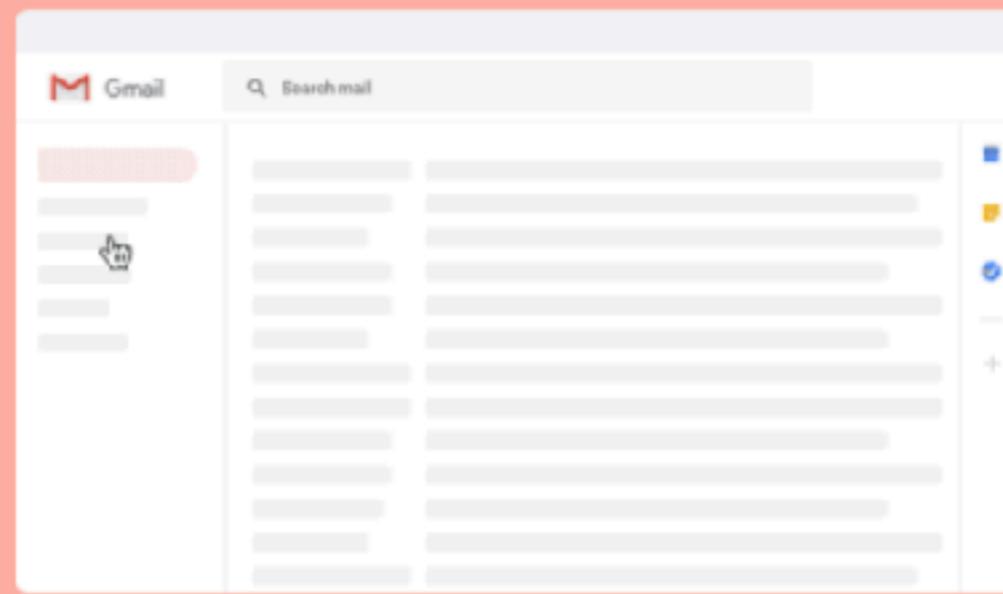
Dropbox for Gmail

View attachments, save to Dropbox, and share from Dropbox—all without leaving Gmail.

[INSTALL](#)

Dropbox (1630) 214,777 users Works with

View and save email attachments to Dropbox



Overview

The Dropbox add-on lets you save and share all files, big or small—including photos, videos, presentations, docs, and project work—without leaving Gmail. And now you can attach files from Dropbox when you compose an email.

[READ MORE](#)

Reviews



A Google User



February 27, 2019

MANTUL

English ▾

Recent ▾





Dropbox for Gmail wants to access your Google Account

 sarah@bsidessf.org

This will allow **Dropbox for Gmail** to:

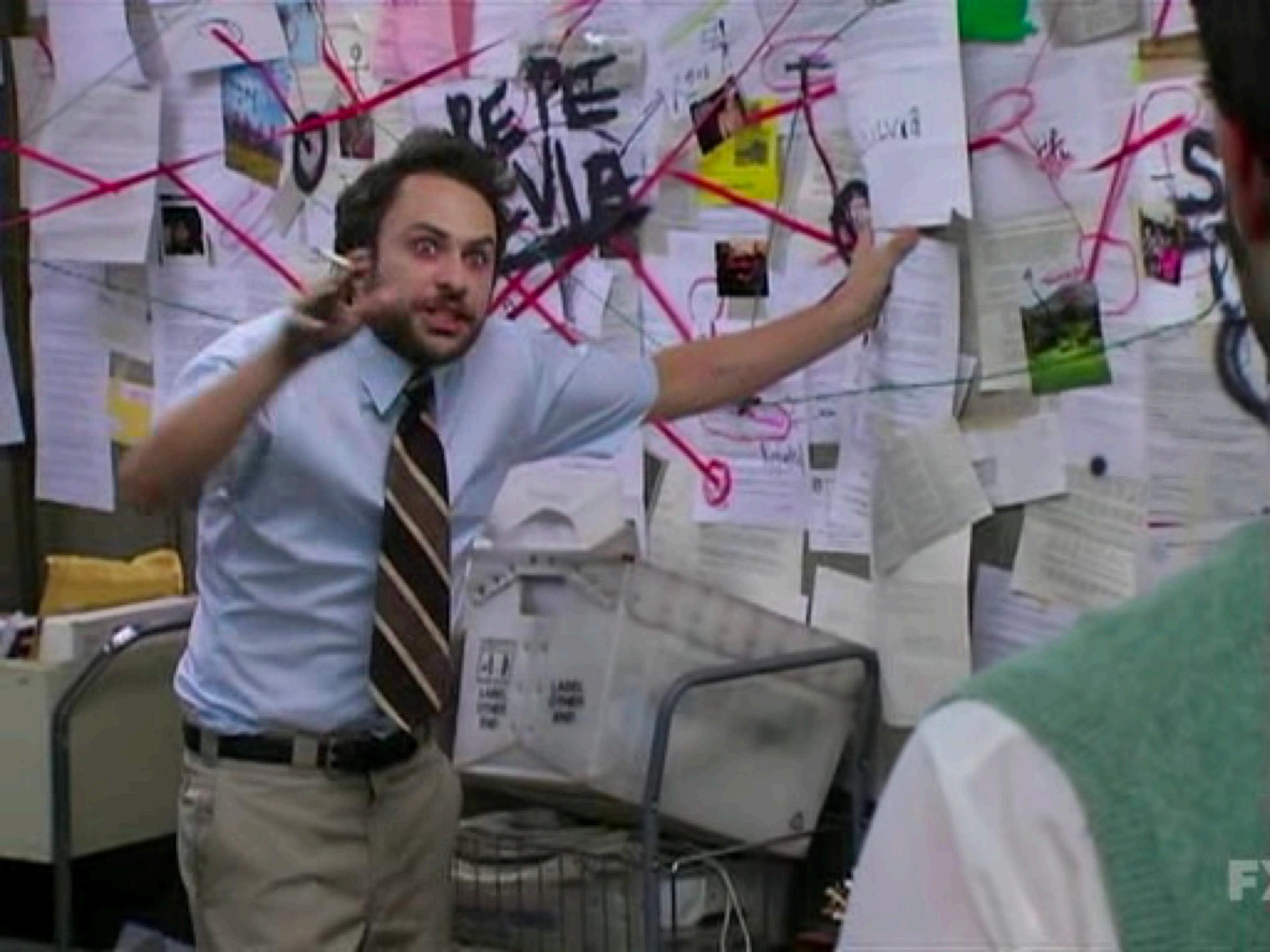
-  See and download your contacts 
-  Manage drafts and send emails when you interact with the add-on 
-  View your email messages when the add-on is running 
-  Run as a Gmail add-on 
-  Manage drafts and send emails 
-  Connect to an external service 
-  View your country, language, and timezone 

Make sure you trust Dropbox for Gmail

You may be sharing sensitive info with this site or app.

Anti-Pattern #5:

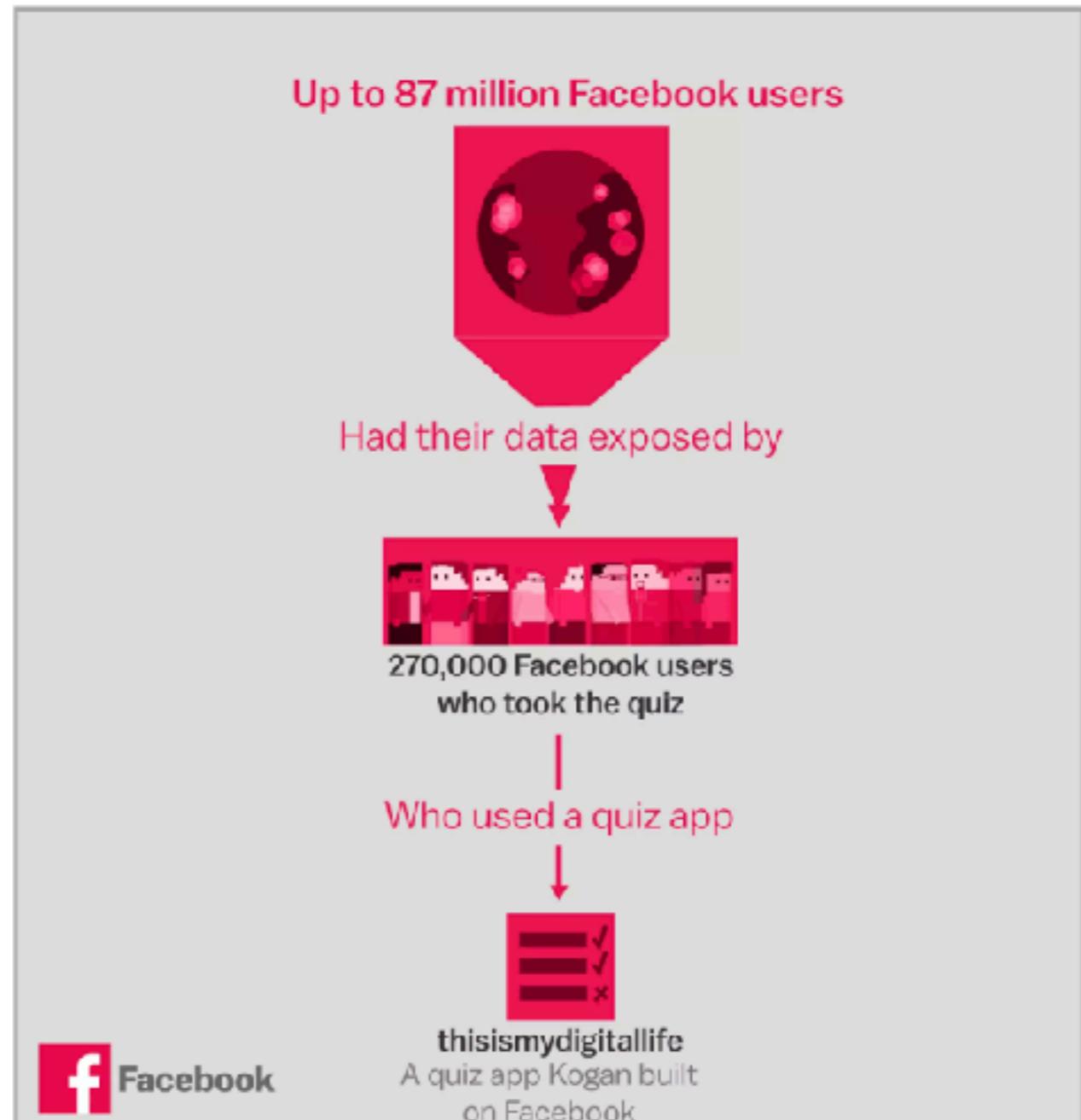
Internet of Integrations



The New York Times

Facebook Says Cambridge Analytica Harvested Data of Up to 87 Million Users





Cambridge Analytica

Anti-Pattern #6:

Unclear Data Ownership

- Inference without Consent
- Lack of Transparency
- Erosion of Control
- Trust in Black-Box Algorithms
- Internet of Integrations
- Unclear Data Ownership

FIN

(questions????)

@worldwise001