



# Growing Pains

CS 278 | Stanford University | Michael Bernstein

# Last time

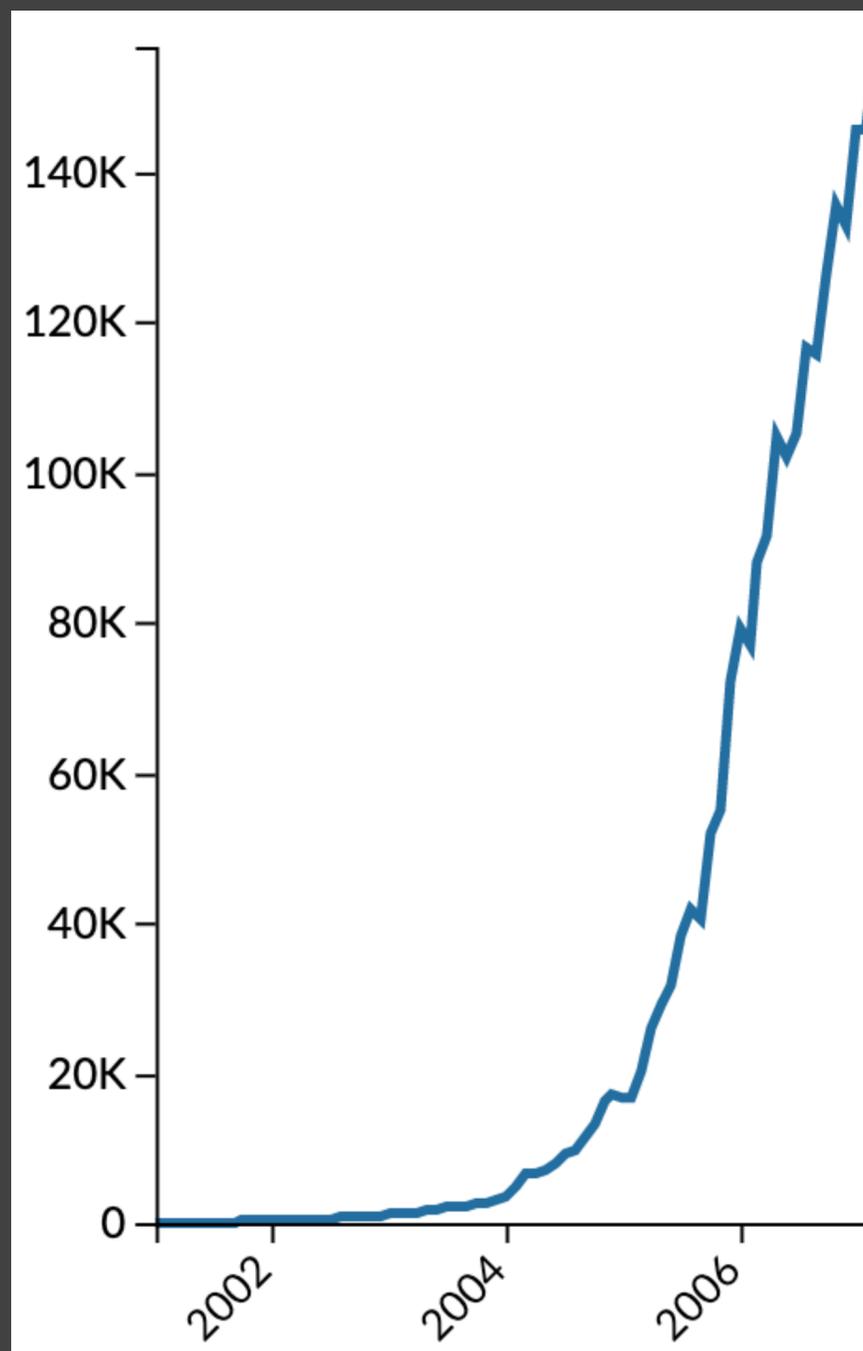
Prototyping social computing systems requires a different approach than usual. Use social bricolage to tie together existing social systems in order to understand the social dynamics you're creating.

The cold start problem occurs when a system is too empty to attract initial usage, so it remains empty. Two solutions:

- Focus on a narrow group initially, and broaden out later

- Be prepared to bootstrap activity

# Wikipedia's growth

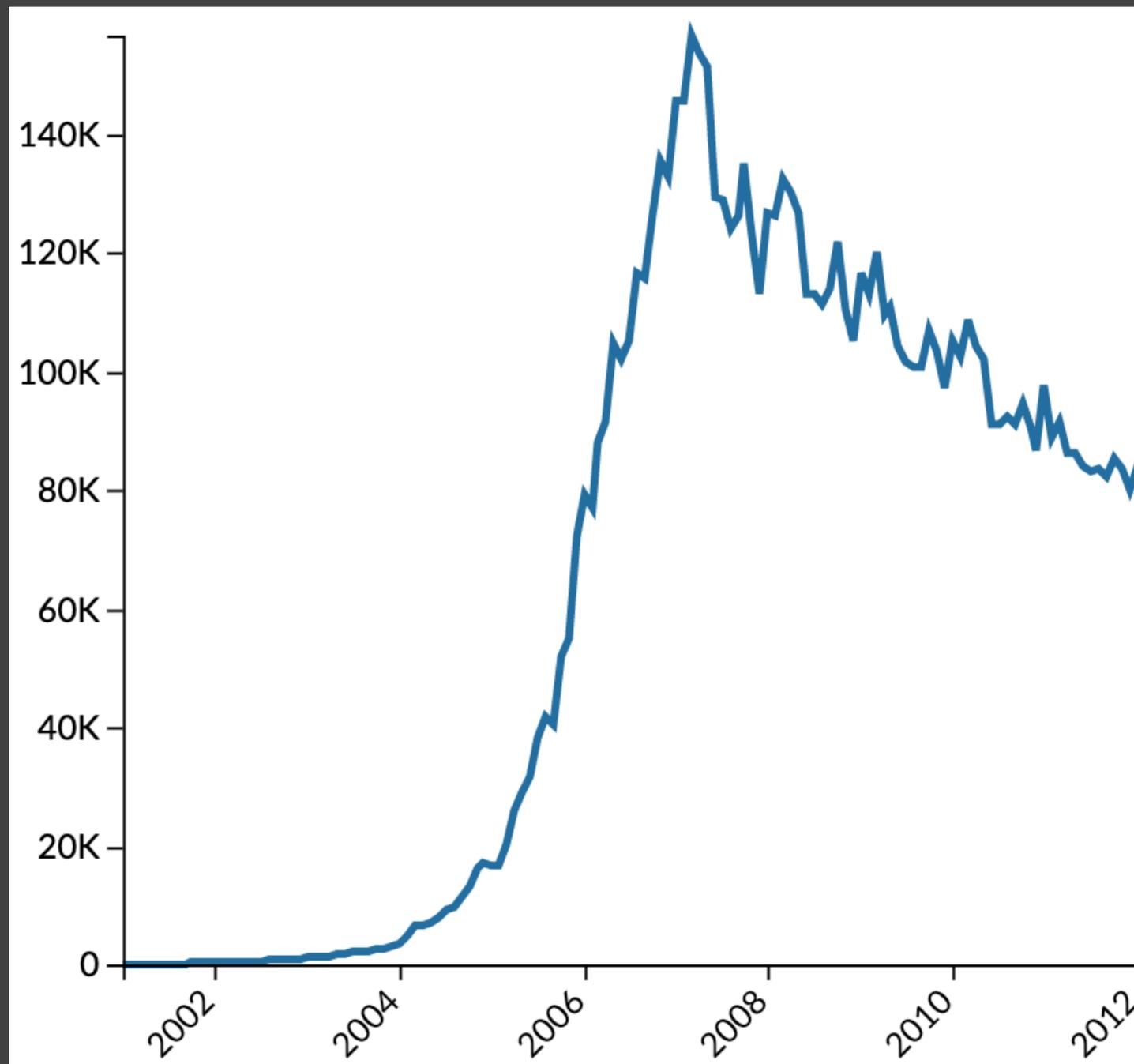


Wikipedia emerged as the leading collaboratively edited encyclopedia and experienced rapid growth

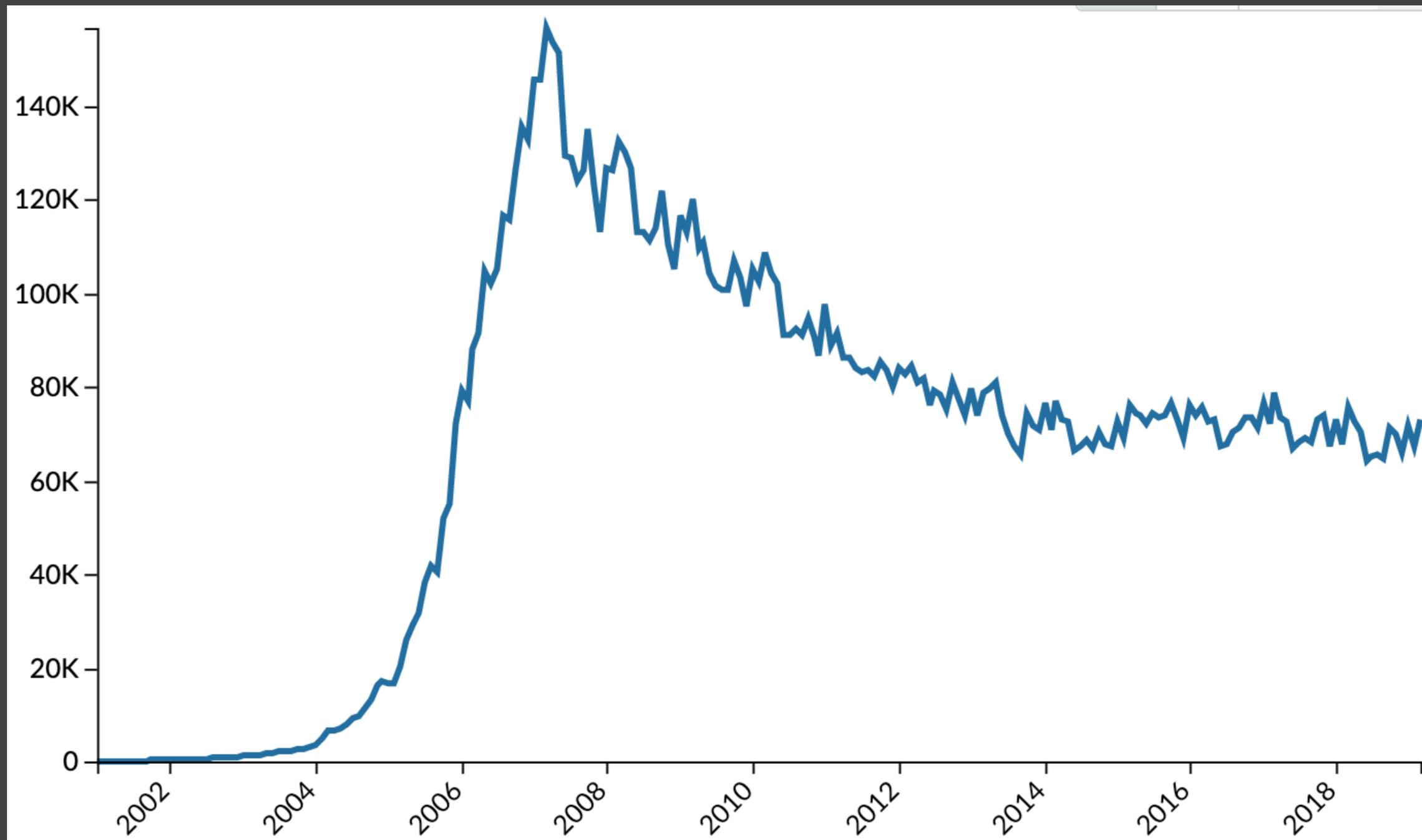
From just a few editors to about 150,000 monthly active editors in just five years

# Wikipedia's growth and decline

...but then something changed.

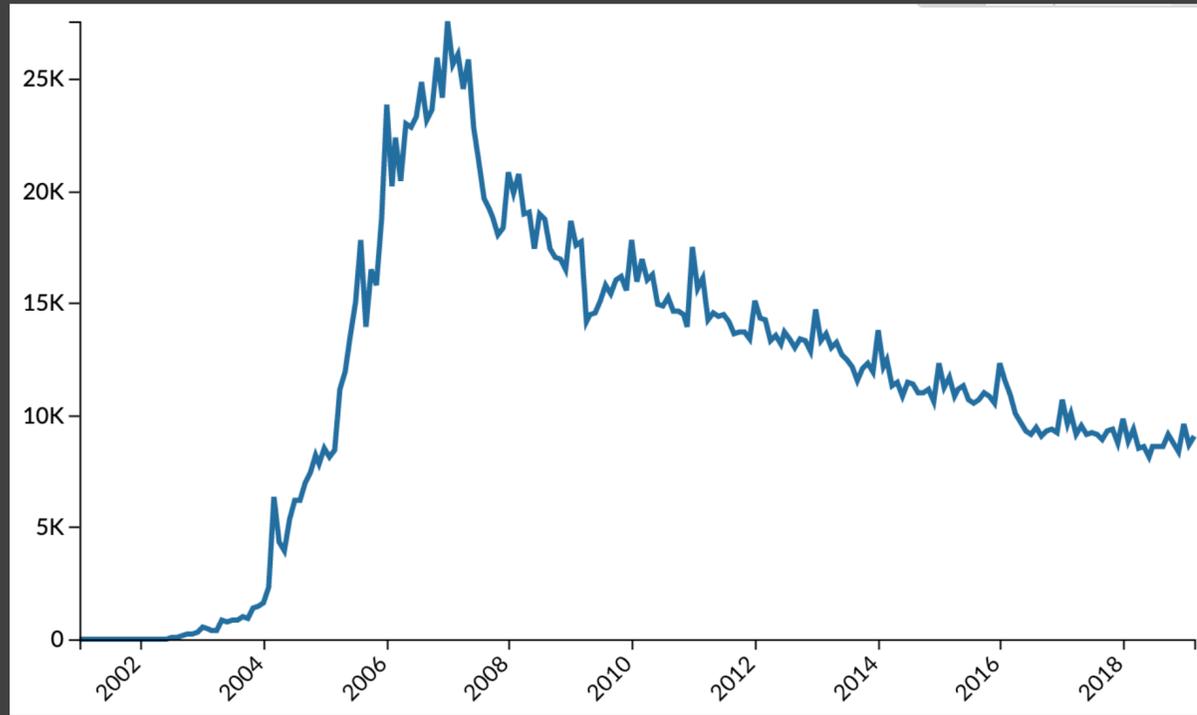


# Wikipedia's growth and decline

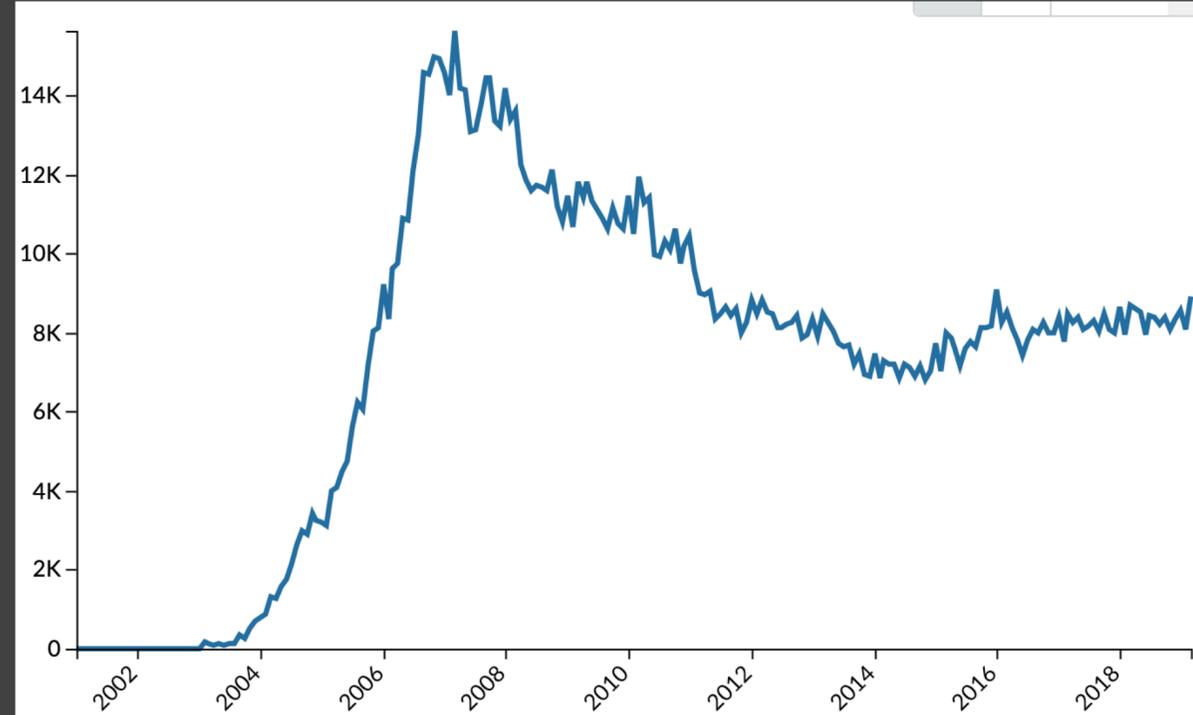


...and has continued to change.

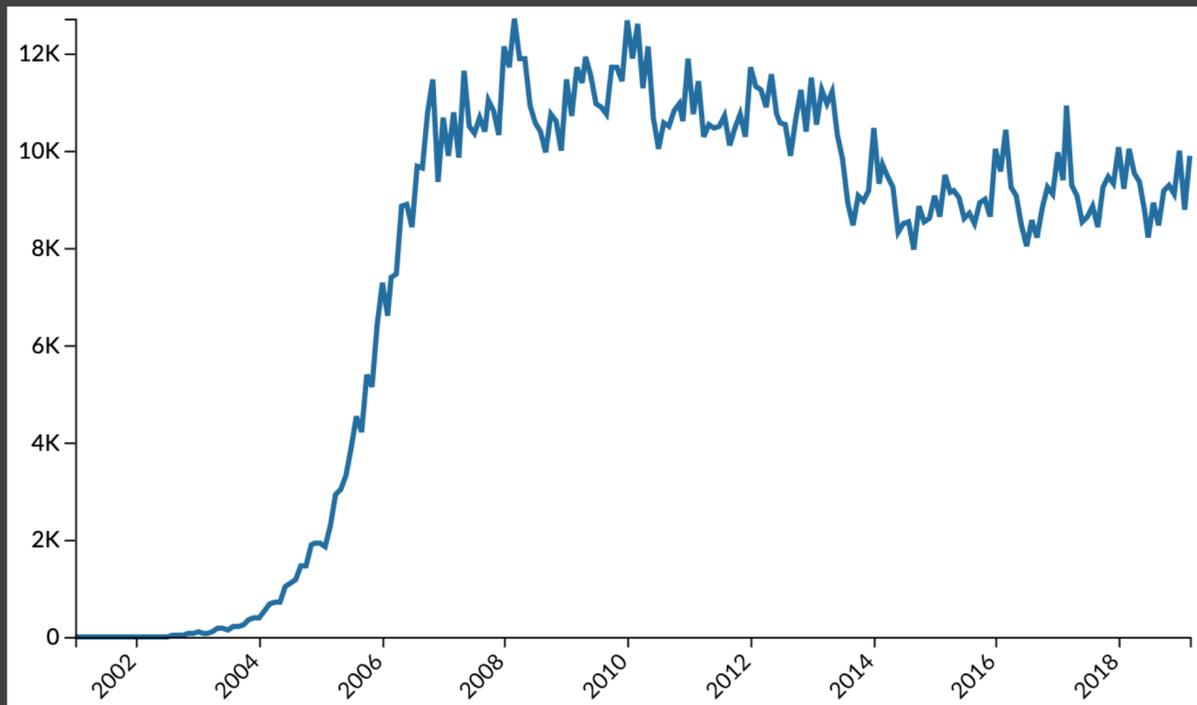
What happened?  
[2min]



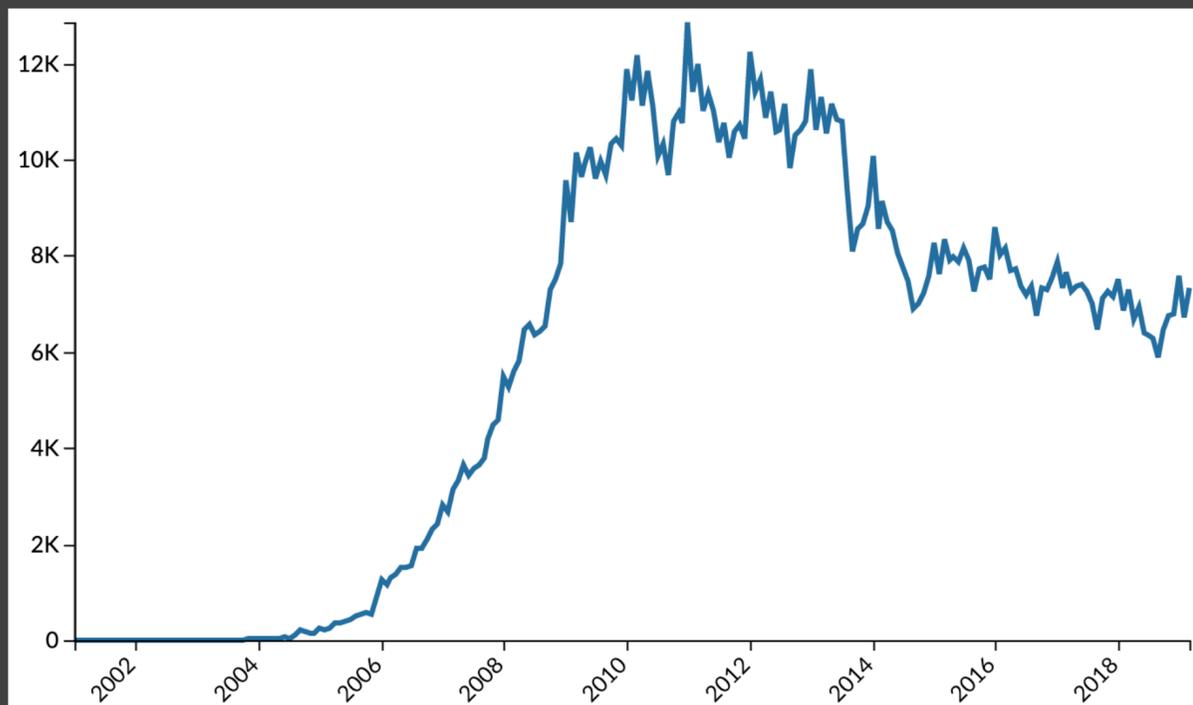
German



Japanese



French

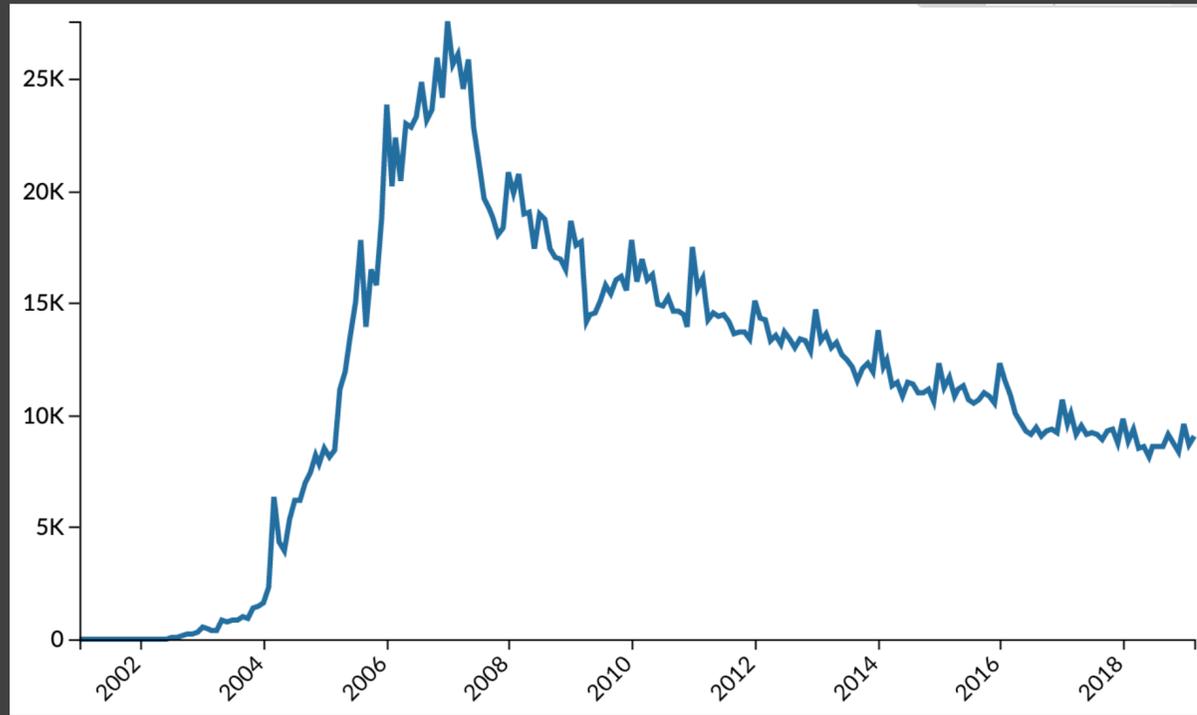


Spanish

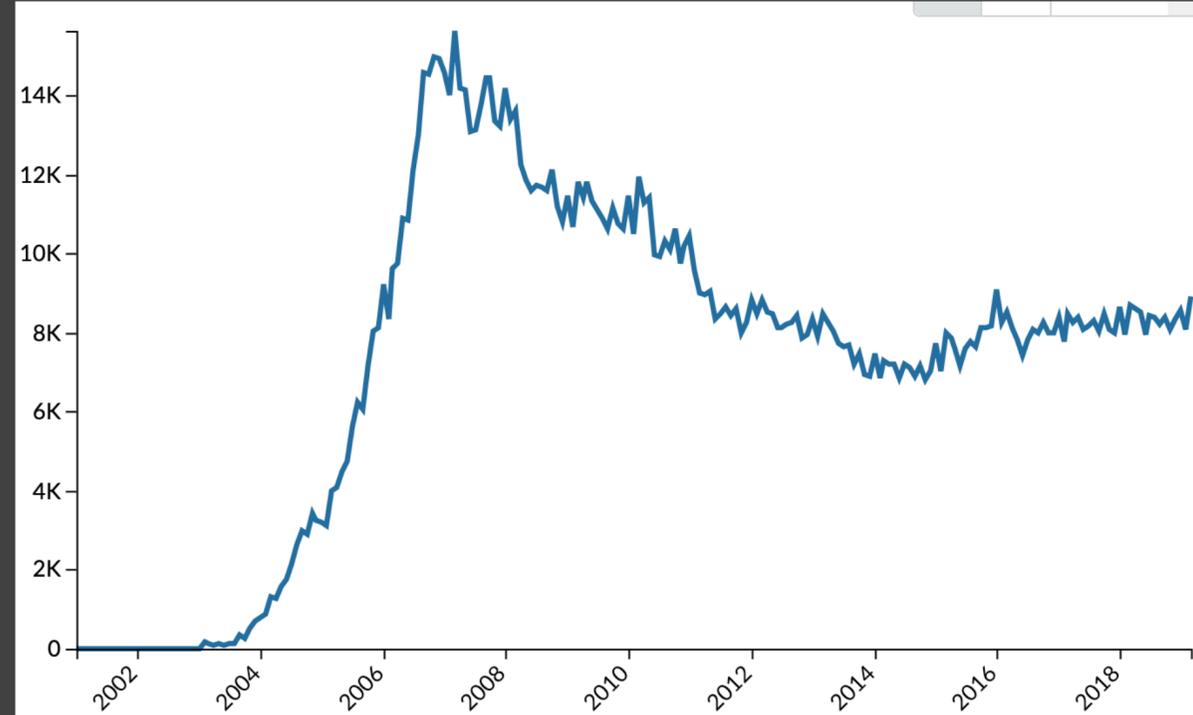
Non-English  
Wikipedias:  
same pattern.

They're all  
different sizes,  
so it's not that  
they ran out of  
articles.

The peak hit at  
different dates,  
so it's not  
exogenous.

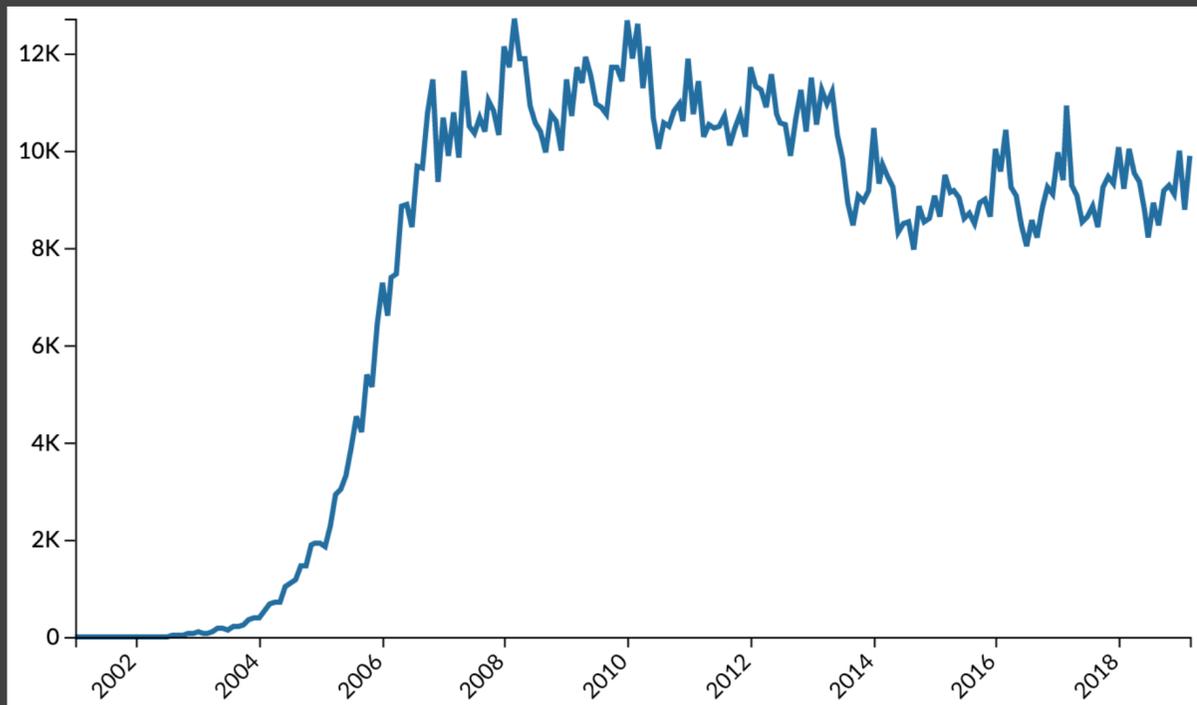


German

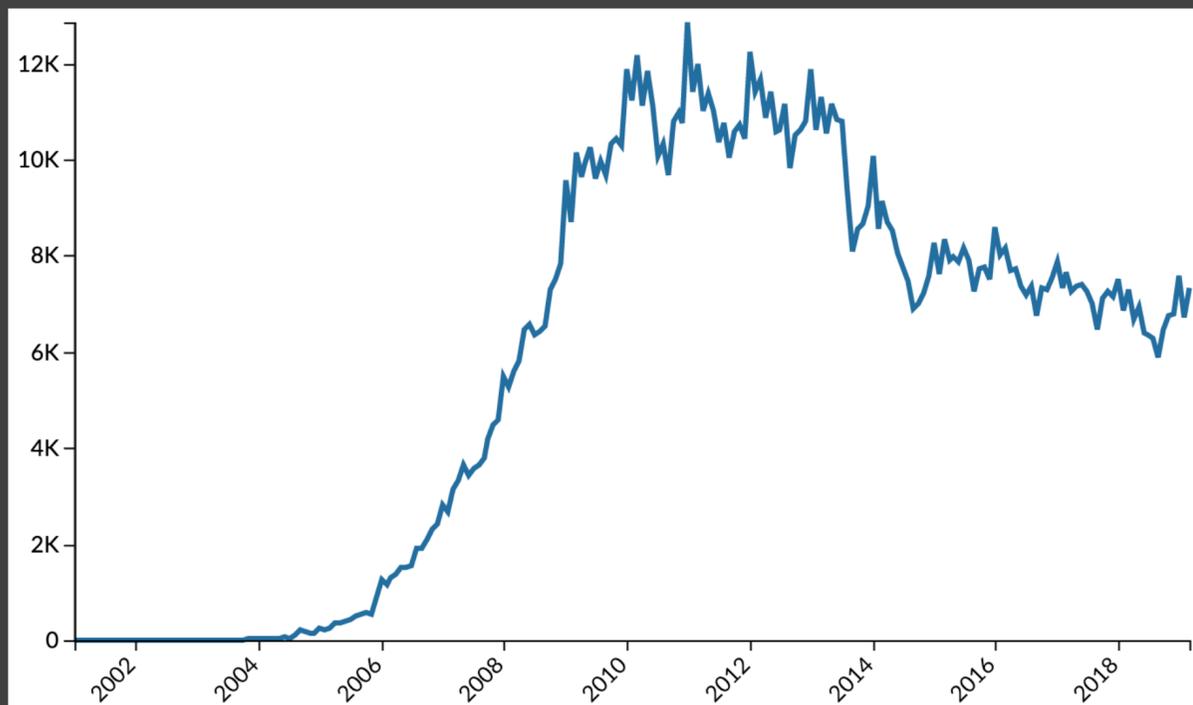


Japanese

So if it's not because they ran out of content, and it's not because they ran out of people...

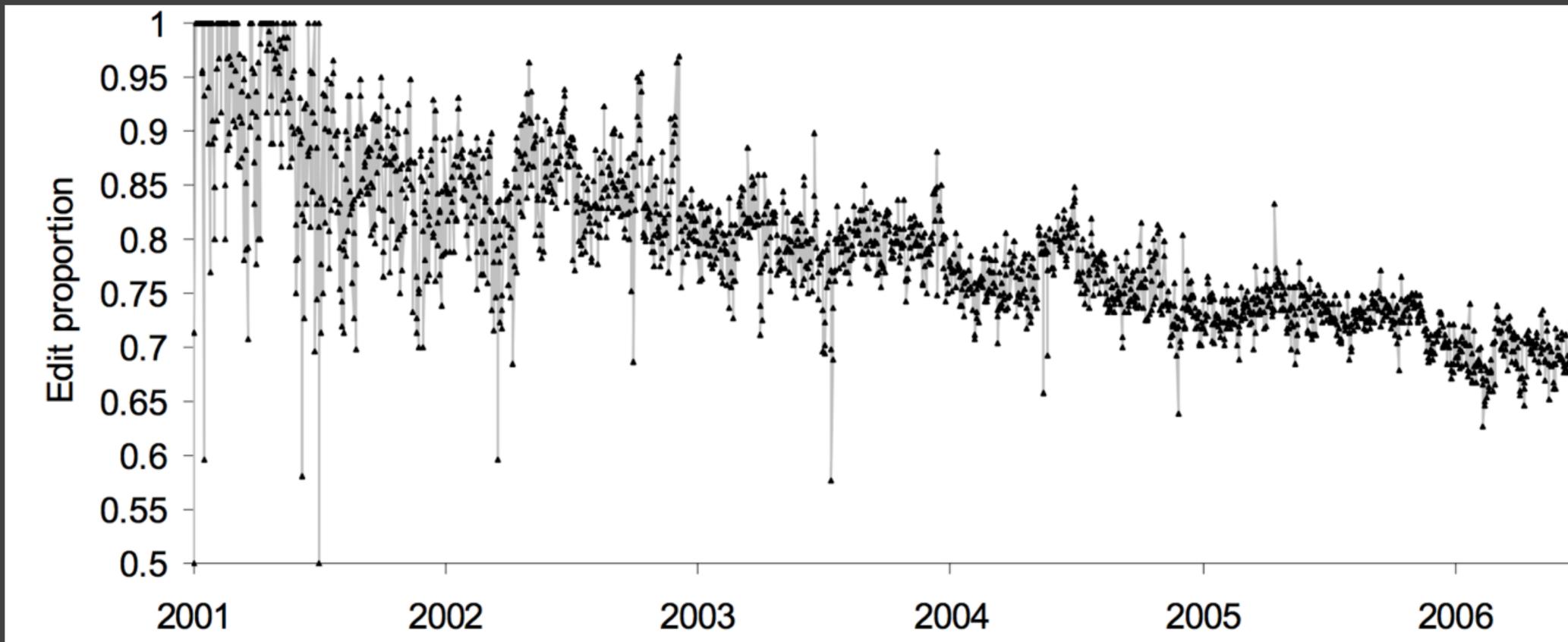


French

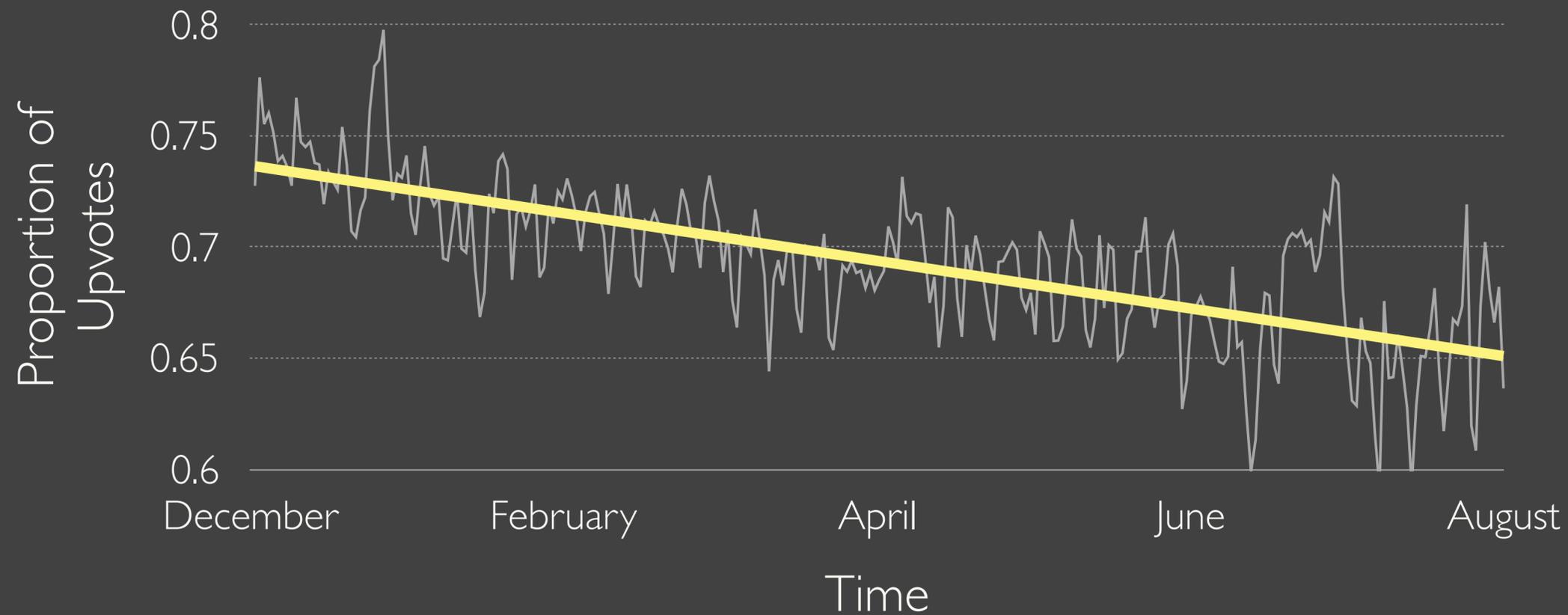


Spanish

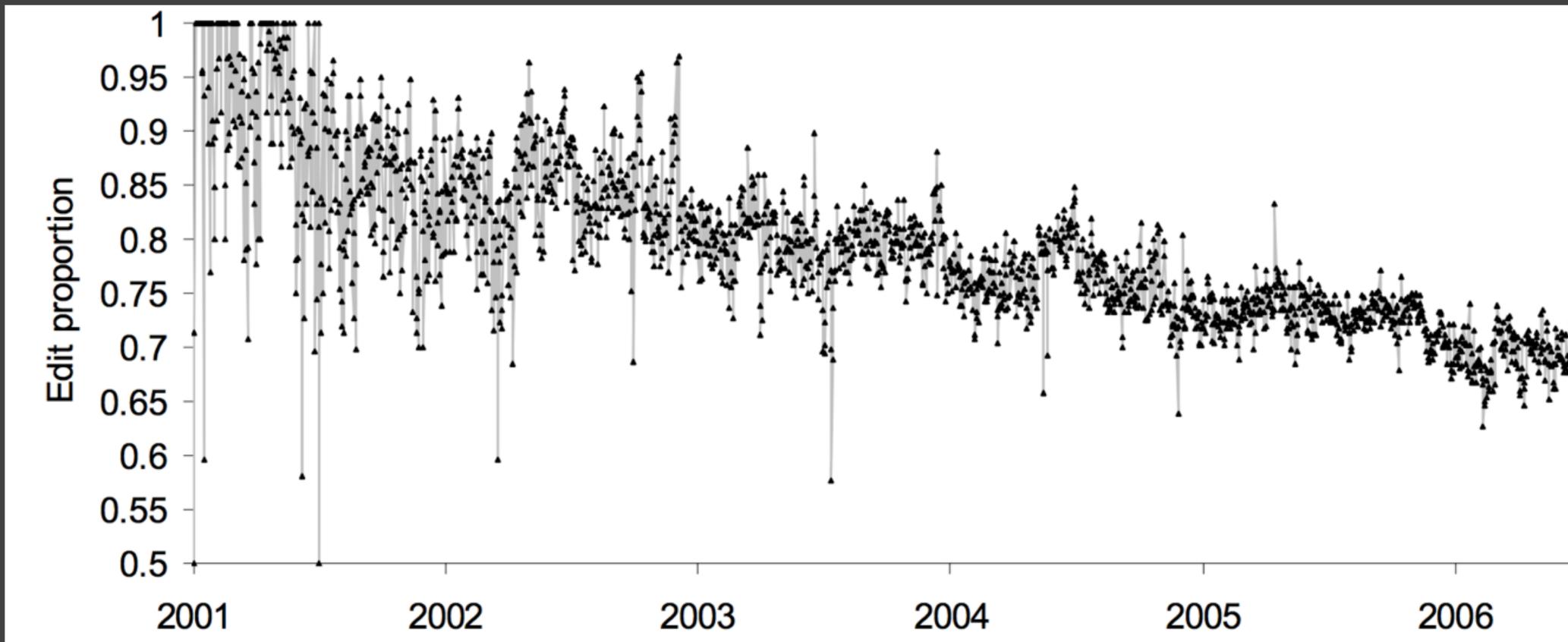
What happened?



Less and less of the editing is on the pages themselves; more and more in the discussion pages. [Kittur et al. 2007]

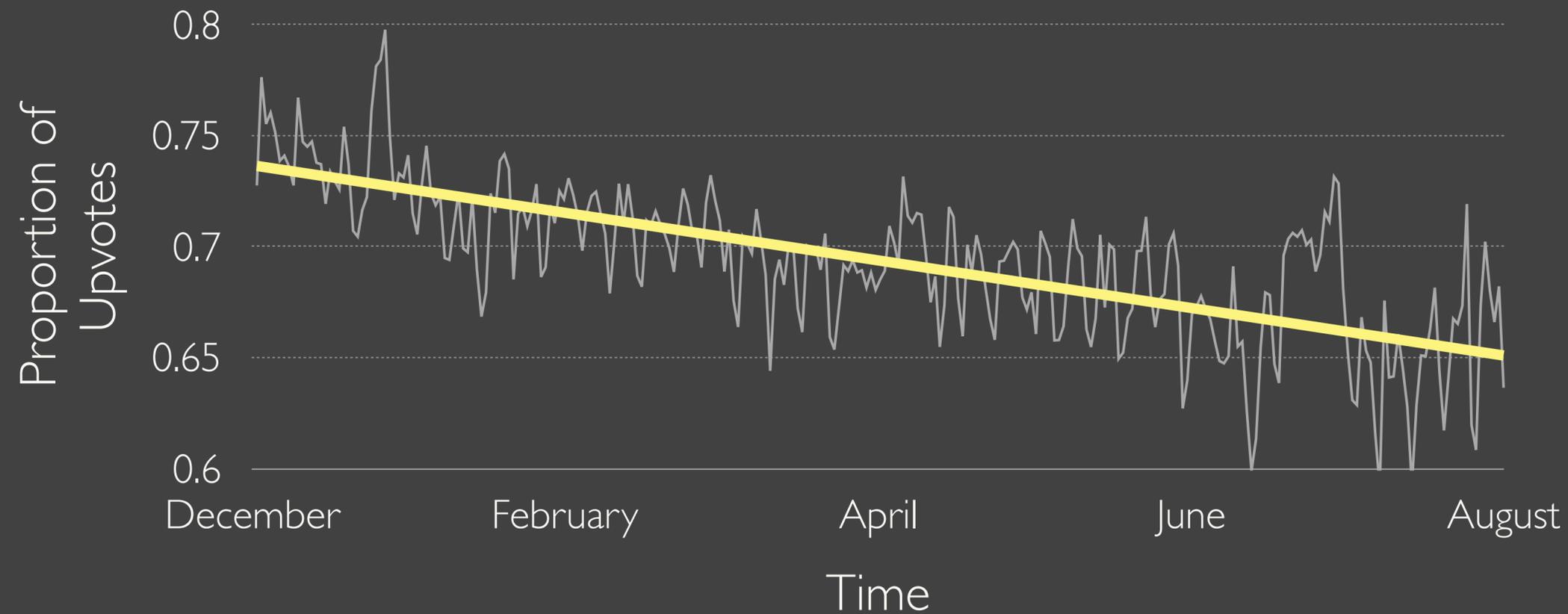


On CNN.com, the community is becoming more and more downvote-oriented over time [Cheng et al. 2017]



Do communities get worse as they grow?

Is this decline inevitable?



# Today: the challenge of growth

What changes about the dynamics of social computing systems as they grow?

What do you need to change, as a designer or community organizer, to keep a social computing system vibrant as it grows?

Topics today:

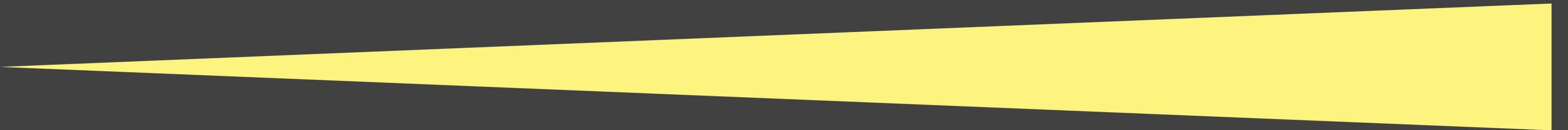
- Invisible labor and moderation

- Information overload and the economics of attention

- Techniques for designing for a global community

**What changes about a  
socio-technical system  
as it grows?**

# What happened?



Harvard  
undergraduates

# What happened?



Anyone with a  
college email address

# What happened?



International

# What happened?



What started out narrow,  
necessarily broadened. New members  
mean new norms, culture and contestation.

Myanmar military

# Broader participation exposes cultural rifts

**VICE** Watch Politics LGBTQ Drugs Opinion Photos Magazine   Vice Channels

## Why Are Trans People Being Banned from Tinder?

The dating app won't really explain why it keeps happening.

SHARE  TWEET 



Asset sources: Wikipedia Commons and provided photos

 **Tall-yuh**   
@Tahlia\_Rene 

Still waiting on @Tinder to unban me since i got banned after being reported for being trans. So much for “trans friendly.” Yalls 30 gender options don’t mean shit when trans people still get banned automatically because of how often cis straight men report us

 30 5:54 PM - Dec 2, 2017 

Cis straight men reporting female-identifying trans women: trans members get auto-banned

# Newcomers challenge norms

New members of the system are typically more energetic than existing members and also interested in a broader range of discussion than the community's current focus [Jeffries 2006]

Newcomers have not been enculturated: they don't know the norms of the system, so they are more likely to breach them [Kraut, Burke, and Riedl 2012]

...and, there are a lot of newcomers, with more constantly joining, exhausting the resources of the existing members.

# Result: Eternal September

**Eternal September**: the permanent destruction of a community's norms due to an influx of newcomers.

Usenet, the internet's original discussion forum, would see an influx of norm-breaking newcomers each September as college freshmen arrived on campus and got their first access to the internet.

In September 1993, America Online gave its users access to Usenet, flooding it with so many newcomers that it never recovered. It was the September that never ended: the Eternal September.

Have you ever read: "This was so much better when it was smaller"?

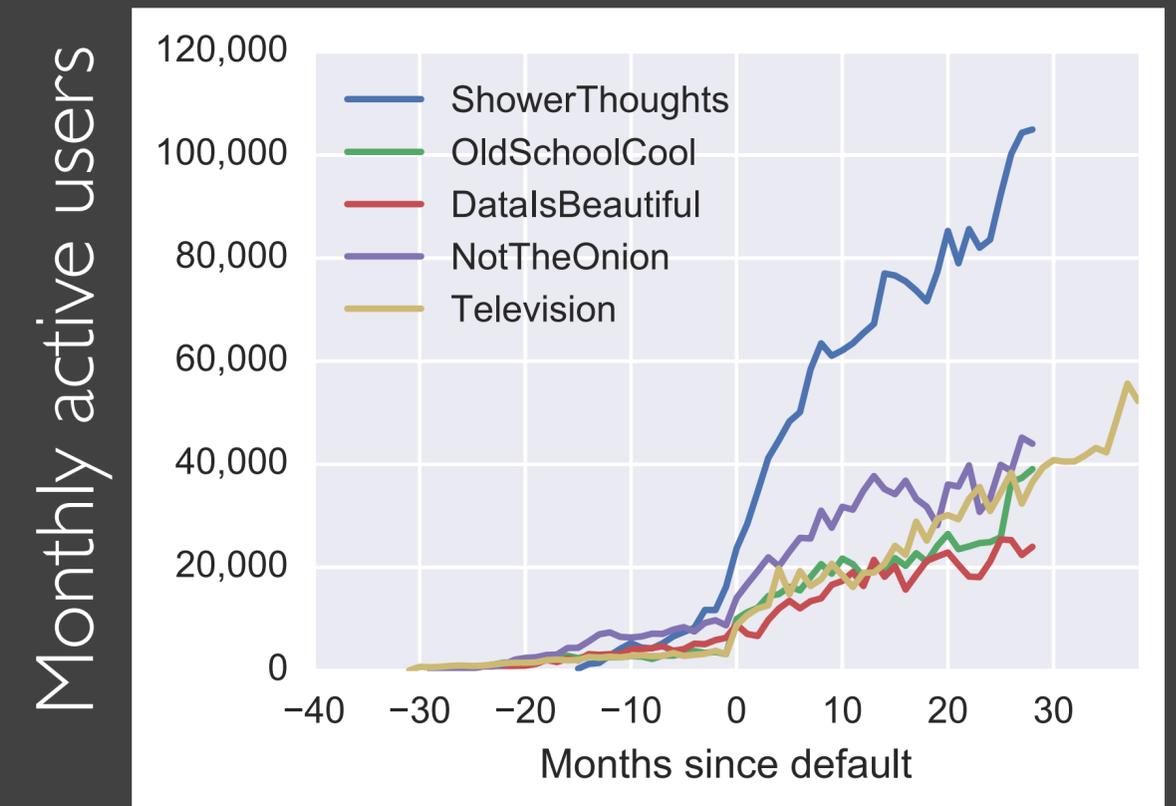
# Surviving an Eternal September

What allows a community to stay vibrant following a massive surge in user growth?

Classic case: small subreddits getting defaulted — added to the default set for new Reddit users

Success required: [Kiene, Monroy-Hernandez, Hill 2016; Lin et al. 2017]

- 1) Strong moderation
- 2) Increased underprovision of attention



Let's unpack these each in turn

# Invisible labor and moderation

# Scale does not come free.

To survive massive growth, moderators must step up their efforts to shepherd behavior toward the community's desired norms.

- Removing off-content and rule-breaking content

- Banning persistent rule breakers

- Updating rules and handling angry flare-ups

# Invisible labor

[Star and Strauss 1999]

Invisible labor is a term drawn from studies of women's unpaid work in managing a household, emphasizing that what the women do is labor in the traditional sense, but is not recognized or compensated as such.

Examples of invisible labor in social computing systems:

- Moderation

- Paid data annotation [Irani and Silberman 2013; Gray and Suri 2019]

- Server administration

# Example: Facebook



Facebook's headquarters in Menlo Park.  
Jason Henry for The New York Times

## ***Inside Facebook's Secret Rulebook for Global Political Speech***

Under fire for stirring up distrust and violence, the social network has vowed to police its users. But leaked documents raise serious questions about its approach.



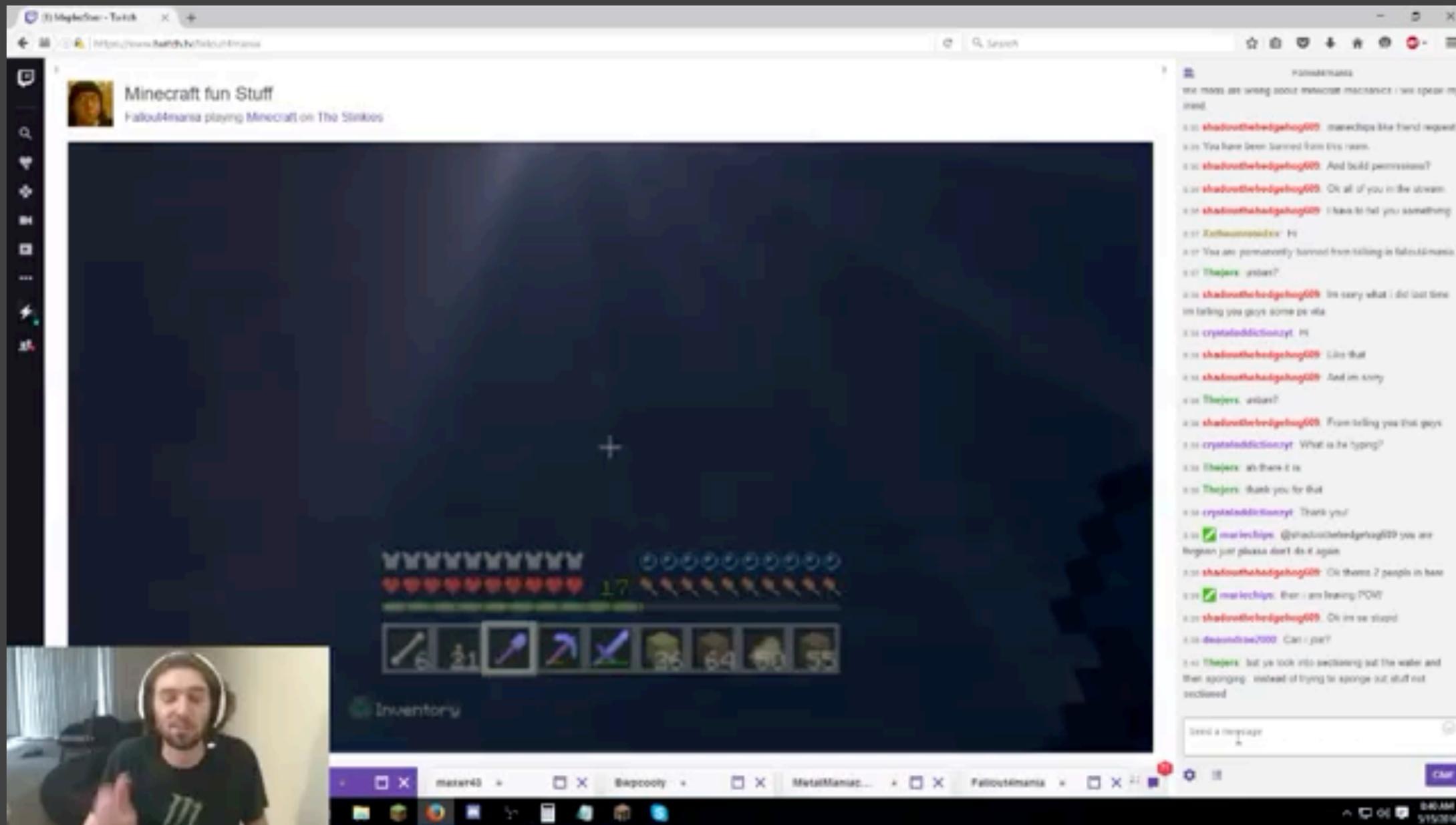
FACEBOOK

## **The Impossible Job: Inside Facebook's Struggle to Moderate Two Billion People**

Moderating billions of posts a week in more than a hundred languages has become Facebook's biggest challenge.

Moderators are responsible for:  
Removing violent content, threats, nudity, and other content breaking TOS

# Example: Twitch



Moderators are responsible for:  
Removing comments,  
banning users in real time

# Example: Reddit



engadget

Unpaid and abused: Moderators speak out against Reddit

Keeping Reddit free of racism, sexism and spam comes with a mental health risk.

The screenshot shows the Engadget website header with the logo and a search icon. Below the header is a grid of ten profile pictures of various people, some of whom are moderators. The main headline reads "Unpaid and abused: Moderators speak out against Reddit" and the sub-headline says "Keeping Reddit free of racism, sexism and spam comes with a mental health risk."



BUSINESS INSIDER

## For whom the troll trolls: A day in the life of a Reddit moderator

Kim Renfro, Tech Insider  
Jan. 13, 2016, 12:27 PM



Kim Renfro/Tech Insider

Liz Crocker is a 33-year-old graduate student and the mother of a one-year-old. Her days are spent writing a dissertation, teaching a course to PhD students at Boston University, looking after her child, and — oh yeah — dealing with internet trolls.

The screenshot shows a Business Insider article. The header includes the Business Insider logo and a search icon. The main headline is "For whom the troll trolls: A day in the life of a Reddit moderator". Below the headline is the author's name "Kim Renfro, Tech Insider" and the date "Jan. 13, 2016, 12:27 PM". There are social media sharing icons for Facebook, a link icon, and a more options icon. The main image shows a woman with glasses and a red shirt sitting at a desk in a library, working on a computer. Below the image is the caption "Kim Renfro/Tech Insider" and the first paragraph of the article: "Liz Crocker is a 33-year-old graduate student and the mother of a one-year-old. Her days are spent writing a dissertation, teaching a course to PhD students at Boston University, looking after her child, and — oh yeah — dealing with internet trolls."

Moderators are responsible for:

- Removing content that breaks rules
- Getting rid of spam, racism and other undesirable content

# Example: AO3

Even in systems like Archive of Our Own that are light on moderation, content debates rage.

**THE VERGE**

CULTURE

## THE ONLINE FREE SPEECH DEBATE IS RAGING IN FAN FICTION, TOO

*The conversation is as old as fan-fic itself*

By [Elizabeth Minkel](#) | Nov 8, 2018, 9:41am EST

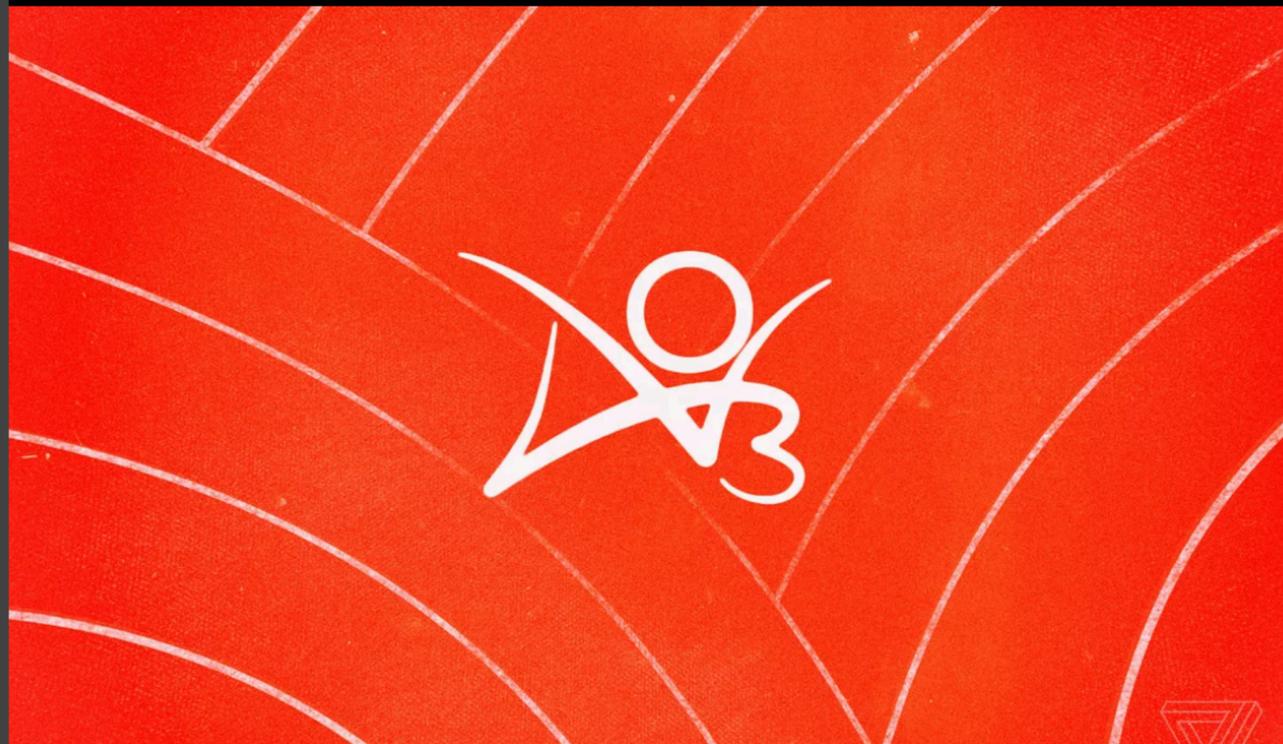
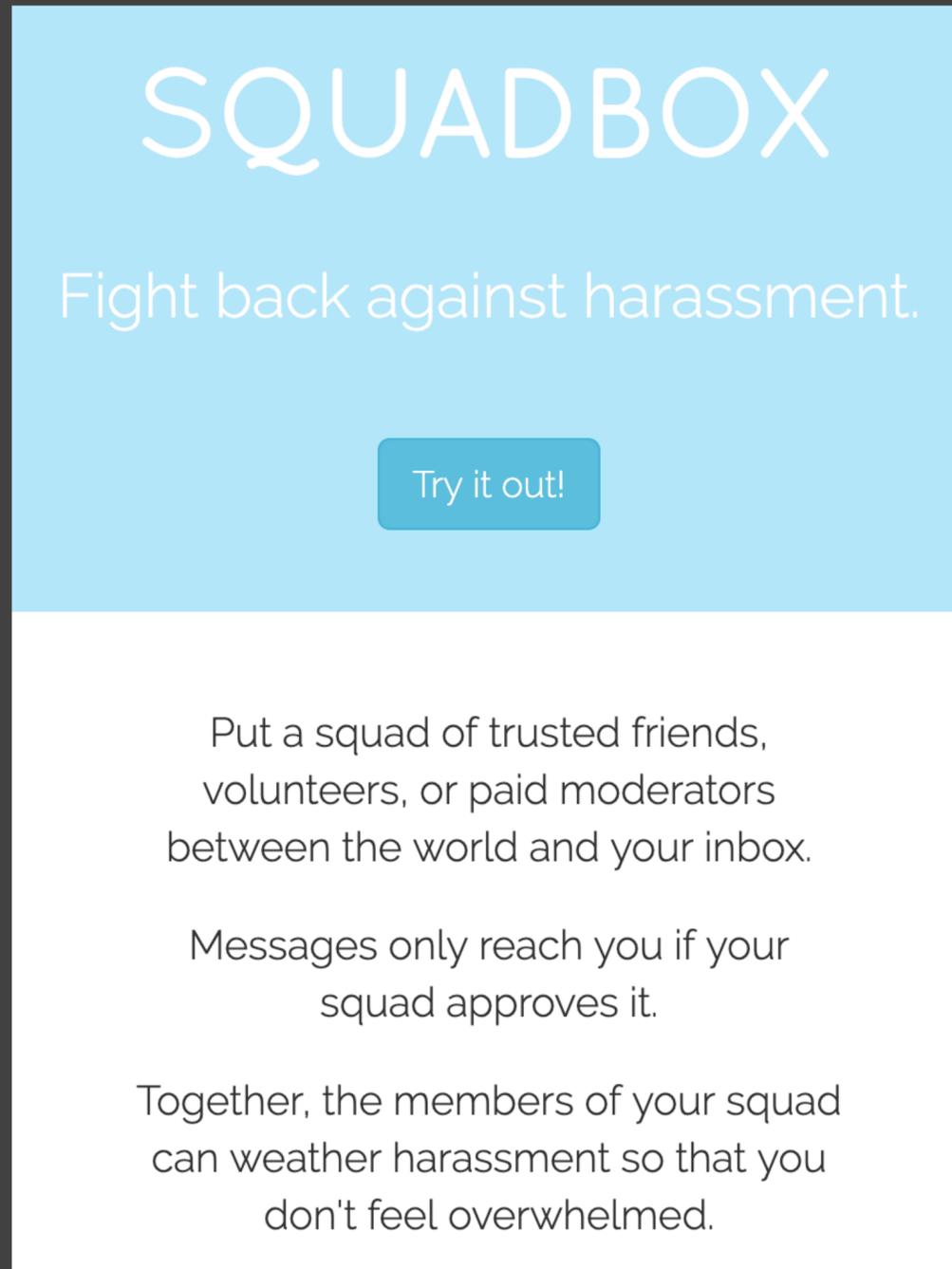


Illustration by Alex Castro / The Verge

# Example: Email

[Mahar, Zhang, and Karger 2018]



**SQUADBOX**

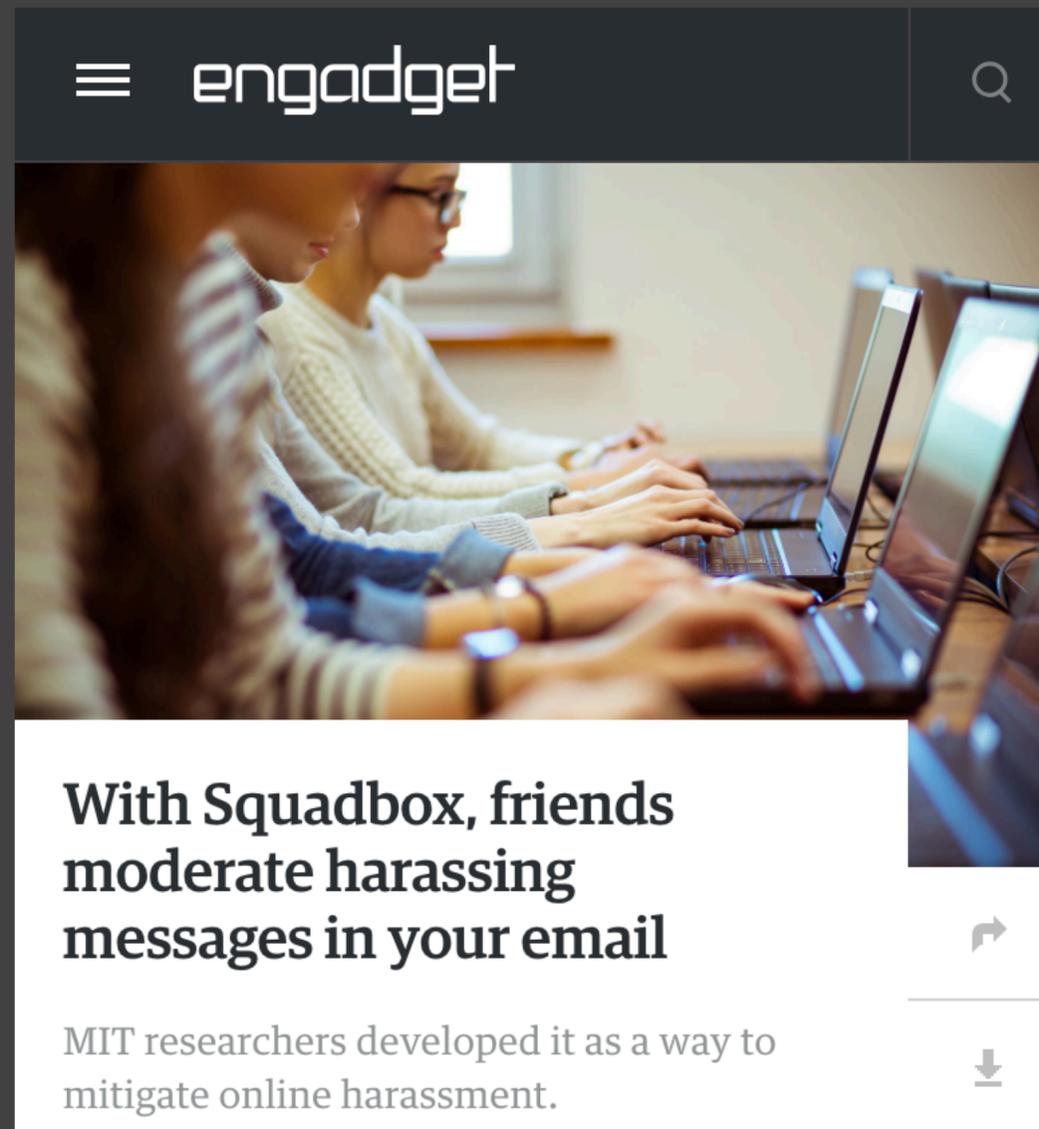
Fight back against harassment.

Try it out!

Put a squad of trusted friends, volunteers, or paid moderators between the world and your inbox.

Messages only reach you if your squad approves it.

Together, the members of your squad can weather harassment so that you don't feel overwhelmed.



engadget

**With Squadbox, friends moderate harassing messages in your email**

MIT researchers developed it as a way to mitigate online harassment.

Friends intercept email before it makes its way to your inbox

# Why is the labor invisible?

Because all that most people see when they arrive is the results of the curation, not the curation happening. When was the last time you saw Facebook's army of moderators change the content of your feed?

The invisible nature of this labor makes moderation feel thankless, and the content that mods face can prompt PTSD and emotional trauma. <3 your mods.

# Moderation's result

It works.

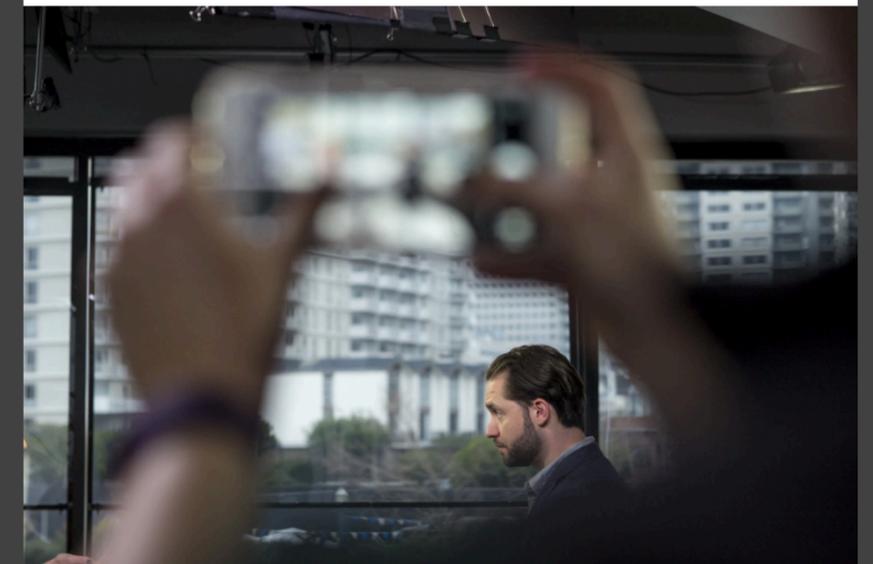
Moderating content or banning substantially decreases negative behaviors in the short term on Twitch. [Seering 2017]

Reddit's ban of /r/CoonTown and /r/fatpeoplehate due to violations of anti-harassment policy succeeded: accounts either left entirely, or migrated to other subreddits and drastically reduced their hate speech.

[Chandrasekharan et al. 2017]

## THE SHIFT

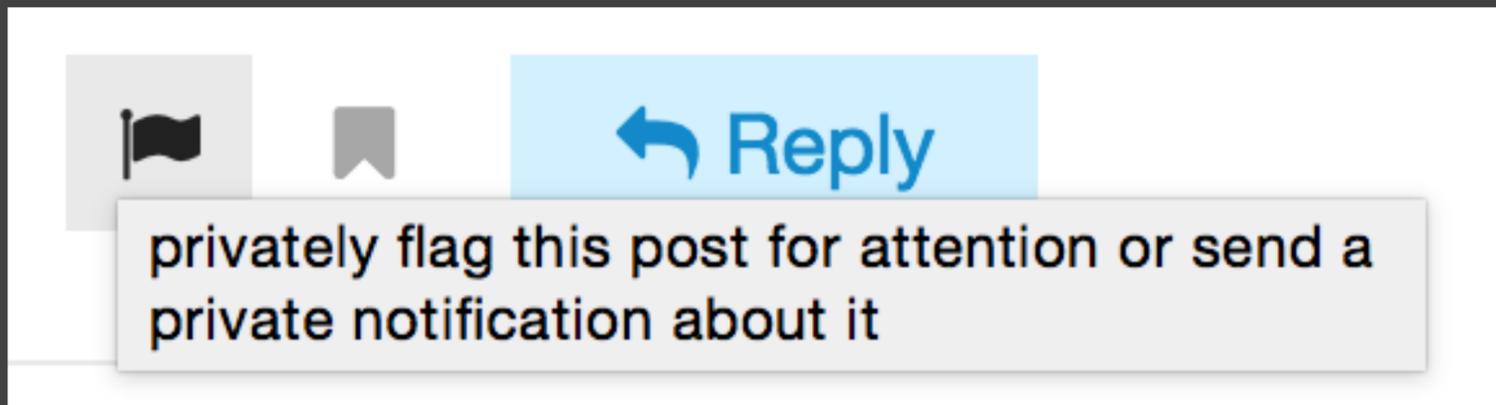
***Reddit Limits Noxious Content by Giving Trolls Fewer Places to Gather***



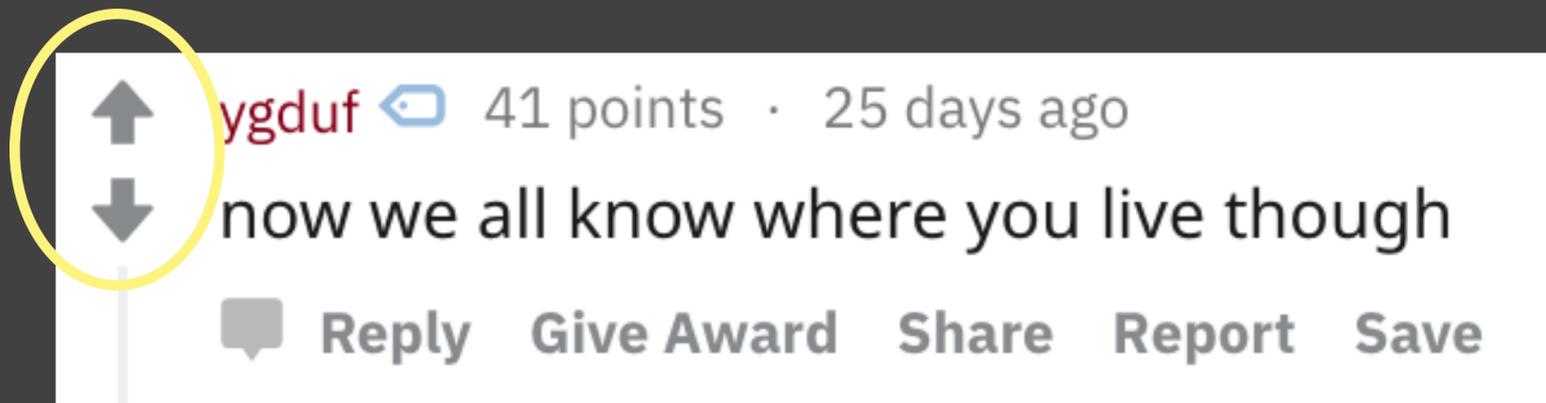
Alexis Ohanian, a founder of the website, which banned several forums in 2015 as part of a broad crackdown on poisonous behavior. David Paul Morris/Bloomberg

# Moderation design: community moderation

Community feedback: up/downvotes, flagging



Discourse



Reddit

# Moderation design: mod bots

Tools that help facilitate moderator decisions by automatically flagging problematic posts, and providing relevant information.

3	Whitman massacre
!	Neighborhoods of Sioux City, Iowa
!	M. T. Ramesh
	Neighborhoods of Sioux City, Iowa
	2019 Sudanese coup d'état
	Neighborhoods of Sioux City, Iowa
	Neighborhoods of Sioux City, Iowa
	MacArthur Park (song)
	Batesville High School (Arkansas)
4	Wabbit Twouble
	Erin, Ontario
1	Morgantown High School
	Farmers' suicides in India
1	Math Field Day

Wikipedia  
Huggle

Reddit  
AutoModerator

[-] AutoModerator [M] [score hidden] 7 hours ago - STICKIED COM

## Attention! [Serious] Tag Notice

- Jokes, puns, and off-topic comments are not permitted in **any** comment, parent or child.
- Parent comments that aren't from the target group will be removed, along with their child replies.
- Report comments that violate these rules.

Posts that have few relevant answers within the first hour, and posts that are not appropriate for the [Serious] tag will be removed. Consider doing an AMA request instead.

# Moderation design:



Whoa. Check out this crazy paper artwork

## just-in-time norm reminders

Recommend a great YouTube video

videos

Can I log in with Google and forum log in too?

discourse

What's the coolest thing you have worked on?

Can I find stuff while writing replies?

discourse

How can I make a post Wiki?

discourse

What is a onebox?

discourse

Favorite TV show scene?

videos

Is the Second Amendment still relevant today?

	3	261	Sep '15
	4	290	Sep '15
	3	223	Sep '15
	3	227	Sep '15
	2	231	Sep '15
	1	109	Sep '15
	10	355	Jul '15
	5	312	Jun '15
	21	145	May '15

# Moderation design: just-in-time norm reminders

Posts Physical ▾ Life ▾ Social ▾ Applied ▾ Other ▾

VIEW    | SORT  HOT ▾

↑  
15.9k  
↓  
Posted by u/JJ\_2016  8 hours ago

**Health** Study found 47% of hospitals had linens contaminated with pathogenic fungus. Results suggest hospital linens are a source of hospital acquired infections

[jwatch.org/na4861...](http://jwatch.org/na4861...) 

 849 Comments  Give Award  Share ...



## COMMUNITY DETAILS



r/science

21.1m  
Members

7.5k  
Online

This community is a place to share and discuss new scientific research. Read about the latest advances in astronomy, biology, medicine, physics, social science, and more. Find and submit new publications and popular science coverage of current research.

JOINED

↑  
1.4k  
↓  
Posted by u/mvea MD-PhD-MBA | Clinical Professor/Medicine  6 hours ago

**Health** The opioid epidemic may have cost US state and federal governments up to \$37.8 billion in lost tax revenue due to opioid-related



# Moderation design: hellbanning

When people know that they're banned, they create new accounts and try to game the system.

Instead, ban them into one of the “circles of hell”, where their comments are only able to be seen by other people in the same circle of hell.

The trolls feed the trolls.

# Information overload and the economics of attention

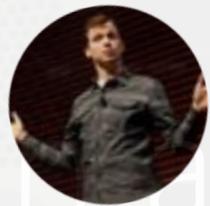
“In an information-rich world, the wealth of information means a dearth of something else: a scarcity of whatever it is that information consumes.

What information consumes is rather obvious: it consumes the attention of its recipients.” - Herb Simon, 1971

“I can information- the  
obvious: it consumes the attention of  
recipients.”

“What information comes that information  
arcity of  
Song by Jesse P:  
<https://youtu.be/FtBiU4se6WY>

“Welcome back, Michael!  
Here's what's trending on Pinterest.  
Which topic do you want to explore next?”



2:20

Wednesday, January 25

SEEKRIT MESSENGER

5m ago

OMG PROFESSOR BERNSTEIN KNOWS YOU ARE  
LOOKING AT UR PHONE

Slide for more

YouTube

FoHo #77: ASSU ELECTIONS CONTROVERSY; FOHO  
ENDORSES ASSU CANDIDATES

WHY I DIDN'T CHOOSE HARVARD

\*EMOTIONAL\*

Chat Replay is disabled for this Premiere.

SAFETY SCHOOL (Harvard Diss Track)

39,153 views

3.1K

77

SHARE

SAVE

...



The Stanford Fleet Street Singers  
Premiered Apr 1, 2019

Answer · Stanford Computer Science

**I am a current Stanford CS theory/pure math undergrad. I eventually want to become a professor at Stanford. How can I achieve that goal?**



Keith Winstein, assistant professor  
Answered Nov 4, 2016 · Upvoted by He Ren, studied at Stanford University

- Talk to some of your current professors and ask them! Most Stanford professors are friendly, especially if you come during office hours. Consider doing CurIS or otherwise getting involved in resear...

(more)



Donald J. Trump @realDonaldTrump · 6h  
Love people who are great under pressure. What a fantastic life comeback for a really great guy!



CC @ChatByCC

Replying to @realDonaldTrump @TheMasters  
@TigerWoods

Congratulations to President Trump's friend Tiger Woods on winning The Masters!

7.5K



18K



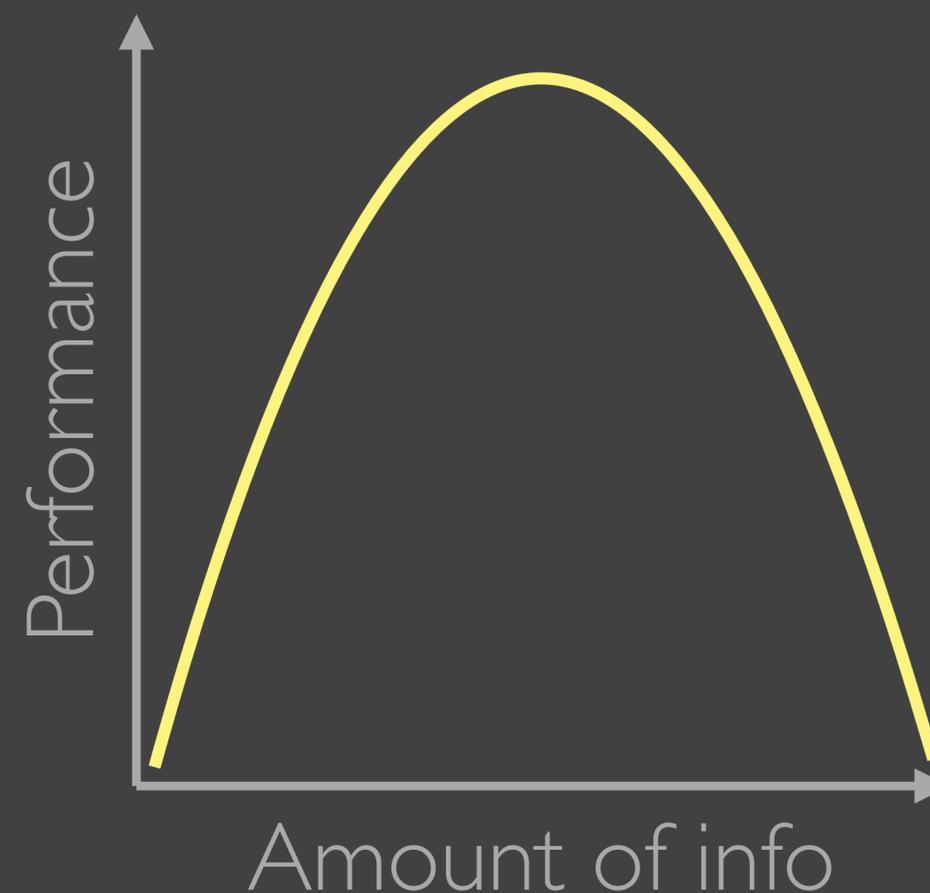
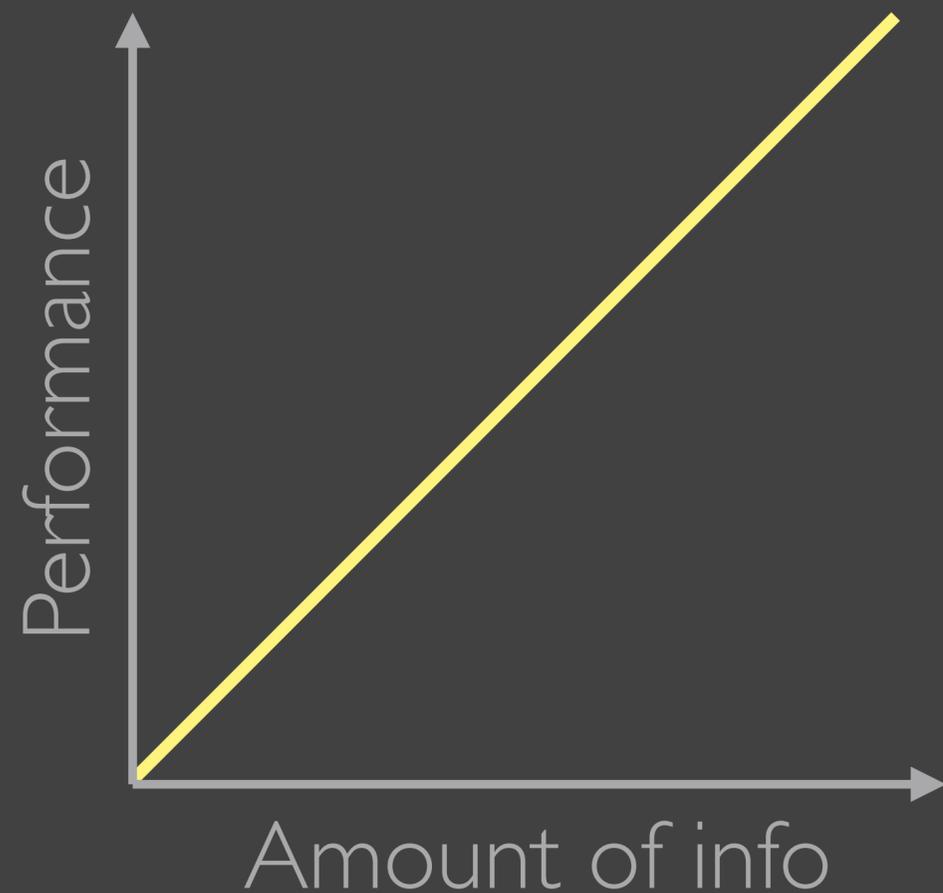
99K



# What's the relationship between information and performance?

Humans as information processors

Yerkes-Dodson law

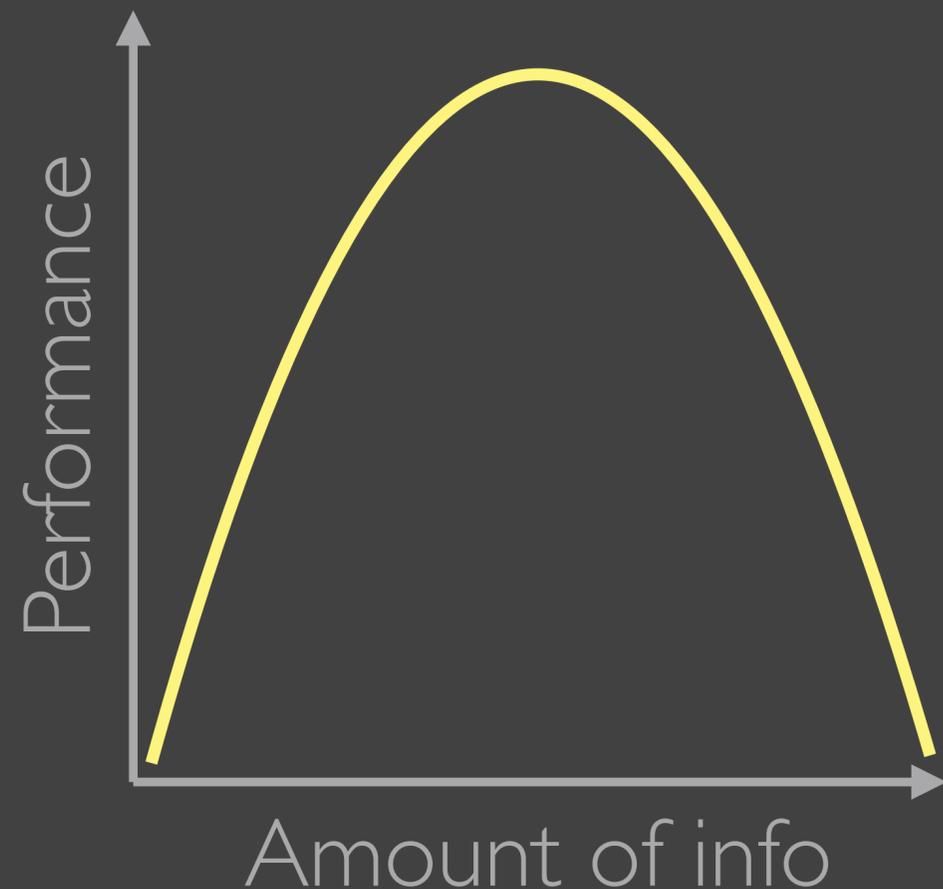


More information = higher performance

Too much information overloads us

# Information overload

Human decision making performance improves with more content and information, but past a saturation point, it decreases.



# Information overload causes attention underprovision

As Usenet groups grow in size, members (1) respond to simpler messages, (2) generate simpler responses, and (3) are more likely to leave. [Jones, Ravid, and Rafaeli 2004]

As a subreddit gets larger, its users cluster their comments around a smaller and smaller proportion of posts [Lin et al. 2017]

Fewer than half of Reddit's most popular links get noticed and upvoted the first time they were submitted to the site [Gilbert 2013]

# Designing for info overload

## Ranking

Unintuitive mental model, but when right, a front page is helpful

Facebook  
Twitter (top)  
Pinterest

Instagram  
Reddit  
Spotify

## Chronological



Simple mental model but spammy accounts can dominate

Twitter  
Email  
Slack

iMessage  
WhatsApp  
Twitch

# Designing for info overload

## Ranking

Unintuitive mental model, but when right, a front page is helpful

## Chronological



Simple mental model but spammy accounts can dominate

How do you think a system should be directing attention in an overloaded community? [2min]

# Techniques for designing for a global community

# How do you test new ideas?

How do you A/B test new ideas, when there's no easy way to bucket people into group A or B? Everyone's connected...

The most common answer is **country comparisons**, where versions are launched to different countries that have similar properties.

e.g., launch one version in New Zealand and another in Australia

Want an advanced answer? Go chat with Johan Ugander in MS&E:

**Graph Cluster Randomization:  
Network Exposure to Multiple Universes**

# How do you build empathy?

How can you build empathy with a huge number of communities?  
How do you prevent yourself from designing for your own prototypical user?

One approach successfully used in product teams: show user videos to engineers

Bring in stakeholder groups for participatory design

Don't assume you can. Instead, create local governance (e.g., subreddits) and be responsive to it.

# But more than those...

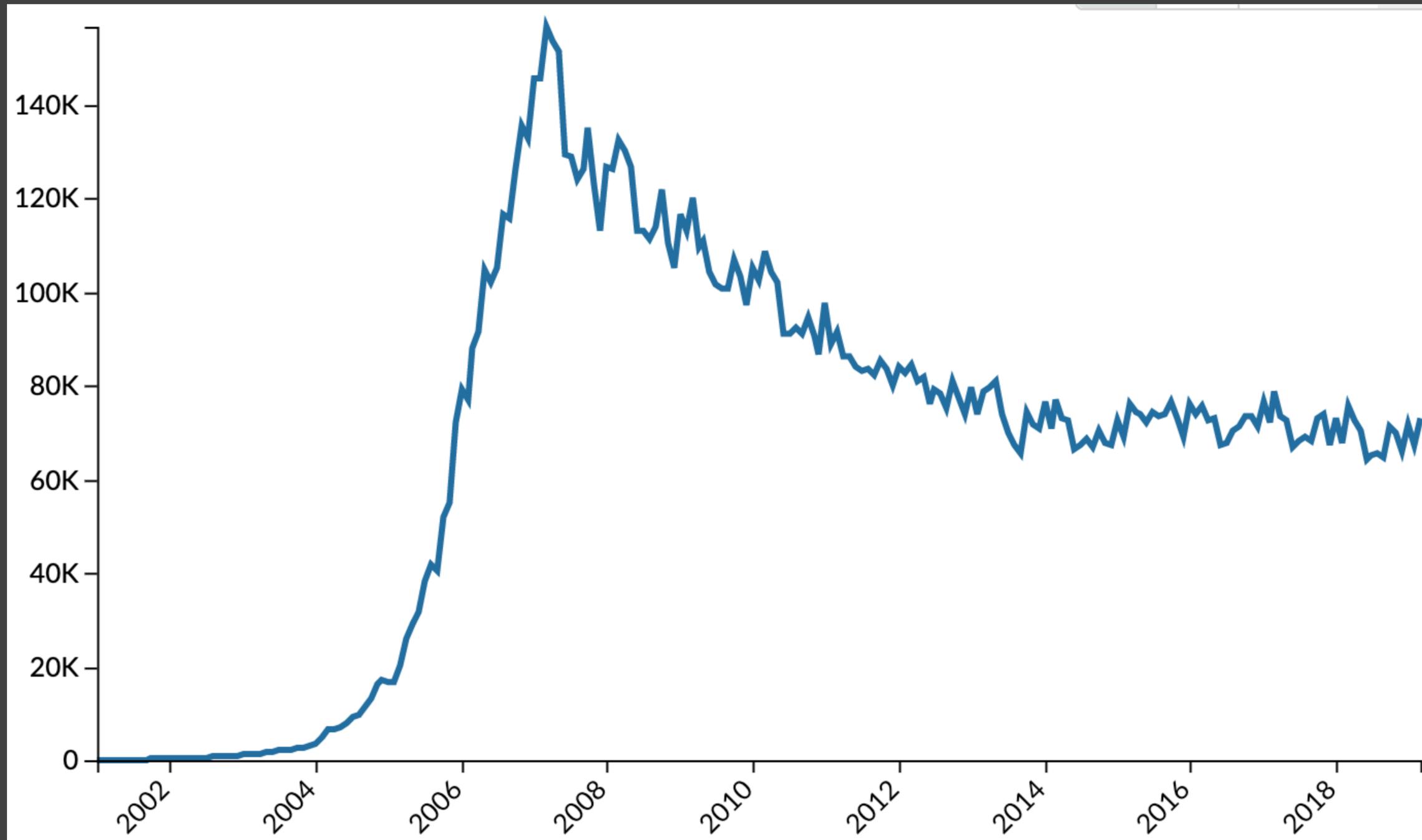
Michael suggests that first, rather than building new features, focus on tools that support the community and its ability to stay upright.

This means tools for recognizing and supporting the invisible labor of moderation and enculturating newcomers.

This means tools for empowering users to manage overwhelming amounts of content.

**Back to the beginning**

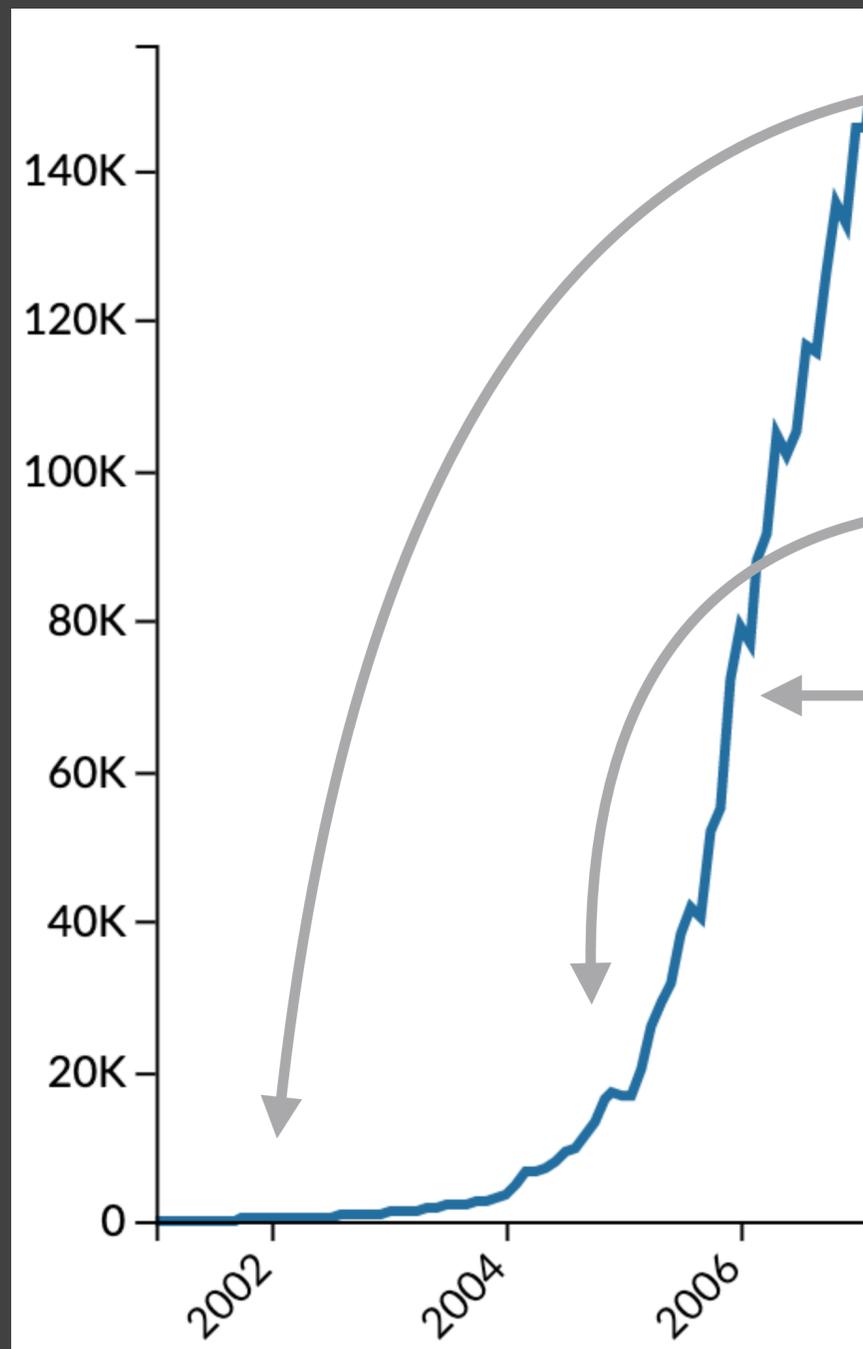
# Wikipedia's growth and decline



Returning to the original question:

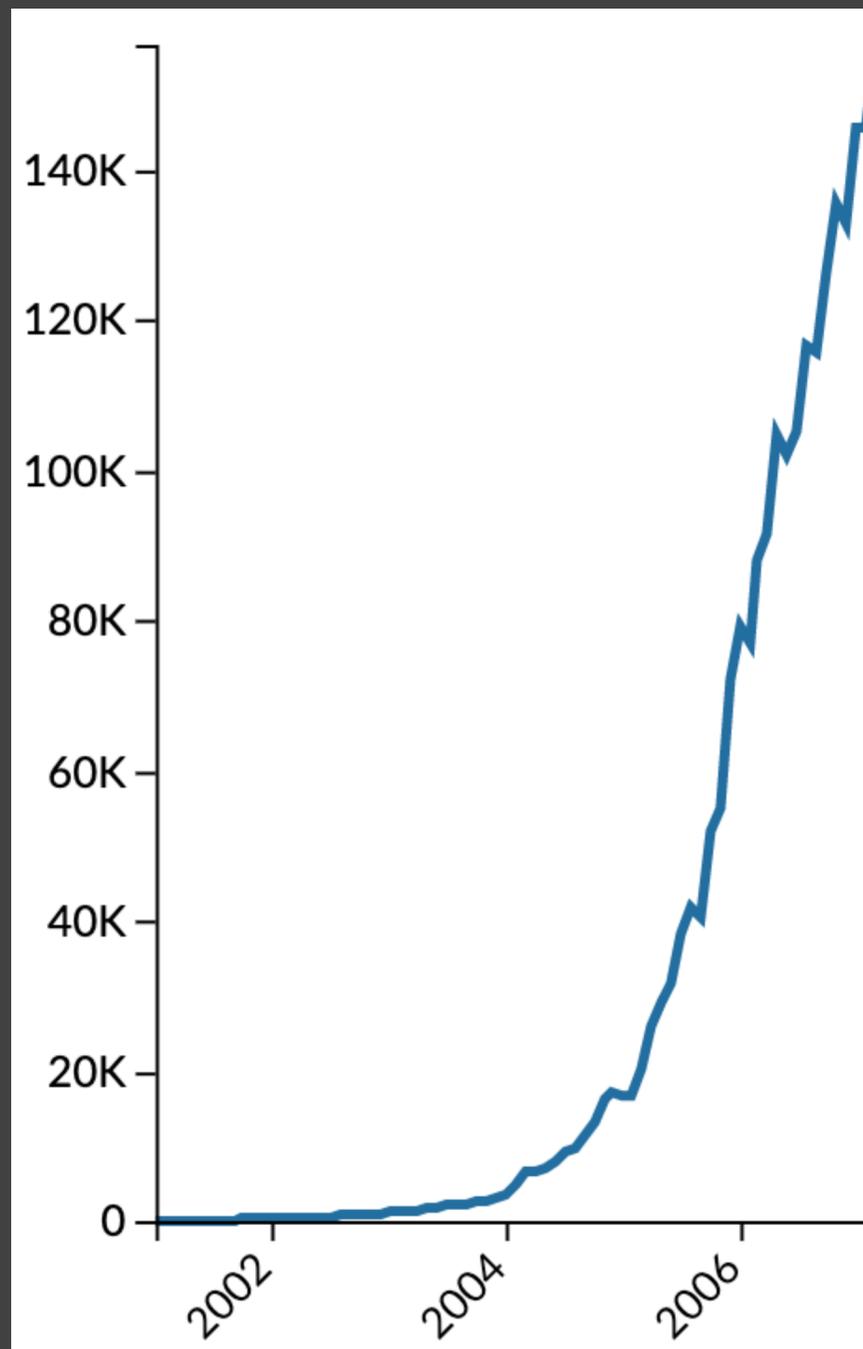
What happened?

# Growing pains [Halfaker et al. 2012]

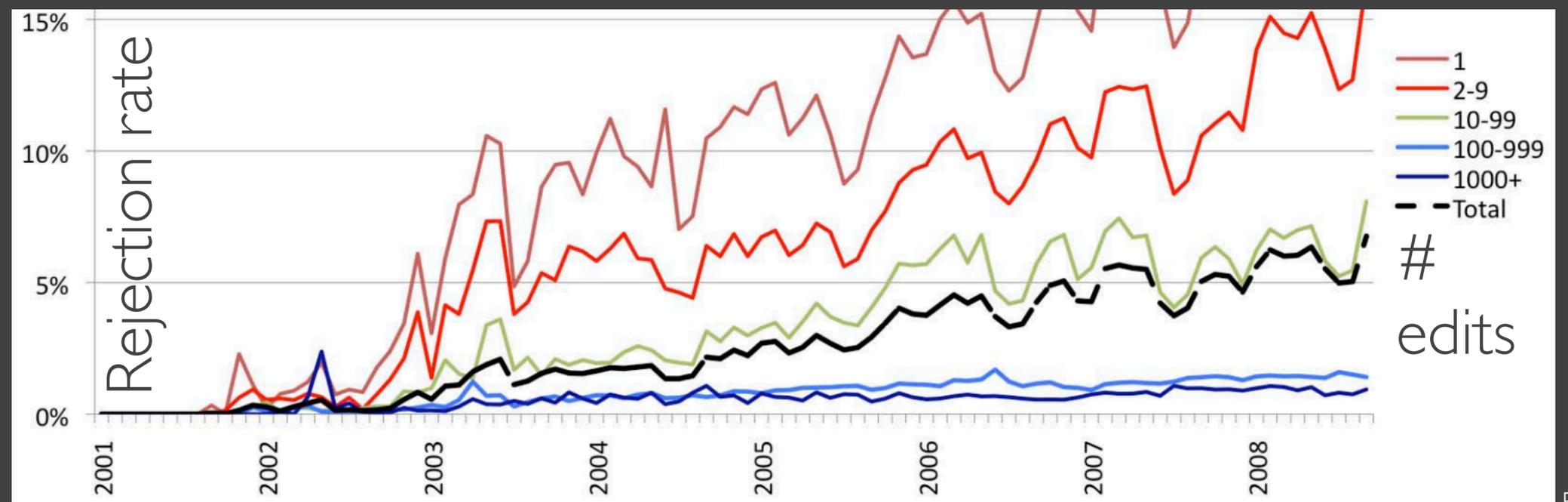


1. Wikipedia starts small, with little moderation needed and strongly motivated contributors
2. The formula works — Wikipedia grows
3. As Wikipedia grows, the percentage and volume of low-quality contributions rises, creating strain on the reputation of Wikipedia and invisible labor for the Wikipedia editors

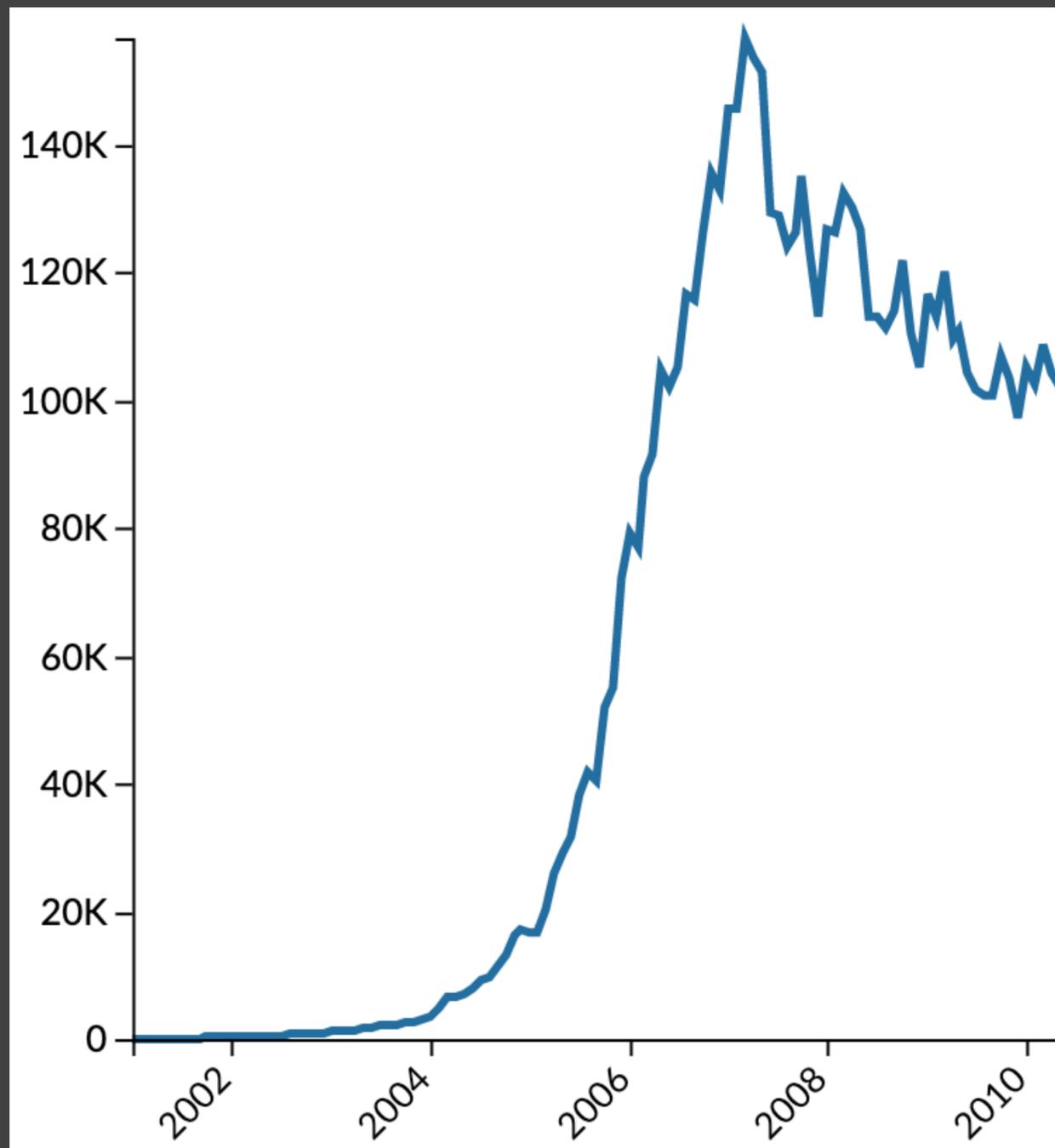
# Growing pains [Halfaker et al. 2012]



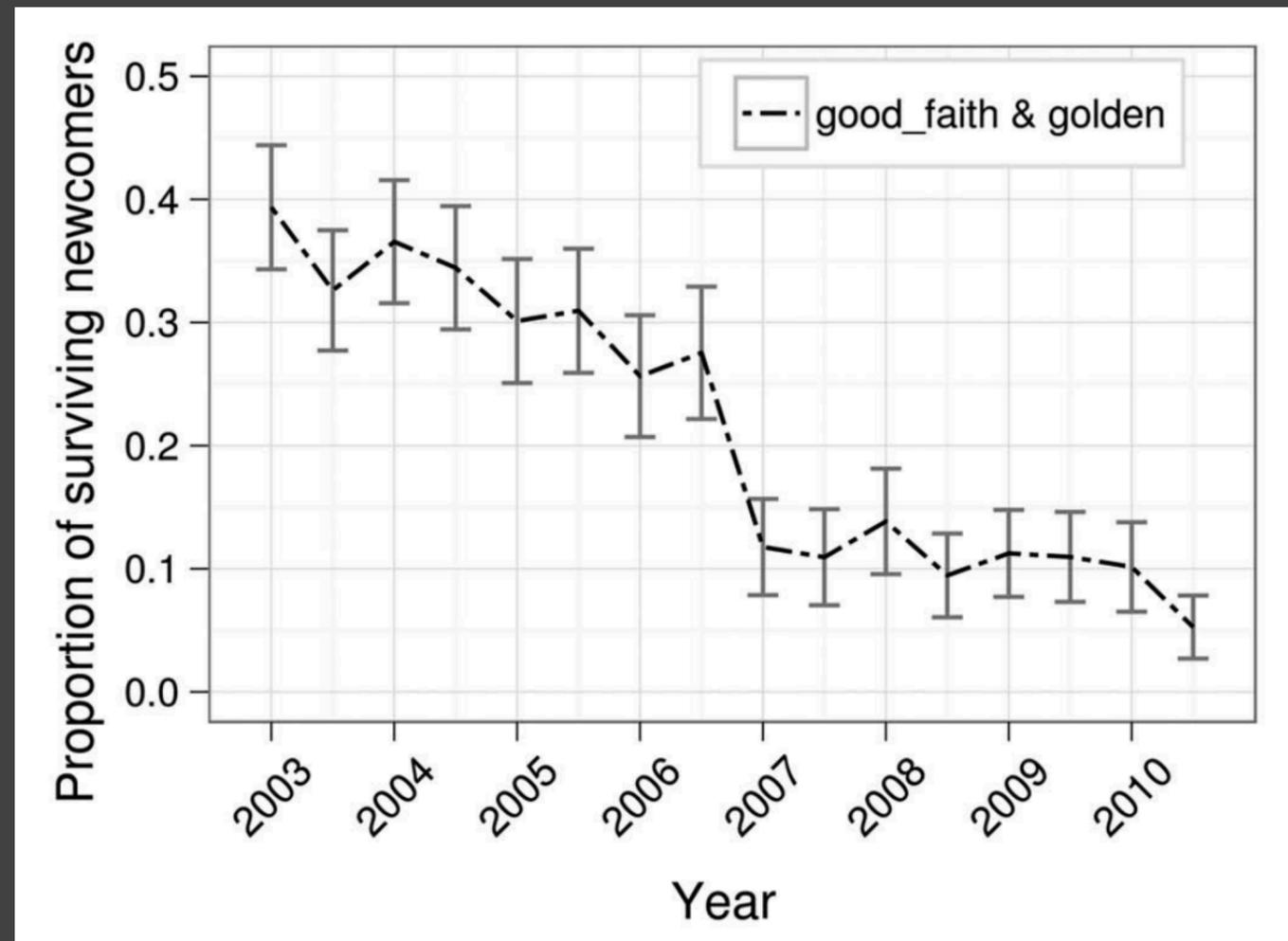
4. To manage the strain, Wikipedia admins stem the tide: they reject more contributions and create bots and tools to help them quickly revert bad work. [Suh et al. 2009]



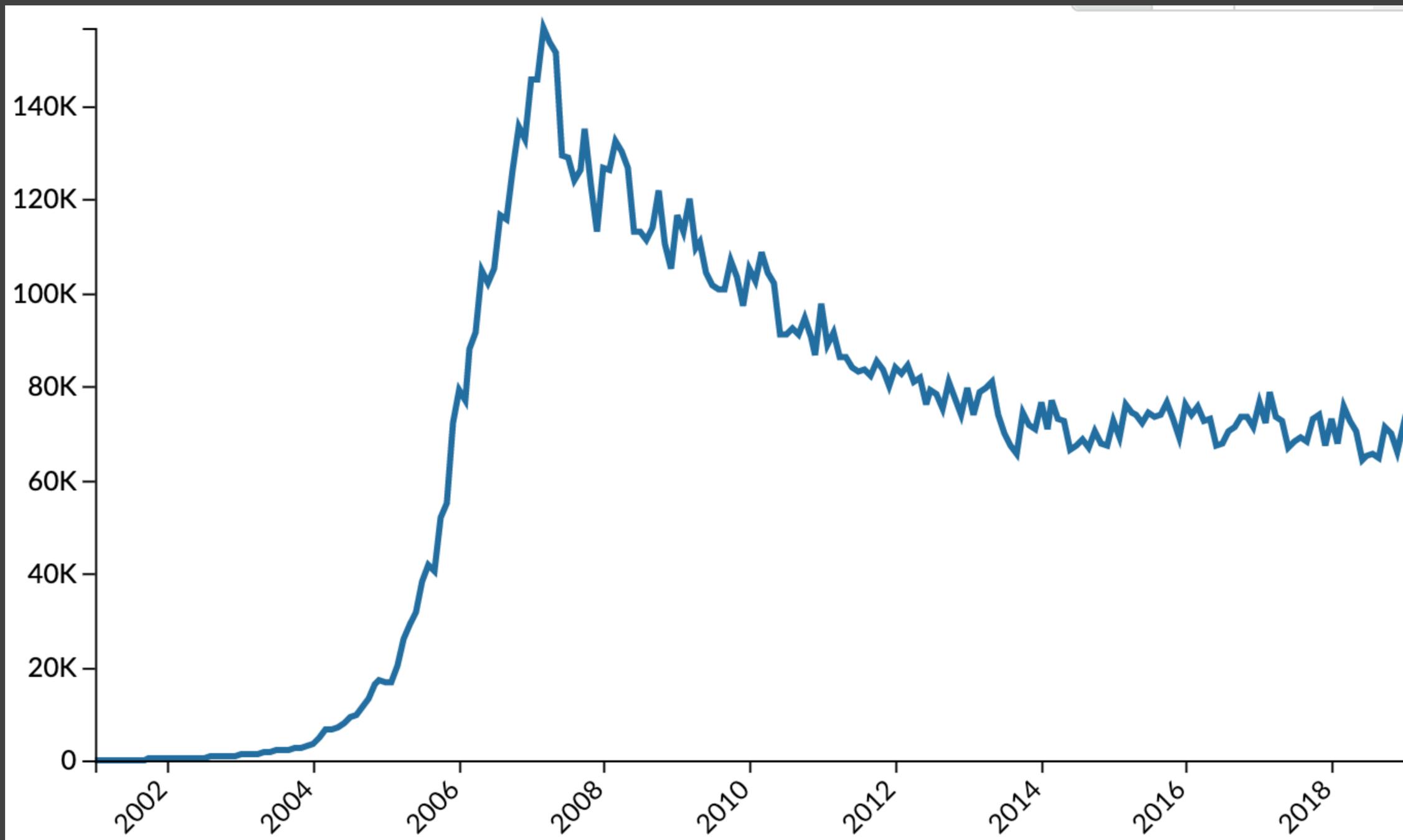
# Growing pains [Halfaker et al. 2012]



5. The increased rejections lead to newcomers less likely to stay.



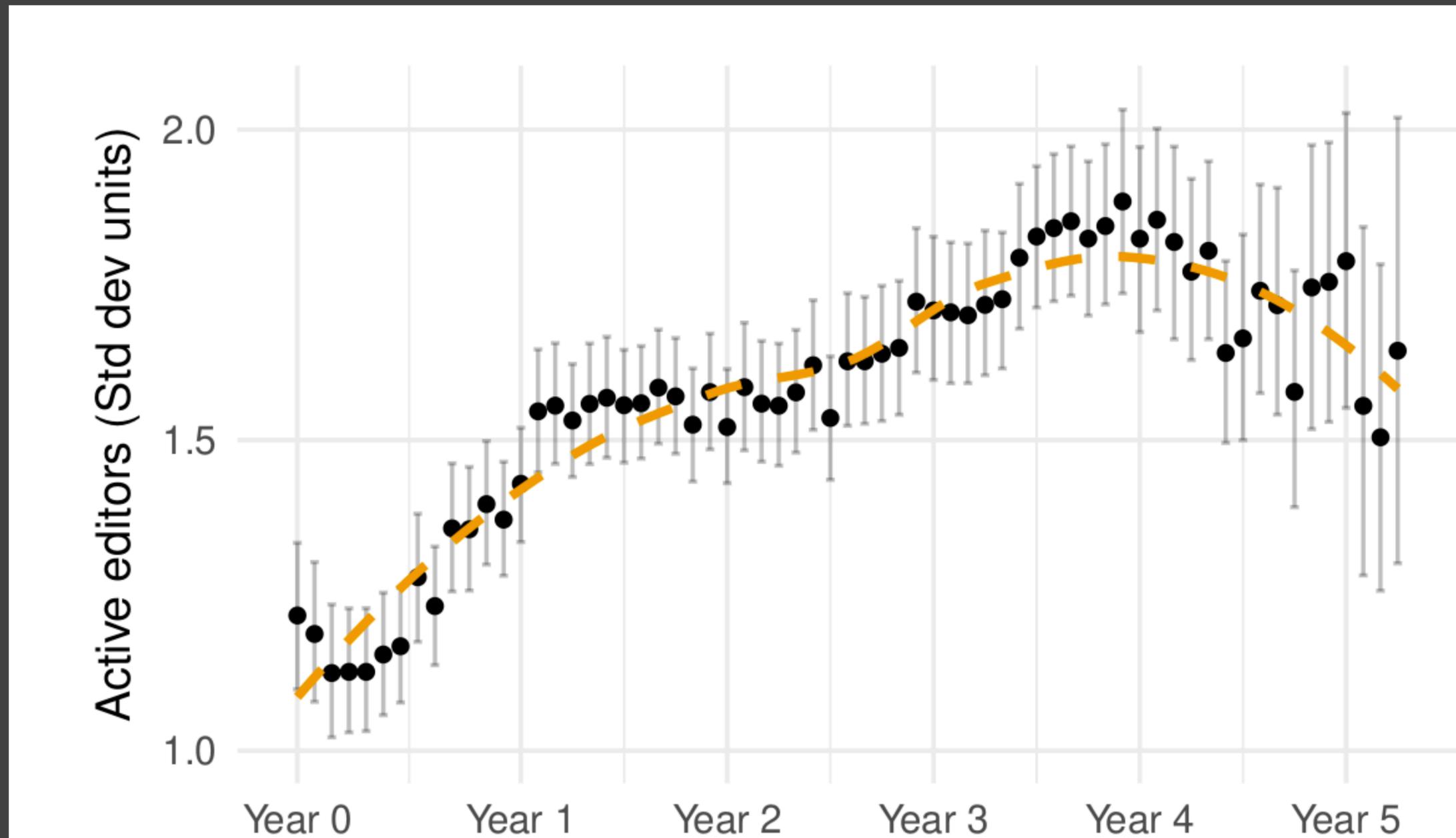
# Growing pains [Halfaker et al. 2012]



1. Start small, little moderation
2. Get popular and grow
3. Strain under newcomer contributions
4. Institute policies to reduce junk
5. Lose newcomers w/ new policies

# Not just Wikipedia [TeBlunthuis et al. 2018]

Replicated across hundreds of Wikia wikis  
e.g., runescape, yugioh, harrypotter, ewrestling, onepiece, clubpenguin



1. Start small, little moderation
2. Get popular and grow
3. Strain under newcomer contributions
4. Institute policies to reduce junk
5. Lose newcomers w/ new policies

# Summary

Growth is a double-edged sword. It's great that lots of people want to play in the same playground, but the rules of the playground weren't set up for so many people.

Invisible labor via human moderation allows social computing systems to maintain their norms in the face of massive growth.

Design can help empower this by making it easier for moderators to identify problematic behaviors and act on them.

Proportionally less content gets attention as the system grows.

Design can help members manage the deluge.

# Social Computing

CS 278 | Stanford University | Michael Bernstein

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