You can't always get what you want

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Introduction

There is something seriously wrong with our public discourse about the Internet. In fact, there are lots of things wrong with it. For a start, it's largely a-historical, by which I mean that is conducted in terms which suggest that the experiences we are having are entirely unprecedented in human history. I speak with feeling on this topic, because I write a weekly newspaper column about this stuff. And much of the time what am attempting to do is to escape from the sociology of the last five minutes which appears to characterise much media commentary in this area. The obsession is always with what Michael Lewis once called the new, new thing. Has Apple peaked? What will those mythical creatures called "teens" do next? Will Snapchat displace Facebook? And so on, *ad infinitum*.

The fact that in 100 years time only cyber-archaeologists will know what Facebook was, and people will wonder what that blip was in the evolution of the Internet between 1993 and 2033 and conclude 'Oh yes, that must have been the Web!' cuts no ice with the hard-faced news editors of our day. And when you say to them that if we want to understand the implications of a revolutionary transformation in mankind's information environment, then it might make sense to reflect on the only previous such revolution – the one triggered by Johannes Gutenberg in 1455 – then they display all the panicky signs of men confronted by a lunatic, like checking for the nearest exit.

And then there's the fact that our public discourse about the Internet is so Manichean, which is a fancy way of saying that we constantly talk about the Net as a struggle between the forces of light and of darkness and lurch from utopian dreams to dystopian nightmares in the blink of an eye. And when I listen to these discussions what comes to mind is a scene in a pub in which two drunks are arguing energetically about whether oxygen is, on balance, a good or a bad thing. The fact is that whether we like it or not the Internet exists, is not going to be uninvented, and has effectively become a part of our everyday

lives. So the question from now on is not whether it's good or bad but how we live with the new reality that it has brought.

The whole elephant

But most of all what comes to mind when I survey public discourse about these matters is the ancient fable of the blind men and the elephant. You know the story, I'm sure. There are these guys who are blind, or as we say nowadays, visually challenged. There is an elephant which, for a change, is not in the room but at the open air. And the task of the blind men is to describe the elephant. Their method is the time-honoured one: each uses his hands to feel a different part of the beast. The guy who feels the trunk describes the elephant as a long, flexible muscle. The guy who gets the hind leg describe something heavy and solid and immovable, like a tree. And so on. God knows what the guy who gets the tail thinks. The moral of the story, of course, is that no description of the whole elephant arises from this exercise.

I think that our discourse about, and view of, the Internet are similarly patchy and disjointed. Which is why I think it is worth trying to get a picture of the whole elephant – trying to get a picture of the Internet as it is, rather than as we'd like it to be, or imagine that it is. It's perhaps a bit ambitious – even hubristic – to imagine that one could do this in a single lecture, but I can at least make a start. As the Chinese say, even the longest journey begins with a single step.

Why the network is unique

Where to start? Maybe the right place to begin is by accepting that, while there have been communications networks from time immemorial, there's never been anything quite like the Net. And the thing that makes it most exceptional is its disruptiveness. If you wanted a shorthand way of describing the Internet you would say that it is *a global machine for springing surprises*. And the key to that capacity lies very deep in its architecture – in the two fundamental axioms that determined its design in the 1970s. The first of these axioms was that this 'internetwork' should have no central ownership or control. The second was that the network should not be optimised for any particular application. This latter axiom led to the design of a system that did only one thing, it took in data packets and one end and did its best to deliver them to their destination at some other edge of the network. That's it. That's all it did.

This principle was later dignified in a number of terms and phrases. "Dumb network, smart applications" was one. The 'end-to-end' principle was another. But whatever you call it, it had radical implications: it meant that if you had an idea for an application that could be realised using data packets, and if you had the talent and skill to write the software to implement your idea, then

the Internet would accept your data packets with no questions asked and do its level best to deliver them to their destination. And because there was no central ownership or control, there was nobody to say "Hey! You can't do that!". Or to ask "Who the hell do you think you are to go messing with this network?" So what Vint Cerf and Bob Kahn and their colleagues had designed was what Barbara van Schewick later described as an architecture for "permissionless innovation". Note that phrase – permissionless innovation – because it's the key to understanding the distinctiveness of the Internet. It is also the key to understanding why the network has triggered – and continues to sustain – an explosion of creativity and innovation, good, bad and indifferent. It's what made it that global machine for springing surprises.

What kind of surprises? Well, here are a few of the obvious ones: the Web; file-sharing; malware; VoIP; eBay; Wikipedia; Google; YouTube; Facebook. All of which came mostly from one or two individuals who had vision and programming talent, and who mostly had little or no money. And, of course, other surprises included malware, phishing, spam and a host of other malodorous stuff. So for the Internet, disruption is a feature, not a bug, which is why it's much more important than any application that runs on it.

The political economy of the Net

But *describing* the Net only takes you so far. In order to understand it you have to look at it through some kind of analytical lens. One such lens is provided by an old-fashioned discipline known as political economy. This is the field of thought from which modern economics evolved, but most modern economists would dearly like to disown their ancestry. Why? Because it would reveal how impoverished their mathematically-obsessed discipline has become. Political economy emerged as a distinct field of study in the mid-18th-century, led by thinkers like Adam Smith, David Hume and Francois Quesnay who began to look at the distribution of wealth and power not in terms of the will of God or other deterministic explanations, but instead in terms of political, economic, technological, natural and social forces and the interactions between them.

So what does the political economy of the Internet look like? Well, the first thing you notice is that it is dominated by a small number of very large companies – Apple, Google, Facebook, Amazon and Microsoft. Yes, Microsoft; it may look like an enfeebled giant that missed the boat on mobile, but it's still a very big and powerful company. And so one of the questions a political economist would ask is: what kinds of power do these huge companies wield, and how does that part differ from that wielded by the huge industrial conglomerates of the past?

Just take Google as an example, we find that it is suspected of wielding old-style industrial muscle – by exploiting its dominance of search to squeeze out competitors; which is the kind of thing that anti-trust lawyers know all about. But on the other hand, the so-called 'right to be forgotten' judgement of the

European Court of Justice actually confers not *a right to be forgotten* but simply a right not to be found by Google's search engine. Which means that here we have a company which effectively has the power to determine who is visible – and who is not – in a networked world. That's a new kind of power, and it's not clear how we might conceptualise it.

Then a political economist might ask: what are the business models of these great new enterprises? They vary from company to company. Apple makes beautiful, premium-priced gadgets and flogs them at huge margins. Amazon does many things, but in the end it all comes down to 2 distinct things: becoming the Walmart of the online world; and being the dominant provider of cloud-computing services. Microsoft continues to do its thing, which is essentially to be the dominant provider of computing infrastructure for governments and large organisations everywhere. Which leaves Google and Facebook, whose business model is essentially surveillance – in the sense that they provide free services that billions of people value and appreciate in return for the capacity and right to monetise the personal data of their users.

Other things that our political economist would notice is the role of venture capital in this digital economy, together with the fact that in both the venture capitalists and the companies themselves there are grotesque gender and ethnic imbalances. And she would also observe that these fantastically profitable enterprises do not appear to be making much impact on the existential threat to our democracies, namely pervasive and increasing inequality. In fact, despite the bleating of Google and Facebook, they – and their industrial frogspawn like Uber – look more and more like great engines of inequality, accumulating unconscionable wealth for their founders and owners while providing the technological basis for a new kind of economy – the concierge economy – in which billions of people, with no job security, provide services for elites who are, as the phrase goes, "cash rich but time poor".

And what of the state? Here our political economist would notice some strange contradictions. On the one hand, the state provides the environment – the public services, the police, the legal systems, the schools and universities on which these great enterprises depend for their safety and functioning. And yet the folks who built and run these companies appear to have overdosed on the neoliberal Kool Aid. Many of them regard the state as essentially a nuisance which ought to be shrunk – and to which they should pay as little tax as compliant tax-havens will allow them to get away with. Standing here in Trinity, less than a mile from where Jonathan Swift once fulminated against hypocrisy, I wonder what the great Dean would have made of people whose vast wealth is entirely built on a network that was conceived and funded by the state despising that self-same state.

That's not to say, though, that the state itself has been blameless in this new, networked environment. In the first place, we now know from Edward Snowden the extent to which nation states have harnessed the technological affordances of Internet and mobile technology to create a surveillance system of Orwellian

proportions. Many years ago, in 1959, when President Dwight Eisenhower was preparing to vacate his high office, he made a television address to the American people in which he warned of the dangers to democracy posed by the rise of what he called the military-industrial complex, by which he meant the vast network of defence contractors – that is to say, arms manufacturers – that had fastened like a colony of leeches onto the US Department of Defense in the formative years of the Cold War. What the Snowdon revelations remind us is that over half a century later, that military-industrial complex has morphed into a military-*information* complex as the Booz Allen Hamiltons of this world scent rich pickings in the paranoia of a post 9/11 world.

The Internet we made: the social construction of cyberspace

Another lens through which we might view the Internet we've got is provided by the history and philosophy of science, and in particular the view that technology is not autonomous in itself, but something that is *socially constructed*. This runs sharply counter to the prevailing Silicon Valley narrative, which is essentially one of *technological determinism* – the idea that technology drives history.

But if you take the idea of social construction seriously, then you see the evolution of the internet in a rather different light. Remember that this technology is now over 40 years old. You can think of its history as a play in four acts. Act One was the ARPANET, the original packet-switching network built by the Pentagon in the late 1960s.

Act Two ran from 1973 to 1993. It opened in September 1973 when design work on the network we use today – the one based on the TCP/IP family of protocols – began. In January 1983 the network was switched on, and the Internet ran as a research facility available only to a very elite group of scholars.

So for the first 20 years of its existence the Internet was essentially the preserve of a technological elite – the computer scientists, engineers, graduate students, and researchers who collaboratively designed and had access to it. It was also a totally non-commercial space: there were no corporations on the early Internet. And this social context was critical in two ways: it shaped the way the technology evolved during the design phase; and it also shaped the way people thought about the technology.

Early users of the network were drawn from a fairly tightly-knit group of researchers, many of whom knew one another and, if they didn't, at least knew the other's institutional base. So, for them, *authentication* – that is, establishing that a user was who she said she was – was not seen as important. And this indifference to authentication was baked into the SMTP protocol designed for handling email. This meant that a mail server on the network did not check the provenance of messages as it passed them on. The implications of this omission did not really become apparent until the network was opened up to millions

and later billions of strangers, when it was one of the flaws in the network that facilitated the sending of junk email.

This is just one example of how the network was shaped by social factors. There are lots more, but we dont have time to go into them now.

Act Three opens in 1993 when the launch of *Mosaic*, the first graphical Web browser, brought the Internet to the attention of the mainstream world. All of a sudden, non-geeks understood what this weird network was for. More importantly, the business world understood it too – as the biggest commercial opportunity in history. So you could say that what happened in Act Three was essentially that Wall Street moved west and created the Internet we have today, by mustering the economic resources which shaped its evolution.

But it wasn't just greedy capitalists who shaped the network. We – the users – played a role too. As the World Wide Web brought the Internet into the mainstream of life it turned out that most of us had a pathological objection to paying for anything online. But we still wanted all the wonderful things that were available online. Since there's no such thing as a free lunch, even in cyberspace, these goodies had to be paid for somehow. All those servers, all that bandwidth, all that the air conditioning, all those SysAdmins. And so a business model evolved: we could have all the goodies for free, but we paid for them by compromising our privacy and by allowing the companies to exploit and monetise our personal information in any way they could. So the Internet we got, that playing-field grotesquely tilted towards the companies and away from us, was our creation too.

And that's worrying in more ways than one. Because what we've also discovered in the last few years is that in a strange way the Internet serves as a mirror in which we see a reflection of human nature. And some of what we see is deeply, deeply troubling. We see, for example, appalling levels of hatred, prejudice, sexism, misogyny, ignorance, homophobia and racism. I've lost count of the number of women I know, or have heard of, who have basically decided to withdraw from cyberspace because of the terrifying levels of abuse that is directed at almost any female who puts her head above the online parapet. The fire-storms of ersatz indignation that sometimes erupt on social media hark back, if not to the Middle Ages, at least to the lynch mobs of the American deep South. And if you want a taste of the astonishing levels of cruelty that people seem capable of on online media, then I recommend spending a few evenings with Jon Ronson's latest book, *So You've Been Publicly Shamed*.

Act Three of the great Internet story ends here. Act Four runs from here to eternity, and what happens in it is up to us.

The affordances of digital technology

In saying that technologies are socially shaped, by the way, I don't mean to imply that the *nature* of these technologies is unimportant or irrelevant. On the

contrary, it's as important as the social and economic forces that determine how it is used. And in this respect, digital technologies are particularly interesting because they have particular affordances which make them radically different from earlier general-purpose technologies which have changed our world.

What are these affordances? Well, here are a few:

- First, there are zero – or near-zero – marginal costs. Which means that when you've made the investment to create additional good or service then it costs almost nothing to roll out each successive copy. Which in turn means that once you've made the initial investment to create the good or service, then replication of it is basically costless.

- Then there are network effects – the phenomenon whereby the value of a network increases exponentially with the number of users. This is why the basic strategy of all successful Internet businesses has been to get big fast; that way you can get to the point where really powerful network effects kick in – and where it's correspondingly more difficult for new competitors to challenge you. It's also why there probably won't be another Facebook: the network power bestowed by 1.4 billion users is just too great.

- Thirdly, there is the strange fact that wherever you look in cyberspace you never see a normal distribution. No bell curves. Instead, what you see are power law distributions – the ones in which a very small number of actors, sites, agents attract the vast majority of the interest, interaction or trade, with everybody else scrabbling for business or attention in the so-called Long tail.

- Fourthly, there is the phenomenon of technological lock-in – the process by which a proprietary technical standard becomes the *de-facto* standard for an entire industry. In the dim and distant past, when the computer really was the PC on your desk rather than the server in the cloud, Microsoft controlled 90+ per cent of that market. Which meant that if you wanted to make a living as a developer then you had to write software that ran under Windows. With the decline of the desktop machine, Microsoft's technological lock-in has eroded (though it's not yet dead, as a visit to any government, hospital or corporate office will confirm). its successor is probably the APIs – the application programming interfaces – for Amazon's cloud computing services, because they are the ones you have to adhere to nowadays if you want to write software for cloud applications.

  Taken together, these four affordances point in one direction – towards winner-takes-all scenarios. So what the affordances bestow on companies that have mastered the technology is an unprecedented kind of corporate power – a power that we have only just begun to appreciate.

The Wu question

Which brings us neatly to the question posed a few years ago by Tim Wu, a law professor at Columbia. In his masterful book, *The Master Switch*, Tim recounted the history of the great communications technologies of the 20th century – the telephone, movies, broadcast radio and TV – in the United States. He shows that the early years of these communications technologies were accompanied by optimistic hopes or Utopian dreams. Every new communications medium brought with it hopes that it would ameliorate the ills of society.

Broadcast radio, for example, attracted an extraordinary faith in its potential as the benefactor, perhaps even a savior, of mankind. The urge to exploit the new medium stemmed from humanitarian as well as economic motives. Well before the Internet, Wu writes,

> "in a world without paid downloads, even before commercial television, the same urge to tinker and to connect with others for the pure good of it gave birth to what we now call broadcasting and practically defined the medium in its early years. In the magazines of the 1910s you can feel the excitement of reaching strangers by radio, the connection with thousands and the sheer wonder at the technology. What you don't hear is any expectation of cashing in".

In the US, where broadcasting began, people dreamed that it would reduce the distance between citizens and a remote federal government, that it would elevate the level of public and political discourse, and that would lead to a cultured society. "A man need merely light the filaments of his receiving set", wrote the Director of Research at the Radio Corporation of America (RCA) in 1922, "and the world's greatest artists will perform for him". Viewed against this background, the hopes and dreams of the early Internet evangelists seem almost tame.

But, in the long view of history, Tim Wu discerned a pattern. New inventions lead to a period of openness, excitement and a feeling that nothing will ever be the same again. But the openness doesn't last. Closure is triggered by the arrival of one or more charismatic entrepreneurs at the point when the novelty of the new technology is beginning to wane and consumers have developed a taste for quality, stability and higher production values than are being delivered by the nascent industry.

The newcomers offer a better proposition: in telephony, for example, AT&T offered a single network (as opposed to the variety of non-intersecting phone systems then in existence) together with the guarantee that customers would get a dial tone when they picked up their handsets; in radio, NBC offered better programming, with professional actors, better scriptwriting, and so on; in movies, the emerging moguls, faced with the creative chaos of the silent movie business, built vertically-integrated chains which owned studios as well

as cinemas, employed stars, and delivered sound (and, later, colour) – in other words a more attractive, uniform product.

And consumers respond to these propositions, which leads to a positive feedback loop: the new entrepreneurs become more and more successful, their competitors fall away and eventually the industry is effectively captured either by a monopolist (telephony), or a cartel (Hollywood).

The most insidious thing is that this process of capture (or closure) doesn't involve any kind of authoritarian takeover. It comes, Wu says, not as a bitter pill but as

> "a sweet pill, as a tabloid, easy to swallow, beloved. And in fact most of the monopolists in history, or the cartels, which take over information industries, deliver a golden age, deliver a process of unprecedented creativity of a certain kind, less diverse but innovative, frankly just a great product. That is the key, and that is what leads the markets towards closure".

You can see where this is headed. The big question, the existential question, that now faces us is whether the process of capture and closure described by Tim Wu will also happen to the Internet. Because remember that it too started out all those years ago as a technology that fostered Utopian dreams; it was seen as a democratising, benevolent force that would change society for the better, that would enable us to build a more attractive, cosmopolitan, connected world. It still retains the potential to achieve all these great things and more. But with every passing day it diverges further from that uplifting path and heads into a virtual world of monopolistic shopping malls, passive consumption and pervasive, intrusive surveillance.

And the strange thing is that we could, if we wanted to, stop this rot that masquerades as technological and social progress. That's why the insight that technology is socially constructed is so important. The Internet we have today was not just an inevitable working out of the logical implications of the technology, but the product of choices made by the interactions of technological innovation, capitalist exploitation, governmental paralysis and user behaviour. And this gives us a clue about what must be done if we are to take back the Net from the institutions that have been relentlessly appropriating it for their own purposes.

So what do we need to do?

First of all, we – the users of the Internet – have to change. We have for too long behaved like irresponsible, naive idiots, accepting grossly skewed terms and conditions and allowing ourselves to be turned into online *consumers* rather than active citizens of cyberspace. Many of the things that we tolerate in

the virtual world – the kind of intensive surveillance practised by the NSA, GCHQ and other agencies would be seen as unthinkable if they were replicated in the real, physical world. Imagine: a policeman stationed outside the door of every home, checking on the movements of all its inhabitants, checking out their visitors, knowing every publication they read, being able to intercept every single communication they make. Unthinkable! And yet apparently tolerated in cyberspace.

We tolerate similar abuses by the companies that provide us with the services we crave. And yet the strange thing is that they are terrified of us, because they know that without our clueless acceptance and passivity their prosperity is threatened. They saw what happened in the online protest against SOPA, the Stop Online Piracy Act, for example. (So, by the way, did the members of the US Congress.) And they have been alarmed by the way the Snowden revelations have undermined public trust in their cloud computing services. So they're not invincible.

If you doubt the feasibility of frightening them into changing, just do this thought experiment: Imagine what would happen if every Facebook user were to boycott the service for a week; or if every Web user were to use Duck Duck Go rather than Google search for a week. Just for a week. Imagine the calls from Wall Street analysts, the flight of advertisers, the plunge in share prices. Imagine the panic in Sand Hill Road, the place where Silicon Valley's premier venture capitalists hang out, if they suddenly had to wonder whether their sure-fire investments might be faltering.

But we also need to wise up and act like citizens in the real world, as well as in cyberspace. Our governments have to be pressured to assert the public interest in the evolution of the online world, rather than passively accepting the dogma of technological determinism. As a start, the laws relating to data protection need to be radically updated to reflect our current reality. We need laws that ensure that *all* the personal information that results from our use of the technology – all our metadata, clickstreams, location tracks and the rest – belongs to us and can only be accessed, exploited and processed by others under conditions of pellucid transparency. Which means that the huge – and currently hidden – market in personal data has to be outlawed, or regulated.

Finally, we should recognise that many of the problems of the Internet we've got are, in fact, a byproduct of the cloud computing architecture that has become the latest manifestation of the technology. It's important to realise that there is nothing inevitable about this – it just seemed the obvious thing for the companies to do at a particular moment in the evolution of the technology. Allowing them to keep all our data in the cloud may have been a good idea once, but it has already passed its use-by date. We need a radically decentralised architecture like the Databox concept developed by my colleagues in Cambridge – technology that enables each one of us to have a personal cloud which we control and which interacts with corporate and government servers on conditions explicitly embodied in APIs.

There's lots more one could say in this vein, but my time and your indulgence are limited. All I really wanted to say is that there is wisdom in the Rolling Stones song from which I took the title of this talk.

> *You can't always get what you want*
>
> *But if you try sometimes, well you might find*
>
> *You get what you need*

OK: it's time we tried.

Thank you.