

WHAT THE INTERNET DID NEXT

BY VINAY GUPTA

The internet has revolutionized one area of life after another. Sometimes it seems like there is no limit to what it can do. But even more profound and systemic transformations are on the way in a variety of sectors including banking, international trade, and sustainable development. Distributed Ledger Technology (also known as blockchain) is the next step of the evolution of the internet.

In the 1960s, when computers still used magnetic tape, a team at IBM invented the modern database. A series of esoteric mathematical insights were encoded into software, enabling ordinary programmers to perform feats of data manipulation which had previously been very, very difficult and time consuming. For the next 20 years, a wave of computerization swept across the world as nearly every institution adopted these new technologies. All records—financial records, inventory, supply chain, personnel, customers and more—wound up stored in these new relational databases. Today, the modern organization is its database, and the database is the organization. What is a bank but software and teams that make decisions based on the software’s output? Data, as they say, is the new oil.

ALTHOUGH THE LINKS ARE SOMETIMES INDIRECT AND HARD TO PARSE, SOFTWARE SHAPES SOCIETY.

The path to digitization is seldom smooth and linear. Consider the music industry. The current state of affairs is very much utopian for listeners: \$10 a month for unlimited access to a library of 30 million tracks is a typical deal offered by the major streaming services. Audiophiles can pay a little more for Tidal, and get the music with far fewer digitization artefacts. For most purposes, we have a utopia for music listeners. No laws were changed, major industry players did not go bankrupt, and the CD followed the tape, the 8 track, and the record into obsolescence. But compare this to the rhetoric of the 1990s, where organizations like the US RIAA complained that the internet was killing music, using much the same rhetoric which was used about the home

cassette recorder, and made dire predictions about the future impoverishment of artists because of these new mediums.

Neither the internet nor home taping killed music. In fact, if anything is killing music, it is the music industry’s refusal to modernize billing practices, allowing artists full and transparent understanding of when and where their music is being played and ensuring they get every penny to which their contracts entitle them. The listener’s experience of music has been revolutionized by technology, but the artists are still often confronted with paper statements and payments which can take two years to arrive as they clear through archaic bureaucracies. Consumer pressure created better services, but the artists have not yet joined the listeners in this new musical utopia.

We could discuss five or six more examples of this kind of rocky, uneven transformation—the ups and downs of digitization, from social media to e-commerce—and we would find the same pattern. In the early days of the digitization of a new field, there is lots of chaos and uncertainty. Then things settle down as incumbents and upstarts find an accommodation, and something smooth, polished and professional becomes wildly popular. Over time, human needs haven’t changed very much. Technology shapes how we meet our needs, but it changes very little about what we want from life or what we are willing to pay for it.

The wheel of transformation continues to turn: yesterday it was the sharing economy, which gave us Uber and Airbnb. Today it is this thing called blockchain, or Distributed Ledger Technology to use the more correct term.

The DLT field started out with mavericks, much like the Napster days of music piracy. As befits such an ambitious technology, the maverick phase of DLT was quite disruptive. Bitcoin, now ten years old, is nothing less than an attempt to set up a “Central Bank of the Internet” complete with a monetary policy locked into immutable code. It comprises a full suite of disruptive technologies and big ideas about prying the right to issue currency away from the State and the banks, and putting it into the hands of computer programmers. Over the last ten years, this vision has faded in and out of reality as the price of Bitcoin (still by far the world’s largest digital currency) wildly fluctuates, often giving the system about the same market capitalization as HSBC or Goldman Sachs. Although market cap may not be precisely the right way to evaluate the penetration of a digital currency system into the global economy, it still gives some sense of the size of the effort and the enterprise. Tens of thousands of skilled programmers have worked on Bitcoin and associated systems, developing new techniques, new perspectives, and new platforms. This is certainly one of the biggest and most interesting technology trends of the last decade.

The most interesting thing about Bitcoin, however, is not its status as a non-state issued global currency. That goal, however ambitious, does not seem to fill an obvious human need. The argument has been made that Bitcoin is, in some sense, “digital gold” or that it is a compelling alternative to the international bank wire, but none of these use cases have accumulated the kind of scale and growth required to really show utility. Much more interesting is the structure of the Bitcoin platform; how all of these people came together, as individuals and relatively small companies, to build a single global system of this scale without centralized control or corporate governance. Although bitcoin is relatively small compared to the real-world financial system—a market cap to rival HSBC is worthy—Bitcoin is around 4 times the size of Spain’s Mondragon Cooperatives network and, what’s more, it is global, decentralized and leaderless. This phenomena of mass collaboration to build efficient new global systems is without precedent. Perhaps the most exciting thing about Bitcoin is not what it does, but that it can exist at all. This is a profound discovery: efficient cooperation at scale without requiring central coordination.

There has been a global trend in this direction developing over the last several decades. The Free and Open Source Software (FOSS) movement, started by Richard Stallman’s Free Software Foundation, writes the majority of the world’s



software infrastructure. The code is written by a diverse range of people, both hobbyists and software engineers for large companies. Uniquely, the licenses attached to the code free it for use in any system without fees or royalties, and permit further evolution of the software. Apple’s MacOS, Google’s Android, and the millions of machines in Amazon’s Cloud are all powered by Free and Open Source software. It is perhaps one of the largest invisible success stories of the 21st century.

Software created under FOSS licenses is available to anybody to use for any reason without restriction. Software engineers working in ordinary software companies, even those that are rivals, will often work together on the same software infrastructure using these collaborative approaches to software development, sharing their updates under FOSS intellectual property licenses which foster cooperation over competition.

The total value of software in this pool is hard to estimate, but is often said to be well over \$100bn. Certainly the world would stop if this common heritage of software was no longer available for some reason; everything from cars to cranes to jetliners are powered by this common shared pool of tools and code. Very nearly all of the software which is part of the DLT transformation is also part of this pool. In many ways, the DLT systems can be seen as an extension of the FOSS software production philosophy into a new phase: something which looks a bit like cloud computing, or a replacement for the internet Domain Name System (DNS), the very DNA of the internet. The DNS system is what makes amazon.com point to Amazon’s computers rather than some other computer connected to the internet. It is the thing which joins up the pieces of the internet into a cohesive whole. But the DNS system is still operated by an

agency, a bureaucracy, although of course all the software to operate it is FOSS software.

This invisible infrastructure quietly supports almost everything in our modern world. It is the system-of-systems behind Wikipedia, behind the Cloud, adopted by banks, contained in all of our phones and most of our laptops, never noticed, keeping the world running. It is a truly remarkable achievement, a true testament to our human capacity for cooperation and collaboration. With the right incentives, the right tools, and the right support, dramatic things are possible.

This is the best route to understanding the DLT revolution. The Free Software movement produces a lot of functional software, but it also produced software tools to support people working together. As those tools improved, the scale of possible collaborations increased, now including Wikipedia, Linux, Android, MacOS, and of course Bitcoin, Hyperledger, and the like. These systems are not anti-economic or even anarchist in any real sense. Rather, they embody routes to collaboration which don't involve conventional job specifications, contracts, and command-and-control modes of economic production as pioneered in Fordism and Taylorism. What is happening here is a cultural transformation as new tools create new possibilities, and new possibilities give rise to the cry for new tools. I genuinely believe that this is a Renaissance, and that we now have the same kind of innovation economy in software that existed in finance centuries ago in Genoa, then later Amsterdam and London as wave after wave of innovation enabled the system of mass collaboration that we now call the financial system.

The global information system runs on top of the financial system; the financial system pays for the wires and warehouses of computers we call the cloud. It is what pays for the chips. It is what pays the salaries of the people writing the software, even the FOSS software. But the emerging information ecology has different rules, different organizational norms which are as dissimilar to what came before as corporations are to feudalism. It is a systemic transformation which has run in phases: computers, databases, electronic mail, the web, e-commerce, social media, the digitization of books, then music and television, then money itself. Not much is left that has not been touched. Democracy itself may yet be in need of an upgrade, both to protect voters from demographic profiling and perhaps to use the enormous power of the internet to

process information to produce government that actually fits the ever-changing needs and desires of dynamic populations.

My company, Mattereum, is making a bet on one part of this pervasive digital transformation. We are chasing the possibility that all of the assets of civilization are going to be digitized over the next couple of decades, starting with such assets as luxury goods and art objects, moving through uniquely identifiable property like laptops, cars, and jet engines, and eventually encompassing consumer goods right down to recyclable bottles. We see a future in which everything has a name, like books have ISBN numbers or phones have IMEIs, and in which all the information about these goods can be used to manage them using computers. Uses include finding new owners for second hand goods and having efficient markets for parked cars or empty guest bedrooms, but also include quickly clearing goods through customs, optimizing the packing of containers and ships in ports, and providing integration of logistics, trade finance, and customs in new systems for world trade which are as revolutionary a leap forward as the jump from buying CDs to renting 30 million tracks for \$10 a month.

Something is coming. It is a shift below the political level, a shift in the basic economic frameworks of society like the industrial revolution and the invention of modern finance. The DLT transformation is the cutting edge of that trend today, but it ran under various names for decades before the blockchain was invented, and it will continue long after the blockchain is either adopted or abandoned and replaced by something better. Everything will change, and yet nothing will change; we all still listen to music, and the revolution in its delivery methods is all but forgotten when we are surprised by some new sweet sound.



Vinay Gupta and Barbara Dietrich