

RECOMMENDATION ENGINES

MASTER IN BUSINESS ANALYTICS AND BIG DATA

ABOUT THIS COURSE... (I/II)

- Session 1, Introduction to Recommendation Engines
- Session 2, Recommendation Methods
- Session 3, Collaborative Filtering
- **Session 4, *Recommendation Engine Labs (Part 1)***
- Session 5, Content-based Filtering and Hybrid Approaches
- **Session 6, *Recommendation Engine Labs (Part 2)***
- Session 7, Building a Recommendation Engine in the Real World
- **Session 8, *Recommendation Engine Labs (Part 3)***
- **Session 9 & 10, *Final Project Evaluation***

ABOUT THIS COURSE... (I/I)

- EVALUATION
 - Class participation: 20%
 - Labs - individual work: 40%
 - Group presentation: 20%
 - Final test: 20%

TODAY'S AGENDA

- **Introductions**
- **Session 1, Introduction to Recommendation Engines**
 - The Long Tail
 - The Paradox of Choice
 - Search vs Recommendation
 - Personalisation
 - The Filter Bubble
 - Taxonomy of Recommendation Engines
- **Session 2, Recommendation Methods**
 - What is a Recommender System?
 - Concept, Formalisation, Engineering, Business
 - Non-personalised Recommendation
 - Personalised Recommendation
 - Collaborative Filtering
 - Content-based Filtering

TO GET DEEPER...

- Coursera.org on Recommendation Systems by **Prof. Joseph Konstan**
- *Slides and Talks by Xavier Amatriain (Telefonica, Netflix, Quora)*

INTRODUCTIONS

ABOUT ME...



Ivan Tarradellas, M.S.

Product Manager, eDreams ODIGEO (current)

Product Manager, Domestika Inc.

Product Manager, Innocells (Banco Sabadell)

Product Manager, Strands Labs

Co-founder, Appventure Games

...

M.S. Computer Science, UOC

Executive Master in Digital Business, ESADE

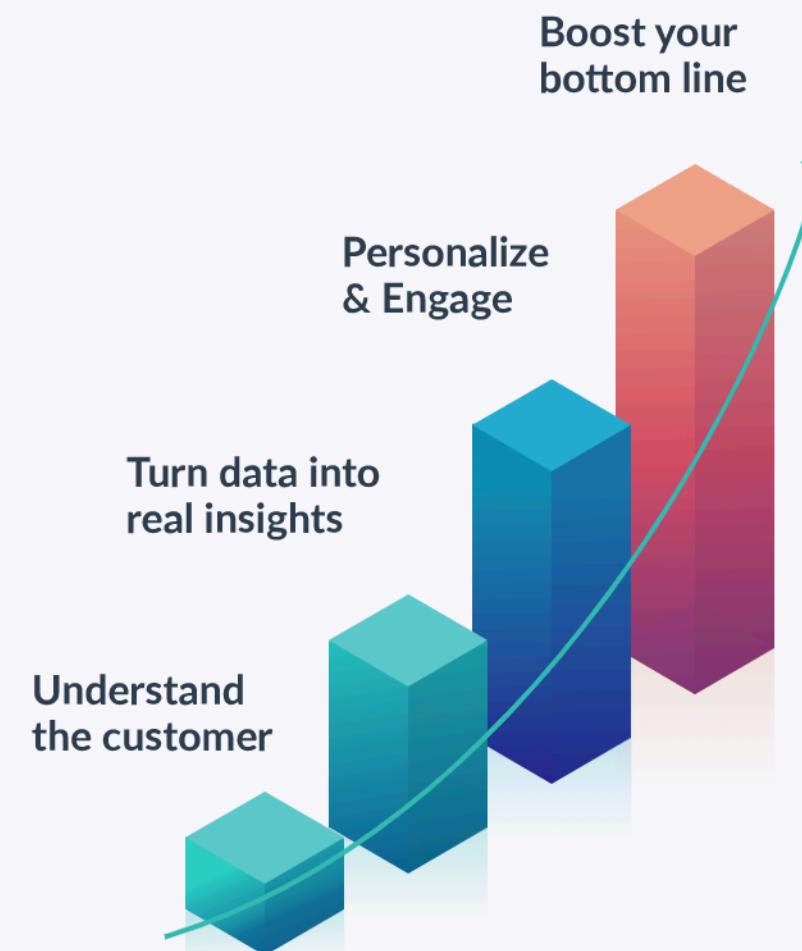
Professor, Product Management, UPC

ABOUT STRANDS

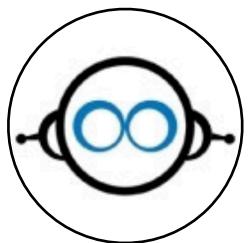
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Strands is a global provider of **Personalisation** and **Recommendation** technologies



Founded as **AI** Music
Recommendation Company

2004



Apple acquires Strands patent
portfolio in Recommendation algorithms

2011



CLO launch in Europe
PostFinance 

2017



2008

Pivot to Fintech,
first PFM in Europe



2012

The largest PFM
deployment in Europe



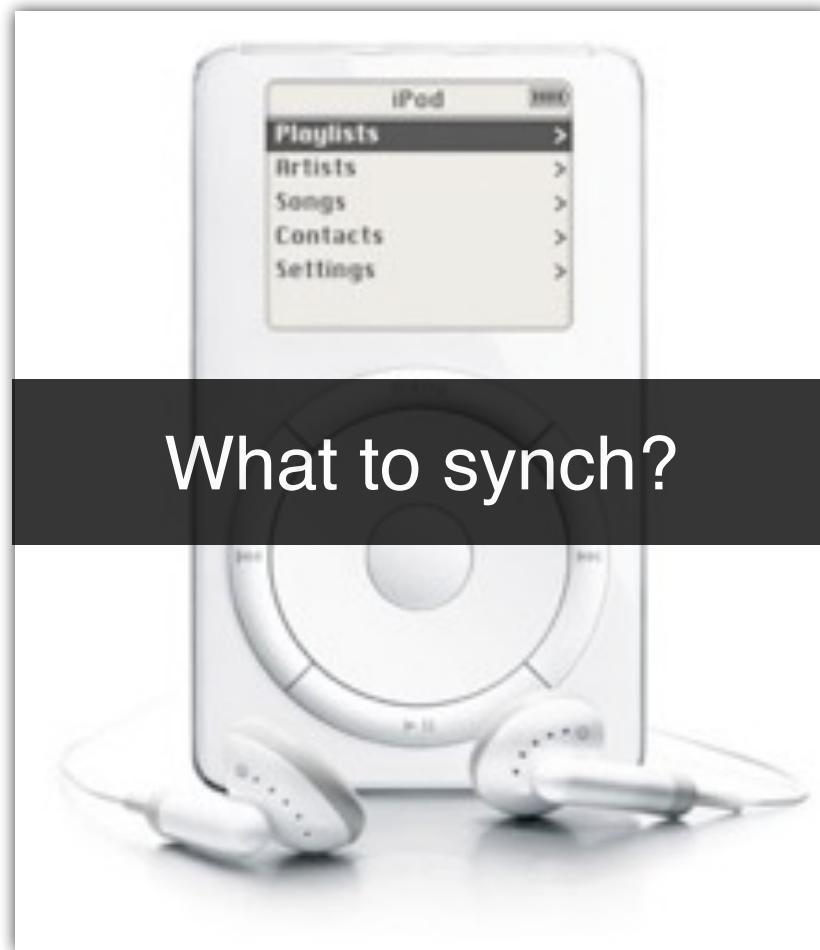
2018

BFM launch in US
New **Engager** System



MUSIC STRANDS

In 2003...



Name	Time	Rating	Pla... ▾	Artist	Album by Art...	Year	Genre	Last Played	Date Added	Compos
De Tus Ojos Soy Cautivo	3:14	★★★	283	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:21	1/12/05 12:41	
Aserejé	3:33	★	275	Las Ketchup	Las Ketchup	2002	Latin	6/11/09 11:39	2/9/05 11:57	Mann
Viviré	3:54	★★★★★	271	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:05	1/12/05 12:41	
Como El Agua	3:41	★★★★★	270	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 20:58	1/12/05 12:41	
Canastera	3:53	★★★	266	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:01	1/12/05 12:41	
Te Lo Dice Camarón	3:37	★★★	261	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:02	1/12/05 12:41	
Al Verte Las Flores Lloran (...)	2:42	★★★★★	260	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:12	1/12/05 12:41	
Calle Real (Fandangos Del ...)	3:53	★★★★★	256	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:09	1/12/05 12:41	
Y Mira Que Mira Y Mira (Al...	3:21	★★★	254	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:12	1/12/05 12:41	
La Primavera (Rumba)	3:53	★	253	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:05	1/12/05 12:41	
Cada Vez Que Nos Miramos	3:48	★★★	253	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:09	1/12/05 12:41	
Salud Antes Que Dinero (Fa...	2:53	★	252	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:10	1/12/05 12:41	
Volando Voy	3:43	★★★★★	251	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:29	1/12/05 12:41	
La Leyenda Del Tiempo	3:34	★★★	250	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:15	1/12/05 12:41	
Con Roca De Pedernal	3:28	★★★	249	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:26	1/12/05 12:41	
Soy Gitano	4:17	★★★	248	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	4/18/10 18:26	1/12/05 12:41	
Malito Yo Estaba	4:22	★★★	247	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:27	1/12/05 12:41	
El Espejo En Que Te Miras (...)	3:07	★★★	246	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:23	1/12/05 12:41	
Un Tiro Al Aire	4:46	★★	243	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:34	1/12/05 12:41	
Viejo Mundo (Bulerias)	2:45	★★★	242	Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:26	1/12/05 12:41	
Rosa María (Tango)	2:18	★★★★★	236	Camaron de la Isl...	Una Leyend...	1994	Flam...	2/15/10 14:15	1/12/05 12:41	

Provide Recommendations in the Music Space

STRANDS RETAIL



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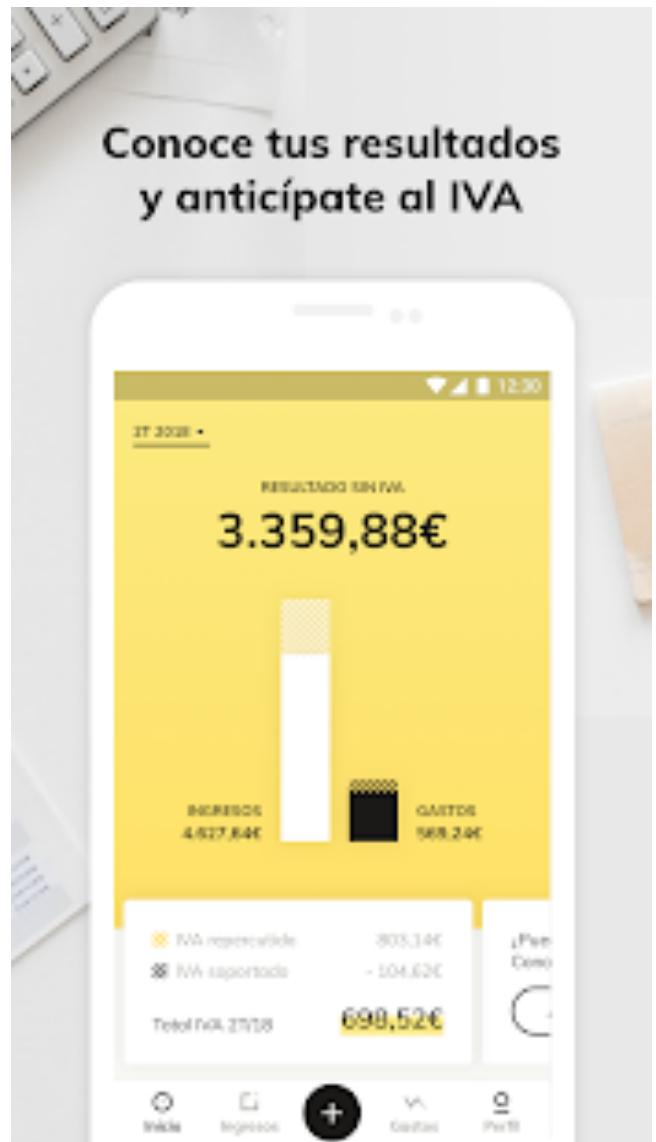


Fifth-largest Spanish banking group

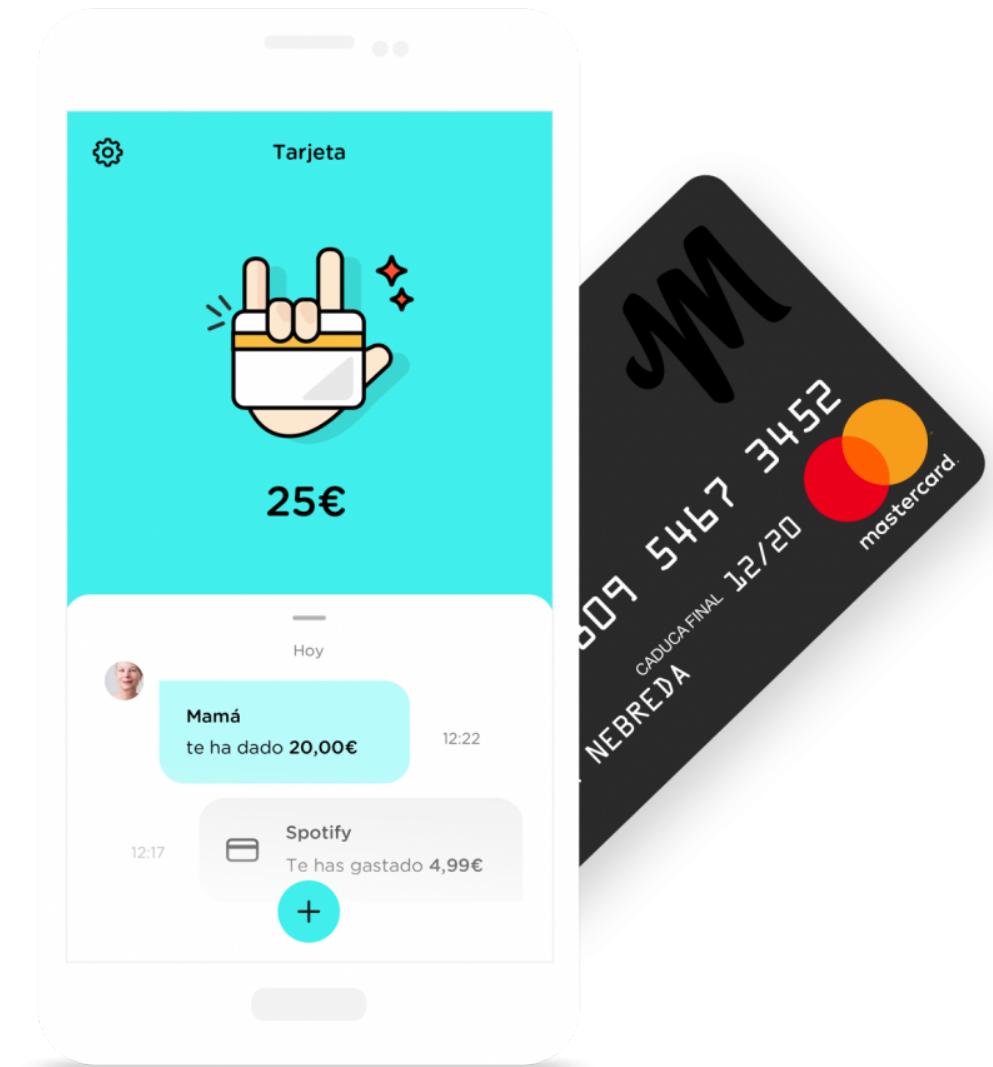
+175M Strategic Investments in Startups

INNOCELLS BUSINESS BUILDER

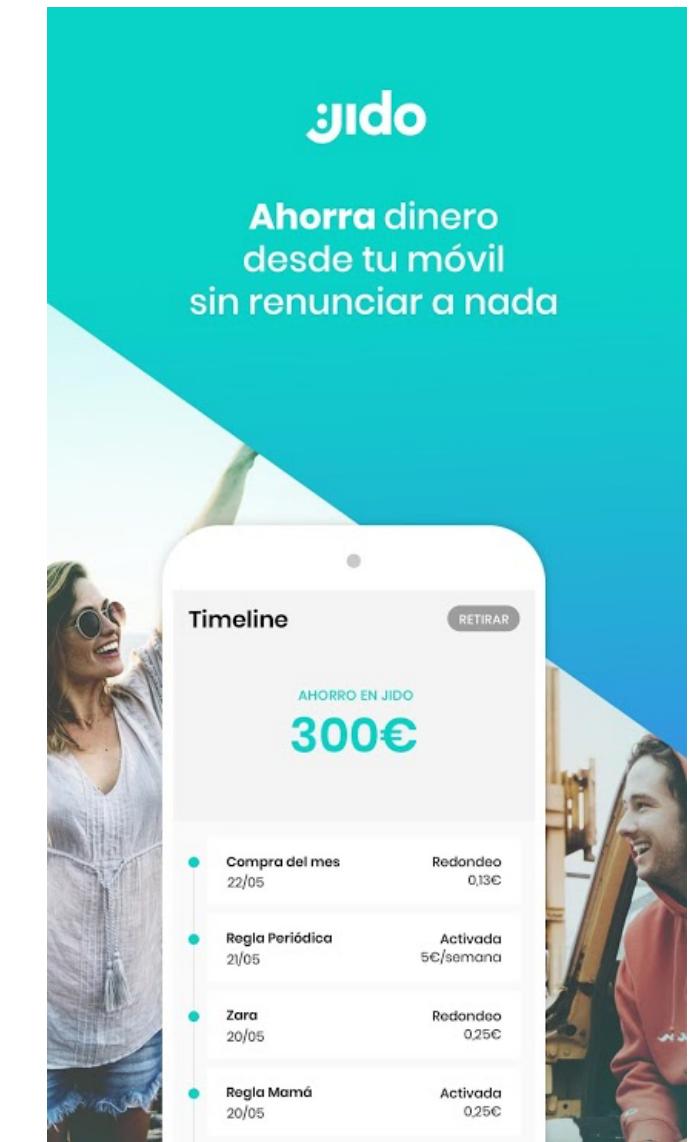
nomo
BANKING



Mitt



jido



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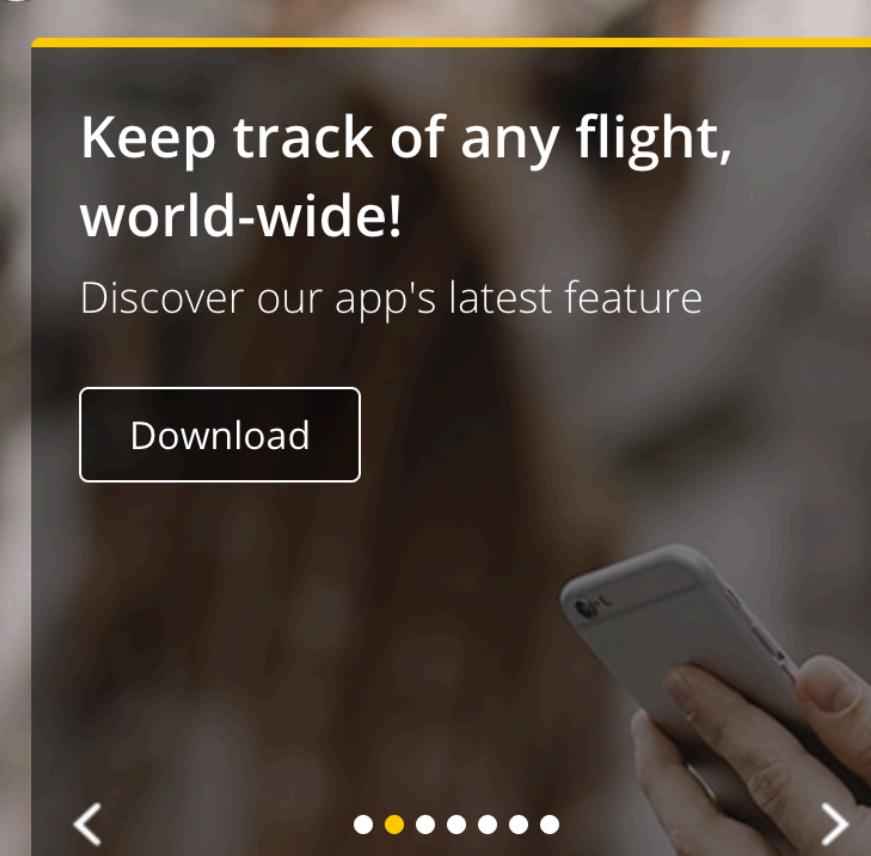
Return One way Multi-city

From To

Departure Return

1 adult 1 2 3 ▾ Only direct | Economy ▾

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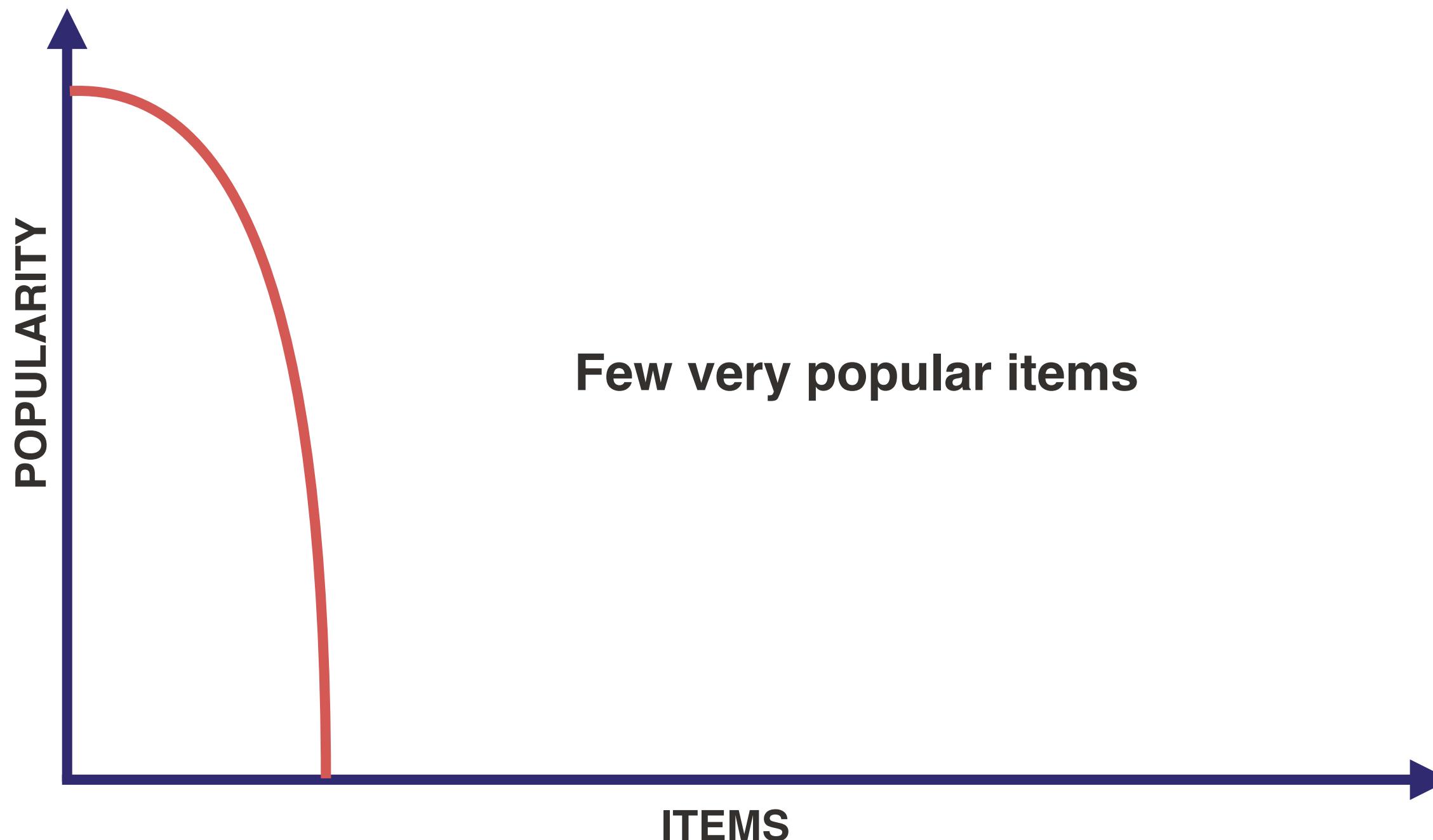
SESSION 1, INTRODUCTION TO RECOMMENDATION ENGINES

- The Long Tail
- The Paradox of Choice
- Search vs Recommendation
- Personalisation
- Examples
- The Filter Bubble

ON THE NEED OF RECOMMENDATION ENGINES

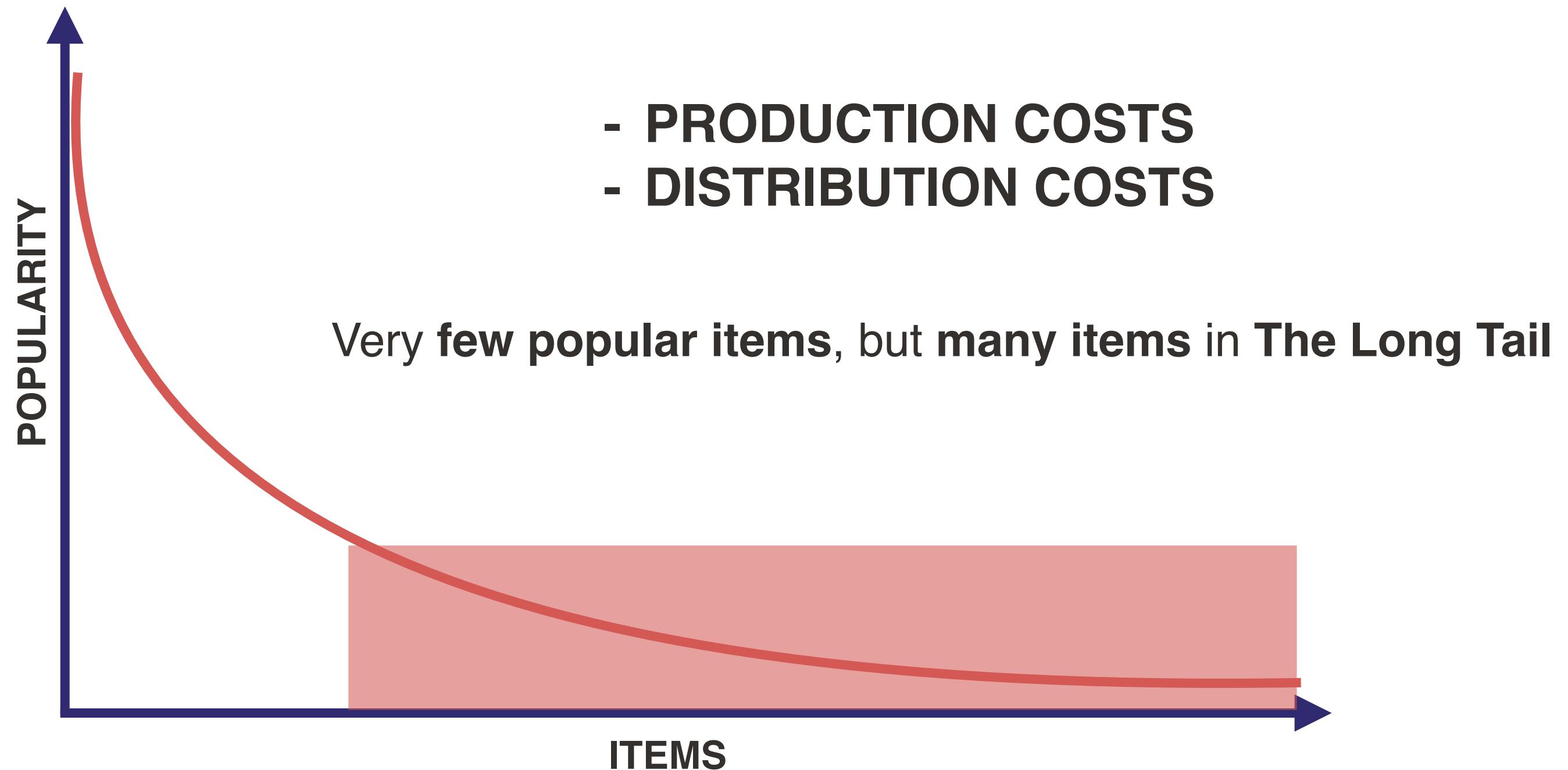


Last century...



THE ERA OF THE LONG TAIL, by Chris Anderson

Nowadays...



THE ERA OF THE LONG TAIL, by Chris Anderson

Fall of PRODUCTION COSTS & GLOBALIZATION



THE ERA OF THE LONG TAIL, by Chris Anderson

Fall of **DISTRIBUTION COSTS & INTERNET**: streaming!



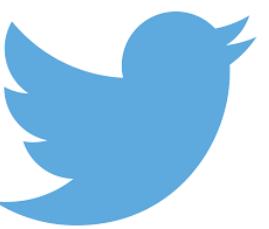
THE ERA OF THE LONG TAIL, by Chris Anderson

All Industries : People



THE ERA OF THE LONG TAIL, by Chris Anderson

All Industries : News



Google
news

TechCrunch



THE ERA OF THE LONG TAIL, by Chris Anderson

All Industries : Knowledge and Education



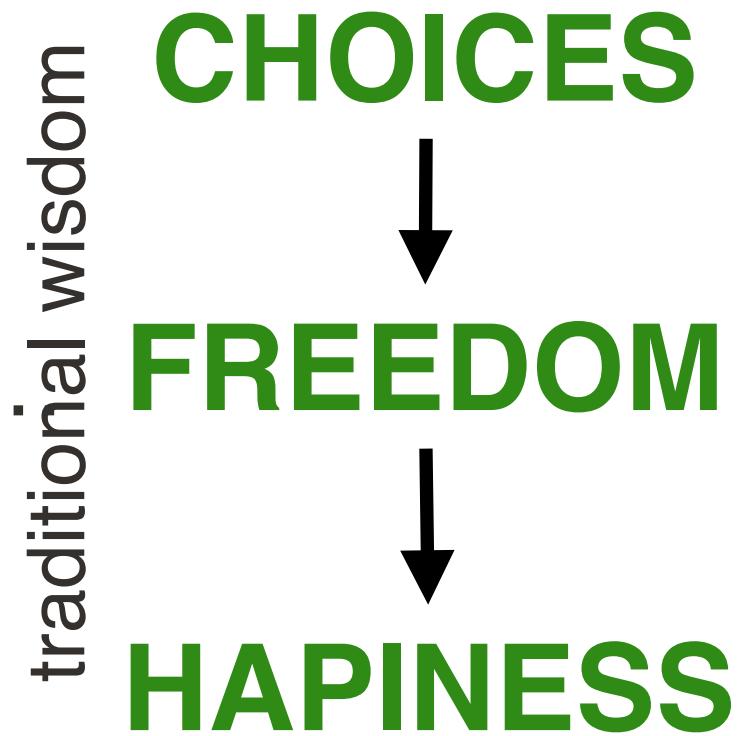
THE ERA OF THE LONG TAIL, by Chris Anderson

All Industries : Goods



THE ERA OF THE LONG TAIL, by Chris Anderson

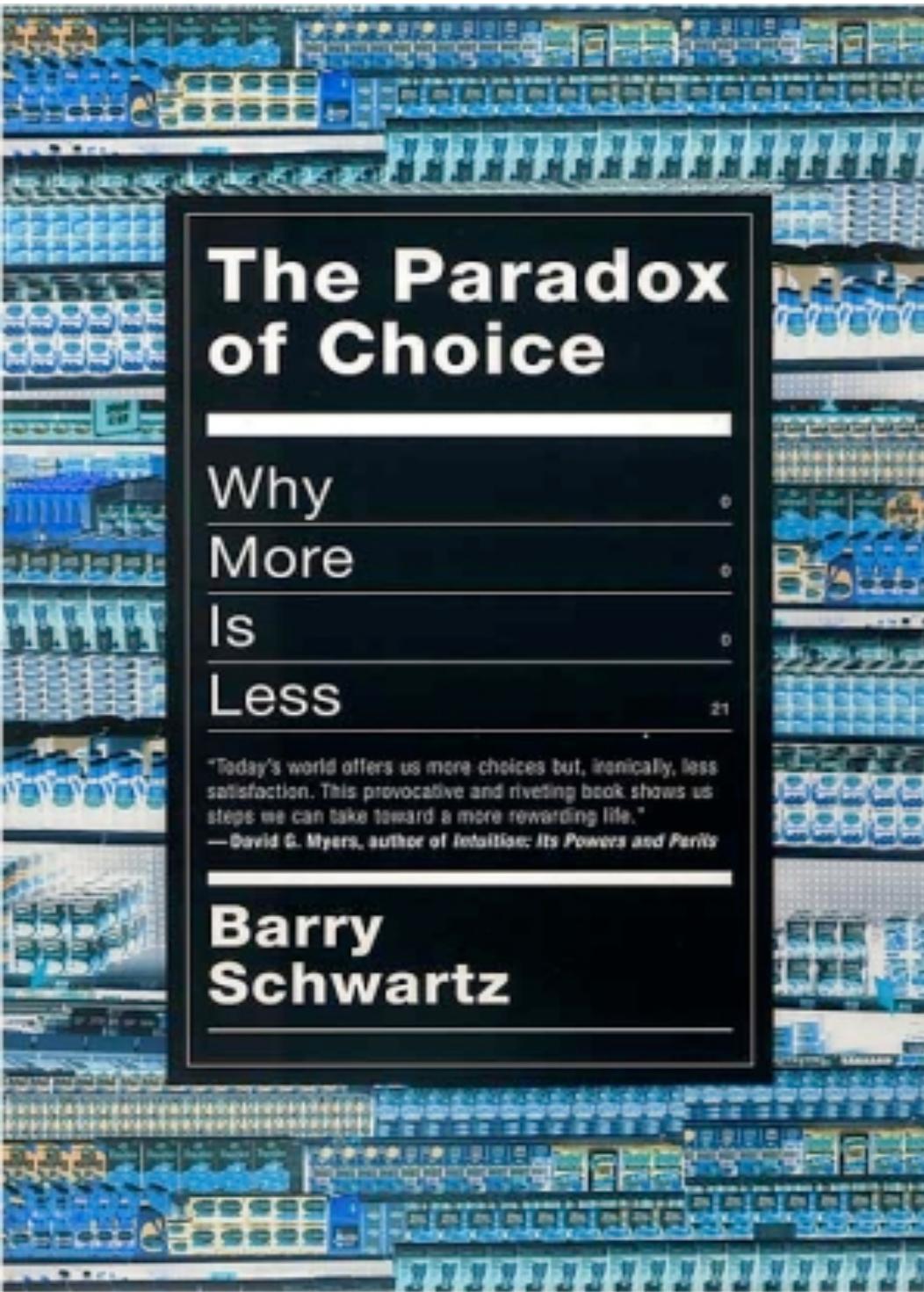
This is **GREAT** because...



but... is it **REALLY** true?

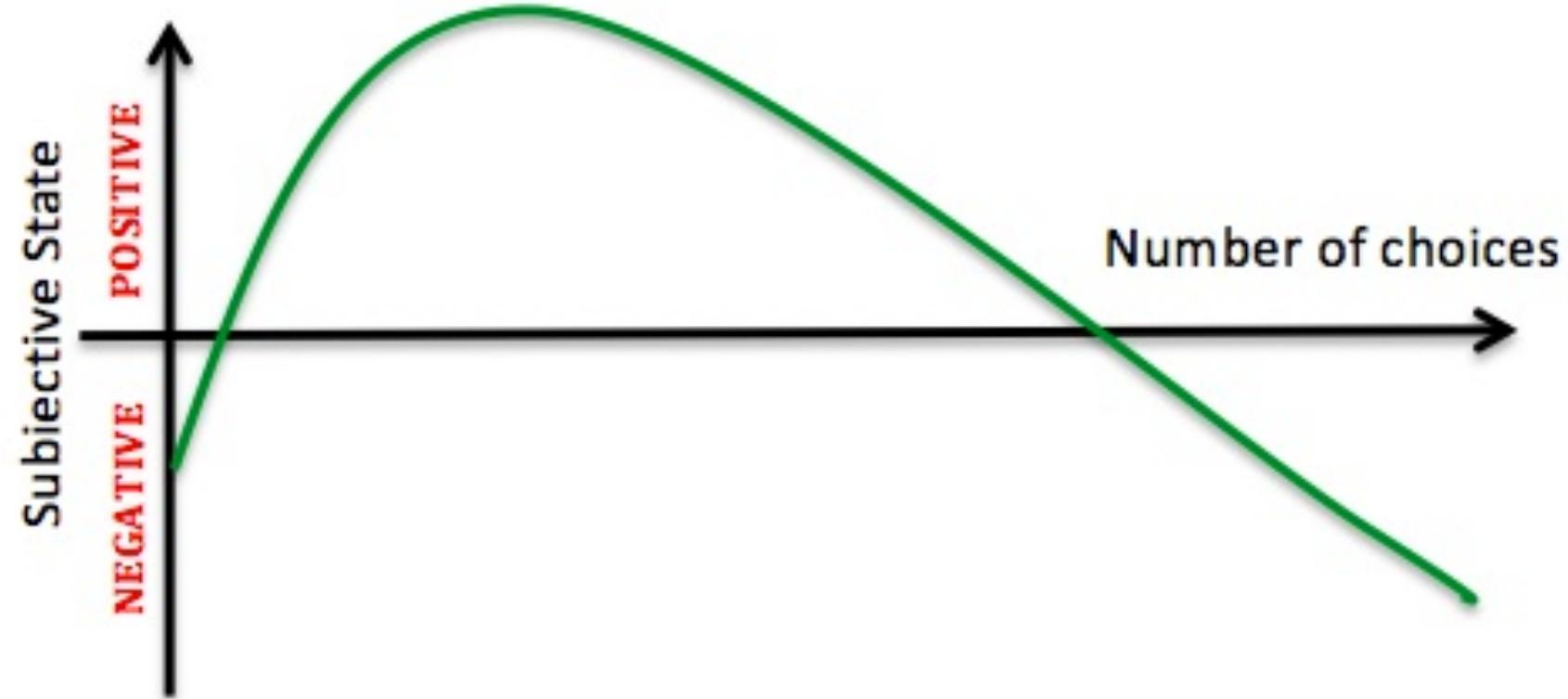


THE PARADOX OF CHOICE, by Barry Schwartz



Barry Schwartz, TED Talk: <https://www.youtube.com/watch?v=VO6XEQIsCoM&feature=youtu.be&t=12m26s>

THE PARADOX OF CHOICE, by Barry Schwartz



- + Maximizers (vs Satisfiers)
- + Analysis Paralysis
- + Opportunity Costs
- + Escalation of expectations
- + Self-blame

THE PARADOX OF CHOICE, by Barry Schwartz



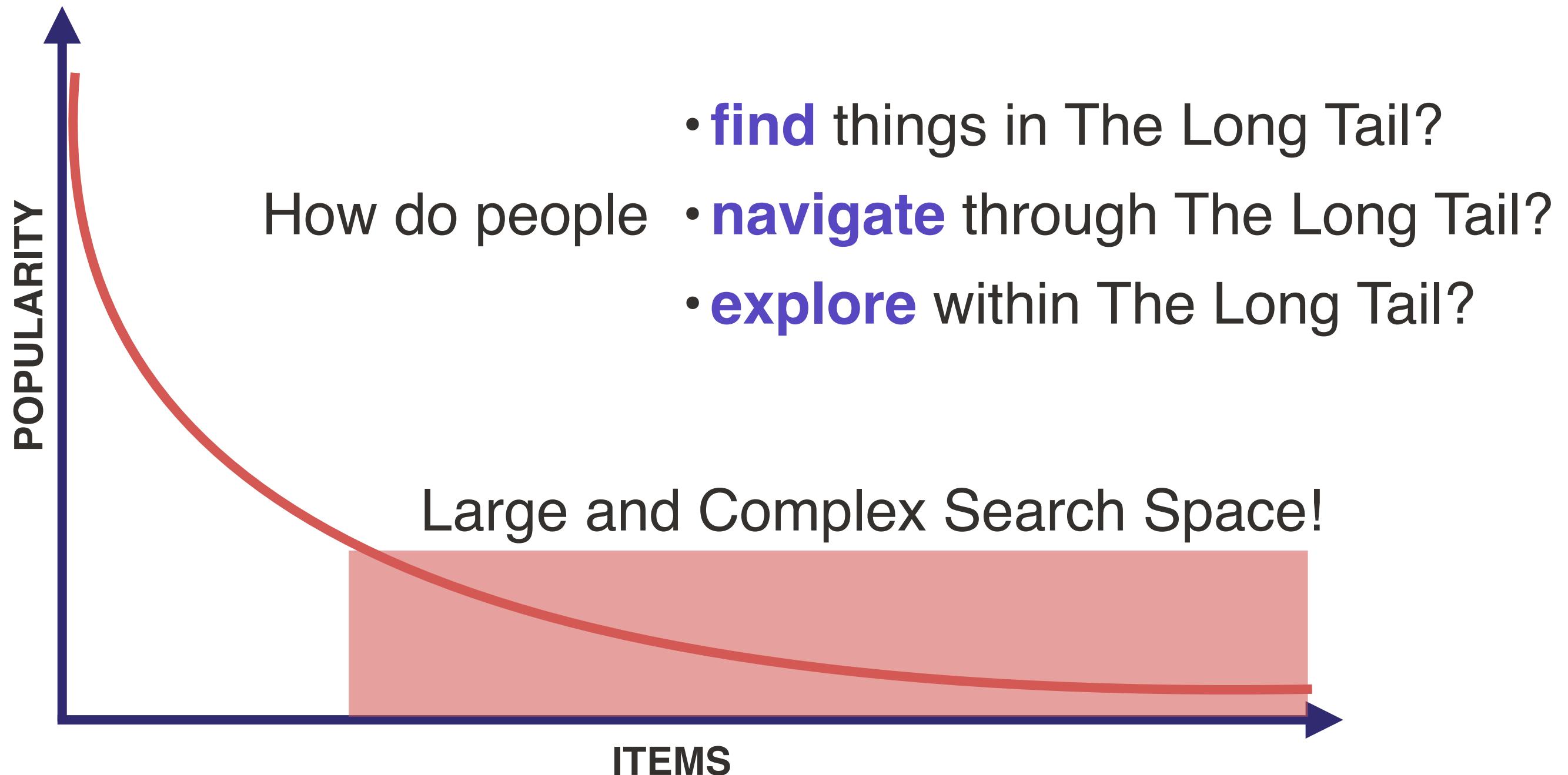
60% stopped to taste
3% of them purchased
100 people = **2 sales**



40% stopped to taste
30% of them purchased
100 people = **12 sales**

Iyengar, Sheena S. and Mark R. Lepper. 2000. When choice is demotivating: Can one desire too much of a good thing? *Journal of Personality and Social Psychology*. 79: 995-1006.

NEW CHALLENGES IN THE ERA OF THE LONG TAIL



SEARCH AND RECOMMENDATIONS

A **SEARCH** engine

the user is **looking for**
according to an **EXPLICIT QUERIES**

information filtering system that present items

A **RECOMMENDATION** engine

the user is **discovering**
according to **PREDICTIONS**

SEARCH AND RECOMMENDATIONS

NON-PERSONALIZED

All people sees the same things

VS

PERSONALIZED

Different people sees different things

SEARCH AND RECOMMENDATIONS

Chris Anderson

We are living the age of information and entering the age of recommendation.

INFORMATION → RECOMMENDATION

CNN Money, "The race to create a 'smart' google"

"The web, they say, is **leaving the era of search** and **entering one of discovery**. What is the difference? Search is what you do when you're looking for something. Discovery is when something wonderful that you did not know existed, or did not know how to ask for, finds you".

SEARCH → DISCOVERY

SEARCH AND RECOMMENDATIONS

SEARCH Engines:

- Google, Wikipedia, TechCrunch, ...

RECOMMENDATION Engines:

- Amazon, Netflix, Spotify, ...

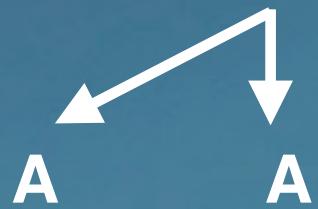
In **MOST CASES**, the barrier is fuzzy... and **both systems are combined!**

RECOMMENDATION is NOT PERSONALISATION

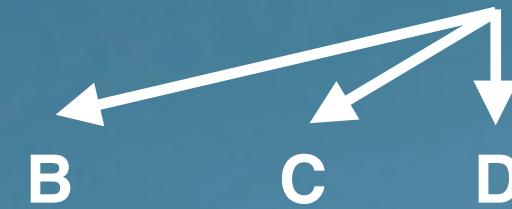
PERSONALISATION

SEARCH (with explicit query!)

NON-



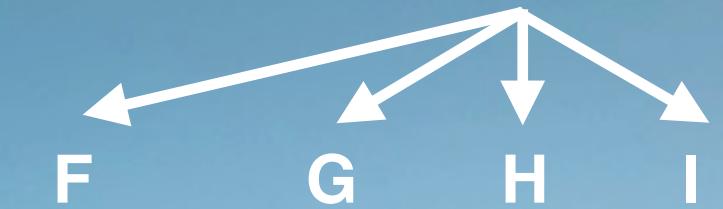
PERSONALISE



NON-



RECOMMENDATION
PERSONALISE



EXAMPLES

WIKIPEDIA

English

The Free Encyclopedia

4 852 000+ articles

Deutsch

Die freie Enzyklopädie

1 801 000+ Artikel

日本語

フリー百科事典

960 000+ 記事

中文

自由的百科全書

811 000+ 條目

Polski

Wolna encyklopedia

1 103 000+ haset

Español

La enciclopedia libre

1 168 000+ artículos

Русский

Свободная энциклопедия

1 209 000+ статей

Français

L'encyclopédie libre

1 609 000+ articles

Italiano

L'enciclopedia libera

1 191 000+ voci

Português

A encyclopédia livre

869 000+ artigos



NON-PERSONALISED SEARCH

WIKIPEDIA

English

The Free Encyclopedia

4 852 000+ articles

Deutsch

Die freie Enzyklopädie

1 801 000+ Artikel

日本語

フリー百科事典

960 000+ 記事

中文

自由的百科全書

811 000+ 條目

Polski

Wolna encyklopedia

1 103 000+ haset

Español

La enciclopedia libre

1 168 000+ artículos

Русский

Свободная энциклопедия

1 209 000+ статей

Français

L'encyclopédie libre

1 609 000+ articles

Italiano

L'enciclopedia libera

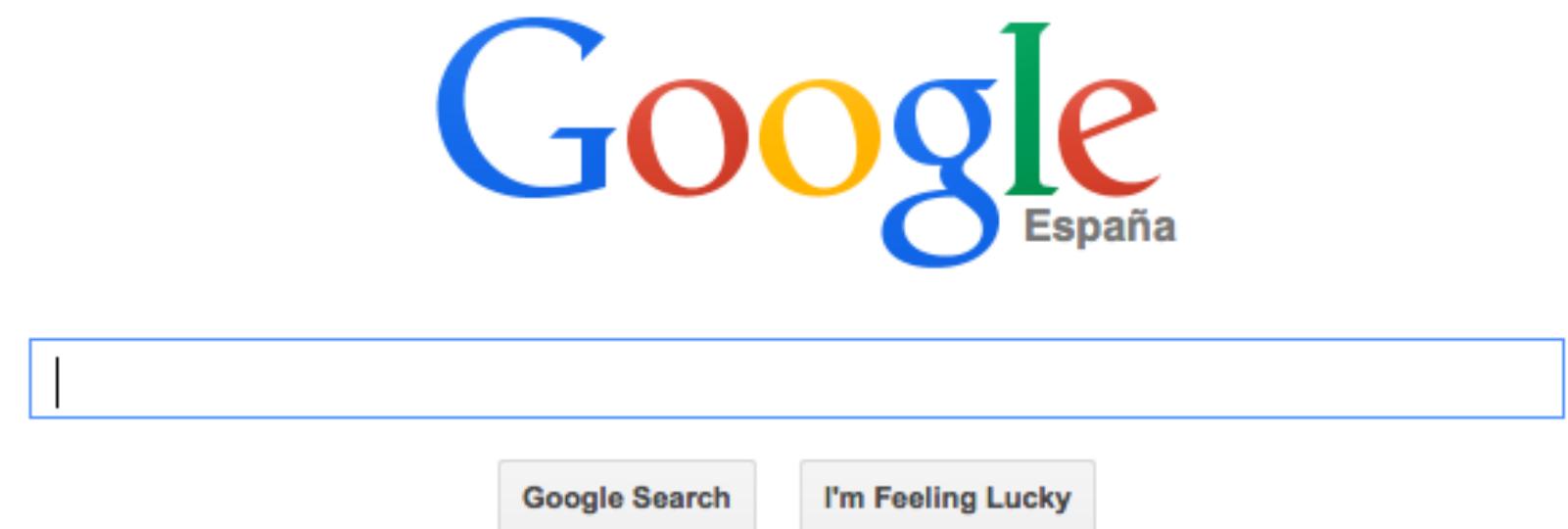
1 191 000+ voci

Português

A encyclopédia livre

869 000+ artigos





PERSONALISED SEARCH



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Recommended

Peter Pan pelicula completa en español - dibujos... by DEimOn18257-92 5,652,434 views • 1 year ago	Honda D16 Connecting Rod Lightning by fiatnutz 24,471 views • 1 year ago	BMW Motorcycle Big Bore by fiatnutz 2,638 views • 1 year ago	Scrambler Slam: Ducati vs. Triumph by Motorcycle.com 120,659 views • 2 weeks ago	200,000+ VIEWS! BMW Motorrad R850R R1100R... by Zoltan Fogarasi 265,439 views • 3 years ago
RESTAURACIÓN MOTOR BULTACO. FASE 1:... by KennyrobertsTGN 3,833 views • 1 year ago	Where is your Car Show: Parking Lot or Grass? by AMMO NYC 83,889 views • 1 year ago	Cylinder Head Resurfacing Fiat 129 X1 9 & What Not t... by fiatnutz 6,130 views • 3 months ago	Frozen: Anna salva a Elsa - HD [Español Latino] by Primrose23 1,310,993 views • 1 year ago	Blancanieves y los Siete Enanitos Película Completa by Alfredo Culvador Mogambo 5,583,128 views • 1 year ago

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Motorcycles Recommended videos for you

BMW Service - BMW R100 Pushrod Tube Seal... by Chris Harris 13,756 views • 2 years ago	BMW Service - R100 Spline Lube Part 4 of 4 by Chris Harris 9,369 views • 2 years ago	BMW Service - BMW R100 Pushrod Tube Seal... by Chris Harris 19,468 views • 2 years ago	BMW Service - R100 Spline Lube Part 1 of 4 by Chris Harris 17,248 views • 2 years ago	BMW Service - R100 Spline Lube Part 2 of 4 by Chris Harris 11,301 views • 2 years ago

Subscribe 239,126

SEARCH and RECOMMENDATIONS

PERSONALIZED SEARCH OPTION + WHAT TO WATCH RECOMMENDATIONS...

The screenshot shows a video recommendation interface with the following sections:

- Search Bar:** A blue-bordered input field with a magnifying glass icon and an "Upload" button.
- Navigation:** A horizontal menu with tabs: "What to Watch" (underlined), "My Subscriptions", and "Music".
- Recommended Videos:** A grid of 10 video thumbnails with titles, durations, and upload details.
 - Peter Pan película completa en español - dibujos...** by DEimOn18257-92 (47:35, 5,652,434 views, 1 year ago)
 - Honda D16 Connecting Rod Lightning** by fiatnutz (10:44, 24,471 views, 1 year ago)
 - BMW Motorcycle Big Bore** by fiatnutz (13:05, 2,638 views, 1 year ago)
 - Scrambler Slam: Ducati vs. Triumph** by Motorcycle.com (8:00, 120,659 views, 2 weeks ago)
 - 200,000+ VIEWS! BMW Motorrad R850R R1100R...** by Zoltan Fogarasi (12:32, 265,439 views, 3 years ago)
 - RESTAURACIÓN MOTOR BULTACO. FASE 1:...** by KennyrobertsTGN (16:48, 3,833 views, 1 year ago)
 - Where is your Car Show: Parking Lot or Grass?** by AMMO NYC (10:29, 83,889 views, 1 year ago)
 - Cylinder Head Resurfacing Fiat 129 X1 9 & What Not t...** by fiatnutz (4:04, 6,130 views, 3 months ago)
 - Frozen: Anna salva a Elsa - HD [Español Latino]** by Primrose23 (2:25, 1,310,993 views, 1 year ago)
 - Blancanieves y los Siete Enanitos Película Comple...** by Alfredo Culvador Mogambo (1:18:02, 5,583,128 views, 1 year ago)
- Show more** button (located next to the last video thumbnail).
- Motorcycles** section: Recommended videos for you.
 - BMW Service - BMW R100 Pushrod Tube Seal...** by Chris Harris (10:43, 13,756 views, 2 years ago)
 - BMW Service - R100 Spline Lube Part 4 of 4** by Chris Harris (15:58, 9,369 views, 2 years ago)
 - BMW Service - BMW R100 Pushrod Tube Seal...** by Chris Harris (9:44, 19,468 views, 2 years ago)
 - BMW Service - R100 Spline Lube Part 1 of 4** by Chris Harris (16:30, 17,248 views, 2 years ago)
 - BMW Service - R100 Spline Lube Part 2 of 4** by Chris Harris (16:28, 11,301 views, 2 years ago)
- Subscribe** button (with 239,126 subscribers) and a close button (X).

RECOMMENDATIONS

CUSTOMERS WHO VIEWED X ALSO VIEWED Y

Customers who viewed this item also viewed



CUST. WHO BOUGHT X ALSO BOUGHT Y

Customers who bought this item also bought



FREQUENTLY BOUGHT TOGETHER

Frequently Bought Together



Price for both: \$57.09

Add both to Cart

Add both to Wish List

These items are shipped from and sold by different sellers.

This item: Sennheiser HD 449 Headphones Black \$48.00

Zalman Zm-Mic1 High Sensitivity Headphone Microphone \$9.09

FREQUENT TRIPS

RECOMMENDATIONS

Booking.com   Refer Friends & Earn [List Your Property](#) [Register](#) [Sign in](#)

Accommodations [Flights](#) [Packages](#) [Trains](#) [Cruises](#) [Rental Cars](#) [Airport Taxis](#) [Restaurants](#)

Find Hotels & Unique Places to Stay

Destination, property name or address:
More places than you could ever go (but you can try!)

Check-in  Check-in Date  Check-out  Check-out Date

2 adults  No children  1 room 

Are you traveling for work? Yes No 

Search

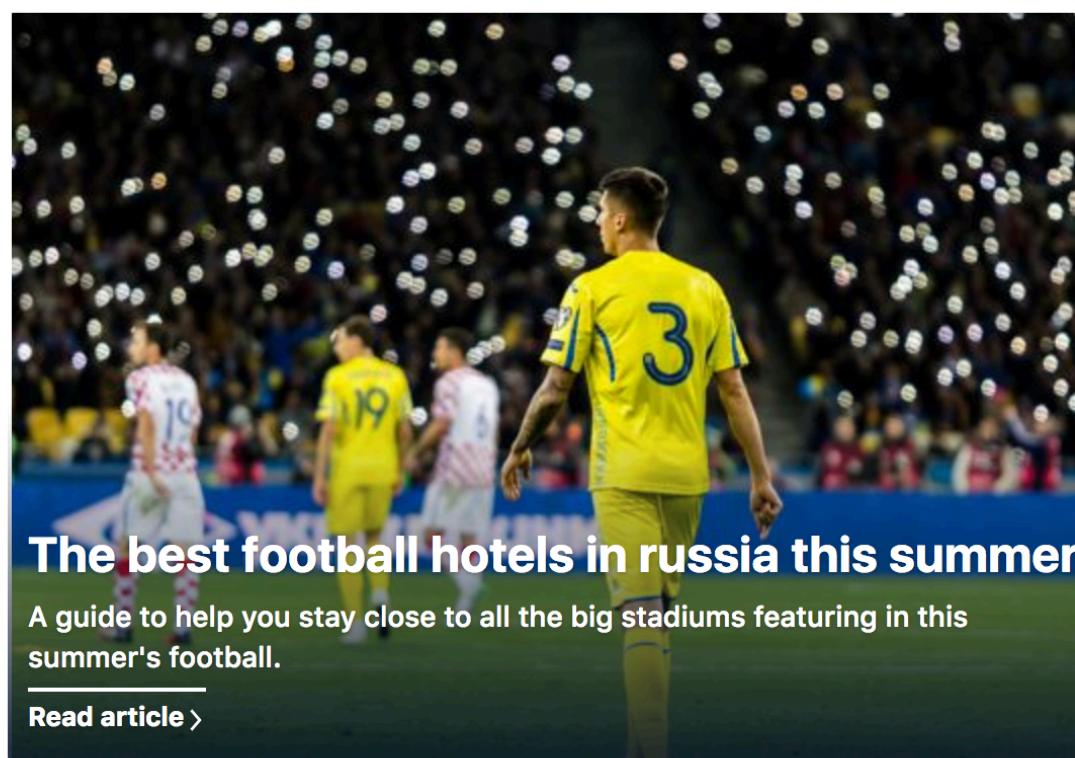
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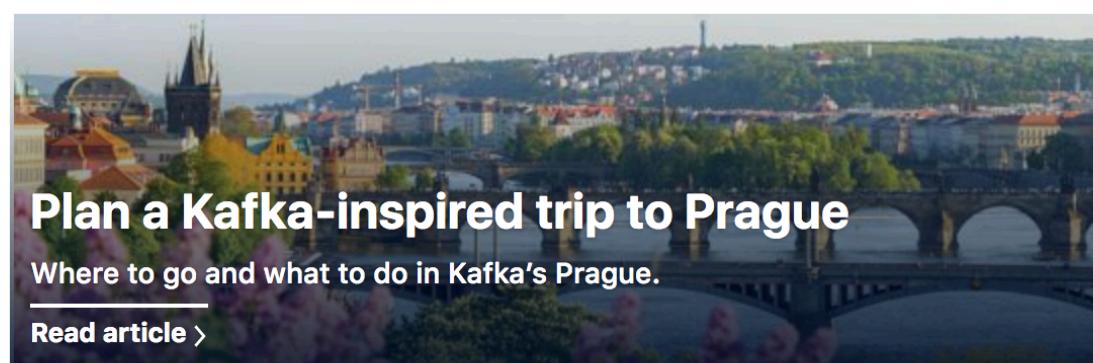

Barcelona  2,934 properties
Average price **€ 86.24**


Madrid  3,232 properties

Get inspiration for your next trip


The best football hotels in russia this summer
A guide to help you stay close to all the big stadiums featuring in this summer's football.
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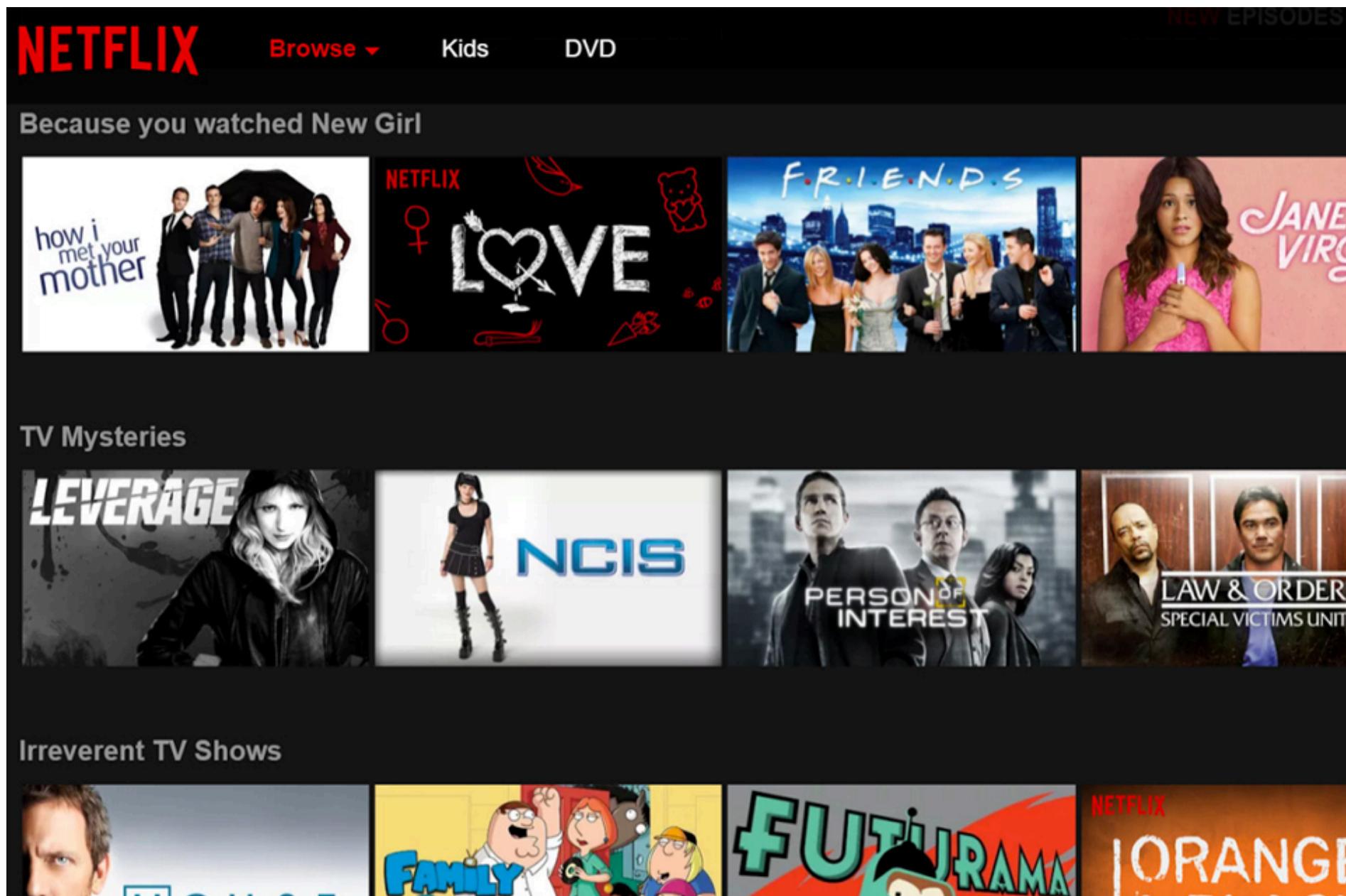

7 great walks across Italy
Italy is ideal to explore on foot, and here are 7 of the nation's best walking trails.
[Read article >](#)


Plan a Kafka-inspired trip to Prague
Where to go and what to do in Kafka's Prague.
[Read article >](#)

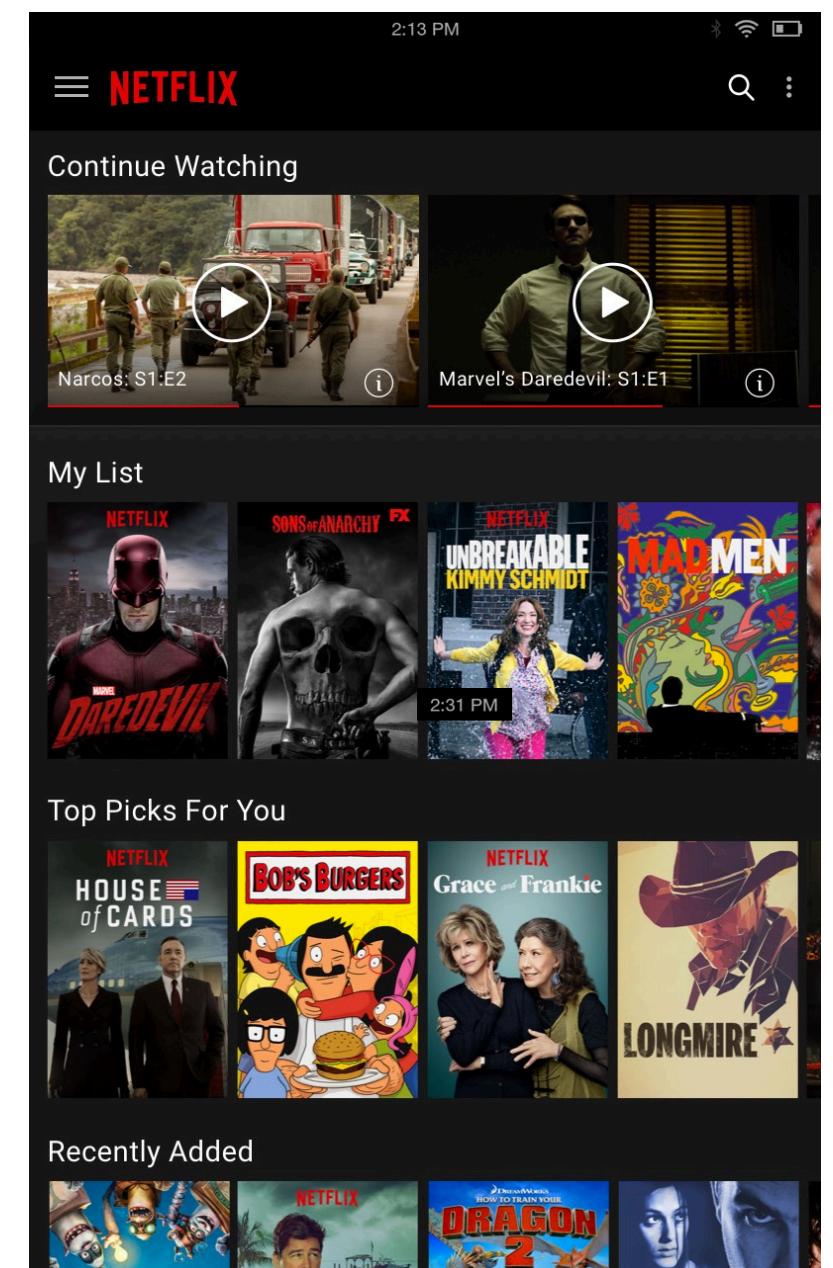
PERSONALIZED INSPIRATION

RECOMMENDATIONS

BECAUSE YOU WATCHED



TOP PICKS FOR YOU



MORE EXAMPLES

Exercise!

Think about more examples of Recommendation Systems...

RECOMMENDATIONS

BROWSE DISCOVERY

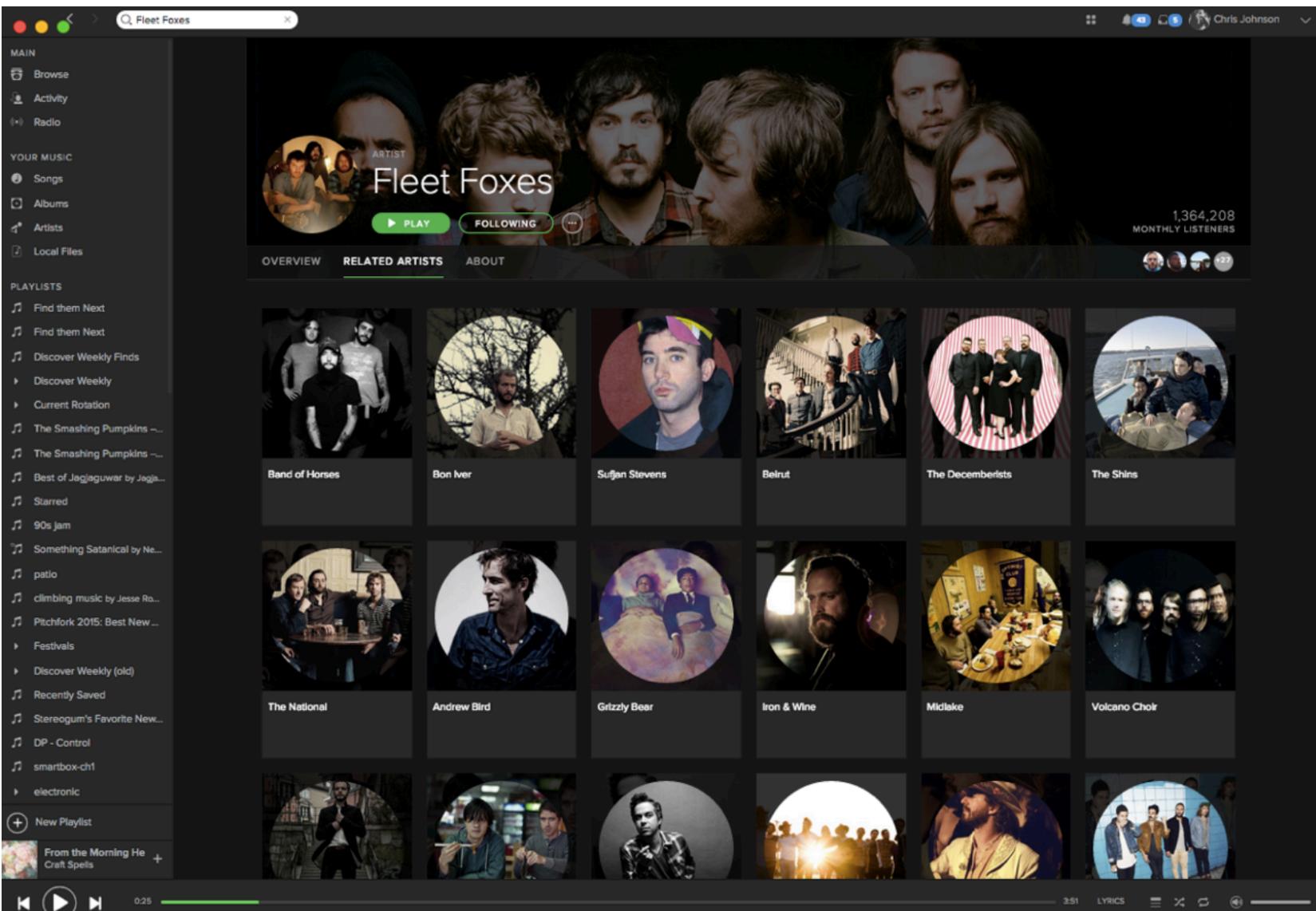
The screenshot shows the 'Browse' section of a music streaming application. The top navigation bar includes 'Search', 'Chris Johnson', and tabs for 'MAIN', 'Browse', 'Activity', 'Radio', 'OVERVIEW', 'CHARTS', 'GENRES & MOODS', 'NEW RELEASES', and 'DISCOVER'. The 'DISCOVER' tab is highlighted. The main content area is titled 'TOP RECOMMENDATIONS FOR YOU' and displays five album covers: 'The Beautiful Moon' by High Water, 'Nootropics Remixed' by Lower Dens, 'Song for the Lovers' by Closer, 'Toska' by Vogue Dots, and 'Your Eyes' by Majical Cloudz. Below this is a section titled 'NEW RELEASES FOR YOU' featuring 'Poison Season' by Destroyer, 'ZABA (Deluxe)' by Glass Animals, 'Frozen Throne LP' by Groundslava, 'Live at 9:30' by Animal Collective, and 'Horizons' by Willis Earl Beal. At the bottom is a section titled 'SUGGESTED FOR YOU BASED ON JOEY BADASS\$' showing album covers for 'HELL CAN WAIT' by Danny Brown, 'DOPSY UNDERHORN' by Frank Quartermaine, and 'BOLDY JAMES' by Boldy James.

RADIO FEED

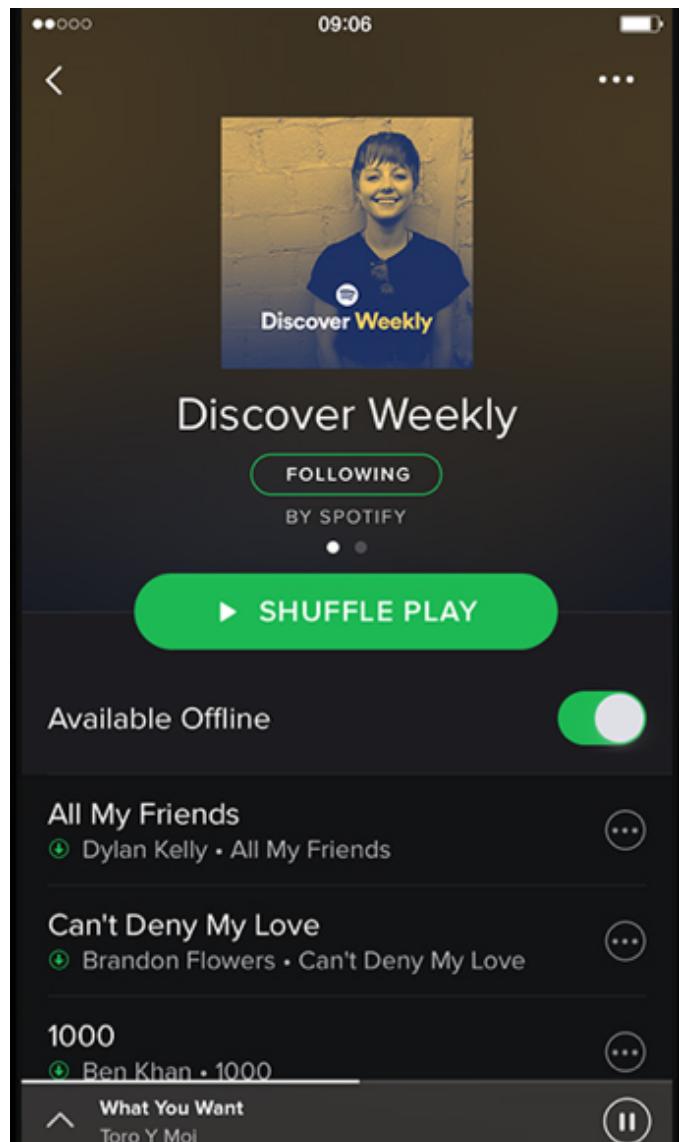
The screenshot shows the 'Radio' feed of a music streaming application. The top navigation bar includes 'Search', 'Chris Johnson', and tabs for 'MAIN', 'Browse', 'Activity', 'Radio', 'OVERVIEW', 'CHARTS', 'GENRES & MOODS', 'NEW RELEASES', and 'DISCOVER'. The 'Radio' tab is highlighted. The main content area features a large banner for 'Sonic Youth ARTIST RADIO' with a play button and a 'NEW STATION' button. Below this are sections for 'PERSONALIZED STATIONS' (Station One: No Joy, Warpaint, Ducktails, Ty Segall, T. Rex, Lou Reed, Rick Ross, Kanye West, Joey; Station Two: Drake, J. Cole, Big Sean, Rick Ross, Queen, T. Rex, Lou Reed, Bob Dylan, Led Zeppelin; Station Three: Queen, T. Rex, Lou Reed, Rick Ross, Kanye West, Joey; Station Four: Weezer, Nirvana, Pearl Jam, Veruca Salt, Foo Fighters; Station Five: Move D, SCSI-9, San Soda, Kim Brown, Smallpeople; Station Six: Kins, Alvvays, Febusader, Only Real, Honeyblood, Yumi) and 'YOUR STATIONS' (From the Morning He Craft Spells, Touch Tides Collection, Vol. 2, and a portrait of a man).

RECOMMENDATIONS

RELATED ARTISTS



DISCOVERY WEEKLY



RECOMMENDATIONS

TRAVELER RANKED, BEST VALUE ...

tripadvisor® Madrid ▾

About Madrid Hotels Vacation Rentals Flights Restaurants Things to do ⋮

Europe > Spain > Community of Madrid > Madrid > Madrid Hotels Best Lodging in Madrid, Spain

Madrid Hotels

Lowest prices for: Jan 28 – Jan 29 ▾ 1 room, 2 adults, 0 children ▾ Update

Sort by: **Traveler Ranked** Best Value Lowest price Distance

Like saving money? We search up to 200 sites to help you save up to 30% X

Price per night
Any €0 €175 +

Amenities
Any


NH Collection Palacio de Tepa Sponsored
SAVE €4 €154
Booking.com €150 **View Deal**
Expedia.es €150
Hoteles.com €150
HotelQuickly €154
View all 9 deals from €150 ▾
1,198 reviews
Free Wifi Restaurant Special offer

RECOMMENDATIONS

POPULAR DESTINATIONS, PER CATEGORY



Hotels Vacation Rentals Flights Restaurants Things to do ...

≡ ⌂ JOIN |

Popular Destinations



Madrid



Marrakech



Lisbon



Berlin

Must-ski slopes around the world



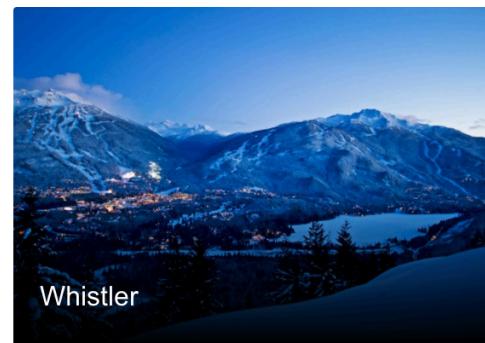
Park City



Morzine



Tignes



Whistler

Popular spots for beer lovers



www.tripadvisor.com/Hotels-g187514-Madrid-Hotels.html



RECOMMENDATIONS

QUESTIONS FOR YOU, TOP STORIES

The screenshot shows the Quora homepage with the following elements:

- Header:** Quora logo, Home, Answer, Notifications (with 4 notifications), Search Quora, and Add Question button.
- Cookie Consent Bar:** "Quora uses cookies to improve your experience. Read more" with a close button (X).
- Left Sidebar (Feeds):** Top Stories (selected), New Questions, Bookmarked Answers, Links, and categories: Psychology, Economics, Books.
- Top Stories Section:** A box for "Ivan Tarradellas" asking "What is your question?"
- Questions for You Section:** A box for "Ivan Tarradellas" asking "What is your favourite product as a product manager?". It includes a timestamp ("Last followed 30m ago"), answer buttons ("Answer", "Pass"), a follow button ("Follow 5"), and social sharing icons (Facebook, Twitter, LinkedIn, ...).
- Second Story Section:** A box for "Ivan Tarradellas" asking "Is it safe to use VPN to unblock WhatsApp calls and other VoIP services in UAE?". It includes a timestamp ("Last followed 1h ago · 2 Answers"), answer buttons ("Answer", "Pass"), a follow button ("Follow 5"), and social sharing icons (Facebook, Twitter, LinkedIn, ...).
- Promoted Content Section:** A box for "Promoted by Aha!" advertising "Product managers finally have a home." It encourages joining a community of product managers to build better products and be happy doing it, with a "Sign up at roadmap.com" button.
- Right Sidebar (Improve Your Feed):** A list of 9 items with green checkmarks:
 - Visit your feed
 - Follow 20 more topics
 - Find your friends on Quora
 - Upvote 3 more good answers
 - Ask your first question
 - Add 3 credentials
 - Answer a question

PERSONALISATION IS GREAT, ...BUT

thinking...

A black and white photograph of a woman wearing a bonnet, looking out from a circular window. She is dressed in a dark, patterned dress. The window is set in a large, textured wall, possibly made of stone or concrete. The scene is framed by a dark, curved shape, resembling a filter bubble.

The Filter Bubble

Meet Scott's Google Search

GENDER:

Male

RACE:

Caucasian

LOCATION:

New York



Google Egypt

About 360,000,000 results (0.24 seconds)

Instant is on ▾

Advanced search

Ads

Crisis in Egypt
Voices in Egypt have been muted but will not be silenced. Listen.
humanrightsfirst.org/Egypt

Egypt - Wikipedia, the free encyclopedia ☆ ⓘ
Egypt officially the Arab Republic of Egypt, is a country mainly in North Africa, with the Sinai Peninsula forming a land bridge in Southwest Asia. ...
Hosni Mubarak - Ancient Egypt - Female genital cutting - History of modern Egypt
en.wikipedia.org/wiki/Egypt - Cached - Similar

Egypt News - The Protests of 2011 - The New York Times ☆ ⓘ
World news about Egypt and the protests of 2011. Breaking news and archival information about its people, politics and economy from The New York Times.
topics.nytimes.com - World - Countries and Territories - Cached - Similar

Egypt Travel, Tours, Vacations, Ancient Egypt from Tour Egypt ☆ ⓘ
Information for travelers, resources on history, monuments and activities.
www.touregypt.net/ - Cached - Similar

News for Egypt

 [Why Lara Logan Was Eager to Return to Egypt](#) ☆ ⓘ
1 hour ago
By Charlotte Triggs AP Lara Logan had already had one troubling experience in Egypt before last Friday's "brutal and sustained" sexual assault, ...
[People Magazine](#) - 1658 related articles - Shared by 20+

[In Egypt, renewed hope for gender equality](#) ☆ ⓘ
USA Today - 24874 related articles - Shared by 5+

[Realtime updates for Egypt \(DRC\)](#)

Egypt Daily News, Egypt News

Meet Daniel's Google Search

GENDER:

Male

RACE:

Caucasian

LOCATION:

New York



Google Egypt

About 321,000,000 results (0.15 seconds)

Search Advanced search

Ads

Related to facts about egypt:

Facts About Egypt
Search for Facts About Egypt
Find Facts About Egypt
www.ask.com

Related to ancient egypt:

Egyptian Artifacts
Ancient Egyptian Art and Culture
Artifacts Housed at the Walters
thewalters.org

See your ad here >

Everything

Images

Videos

News

Shopping

Books

More

New York, NY

Change location

Any time

Latest

Past 24 hours

Past week

Past month

Past year

Custom range...

All results

Sites with images

Wonder wheel

Timeline

More search tools

Egypt - Wikipedia, the free encyclopedia

Egypt officially the Arab Republic of Egypt, is a country mainly in North Africa, with the Sinai Peninsula forming a land bridge in Southwest Asia. ... Hosni Mubarak - Ancient Egypt - Female genital cutting - History of modern Egypt en.wikipedia.org/wiki/Egypt - Cached - Similar

Egypt Travel, Tours, Vacations, Ancient Egypt from Tour Egypt

Information for travelers, resources on history, monuments and activities. www.touregypt.net/ - Cached - Similar

Egypt Daily News, Egypt News

Egypt Daily News, covering Egypt News, Arab news, Middle East news and World news. Egyptian Guides, egyptian recipes, egyptian food, egyptian airforce, ... www.egyptdailynews.com/ - Cached - Similar

Images for egypt

Report Images

Egypt - CIA - The World Factbook

Feb 1, 2011 ... Features a map and brief descriptions of geography, economy, government, and people. https://www.cia.gov/library/publications/the-world..._egy.html - Cached - Similar

Egypt State Information Service

Official government site provides information on the country's government, politics, culture, history, economy and tourism. [Arabic, English, French]

Gooooooooogle

Egypt

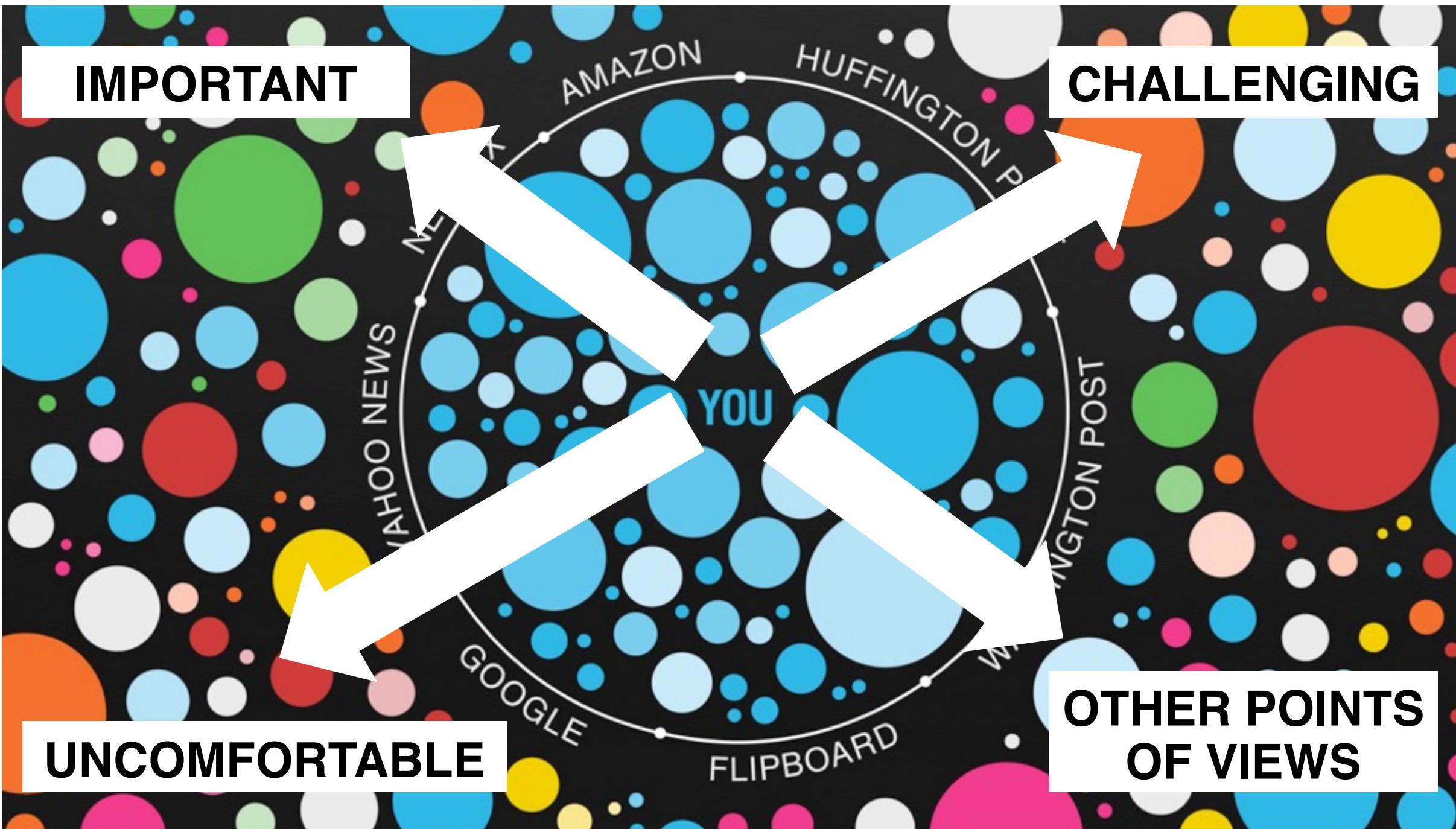


- Crisis in Egypt
- Protests of 2011
- Lara Logan



- Travel, Vacations
- Egypt Daily News
- CIA World Factbook

THE FILTER BUBBLE, by Eli Pariser



Eli Pariser, TED Talk: <https://youtu.be/B8ofWFx525s?t=2m43s>

THE FILTER BUBBLE, by Eli Pariser

+Information Junk



Future aspirational selves

VS



More impulsive present selves



THE FILTER BUBBLE, by Eli Pariser

- Anxiety but ...
- + Tunnel Vision
- + Information Junk
- + Network effects
- + Confirmation Biases

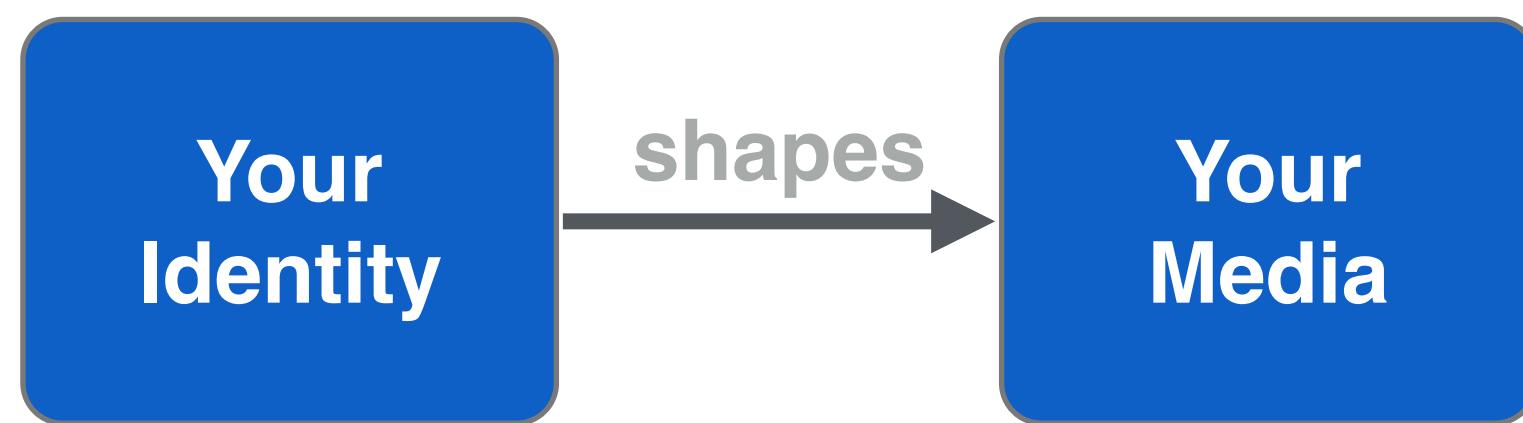
FILTER BUBBLE CASE

“Your Filter Bubble is Destroying Democracy“

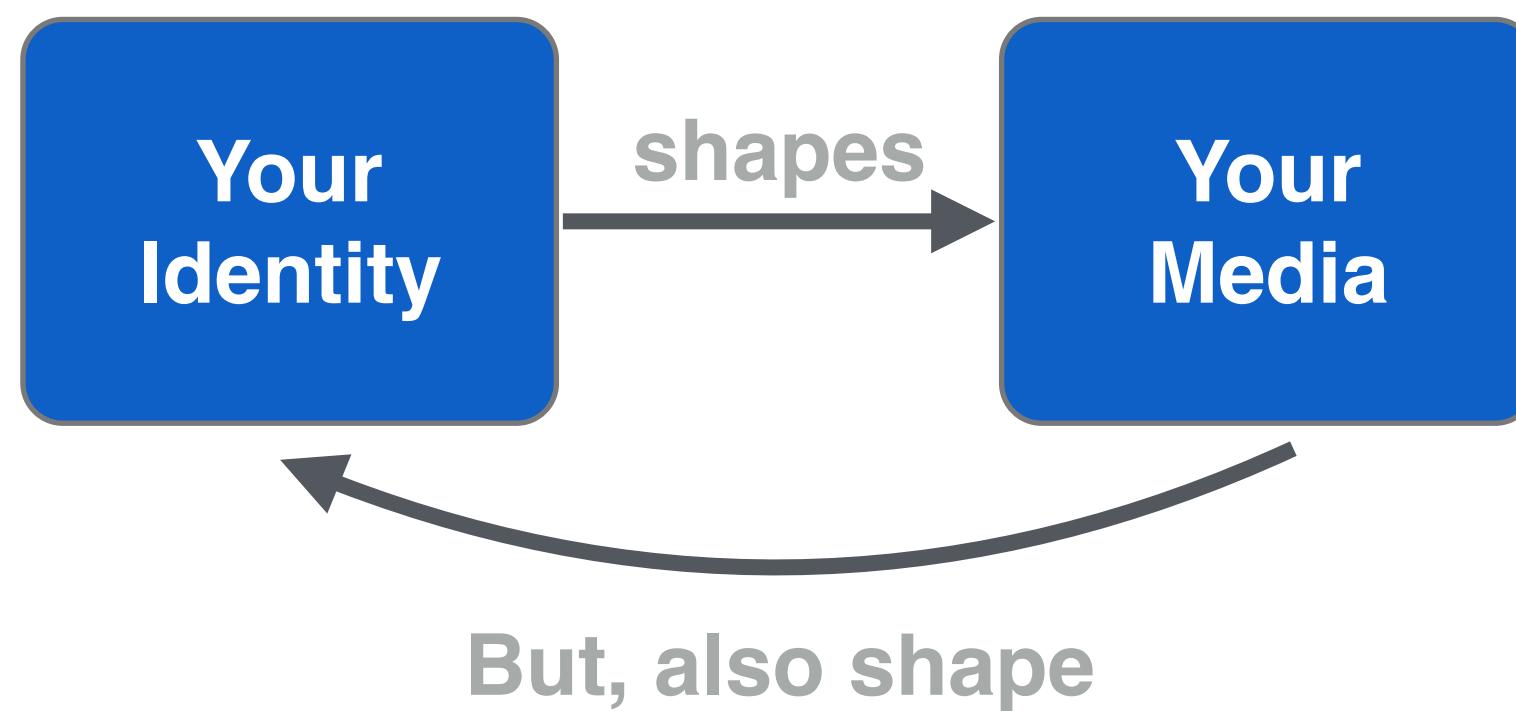
MOSTAFA M. EL-BERMAWY - WIRED

<https://www.wired.com/2016/11/filter-bubble-destroying-democracy/>

FILTER BUBBLE CASE

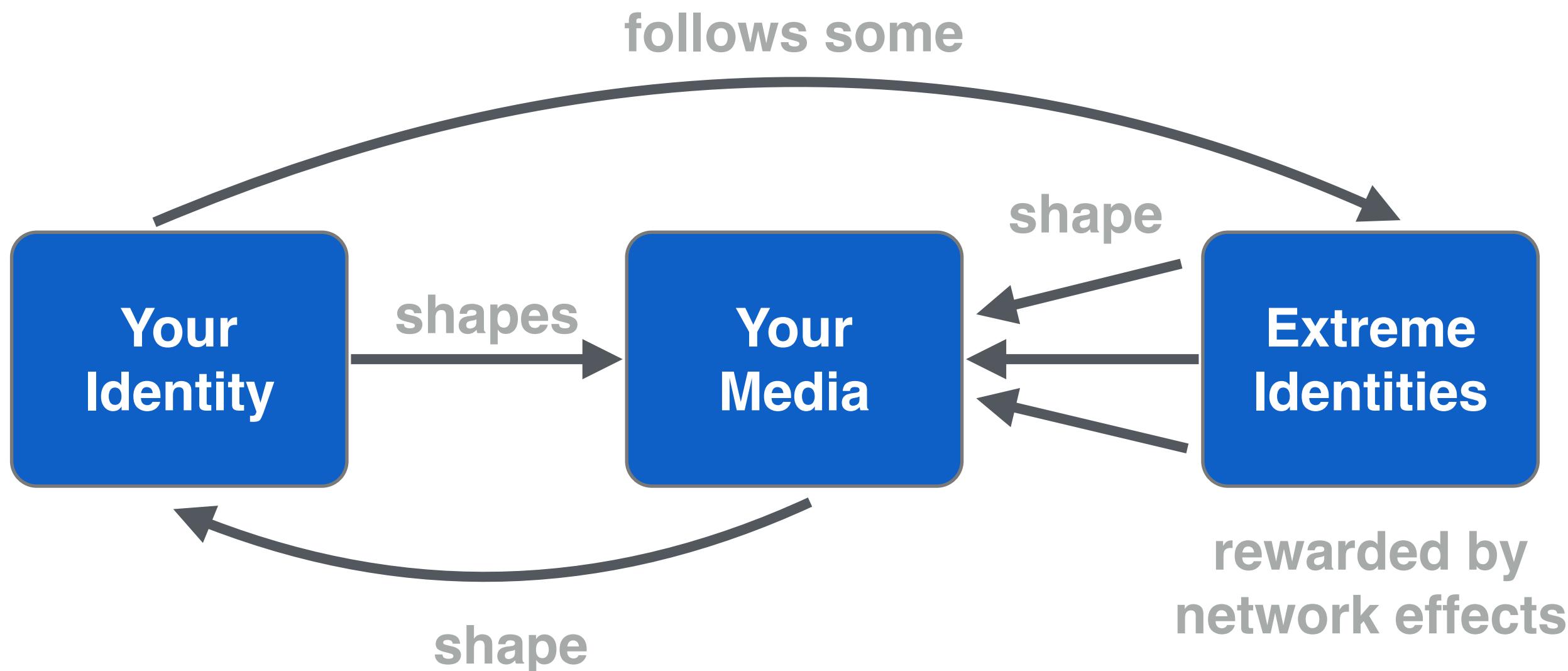


FILTER BUBBLE CASE



FILTER BUBBLE CASE

Confirmation Bias boost with network effects



FILTER BUBBLE CASE

Question!

How would you redesign Facebook's
Recommendation engine to
burst the filter bubble?



How to burst your Facebook filter bubble

THE FILTER BUBBLE, by Eli Pariser

- Anxiety but ...
- + Tunnel Vision
- + Information Junk
- + Network effects
- + Confirmation Biases

THE FILTER BUBBLE, by Eli Pariser

“If we want to know what the world really looks like, we have to understand how filters shape and skew our view of it.”

Eli Pariser - The Filter Bubble

“MY PERSONAL” VIEW...

1. The Long Tail era is **GREAT**
2. The Paradox of Choice can be solved with **PERSONALISATION**
 - **SEARCH**
 - **RECOMMENDATIONS**
3. The Bubble Filter can be overcame by:
 - Giving **PERSONALISATION CONTROL** to the user
 - Presenting **EXPLANATIONS** to the user
 - **BALANCING** future aspirational vs present selfs items (as editors before)

TAXONOMY OF RECOMMENDATION ENGINES

TAXONOMY OF RECOMMENDATION ENGINES

by *Joseph Konstan* and *Michael Ekstrand* ([Coursera.org course](#))

Analytical Framework

Dimensions of Analysis

1. Domain
2. Purpose
3. Recommendation Context
4. Whose opinions
5. Personalisation Level
6. Privacy and Trustworthiness
7. Interfaces
8. Recommendation Algorithms

TAXONOMY OF RECOMMENDATION ENGINES

by *Joseph Konstan* and *Michael Ekstrand* ([Coursera.org course](#))

1. DOMAIN

- Nature of the items to recommend:
 - News, text, links, ...
 - Products, Vendors, Bundles, Configurable Products
 - People (dating, LinkedIn, Facebook, Twitter, ...)
 - Sequences (music playlists, etc)
- New items / recurrent items?
 - Movies / Music

TAXONOMY OF RECOMMENDATION ENGINES

by *Joseph Konstan* and *Michael Ekstrand* ([Coursera.org course](#))

2. PURPOSE

- Sales
 - Up-sell (Apple configurator)
 - Cross-sell (Amazon)
- Information / Knowledge (news, forums)
- Education / Advice / Tips (financial services)

TAXONOMY OF RECOMMENDATION ENGINES

by *Joseph Konstan* and *Michael Ekstrand* ([Coursera.org course](#))

3. RECOMMENDATION CONTEXT

- Activity
 - Shopping
 - Working out
 - Working
- Recommendations constraints
 - Group (musical bar, TV at home, ...)
 - Level of attention / Level of interruption

TAXONOMY OF RECOMMENDATION ENGINES

by *Joseph Konstan* and *Michael Ekstrand* ([Coursera.org course](#))

4. WHOSE OPINIONS

- Experts (Pandora)
- Crowds
- People like you

TAXONOMY OF RECOMMENDATION ENGINES

by *Joseph Konstan* and *Michael Ekstrand* ([Coursera.org course](#))

5. PERSONALISATION LEVEL

- Non-personalisation
- Demographic
- Ephemeral (based on activity)
- Persistent (based on preferences)

TAXONOMY OF RECOMMENDATION ENGINES

by *Joseph Konstan* and *Michael Ekstrand* ([Coursera.org course](#))

6. PRIVACY AND TRUSTWORTHINESS

- Privacy
 - Preferences (explicit vs implicit)
 - Identity
- Trustworthiness
 - Business rules built-in the system
 - Transparency / Reputation

TAXONOMY OF RECOMMENDATION ENGINES

by *Joseph Konstan* and *Michael Ekstrand* ([Coursera.org course](#))

7. INTERFACES

- Output
 - Predictions
 - Recommendations
 - Filtering
 - Organic vs Explicit presentation (critique-based systems)
- Input
 - Explicit
 - Implicit

TAXONOMY OF RECOMMENDATION ENGINES

by *Joseph Konstan* and *Michael Ekstrand* ([Coursera.org course](#))

8. RECOMMENDATION METHODS

- Non-personalised
- Personalised
 - Content-based Filtering
 - Collaborative Filtering

TAXONOMY OF RECOMMENDATION ENGINES

Exercise!

Identify each dimensions for Twitter...

TAXONOMY OF RECOMMENDATION ENGINES

DOMAIN: Text with links, information. New items.

PURPOSE: Social Information (organic), with sponsored ads (business)

RECOMMENDATION CONTEXT: individual recommendations, no activity related (general), sports/events (specific)

WHOSE OPINIONS: crowds and people like you

PERSONALIZATION LEVEL: based on your followers, and your hashtags. Combination of Ephemeral and Persistent

PRIVACY & TRUSTWORTHINESS: The identity is hidden behind an alias and email. Preferences are based on followers, likes, retweets, etc. Mainly in an explicit way.

INTERFACES: through web and mobile apps tweets are presented in an ordered list. The user can also search for a specific topic or user. Input is based on the activity from the user. Specific UX when sports/events.

RECOMMENDATION METHOD: Collaborative filtering and content-based filtering based on hashtags, keywords, etc.

TWITTER ADS BUSINESS

OBJECTIVE > DETAILS

Welcome to Twitter Ads

Twitter Ads objective based campaigns are designed to help you achieve results that drive action and add value to your business. Create campaigns tailored for a variety of business goals, from driving website traffic to increasing brand awareness. [Learn more](#)

Select the objective for your campaign



Awareness

You want as many people as possible to see your Tweet.



Followers

You want to build an engaged audience to amplify your message, on and off Twitter.



Promoted video views

You want more people to see your GIFs, Vines, or videos.



Website clicks or conversions

You want people to visit and take an action on your website (e.g. download a paper or make a purchase).



Tweet engagements

You want to maximize engagement of your Tweets and get more people talking about your business.



Want more?

Click to see a complete list of campaign objectives.

TWITTER ADS BUSINESS

CAMPAIN
Awareness campaign
↳ Objective
↳ Details

AD GROUPS
Awareness ad group 1
↳ [Creatives](#)

[CREATIVES](#) > [TARGETING](#) > [BID & BUDGET](#) > [REVIEW & COMPLETE](#) [Next](#)

Choose your creatives

Tweets **1 selected**

Ivan Tarradellas @itarradellas [Search](#) [C](#)

Tweet

Ivan Tarradellas @itarradellas · Apr 06
“Creating Usability with Motion: The UX in Motion Manifesto” by @UX_in_Motion [medium.com/@ux_in_motion/...](https://medium.com/@ux_in_motion/) 

Ivan Tarradellas @itarradellas · Mar 09
The best sales advice I ever got was from a surfer dude. lnkd.in/ddGV2Tt 

Ivan Tarradellas @itarradellas · Mar 09
Google is acquiring data science community Kaggle lnkd.in/dbupNM8 

Ivan Tarradellas @itarradellas · Feb 23
Teaching Recommendation Engines and talking about Strands CLO at IE Madrid 

Ivan Tarradellas @itarradellas · Feb 06
Recommendations using the OCEAN five-factor personality model. How Cambridge Analytica worked during US elections. youtube.com/watch?v=n8Dd5a... 

Choosing your creatives

This campaign will promote any Tweets you choose. Only Tweets that are eligible for this campaign type are available to use.

See best practices for Tweets [here](#).

[Return to original campaign form](#)

TWITTER ADS BUSINESS

CAMPAIN

Awareness campaign
↳ Objective
↳ Details

AD GROUPS

Awareness ad group 1
↳ Creatives
↳ Targeting

CREATIVES > TARGETING > BID & BUDGET > REVIEW & COMPLETE

Next

Find your audience

Demographics

Target users by gender, age, device, platform, and location.

Select gender: Any gender, Male, Female

Select age ranges: Select ages...

Locations, devices, and platforms

Target users by country, state, region, metro area, postal code, platform, or device.

All | Search

Location: Spain

Audience features

Target users by interests, keywords, similar to followers of @usernames, and more. ?

All > Interests | Search

Import multiple criteria

No audience targeting selected

Audience summary

Defining your own audience is optional. In many cases, providing fewer targeting parameters may improve your results. Either way, Twitter will continually optimizes your campaign for high performance in the marketplace.

Return to original campaign form

TWITTER ADS BUSINESS

The screenshot shows the Twitter Ads targeting interface. At the top, there's a blue header bar with the text "Business · Browse". Below it, a navigation bar includes "Gaming · Browse", "Society · Browse", "Music and radio · Browse", "Life stages · Browse", "Home and garden · Browse", "Style and fashion · Browse", "Books and literature · Browse", "Careers · Browse", "Food and drink · Browse", "Beauty · Browse", "Sports · Browse", "Automotive · Browse", "Events · Browse", "Science · Browse", "Family and parenting · Browse", "Movies and television · Browse", "Technology and computing · Browse", "Pets · Browse", "Hobbies and interests · Browse", "Education · Browse", "Travel · Browse", and "Health · Browse". A "Select age ranges" dropdown is visible. At the bottom of the targeting section, there's a search bar with "All > Interests" and a "Search" button. Below the targeting section, a message says "Import multiple criteria" and "No audience targeting selected".

SESSION 2

RECOMMENDATION METHODS

- What is a Recommender System?
 - Concept
 - Formalisation
 - Engineering
 - Business
- Non-personalised Recommendation
- Personalised Recommendation
 - Content-based Filtering
 - Collaborative Filtering

WHAT IS A RECOMMENDER SYSTEM? (CONCEPT)



WHAT IS A RECOMMENDER SYSTEM? (FORMALISATION)

- Let C be the set of all **users** and let S be set of all possible recommendable **items**
- Let u be a utility function measuring the usefulness of item s to user c , i.e.:

$u : C \times S \rightarrow R$, where R is a totally ordered set

- For each user $c \in C$, we want to choose items $s \in S$ that maximise u

WHAT IS A RECOMMENDER SYSTEM? (ENGINEERING)

A Recommender processes information and transforms it into actionable knowledge

Recommender Components

Knowledge
Base

Knowledge
Processing
Application

Business
Control
& Analytics

User
Interface

It has a certain level of **autonomy** presenting recommendations to the end user

WHAT IS A RECOMMENDER SYSTEM? (BUSINESS)

A Recommender selects the product that if acquired by the buyer **maximises value of both buyer and seller** at a given point in time

PREDICTION VS RECOMMENDATION

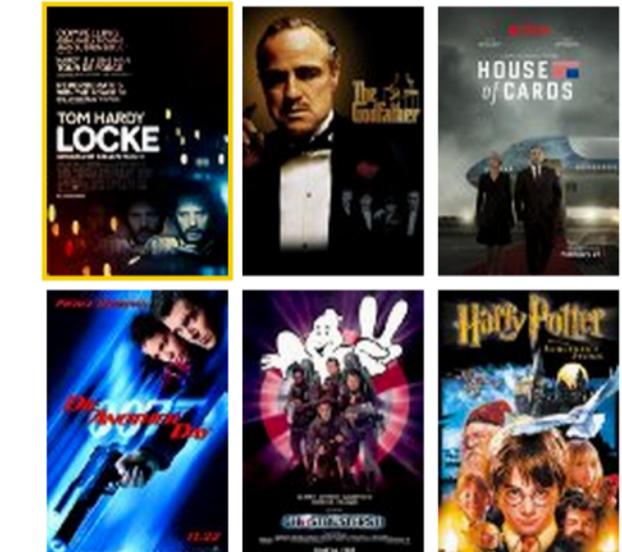
Question!

What's the difference between a Prediction and a Recommendation...

PREDICTION VS RECOMMENDATION

- The **prediction** is the statistical **quantification** (Pa, i)
- The **recommendation** is the **final suggestion**
 - The system choice for the target user
 - Usually follows a **top-n** sorted list

Recommended for you



◀ Prev 6 Next ▶

RECOMMENDATION METHODS

NON-PERSONALISED

PERSONALISED

COLLABORATIVE FILTERING

CONTENT-BASED FILTERING

There is NOT a BEST method... it all depends on the domain, goal, data, purpose, ...

RECOMMENDATION METHODS

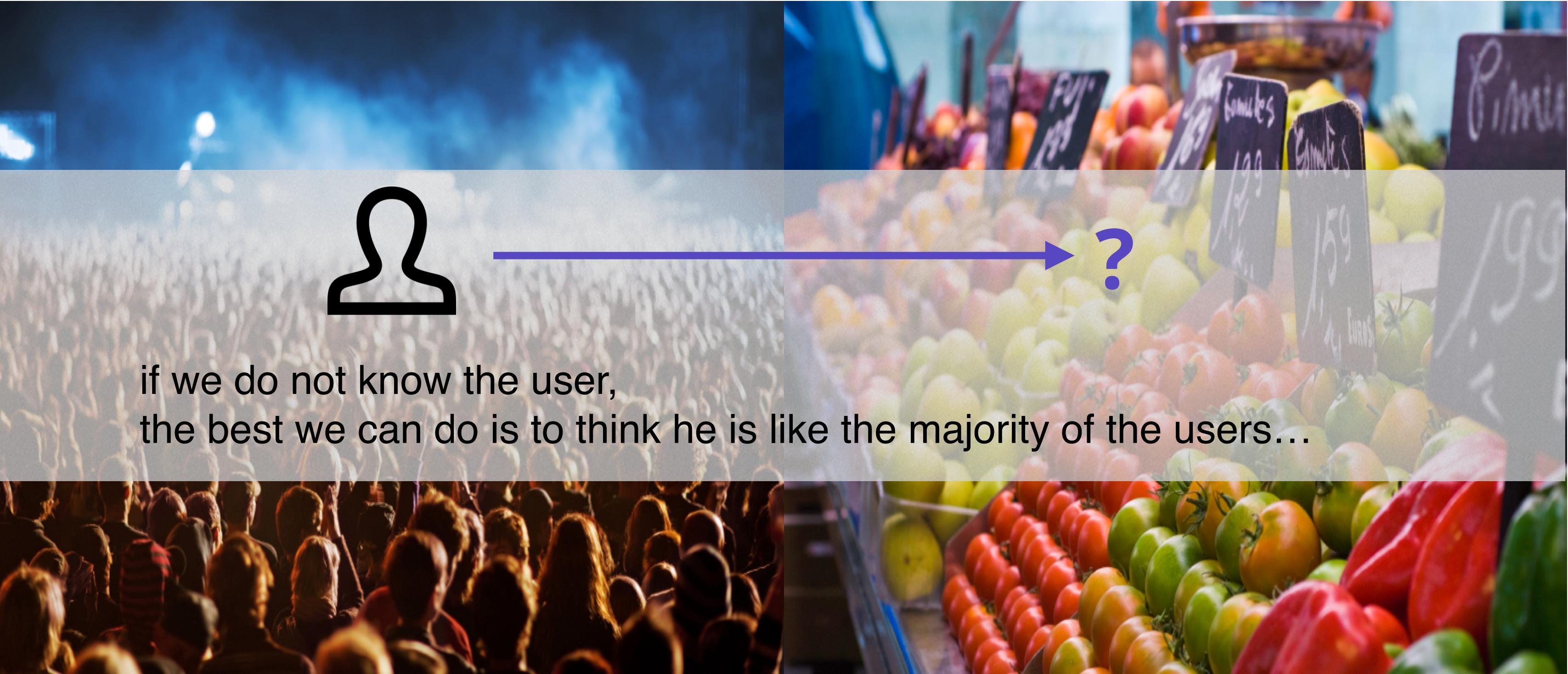
Question!

What we can do if we do not know the user?

NON-PERSONALISED RECOMMENDATIONS

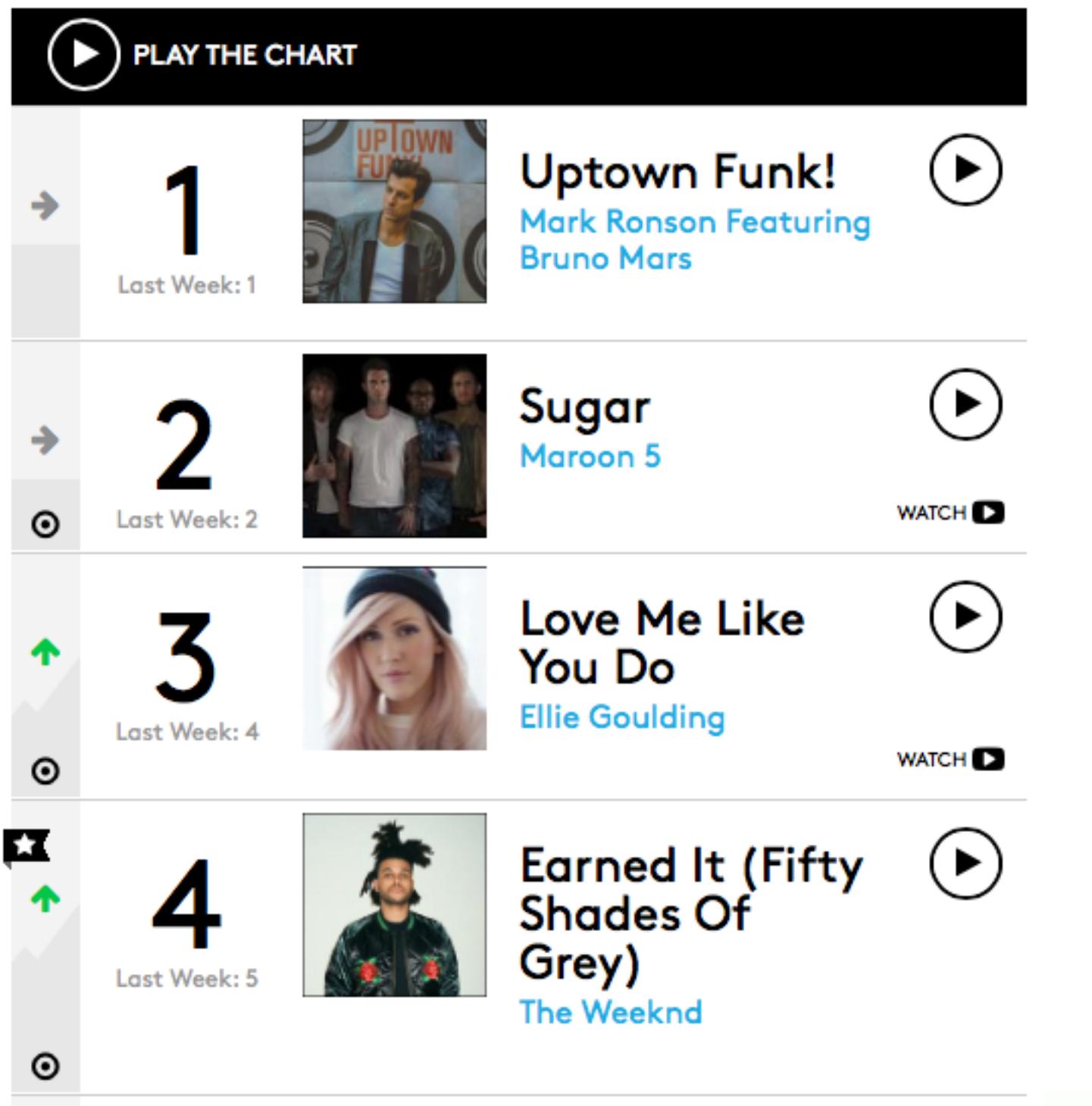


if we do not know the user,
the best we can do is to think he is like the majority of the users...



NON-PERSONALISED RECOMMENDATIONS

reminder : all users get the same recommendations...



- top sold items
- most liked items
- top listened songs
- newest hits
- trending topics
- etc...

NON-PERSONALISED RECOMMENDATIONS

reminder : all users get the same recommendations...

Mercer Hotel Barcelona
594 reviews | #1 of 514 hotels in Barcelona
#1 Just for You | A top contemporary hotel in Barcelona, Luxury... more
"Super hotel" 04/12/2015
"Superb dinner!" 04/11/2015

Colon Hotel
1,144 reviews | 120 of 514 hotels in Barcelona
#2 Just for You | Upscale, Popular romantic hotel in Barcelona... more
"Very good" 04/09/2015
"The cathedral view - pretty great!" 04/07/2015

Hotel Primero Primera
423 reviews | #6 of 514 hotels in Barcelona
#3 Just for You | Popular stylish hotel in Barcelona, Has a... more
"Look no further - best place to stay in Barcelona" 04/09/2015
"Spanish gem to be enjoyed" 04/01/2015

user-item matrix:

		hotels										
		j	3	5	4	4	3	4	3	5	5	4
users	i											

hotels (j) = 4

COLLABORATIVE FILTERING

How do **YOU GET RECOMMENDATIONS** on movies (analogically)?

1. Identify **neighbours** to the target user (*friends*). Need a similarity function!
2. Identify **items** these neighbours have rated positively.
3. Generate a **prediction** of those unknown items for the target user.

COLLABORATIVE FILTERING

1. User-based CF

- Select neighbour users
- Use their ratings

2. Item-based CF

- Compute similarity among items based on ratings
- Use target user ratings to deduce recommendations

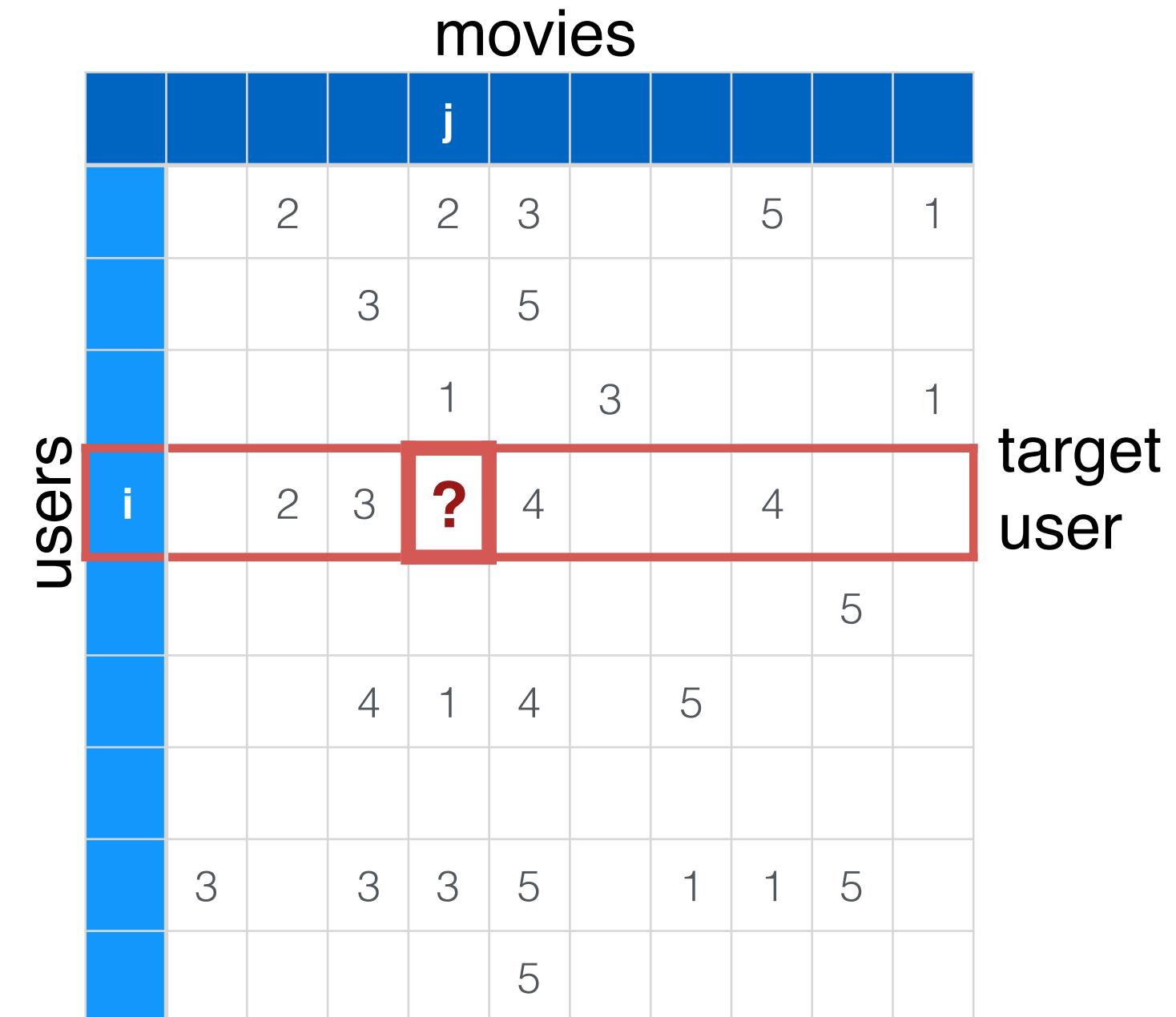
- Item attributes are irrelevant (**content agnostic!**)
- Can be used with **highly sparsity user-items matrices**

COLLABORATIVE FILTERING

User-based CF

Approaches:

1. Non-personalised
 - take average of ratings for j
2. Personalised
 - take weighted average of ratings for j
 - ***how to weight users?***
 - *more similar users get more weight!*
 - similarity function:
 - what neighbours to consider?
 - how much weight they get?



COLLABORATIVE FILTERING

User-based CF

user similarity
(Pearson correlation)

$$\text{simil}(x, y) = \frac{\sum_{i \in I_{xy}} (r_{x,i} - \bar{r}_x)(r_{y,i} - \bar{r}_y)}{\sqrt{\sum_{i \in I_{xy}} (r_{x,i} - \bar{r}_x)^2} \sum_{i \in I_{xy}} (r_{y,i} - \bar{r}_y)^2}$$

rating prediction
(weighted sum)

$$r_{u,i} = \bar{r}_u + k \sum_{u' \in U} \text{simil}(u, u')(r_{u',i} - \bar{r}_{u'}) \quad , k = 1 / \sum_{u' \in U} |\text{simil}(u, u')|$$

COLLABORATIVE FILTERING

User-based CF

1. Compute average ratings

2. Compute similarities

$$(4-3)(4-3.33) + (2-3)(1-3.33) = 0.66 + 2.33 = \mathbf{3}$$

3. Compute predicted ratings

$$\text{sqrt}(((4-3)^2 + (2-3)^2)((4-3.33)^2 + (1-3.33)^2))$$

$$\text{sqrt}((1+1)(0.66^2 + -2.33^2))$$

$$\text{sqrt}(2(0.4356 + 5.4289))$$

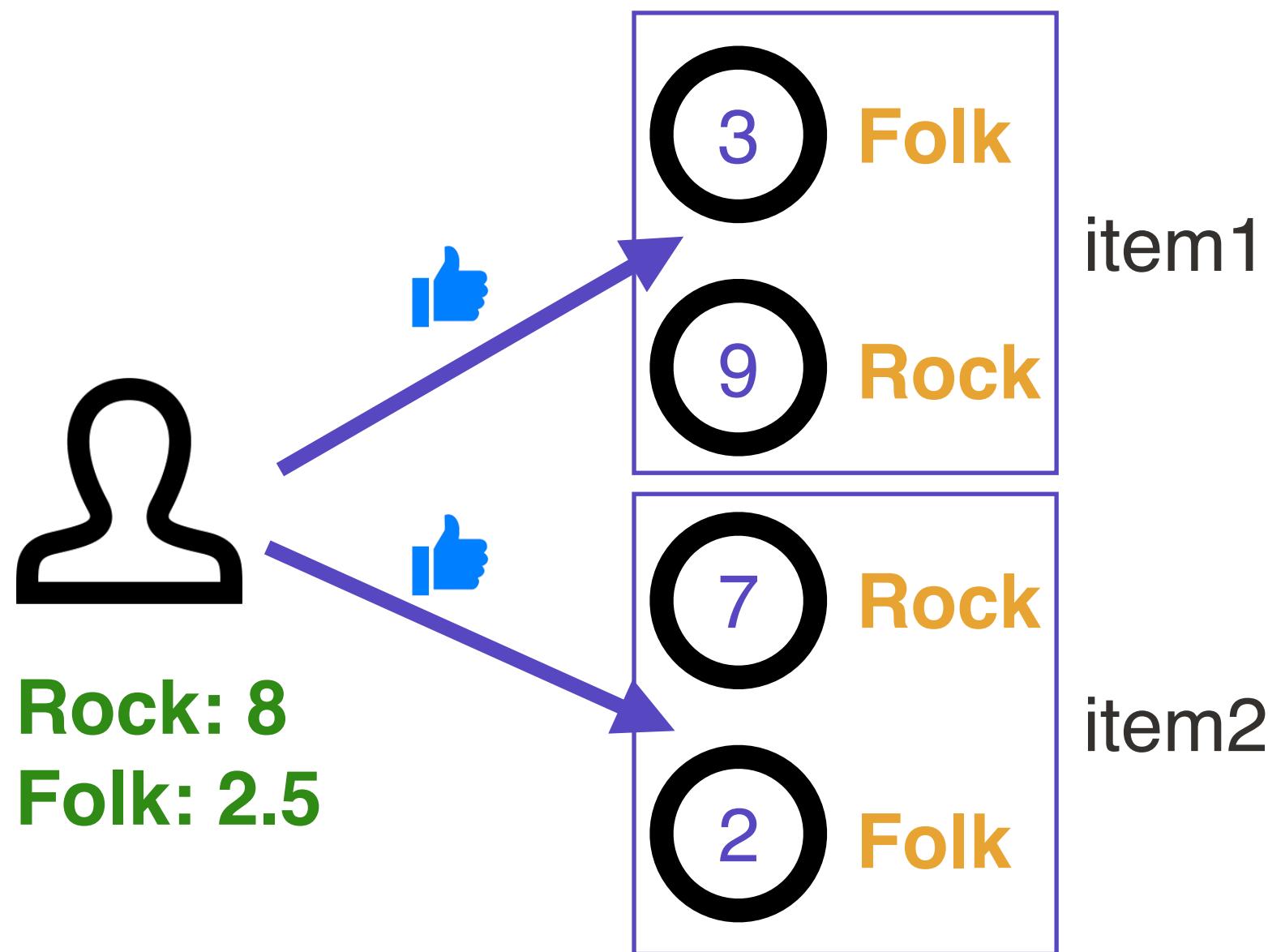
$$\text{sqrt}(11.729) = \mathbf{3.4247}$$

$$3 / 3.4247 = \mathbf{0.875}$$

		movies						$simil(x,y)$	$avg\ ratings(x)$
		1	2	3	4	5	6		
users	1	2			4	5		NA	$11/3=3,66$
	2	5		4			1	0,875	$10/3=3.33$
users	3			5		2		1	$7/2=3,5$
	4		1		5		4	-1	$10/3=3.33$
users	5	3.31	3.31	4	2.22	2.28	2		6/2=3
	6	4	5		1			NA	$10/3=3.33$

CONTENT-BASED FILTERING

- Build a **User Model** against **Item Features** from **User Ratings**



CONTENT-BASED FILTERING

The image shows a computer screen displaying a music player application. At the top, there is a play queue with several album covers visible, including "Louis Armstrong" and "MACACO PUERTO PRESENTE". Below the play queue is a table listing a large number of songs. The columns in the table include: Name, Time, Rating, Artist, Album by Art..., Year, Genre, Last Played, Date Added, and Compos. The table lists numerous tracks, many of which are checked (indicated by a blue square icon). The artist "Camaron de la Isla" appears frequently. The genre "Flamenco" is also prominent. The table is scrollable, with a vertical scrollbar on the right side.

Name	Time	Rating	Artist	Album by Art...	Year	Genre	Last Played	Date Added	Compos
De Tus Ojos Soy Cautivo	3:14	★★★	283 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:21	1/12/05 12:41	
Aserejé	3:33	★	275 Las Ketchup	Las Ketchup	2002	Latin	6/11/09 11:39	2/9/05 11:57	Mann
Viviré	3:54	★★★★★	271 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:05	1/12/05 12:41	
Como El Agua	3:41	★★★★★	270 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 20:58	1/12/05 12:41	
Canastera	3:53	★★★	266 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:01	1/12/05 12:41	
Te Lo Dice Camarón	3:37	★★★	261 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:02	1/12/05 12:41	
Al Verte Las Flores Lloran (...)	2:42	★★★★★	260 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:12	1/12/05 12:41	
Calle Real (Fandangos Del ...)	3:33	★★★★	256 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:09	1/12/05 12:41	
Y Mira Que Mira Y Mira (Al...)	3:21	★★★	254 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:12	1/12/05 12:41	
La Primavera (Rumba)	3:53	★	253 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:05	1/12/05 12:41	
Cada Vez Que Nos Miramos	3:48	★★★	253 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:09	1/12/05 12:41	
Salud Antes Que Dinero (Fa...)	2:53	★	252 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:18	1/12/05 12:41	
Volando Voy	3:33	★★★★	251 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:29	1/12/05 12:41	
La Leyenda Del Tiempo	3:34	★★★	250 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	7/1/10 21:15	1/12/05 12:41	
Con Roca De Pedernal	3:28		250 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:20	1/12/05 12:41	
Soy Gitano	4:17	★★★	250 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	4/18/10 12:42	1/12/05 12:41	
Malito Yo Estaba	4:22		248 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:17	1/12/05 12:41	
El Espejo En Que Te Miras (...)	3:07		248 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:23	1/12/05 12:41	
Un Tiro Al Aire	4:46	★★	243 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:34	1/12/05 12:41	
Viejo Mundo (Bulerias)	2:45		242 Camaron de la Isla	Una Leyenda F...	1994	Flamenco	5/26/10 18:26	1/12/05 12:41	
Rosa María (Tango)	2:18	★★★★★	236 Camaron de la Isl...	Una Leyend...	1994	Flam...	2/15/10 14:15	1/12/05 12:41	

- Thousands of ratings
- Dozens of features
- User Model can be complex!

CONTENT-BASED FILTERING

User Model

dimension Artist

	1..10
Springsteen	4.5
Cold Play	4
Beatles	8
Madona	4
Lou Reed	1
....	...

dimension Genre

	1..10
Rock	4
Classic	5
Folk	2
Punk	9
Ethnic	0
....	...

dimension Decade

	1..10
60s	4
70s	5
80s	0
90s	9
00s	1
....	...

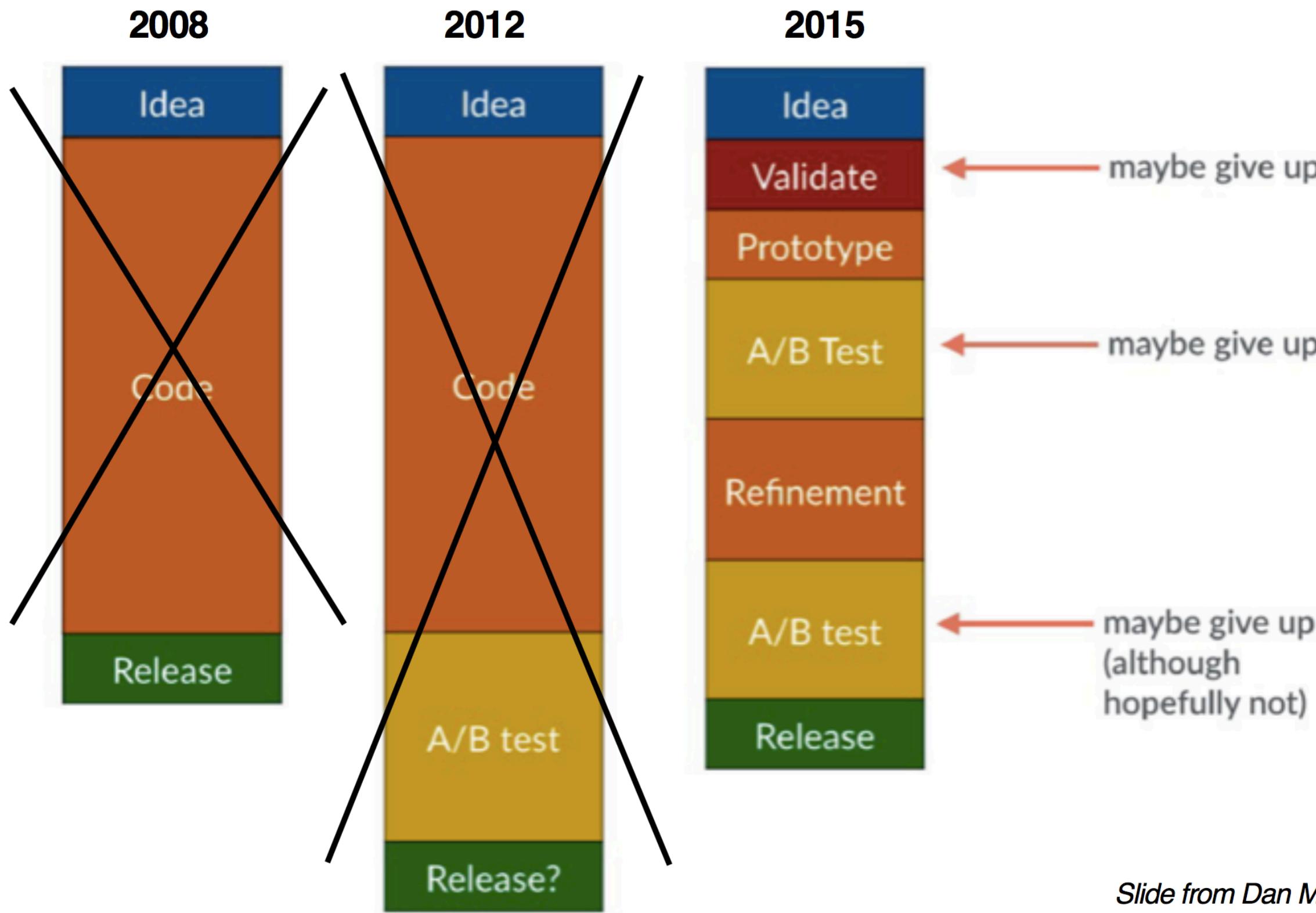
A vector dot product of {New item dimensions} with the user Model

RECOMMENDATION SYSTEM

Question!

How to start and make progress?

PRODUCT DATA SCIENCE



Slide from Dan McKinley - Etsy

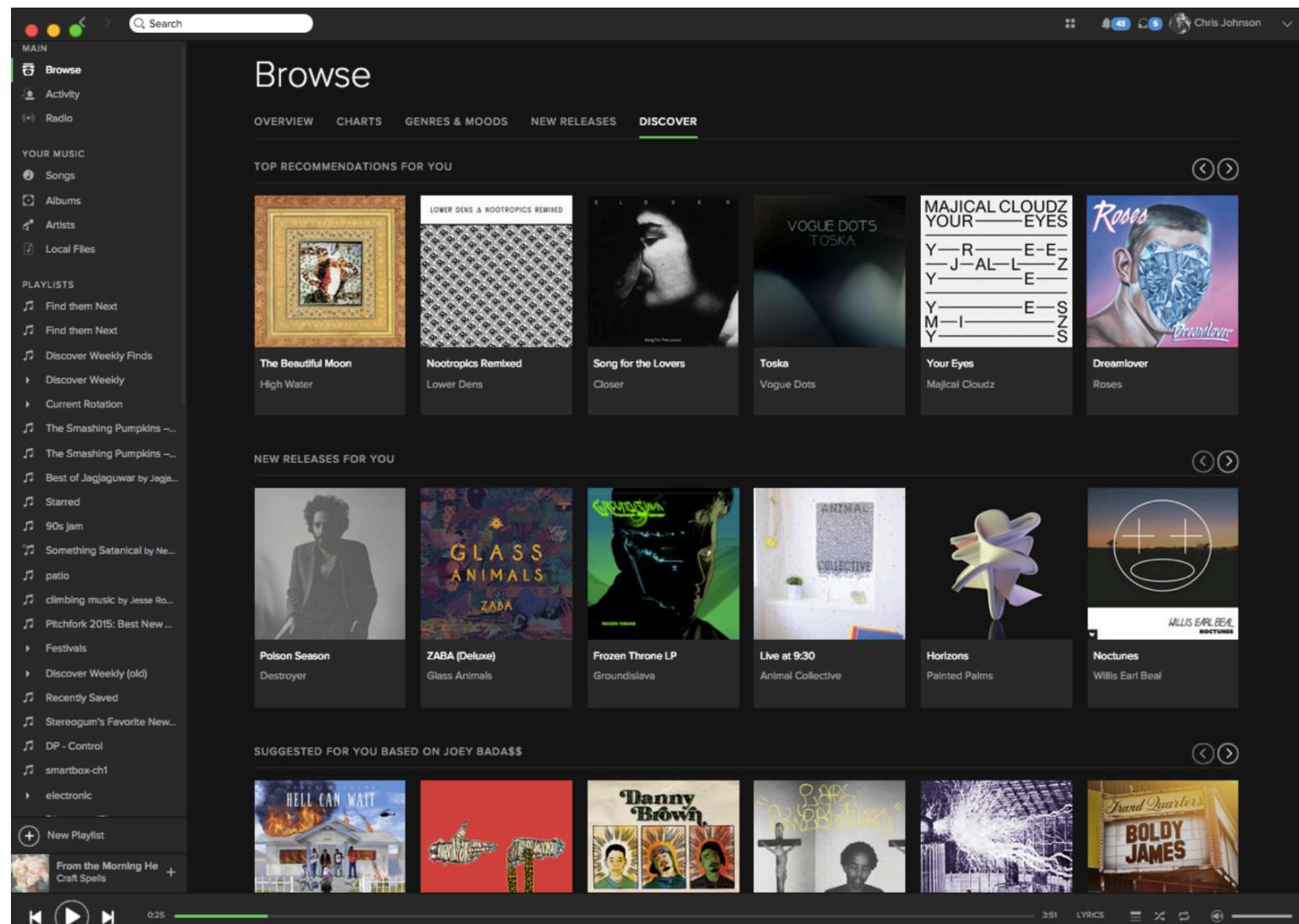
RECOMMENDATION METHODS

Question!

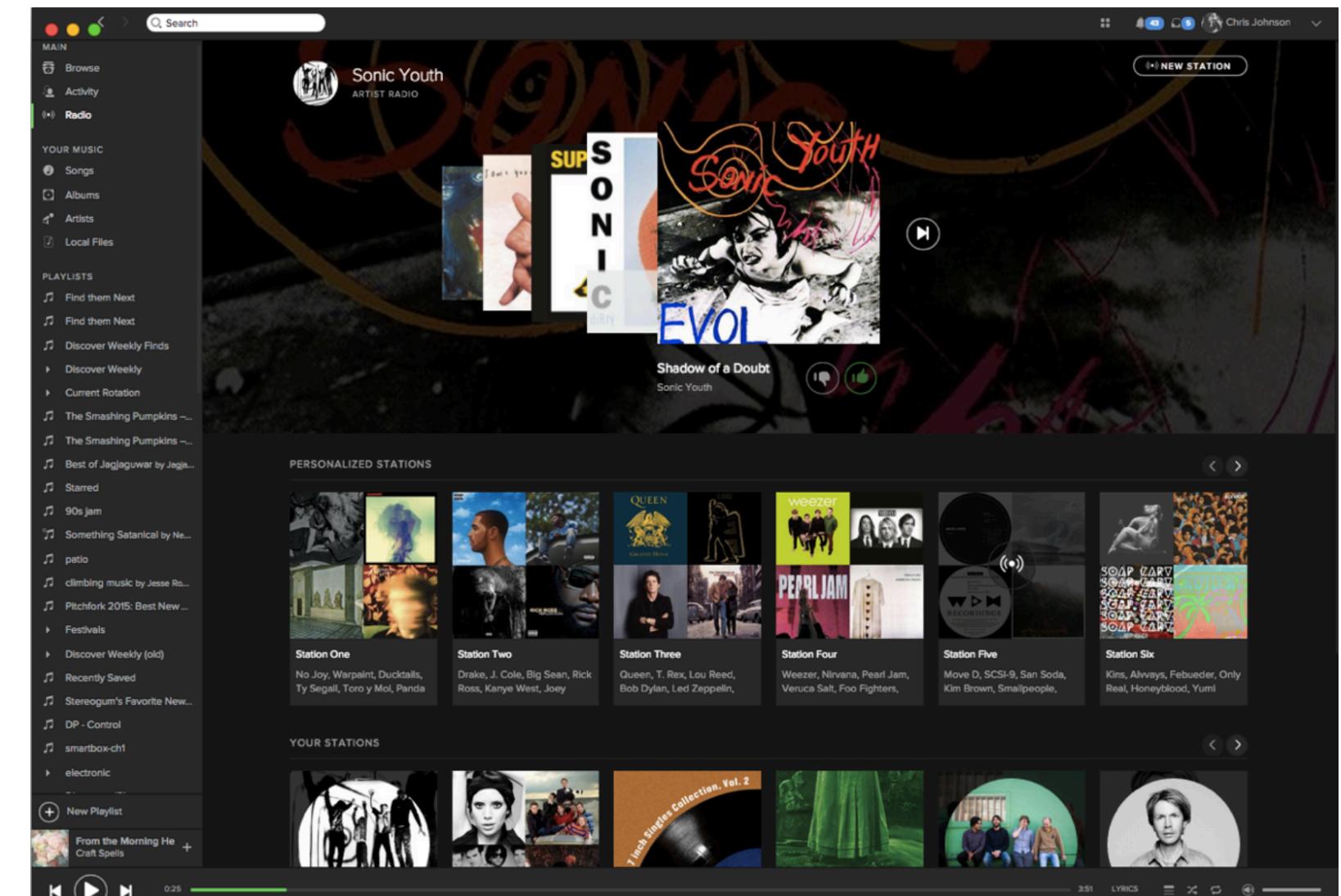
Which one to choose?

HYBRIDS : SPOTIFY CASE

BROWSE DISCOVERY

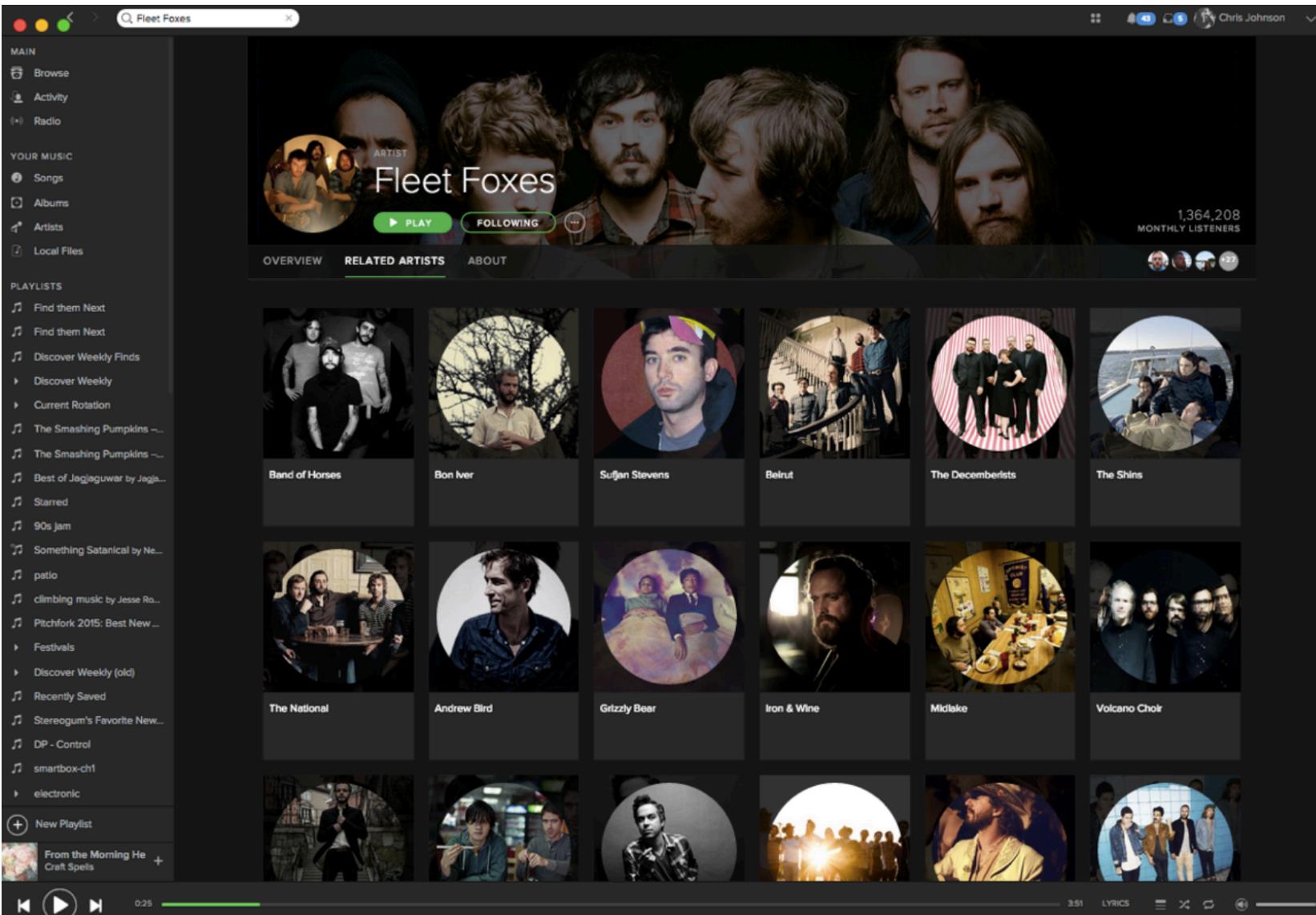


RADIO FEED

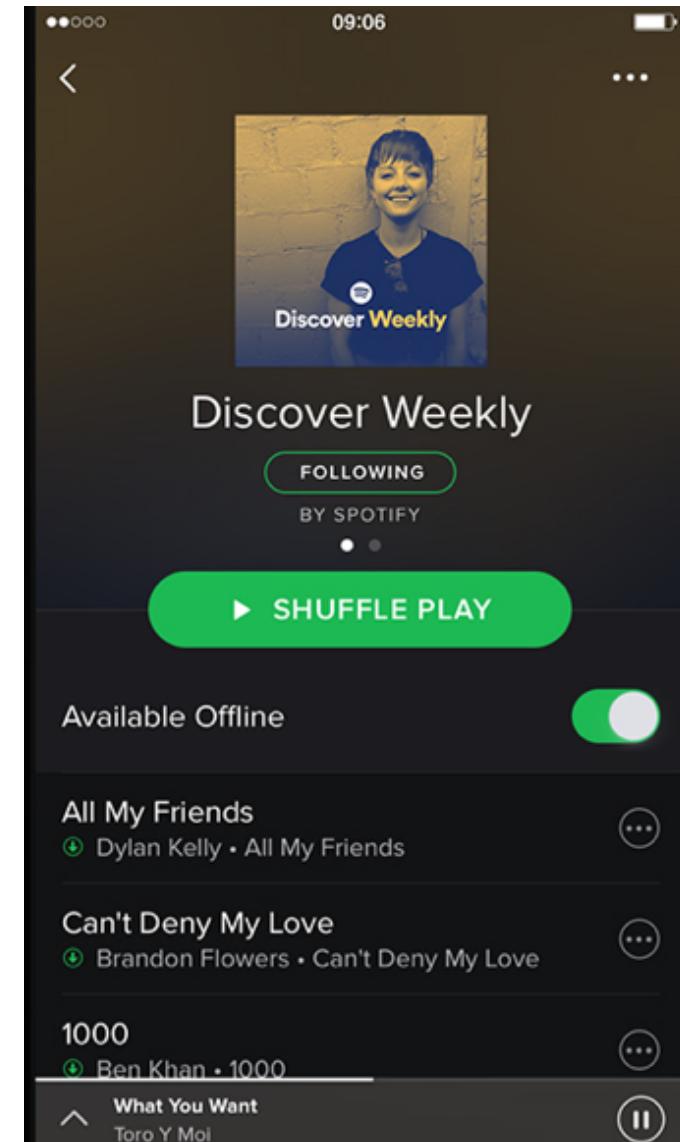


HYBRIDS : SPOTIFY CASE

RELATED ARTISTS



DISCOVERY WEEKLY



THANKS!