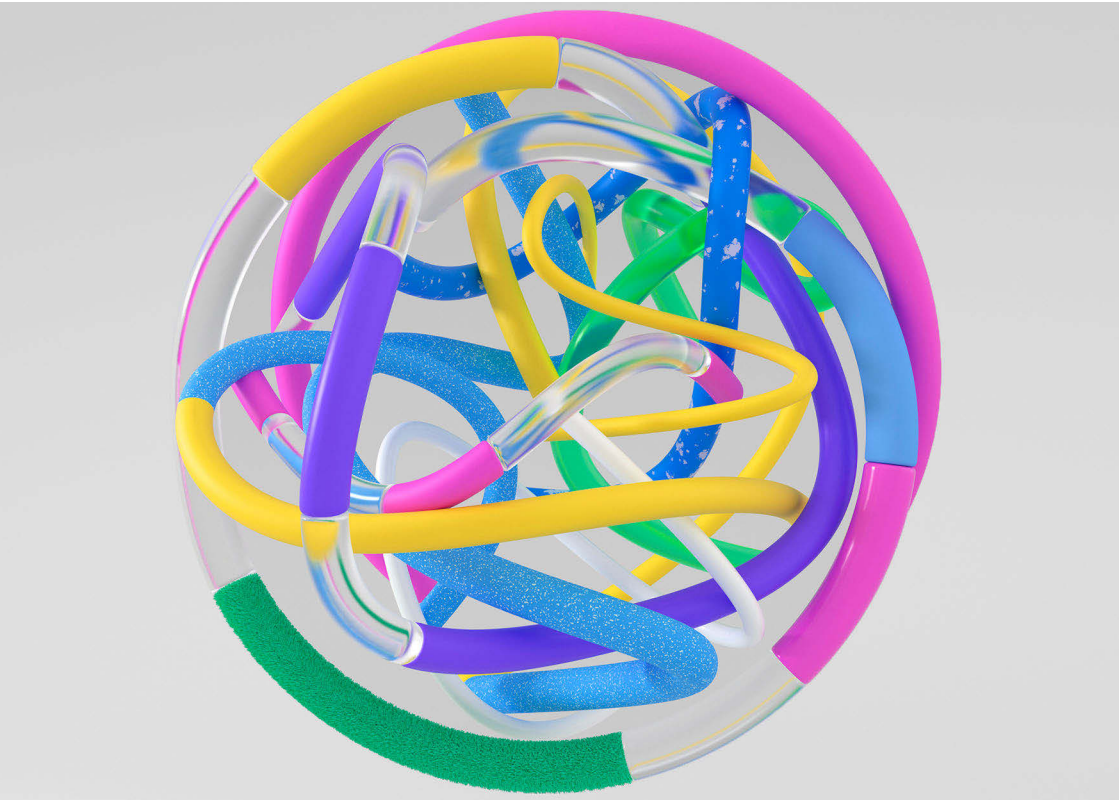
Who controls it?

Understand the issue: Decentralization



A few large players dominate much of the online world, but the internet is healthier when it is controlled by many.

Many of the challenges facing the health of the internet today, can be traced back to the fact that the most ubiquitous digital products and services are controlled by a handful of players.

In the last year, the debate about this consolidation of power has continued, sharpened and, in some cases, started to grow teeth.

The digital world is dominated by eight American and Chinese companies: Alphabet (Google's parent company), Alibaba, Amazon, Apple, Baidu, Facebook, Microsoft and Tencent.

These companies and their subsidiaries have outsized control over the internet. They dominate all layers of the digital world, from the search engines, browsers and social media services many of us use daily, to core infrastructure like undersea cables and cloud computing that few of us see. They built their empires by selling our attention to advertisers, disrupting business models and creating new online marketplaces, and designing hardware and software that is now deeply integrated into many of our lives. Their influence is ever-increasing in our private lives and public spaces. Where they misstep, we can experience real harm.

A healthy balance of power in our global internet ecosystem depends on a delicate interplay between governments, companies and civil society. We need effective competition standards and technical interoperability – between the products of *different* companies – to ensure that the internet grows and evolves in ways that accommodate the diverse needs of people around the world.

Fines for breaking antitrust laws like the $5 billion fine that European Union regulators hit Google with in 2018 have not had the effect needed to ensure a balanced and open future.

Many are exploring alternatives to an internet driven by the interests of corporate goliaths on their own. New business models are emerging that seek to distribute control among users, including platform cooperativism and collaborative ownership.

Vibrant communities of innovators are working to create alternatives to centralized systems by upscaling local connectivity, spinning up decentralized products, protocols and products and even creating independent alternatives to publishing on the big tech platforms.

From the start, the internet has enabled people to challenge authority, upend traditional business models and create greater transparency, open-

ness and accountability. But the disruptive-for-good vision of the internet isn't something we can take for granted.

Everyone who uses the internet has a stake in its future. From city officials to technical professionals, to tomorrow's generation of internet users.

For an internet where there is true choice, we need to support products that diversify the market, and laws and policies that protect users and foster healthy competition. We need to join forces and drive citizen action, research and innovation to build a healthier internet.

When a hurricane zaps the internet

The internet is designed to be resilient. But after Hurricane Maria in 2017, as Puerto Ricans rushed to contact friends and family, many found they couldn't get online.

The storm broke power lines and toppled telecom towers, taking out 95.6% of cell sites and leaving Puerto Ricans scrambling for a signal. It zapped the internet.

Half a million homes were damaged, thousands of people died. By some estimates, the territory experienced the worst power failure in U.S. history.

Extreme weather caused by climate change increases the likelihood that disaster will strike again soon – in Puerto Rico and around the world – and that once again, loss of internet will make a humanitarian crisis even harder to overcome.

"We're talking about humans of flesh and bone [who died] because of telecommunications, because you couldn't pick up the phone or message someone," said Puerto Rican journalist Sandra Rodriguez in an interview with NOVA Next about the internet outages.

Following Hurricane Maria, Puerto Rico's internet problems soon spread. Several countries in South America that rely on submarine cables that land on the Caribbean island, including Argentina and Brazil, experienced network disruptions in September 2017 due to power failures.

A variety of small and big scale initiatives to restore the internet blossomed. The non-profit NetHope sent and installed WiFi equipment. Telecom companies deployed mobile hotspots. Google's Project Loon delivered internet via balloons. Still, it took nearly a year to restore power to the whole

island, and average internet speeds did not reach pre-storm levels until August 2018, according to NOVA Next.

With hurricane season looming every year, Puerto Rican internet advocates are pushing for measures to fortify the internet for the next big storm. In February 2018, The Internet Society (ISOC), a nonprofit that champions internet access for all, issued a report informed by their Caribbean chapters of what could be done to prevent another connectivity disaster.

Electricity is a must-have. But the island's natural geography and historic planning makes energy supply tricky. For instance, while most of Puerto Rico's 3.3 million people live in northern metropolitan areas, 70% of power generation happens in the south. That awkward centralization means the grid system has to cut across the island, exposing wires to the elements.

Distributing power up Puerto Rico's mountains is also difficult and costly. After the power outage, cell towers relied on backup generators. Once the generator fuel ran out, "You couldn't get to the towers because the roads were blocked, so antennas started to drop off because they didn't have power. It was messy," said Eduardo Diaz, a director of the ISOC Puerto Rico board who is also assembling an advisory committee to help develop the chapter's strategic plan.

Diaz says local loss of confidence in the grid is driving new, sustainable, decentralized energy solutions that fit the climate better. "This is a tropical island, you get sun most times of the year … You won't believe how many people want to get into solar, or be offgrid in case something like this happens again. There's a huge market," Diaz says.

But Puerto Rico also needs to raise climate awareness among internet stakeholders. Despite working in a storm-prone area, the internet industry doesn't always build sustainably.

Shernon Osepa, Regional Affairs Manager for Latin America & The Caribbean Bureau at ISOC, sees a need to address this problem. "These operators know that we live in a very vulnerable environment, but some of them are deploying networks as if we're living in a region where these things don't happen," Osepa cautioned, noting that some Caribbean infrastructure is only rated to withstand category 3 hurricanes, despite facing category 4–5 hurricanes.

Opening data to the public is also key for the recovery. "We don't have a picture of how bad the telecommunication is," Diaz says. He argues that the

Puerto Rico Broadband Taskforce should prioritize creating a map of what parts of the island are without broadband service.

Puerto Rico suffered from broken infrastructure and budget cuts long before the storm. The U.S. Federal Emergency Management Agency has contributed large sums to emergency repairs, but politicians are reluctant to supply the funds necessary for a complete infrastructure redesign. Instead they opt for quick-fixes, or even plans that are not in Puerto Rico's best interests.

In response to tight budgets, Diaz encourages creative thinking and more sustainable solutions. For instance, he says, existing internet access grants for public schools could be used to create "anchor institutions" that help supply internet to people in surrounding communities.

Climate change is rapidly creating new hurdles for internet advocates in the Caribbean and around the world. We can expect more hurricanes and natural disasters for sure. This urgently calls for alternative and regionally appropriate infrastructure to be deployed already today.

▶ Further reading

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- Lights Out: Climate Change Risk to Internet Infrastructure, University of Wisconsin – Madison, 2018. https://ix.cs.uoregon.edu/~ram/papers/ANRW-2018.pdf
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The new investors in underwater sea cables

"The cloud" exists deep under the sea. Although you might first think of satellites and cell towers, before the data reaches your phone or router, it often travels beneath oceans: through a massive, global network of undersea fibre optic cables.

This global submarine cable network is growing, bringing the opportunity of high speed internet to more people, including in remote island nations. But who is building this network?

This network of submarine cables transports petabytes of information around the world on a daily basis, in a manner that is invisible to most users – a huge technical feat. Historically, these submarine cables have been built by telecom carriers, who form consortia to finance the construction of a cable. In the 1990s, undersea cables began to attract investment from private companies, who saw the potential to make a profit by selling capacity to telecom companies and private companies alike [see interactive map and timeline of undersea cables on the Internet Health Report 2019 website].

Today, the investment landscape in undersea cables is shifting yet again. Because they now make up the greater part of undersea cable traffic, internet companies are beginning to finance and construct their own undersea cables. In fact, Google, Facebook, Amazon and Microsoft owned or leased more than half of the undersea bandwidth in 2018. Currently, Google alone owns six active submarine cables, and plans to have eight more ready within two years.

An equally significant driver of investment in undersea cables today are concerns regarding cybersecurity. The Snowden revelations in 2014 exposed the extent of government surveillance of internet infrastructure, including fibre optic cables. Given that 95 percent of the internet's data and voice traffic travels between continents underwater, the corporate and political powers that influence and control the infrastructure can have significant global social and security implications. In this context, physical ownership of undersea infrastructure to mitigate the risk of surveillance is emerging as an investment motivation.

Still, the rapid expansion of the submarine cable network in the last decade was largely fueled by the meteoric increase in demand for internet services. The rapid uptake of cloud computing, connected devices, streaming and countless other services many of us now take for granted – combined

with users' expectation that it all works quickly and smoothly – put major pressure on service providers.

For videos to play and links to open milliseconds after a click, with minimal latency, content needs to be cached as close as possible to users. So companies like Facebook and Google began to build global networks of data centers. To connect those data centers, they not only invest in existing cables, but also increasingly build their own cables to ensure that their services are quickly and readily available anywhere in the world.

It's a new development for online platforms to also be the owners (or co-owners) of the delivery infrastructure. At a time when there is already significant concern about the consolidation of power by the biggest technology companies in multiple realms, and telcos are merging with traditional media companies, it raises questions about who (literally) controls the internet, and how we wish to see it develop in the future. When the same companies own the online platforms and the infrastructure to access them, we have to consider whether the incentives and agreements for sharing access to cables thus far will still make sense.

With so many aspects of our societies and economies relying on the internet – and the undersea cables that power it – we can and should demand that the public has a say in the regulation of this critical infrastructure.

▶ Further reading

- The Submarine Cable Map, TeleGeography, 2019. https://www.submarinecablemap.com/
- Internet Economics is a Thing and we Need to Take Note, Geoff Huston, 2018. https://labs.ripe.net/Members/gih/internet-economics-is-a-thing-and-we-need-to-take-note
- Internet Drift: How the Internet is Likely to Splinter and Fracture, Steve Song, 2018. https://digitalfreedomfund.org/internet-drift-how-the-internet-is-likely-to-splinter-and-fracture/
- 'People think that data is in the cloud, but it's not. It's in the ocean', New York Times, 2019. https://www.nytimes.com/interactive/2019/03/10/technology/internet-cables-oceans.html

What if Facebook were owned by its users?

For decades, startup founders have looked with dollar signs in their eyes at anything you could possibly do with the internet. In a corporate culture fostered by large venture capital funds, startups compete to become the next big billion-dollar disrupter, like Uber or WhatsApp.

Too often, the business models of the biggest internet companies have led them to squander the trust of users and workers by putting profits ahead of people's best interests.

At the height of public scandals, consumers have launched campaigns like #DeleteUber or #DeleteFacebook to voice their objections. But with few good alternatives to major internet companies like Amazon, Google or Facebook, the social or economic cost of abandoning them can be too high. Could there be a truly democratic way for users to steer companies?

A new generation of internet entrepreneurship is emerging to respond. There is Zebras Unite, a women-led movement to push for more ethical and inclusive alternatives to the "unicorn" culture of Silicon Valley. There is the Purpose Foundation that promotes "steward-ownership" as a legal structure to prioritize a mission over profit. And there are hundreds of cooperatively owned and managed companies around the world exploring how to share power and profits directly with users, in order to break the cycle of maximizing gain at any cost.

Mapping such alternative forms of internet entrepreneurship – or "platform cooperativism" – is a passion of *Nathan Schneider* at the University of Colorado Boulder in the United States. Together with Trebor Scholz who initiated the Platform Cooperative Consortium at the New School in New York, he co-organized some early gatherings of the platform coop community. Schneider is the author of Everything for Everyone: The Radical Tradition That Is Shaping the Next Economy and a co-founder of Start.coop, a business accelerator for new cooperatives.

Q: What is the problem platform cooperatives could solve?

Nathan Schneider: We are in a major accountability crisis with the online economy. Companies are taking on utility roles, but we don't have a choice of whether to use their services because there are no meaningful alternatives. We see people agonizing about giving away their data, but not really doing

anything because they have no other choice. Community ownership is an opportunity to build accountability into platforms. It is a vehicle for users to gain a voice and build democracy into companies. Maybe it can even lead to a rejuvenation of the democratic sphere.

In most places, people don't even stop to consider that they have the choice to create an alternative to existing companies that are giving people a bad deal.

When Uber backed out of Austin, Texas following a dispute with local authorities in 2016, it led to the creation of a new ride-sharing nonprofit, Ride Austin. It's better for drivers and supports other local nonprofits. It's a totally different vision for how things can work in an economy.

Q: Do you think big tech could evolve in the direction of cooperative models?

Wouldn't it be great if these big companies would share ownership with the people who are really generating value for them? Instead we have an online economy that is structured to generate massive profits for a small number of shareholders. Involving users in ownership means making sure they are not getting cut out of the value they are creating, and ensuring that they benefit alongside investors in the wealth that they are creating together.

In 2017, I was involved in a campaign to bring a shareholder resolution to a Twitter annual meeting to encourage the company to consider options for expanding user ownership and governance in the platform as a way to address systemic problems. We weren't successful, but we do need more strategies to bringing democracy to companies. Especially when we recognize they're so big that they basically become utilities. For instance, it could be a legal structure and tax treatments that would lead somebody like Facebook's Mark Zuckerberg to see it as a reasonable option to transfer large amounts of stock and control to users.

Q: The allure of venture capital funding is strong. What motivates founders to go for a cooperative business model instead?

Often people are trying to solve deep problems and realize that handing something over to investors just isn't going to cut it. One example is Jen Horonjeff, the founder of Savvy. It's a health insights platform for patients and their families. She has a chronic illness and she was obsessed with

patients having more control over their illness. She knew that whenever you hand medical processes over to investors, patients get exploited. So she turned to a coop model as a last resort to protect people, and at the same time run a business.

The economy needs variety. There may always be a need for the classic high risk and high return model of venture capitalism, but at the same time we can create more options.

► Further reading

- Ours to Hack and to Own: The rise of platform cooperativism, a new vision for the future of work and a fairer Internet, edited by Nathan Schneider and Trebor Scholz, 2017. https://www.orbooks.com/catalog/ours-to-hack-and-to-own/
- Platform Cooperative Consortium. https://platform.coop/
- The Internet of Ownership Website and Directory. https://ioo.coop/
- Why the cooperative models need to be at the heart of our new economy, Fast Company, 2018. https://www.fastcompany.com/90249347/why-the-cooperative-model-needs-to-be-at-the-heart-of-our-new-economy

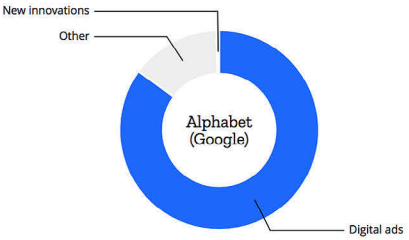
How do the biggest internet companies make money?

Eight companies wield enormous power over the entire internet: Google, Facebook, Microsoft, Amazon, Apple, Baidu, Alibaba and Tencent. Most internet users today are in daily contact with at least one. They each have so many different products, services and investments that it's not always clear what their main source of revenue is, or how a company profits from services offered for "free," such as search, email, games, social media or instant messaging.

Just how do these giants of the internet make money? We've sorted them into four overlapping categories according to their primary source of revenue.

The Attention Merchants: Google, Facebook and Baidu

There's money to be made from selling your attention to advertisers. The main business of Google, Facebook and Baidu is to collect data about what you do online, and enable publishers and marketers to target you with personalized ads. In 2018, Google and Facebook together controlled an estimated 84% of the global digital ad market outside of China.

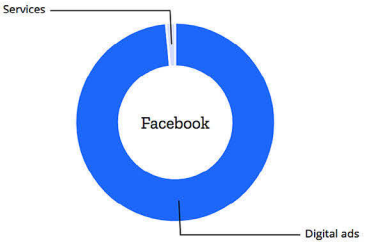


Alphabet (Google)
Google's parent company Alphabet earns 85% of their revenue from digital ads. Around 70% comes from ads on Google's own products, e.g. Google Search or YouTube. Alphabet also owns Google's AdSense and AdMob –– services for placing ads on other websites –– that together account for 14.6% of revenue. Sales of devices, like phones, home assistants, and apps in the Google Play store make up 14.5% of Alphabet's total revenue.

Revenue (2018)
$136.8 billion USD

Market capitalization
$795.3 billion USD

Alphabet (Google) Source:
Annual Report 2018, Alphabet, 2019. Market capitalization estimate from Yahoo Finance on March 4, 2019

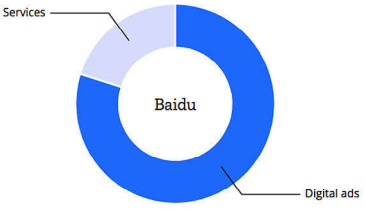


Facebook
We think of Facebook as a "social network," but they are in fact an ad company. With around 2.32 billion monthly active users, Facebook makes more than 98.5% of its revenue — over $55 billion USD — from selling ads that appear in our news feeds, mostly through the Facebook app. A fraction of their overall revenue (1.5%) is from games and other apps and products sold on Facebook.

Revenue (2018)
$55.8 billion USD

Market capitalization
$463.1 billion USD

Facebook Source:
Annual Report 2018, Facebook, 2019. Market capitalization estimate from Yahoo Finance on March 4, 2019



Baidu
Baidu owns the top search engine in China with over 70% of the market share. It has a smaller revenue and footprint than Google, but a similar business model. Baidu makes about 80% of its income from selling ads. A smaller revenue stream (about 20%) is from membership services of iQIYI (a video streaming service similar to Netflix) and payment services. Like Alphabet, Baidu also invests in artificial intelligence and other innovations, like self-driving cars.

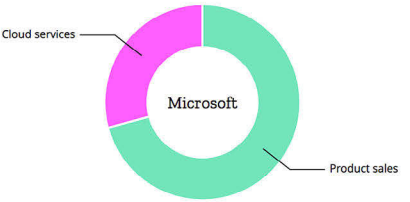
Revenue (2018)
$14.9 billion USD

Market capitalization
$56.6 billion USD

Baidu Source:
Annual Report 2018, Baidu, 2019. Market capitalization estimate from Yahoo Finance on March 4, 2019

The Machinists: Apple and Microsoft

Microsoft and Apple earn most of their revenue from creating and selling the devices and software that allow us to access the online world. Mobile phones, computers, gaming consoles — as well as software like word processors and cloud storage — are all products that bring in revenue.

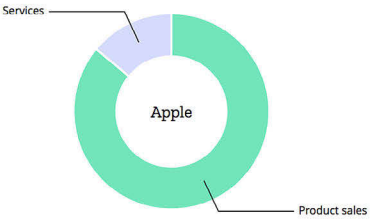


Microsoft
70.8% of Microsoft's revenue is from product sales, but these products span many categories, including "productivity" products like Microsoft Office software and the online recruitment platform LinkedIn. Also in the category of product sales is software (including Windows), hardware (including Xbox and Surface tablets) and search ads. Microsoft's cloud-based services generated 29.2% of their total revenue in 2018.

Revenue (2018)
$110.4 billion USD

Market capitalization
$863.4 billion USD

Microsoft Source:
Annual Report 2018, Microsoft, 2018. Market capitalization estimate from Yahoo Finance on March 4, 2019



Apple
Apple earns 86% of its revenue from sales of digital devices and computers. The iPhone reigns supreme by a large margin: over half of Apple's total revenue in 2018 -- nearly $167 billion USD -- was thanks to the pricey mobile phone. Sales of Mac computers accounted for 9.6% of product sales and iPads 7%. Apple's services including iCloud, Apple Care or Apple Pay make up 14% of their overall company revenue.

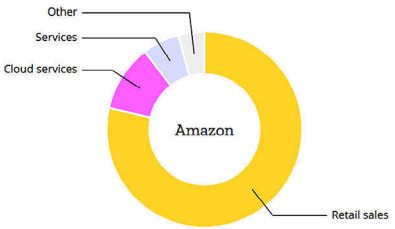
Revenue (2018)
$265.6 billion USD

Market capitalization
$825.0 billion USD

Apple Source:
Annual Report 2018, Apple, 2018. Market capitalization estimate from Yahoo Finance on March 4, 2019

The Retail Middlemen: Alibaba and Amazon

Amazon and Alibaba primarily make their money by selling us things online. Both Amazon and Alibaba have also begun to open physical retail stores that meld with online experiences. There's much more. They each also sell digital ads and services including online video streaming, logistics and cloud computing, money transfers — even food delivery services!

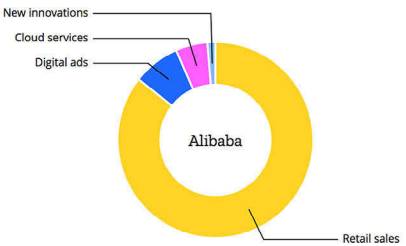


Amazon
It used to be a book business, now it's an everything business. Amazon makes most of its revenue (78.5%) through retail sales. Subscription fees for Amazon Prime (including video streaming) brings in 6% of their revenue. Amazon Web Services brought in 11% of Amazon's total revenue in 2018, an on-demand cloud computing service offering computing power, database storage web hosting and other functionality.

Revenue (2018)
$232.9 billion USD

Market capitalization
$821.2 billion USD

Amazon Source:
Annual Report 2018, Amazon, 2019. Market capitalization estimate from Yahoo Finance on March 4, 2019



Alibaba
Alibaba earns most of its revenue (85.6%) by selling goods to 552 million customers in China, but also from digital ads, subscription fees for Youku Todou (a popular video streaming service) and with cloud-based services. Alibaba offers cloud services and invests into integrating and further digitizing its different businesses. Moreover, Alibaba is innovating on software products like AutoNavi, a mapping service with approximately 60 million daily active users.

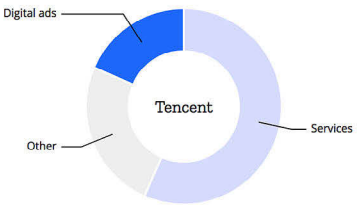
Revenue (2018)
$39.9 billion USD

Market capitalization
$476.7 billion USD

Alibaba Source:
Annual Report 2018, Alibaba, 2018. Market capitalization estimate from Yahoo Finance on March 4, 2019

The Multi-Faceted One: Tencent

The Chinese company Tencent is especially known for its messaging platform WeChat, but the company does not disclose how much money it makes from it directly. Unlike WhatsApp or Telegram, WeChat is much more than a messenger app — it is deeply integrated into everyday life in China and allows you to do things like pay bills and schedule a doctor's appointment.



Tencent
The majority of Tencent's revenue comes from in-app purchases of virtual goods (mostly extras in games), and subscription fees on Tencent Video (lumped together in 'Services' with 56.6% of the total 2018 revenue). An increasingly important section for Tencent are payment services (included in 'Other' with 24.9%), which mostly refers to fees for online transactions through WeChat Pay. Other than that, Tencent makes money with digital ads on its media platforms and messengers (18.5%).

Revenue (2018)
$45.5 billion USD

Market capitalization
$397.2 billion USD

Tencent Source:
Annual Report 2018, Tencent, 2019. Market capitalization estimate from Yahoo Finance on March 4, 2019

An open source alternative for "the cloud"

Cloud services have become the default tools many people use to get their work done. But this can mean giving up privacy and control. Some open source alternatives are now offering tools to put people back in charge.

Frank Karlitschek is a German open source developer and founder of Nextcloud, a platform for storage, collaboration and everything else you expect to work together online.

"We have this huge centralization of everything. The cloud infrastructure that drives a lot of the services on the internet, is controlled by very few entities, like Amazon, Google and Microsoft. They are the backbone of everything and this is not healthy," he says.

Nextcloud was originally founded as an alternative to Dropbox, but where the user could get the benefits of cloud services on infrastructure they control. It has since evolved into a fully modular productivity suite, meaning you can choose which applications you run on the platform

"The idea was that you can run your own server on your own infrastructure, so it's decentralized and federated," says Karlitschek. He compares the current version of Nextcloud to G Suite from Google or Microsoft Office 365.

"There's a lot of sharing, collaboration and communication features, document editing, calendars, contacts, all kinds of things. It's a full modern collaboration suite but it's a hundred percent open source and on your own infrastructure."

Nextcloud has about 1,800 individual contributors of code, from single fixes to multi-year engagements. "But it's more than code," says Karlitschek. "For examples there's translations. It's available in 95 different languages and they are all done by volunteers all over the world."

It is not purely volunteer-driven, however. 45 people are employed to maintain the codebase full-time. Their business model is to sell support subscriptions to organizations that use Nextcloud for free, a time-tested way of generating revenue from free and open source software.

Free and open source software emerged at a time when people ran software on their own computers, whether a PC on their desk, or a server in a hosting center. By running non-proprietary code, you had more control of what your computer was doing.

But as cloud services are becoming the default mode of working together, that kind of control is slipping away. "In a way it's even more closed than

proprietary software running on your own laptop, because at least there you know where it is," says Karlitschek.

In order to create a product that compares and competes with the global internet monopolies, you need to get a lot of things right.

"You need to have an alternative software that is as good. You need to have all the features that the user expects. If you have less features they will use the other software," says Karlitschek.

But even if you make the user interface and workflows interesting and useful, there are still obstacles to adopting decentralized cloud services.

With Google or Microsoft, you just create an account and get started. To use Nextcloud, you first need to install it on a server. No matter how easy this process is made, it is still one step more than the experience of the proprietary cloud. Hosting your own cloud also costs money.

"In the old days, with open source and free software, we always had the cost benefit on our side. We could say, if you use Linux it's as good as Microsoft and it costs nothing, where Microsoft costs money. With cloud services it is unfortunately the other way around. Nextcloud is free, but you still need to host it somewhere. Hosting now comes for free with the other services," says Karlitschek.

► Further reading

- Nextcloud. https://nextcloud.com/
- Orkney Cloud. http://orkneycloud.org/
- Decentralized Web Summit. https://www.decentralizedweb.net/
- IndieWeb: Getting Started. https://indieweb.org/Getting_Started