

Back to the future of the Internet: guidance from the Web’s open origins for today’s problems

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Introduction

The historical ideal for the web was an open and innovative space that would have exceedingly positive effects on humanity. Yet, as the technology has advanced, we have seen both incredible advancements and unforeseen problems emerge from the web. As we stare down the challenge of addressing those problems, we would do well to recall and incorporate the key aspects of openness which lie at the Internet’s core.

In this article I describe some of these key aspects and how they may help us devise better solutions to today’s problems. I do not touch on every current challenge of Internet life. Instead, I focus on a handful where the history in building open Internet technology and standards sheds particular light on the topic.

The early promises of an “open” Internet

The early days of online life were full of wonder. In my first session “surfing the web” in 1993, I was able to connect to Peking University, where I had studied years before but from which I had been completely disconnected since returning home. The experience made me giddy with the possibilities.

Over the years I’ve watched many people have this response the first time they encounter the Internet. The early days of the web brimmed with a sense of marvel at the possibilities. Our aspirations were far beyond technical. We saw the web as a tool for the creation of new opportunities in people’s lives and for solving some of the world’s most intractable problems. History had showed us the impact of the printing press on human progress, and we knew instinctively that the Internet held similar potential.

From the beginning, it was clear that the basic design and technical architecture of the Internet and the web were huge drivers of possibilities and opportunities. That architecture was based on open standards and open source code that anyone could see and use. It was not centralized. It did not rely on a single node at the top of a tree of decision-makers. The architecture had no central entity determining if I was permitted to go online, or if the Peking University site was permitted to be online, or if we could connect. Very often technologies that have great scale are highly centralized. The Internet and the web were different — they were designed as technologies of scale without centralization.

Beyond this, the architecture explicitly allowed people to create new experiences that the Internet’s creators had not thought of and could not control. For example, the early web was about text: words and links. When it became clear that audio and video would be useful, they were added. When someone first had the idea of enabling voice calls over IP, they added it, paving the way for the messaging apps of today. No single centralized entity had the right or opportunity to say

“no, we won’t permit that to exist anywhere, voice over the Internet would destroy my business model, it’s better that we keep phone calls expensive ⁽¹⁾.” The structural design of the Internet itself meant that innovation could flourish, and consumers and citizens could have more choices in the products we use, and more ability to create as well as consume offerings made by others.

In time, the shorthand for this foundational architecture and outlook became “open” we began to speak of “the open Internet.”

A more balanced understanding

The open Internet has fulfilled much of its original promise. Today, online education, vast knowledge resources, government services, financial opportunities, cross-cultural collaboration, and instantaneous entertainment enrich the lives of billions. In addition, the expansion of the Internet has fueled ideas of openness in multiple other realms such as open government, open data, open science, open education, crowdfunded campaigns, and open access to an immense archive of knowledge.

However, in time we have seen a range of negative impacts emerge from the web. Increasingly, it is becoming easy to forget the benefits the Internet brings, or the promise it first held to better the human condition. A new vision of online life is creeping in, one in which the Internet is dominated by a few mega-corporations that see and control everything, where governments censor and turn off the Internet when it suits them, and where citizens can’t tell what’s true, and respond to rumors with violence and increasingly inhumane actions.

Experts, activists, politicians, technologists and citizens are all struggling to face the threats which today pervade the digital realm. Although there is common agreement that those threats are very real and very severe, there is little consensus on how to deal with them.

As our societies respond to these new problems, we would do well to draw on the best from the past, and incorporate it into the next iteration of the Internet and the future of our online life. If we neglect to do this we will lose the promise of the Internet. Responding to today’s online challenges requires remembering, reimagining and reapplying key aspects of openness which lie at the Internet’s core. Only by using openness as a starting point can we ensure that the solutions we devise move us in the direction of a web that is innovative, competitive and sustainable.

This does not translate into an absolutist commitment to openness, particularly if that comes at the detriment of Internet users’ everyday experience of the web. A web without limits or accountability, which permits a “free-for-all” of human and corporate behavior, will only benefit the most powerful or the most violent, with the rest of humanity rendered victims without recourse.

We need smart, thoughtful ideas and policies that integrate the key benefits of open systems into effective solutions to today’s challenges. We should consider citizen and consumer activity, business practices, as well as policy and regulation.

Fortunately, we can make use of the key learnings from the past twenty years. I outline a set of these key learnings below.

Lessons learned from the past

Net Neutrality

Net neutrality is the promise that the organization that transmits content into and out of your home (your “network operator”) treats all content equally. In the early days of the Internet, net

(1) Years after the invention and adoption of VoIP, one telephone company in the United States, Madison River Communications Corp., briefly blocked its own Internet service subscribers from using VoIP services, in an action that was quickly penalized and shortly abandoned.

neutrality was an inherent feature. At that time the technology was not sophisticated enough to make it easy for network operators to distinguish different types of traffic, and so we enjoyed net neutrality without needing a law for it. In the intervening years the technology has advanced, and it is common practice today for network operators to interrogate the data users access, based on its type (text or voice, for example), its content and its source. Increasingly, we have seen network operators seeking to monetize that knowledge by charging more for certain types of data, or for content accessed from certain providers.

Incursions into net neutrality create barriers for people accessing the Internet content of their choice. They also allow the network operators to distort the innovation ecosystem by discriminating against new content and its creators, and by privileging their own subsidiaries. Allowing network operators to pick which content is privileged has huge costs for society as well as for individuals.

Net neutrality is currently protected by policy or regulation in many countries, including in the European Union. However network operators (including in Europe and Korea) are raising the issue anew, advancing the idea that gutting net neutrality will assist the development and rollout of 5G networks and improve the prospects for investment in network infrastructure⁽²⁾.

There are two issues with this argument. First, there is plenty of evidence that network operators do invest in net neutrality environments. In the three years since the European Union's Open Internet regulation was adopted in 2015, France experienced a 25 to 30 per cent increase in investment in the telecoms market, contradicting claims that net neutrality rules stymie market growth⁽³⁾. The largest US network operator, Comcast, increased its investment in cable communications by 13 and 8.6 percent respectively during the two years after the introduction of net neutrality rules in 2015. Small reductions in investment by other large operators during this period were attributed by those companies to other factors⁽⁴⁾. In June 2017, thirty smaller Internet Service Providers informed the FCC that they had encountered no new additional barriers to investment as a result of net neutrality rules⁽⁵⁾.

Second, a financial argument for content discrimination is at its essence an argument for undermining the benefits of the Internet in exchange for greater revenue for the operators. Even if network operators did spend all that extra profit on network infrastructure, we would still end up with a situation in which network operators determine access to content based on what benefits their bottom line. That skews incentives in the market as a whole, and is a bad deal for everyone except the network operators.

Content discrimination makes the Internet worse, not better. In an open system, people can use the network in the way that they want, businesses can become more successful, and the network operators continue to benefit from rich use of their connections and services. Incorporating openness means retaining core principles of net neutrality and user choice, and permitting reasonable network management while explicitly prohibiting discrimination and rent seeking behavior.

(2) See, for example, Kwame Opam, "Major telecoms promise 5G networks if EU cripples net neutrality", *The Verge*, 10 July 2016, available at <https://www.theverge.com/2016/7/10/12139700/telecom-companies-5g-service-european-union-net-neutrality>

(3) Sebastien Soriano, "Europe Has a Message for Americans on Net Neutrality", *Slate*, 12 December 2017, available at http://www.slate.com/articles/technology/future_tense/2017/12/france_s_top_internet_regulator_s_bastien_soriano_has_a_message_for_americans.html?via=gdpr-consent

(4) Klint Finley, "The FCC Says Net Neutrality Cripples Investment. That's Not True," *Wired*, 12 August 2017, available at <https://www.wired.com/story/the-fcc-says-net-neutrality-cripples-investment-thats-not-true/?mbid=GuidesLearn-More>

(5) Letter from 30 ISPs to the FCC, 27 June 2017, available at https://www.eff.org/files/2017/06/27/isp_letter_to_fcc_on_nn_privacy_title_ii.pdf

Open Source and Open Standards

The Internet and the Web are built on a foundation of open source software and open standards. As we reflect on the digital dominance of a few major tech companies in today's web, it is useful to recall the origins of open source and open standards technology and understand its value for today's web.

Open source and open standards are excellent tools for building verifiable and trustworthy products. When a product is open source, consumer advocates can look at the code and help consumers understand what the product actually does. Does the product collect information about you? If so, what information? This transparency to consumers is a key piece of the early openness of the web that has seemingly been lost in the intervening decades. Today, Internet users are mostly in the dark about how the products they use actually operate, or how the algorithms used for “personalization” make decisions and deliver content and services. Users, and often even the companies themselves, are unable to explain how Facebook, YouTube, and other platforms determine what content to display in feeds and in response to search queries. Much of the internet is now powered by proprietary closed source technology, creating black boxes which consumers cannot penetrate.

Twenty years ago, Netscape – then one of the most influential Internet companies in the world – took the decision to make its once market-leading web browser, Netscape Communicator, free and open source. This was a shocking decision to the business community, while wildly exciting to open and free software advocates. At that time, open source and free software was a radical idea, and a radical practice. It's easy to forget that now, when open source is commonplace and one's GitHub repository is part of one's CV. But when the Internet was young, open source and free software were surprising ideas that the average citizen didn't understand and business rejected. In 2001, then-Microsoft CEO Steve Ballmer went so far as to call certain free software licenses “cancer that attaches itself in an intellectual property sense to everything it touches⁽⁶⁾”, while Jim Allchin, Microsoft's VP for Windows, suggested open software was “un-American” due to the openness and sharing requirements⁽⁷⁾.

Open standards are also a key component of the Internet and the Web. Standards are what makes components compatible without adaptation; for example, electrical engineering standards enable you to plug any properly-made electrical appliance into an electrical outlet. Open standards enable a more even playing field for new developers, because they enable developers to create new products which can readily interact with or replace existing products.

The importance of open source and open standards for the successful operation of the web has been demonstrated repeatedly. Today, however, the dominant platforms that control so much of our online life do not run their business as open source. (Facebook and Google contribute many things to the open source world, but not their core business technologies.) We cannot inspect their products, understand their services, or verify that they do what they say they do. Similarly, the major platforms are not interoperable with others. Instead, the platform vendor determines everything. Innovation that might challenge the platform vendor, or give consumers a real choice in their experience, requires permission from the vendor. The result is that a very few platforms are able to consolidate their dominance by blocking the emergence of web services or applications which might challenge or replace their products.

(6) Thomas C. Greene, “Ballmer: “Linux is a cancer,” The Register, 2 June 2001, available at https://www.theregister.co.uk/2001/06/02/ballmer_linux_is_a_cancer/

(7) Farhad Manjoo, “A tip of the black hat from MS,” Wired, 27 July 2001, available at <https://www.wired.com/2001/07/a-tip-of-the-black-hat-from-ms/>

Interoperability assists in building a competitive marketplace, where small and big players alike are able to build things that respond to the demands of consumers. This means that Internet users themselves are more empowered when products are interoperable. As much of the web's technical infrastructure becomes the domain of a handful of large technology companies, it is important to think about how we can preserve interoperability. Returning to the idea of open source and encouraging Internet users to expect and demand open source products is an essential part of this challenge.

Control of personal data

Users must be able to shape their own online experiences. This is a difficult vision to realize when users lack control over the data that powers those experiences. A typical consumer doesn't understand what personal data is being collected, created, and used; doesn't have access to the data they provide or the data generated about them; and doesn't have any influence over whether and how data is collected or used, how or by whom. And in some parts of the world, Internet users still lack fundamental protections for the privacy and security of their data held by third parties. We must figure out how to build effective data access and data control into Internet technologies and norms.

We need to reestablish agency on the part of Internet users to determine the conditions upon which their personal data is used by others. One means of doing so might come in the form of data portability, with which we already have some experience in the field of healthcare. Perhaps it is time to force a serious discussion about what effective data portability in the digital consumer context would mean. I am well aware that the data each online platform generates is specific to that platform, and that providing a way for consumers to access, control and use their data from within each platform is complex. I also understand the claims that data APIs reveal aspects of a business model or proprietary information, or are impossible or unpractical for other reasons. I've built Internet products for 20 years and I recognize that any of these arguments are likely to contain grains of truth, sometimes quite large grains of truth. "Data portability" in the most complete interpretation of the concept is likely very hard in practice as it concerns the web.

Even so, these arguments remind me of the arguments about free and open software twenty years ago. Pieces of software such as operating systems are incredibly complex, and the idea that they could be made free and open source – that the development of modules and APIs and governance practices could be distributed and shared – seemed unimaginably hard and even radical a few decades back. And yet, Linux and other complex projects, including web browsers such as Firefox, have solved these problems and have since become mainstream systems deployed widely.

Another means of asserting user control and agency over personal data may come in the form of data protection regulation. The EU and Brazil have adopted data protection laws (the General Data Protection Regulation and the Brazilian General Data Protection Law, respectively) that are starting to change the landscape and user expectations. This is a very positive development. I predict that these laws – as with static regulations in general in the rapidly changing field of technology – will have a range of unintended consequences, some of which will seem absurd or counter-productive. But given the information and market power asymmetries of the Internet today, it is far better to adopt comprehensive protections and work with the consequences as they come, than to abdicate responsibility.

Tackling the problems of data access and control probably won't be easier than making free and open source software work. But we need to try. This experience with open source software strongly suggests that a much higher degree of protection and control of personal data is achievable. However complex a goal it is, guaranteeing data protection and portability on the web will not only give the individual more control and more safety, it will fuel competition, prevent vendor-lock in, create incentives for responsible stewardship, and enable new services to compete more equally for customers.

Human nature and the attention economy

Our early aspiration was that the Internet would contribute to the betterment of the human condition. But recent experience makes it clear that the web has not positively enhanced all aspects of human nature. Hatred, anger, irrationality, misogyny, and lies are flourishing alongside the free flow of information and ideas that the web permits. Victims of trolling, violence, bullying, and the misinformation and manipulation that catalyze them abound. The accountability systems and other mechanisms societies have used to keep these in check are either lacking or not functioning adequately online.

Meanwhile, the business models of today's big platforms are based on an understanding of the "attention economy" – that is, how long can platforms retain the attention of their users, keep them watching, clicking and generating data to increase their advertising revenue. We are only beginning to understand how outrage, sensationalist headlines and conspiracy theories can monopolize the attention of Internet users and affect societal trends, outlooks and actions.

It could well be that the attention economy not just reflects, but magnifies, the short-term, outrage-based, violent or anti-social aspects of human nature. If this is the case – and if this distortion can't be effectively mitigated – then this business model is at odds with a healthy society. Significant, well-funded research is needed in these topics. If the attention economy indeed fosters mob mentality, isolation, social divides and breakdowns, then we have serious rethinking ahead of us.

A key learning from the past we should bring into this debate is the value of transparency. Transparency creates opportunities for the development and reinforcement of good societal norms and accountability; its absence creates dark places for bad actors and actions to hide and flourish. The core element of the attention economy – the fundamental technologies that make it work – are not at all open or transparent. We need to develop stronger expectations, reinforced by user behavior, policy or law, that platforms demonstrate transparency and algorithmic accountability. This is critical to understanding, let alone solving, the problems that the attention economy may have caused.

Consumer expectations

The early years of the Internet taught us that consumers will change products and behaviors when they can see what a better opportunity looks like and can take meaningful action to seize that opportunity. Many express great interest in eradicating hateful and harassing behaviour online, and in re-establishing control over their personal data. Yet few users feel they have the agency or power to control what happens on the web. The sense of individual empowerment that was so present at the birth of the web has been lost. We need to find a way to establish agency on the part of Internet users to determine the conditions upon which they use the Internet.

The first generation of consumers to find the Internet did so through the Netscape Navigator browser, which naturally had almost 100% market share. Within a few years, Microsoft's Internet Explorer came to hold over 95% market share. Once this monopoly was established the quality of Internet Explorer began to decline. Microsoft stopped investing in the browser, and the security of users, their data and their computers were put at risk.

Mozilla was working on the precursor to Firefox during this time. Over and over again we were told that consumers would never change browsers. We were told that Microsoft had been too successful in making the browser part of a larger operating system. We were told consumers wouldn't understand what a browser was anymore, and wouldn't take the action needed to use another browser, even if a great one existed. Mozilla was a non-profit building Firefox to fulfill our mission, so we didn't let this stop us.

By the time Firefox was released in 2004, the security problems with Internet Explorer had exploded. And consumers proved themselves to be far smarter, more empowered and more interested in the technology of the web than prevailing wisdom had given them credit for. Consumers understood that changing browsers could make an important difference to them, and change they did.

We face an analogous situation today. Consumers may be deeply uncomfortable with the big platforms, but it's hard to imagine anything different could exist. This is particularly true for generations that have come online recently, use phones uniquely or primarily, or live within a walled garden such as that provided by Facebook's Free Basics.

It is vital to demonstrate that this need not be our future. History is instructive, and regulation has a role to play. But true hope comes from a cycle of consumers seeing products that make life better for them, giving signals to the development ecosystem and spurring interest in new products.

I am convinced that positive change to the Internet environment will involve raising consumer expectations, and a corresponding growth in product experimentation and diversification. This is a long term project, and part of how a vibrant and innovative ecosystem develops. We need more entrepreneurs experimenting with products that have better privacy and data protection characteristics. We need consumers to learn of these products, enjoy them, and demand more in the market. Consumer interest plus product diversification plus consumer choice of new products would build a world where innovation, choice and better experiences go hand in hand.

Towards a longer term cultural change

Drawing on the lessons about the importance of openness that we've learned over the Internet's lifespan is an integral part of building long term sustainable solutions to the web's current challenges.

Observing the growth and maturation of the web has led me to the conclusion that technology serves as an amplifier for humanity. It makes human progress faster and more impactful; it ensures financial benefits are more widely enjoyed; it accelerates intellectual advancements and enables more people to benefit from them. The web is like a magnifying glass for all the best and most exciting human achievements. And it can also be tuned to the worst aspects of the human condition. While the web can amplify humanity's progress, it can also amplify humanity's harm, harassment, untruths, and discrimination.

If we conceptualize it this way, the Internet appears to us as a tool and a platform for both good and bad, rather than as the source of both problems and benefits. I encourage the adoption of this viewpoint not to absolve the Internet of culpability, but to make it clear that solving its problems will, in the long term, require more than changes to its technical design and architecture. It will require addressing the underlying source of those problems.

Another solution is for public funds aimed at innovation or entrepreneurship or local business development to seek out and welcome tech organizations that explicitly care about social good and public benefit. France is a leader with its Social Good movement, and yet many such organizations find themselves shut out of funding, mentorship and assistance programs. We should enhance STEM education so that our scientists, technologists and MBAs are also educated in the effects of technology on the human psyche and on societies. We should make sure that technology and science communities are populated by diverse individuals from a range of cultural and societal backgrounds to ensure the technological solutions they devise reflect a broad range of interests and concerns.

I have made it part of my mission at Mozilla to engage our community in an ongoing discussion of what we want the Internet to be, and to educate Internet users to always keep their fingers on the pulse of the web. Afterall, it is the health of the Internet with which we are concerned - how vibrant, active, and agile it can be, even despite the threats it faces. In 2007, we launched the Mozilla Manifesto - ten principles that defined our vision for the open web, and which reiterated the ideals to which we adhere as a company and a foundation. This year, we issued an addendum to that Manifesto: a pledge for a “Healthy Internet”, one which set out our aspirations for what the human experience of the web should be. We committed to diversity, plurality, the promotion of civil discourse and human dignity, and steadfastly declared our dedication to an Internet which elevates critical thinking and verifiable facts. This was our attempt to reestablish that most central idea, there at the birth of the Internet - that the Internet has remarkable potential as an exceptional tool for the betterment of the human condition.