Shaping A DATA ECONOMY

The world needs a new system of governance for the buying and selling of data

Murat Sonmez

Robots are rolling through hospital wards and warehouses, decontaminating rooms with ultraviolet light. Voice-activated and -connected devices are helping people with limited mobility and chronic conditions. Medical professionals are using artificial intelligence (AI) to speed up diagnosis and treatment. Drones are delivering blood on demand, cutting delivery times from hours to minutes and eliminating waste at the same time.

These technologies collectively represent the Fourth Industrial Revolution (4IR)—the recent explosion of computing power combined with connectivity that has led to the fusion of our physical and digital worlds. The 4IR has changed how most of society interacts with and uses technology. It is developing at a speed and scale unlike anything we have ever seen—and without any constraints or guidelines.

Technology was already speeding ahead when the global pandemic began. Now it is in even higher gear. More than 80 percent of business executives are accelerating plans to digitalize work processes and deploy new technologies. By 2025, employers will divide work equally between humans and machines.

Yet the underlying challenges of this revolution remain unaltered. How do we harness the potential of this technology while mitigating the risks? How can we ensure that all of society benefits, and not just the privileged few?

Harnessing data's economic power

Data is the key to unlocking the potential of the 4IR. It fuels AI, precision medicine, robotics, and the Internet of Things. How we use data and how we safeguard it will determine the ultimate success or failure of the revolution. But there are fundamental questions that need to be answered to move forward: Who owns data? What can you do with it? Who derives the economic benefits?

We have already seen the economic value of data through the valuation of technology companies eclipsing the size of most of the world's economies. What if we could find a transparent and equitable mechanism to unlock the economic value of data for individuals and organizations and do it while protecting the privacy of the data's owners? We could not only unleash the power of data in addressing critical challenges in health, agriculture, transportation, and the environment but also create a revenue stream for the owners of the data.

There is a need for policies that are forward-looking and enabling rather than backward-looking and punitive. To move forward, we need a new data operating system (data OS) for the governance of 4IR.

First, we need to reimagine the notice and consent mechanisms that allow owners of data to specify what purposes their data can be used for, for how long, and whether the owners should be paid. These rules can be attached to data sets—much like media digital rights management—so that they cannot be used out of bounds.

Second, we need a certification mechanism for applications requiring the use of various data sets. Data-mining algorithms should be trustworthy. Think of it as a 4IR app store, managed by a trusted agency that certifies the owners of these applications and their compliance with the new consent protocols and restrictions.

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Third, we need a transparent mechanism for the valuation of data. On its own, data does not have economic value; it is similar to a commodity such as sugar, cotton, or coffee, with prices driven by supply and demand. We could declare data a tradable asset through such an exchange mechanism, using market forces to price it for specific uses based on demand. Unlike commodities, however, data is not a single-use asset; it can be used repeatedly and for a variety of purposes.

Finally, we need a cross-border data flow and digital remittance mechanism. Countries could draw up bilateral treaties agreeing to share data across borders for purposes they agree to, pooling their data assets via a flexible, yet secure, mechanism. Cross-border payments can be facilitated by digital means, ensuring timely payment to the owners. These owners pay taxes as they receive income, and the users of data pay taxes at the moment of consumption in their own jurisdictions, yielding a transparent and fair taxation system and a new source of income for governments.

This four-tiered approach has the potential not only to generate a continuous income stream for individuals, but it also allows companies holding onto vast amounts of data to use transparent mark-to-market mechanisms and introduce a balance sheet asset benefiting all stakeholders.

Such a system would enable us to reverse-engineer breakdowns and glitches before they occur. It would alert us to the risks ahead, identify appropriate responses, and thus help us prevent an unwanted future. If designed correctly, the new operating system could boost economic growth and tackle the challenges ahead while minimizing negative impacts on society.

This scenario is not a far-fetched dream. There are three case studies of 4IR technologies working to solve some of the world's biggest challenges: treating rare diseases, securing enough food for the planet, and building trust where it has been broken. But, as highlighted below, there are a few crucial pieces missing when it comes to accelerating and scaling their benefits globally.

Treating rare diseases

A compelling example of the benefits of the new data OS involves rare diseases. Worldwide, 400 million are affected by a rare disease, more than cancer and AIDS combined. There are 7,000 identified rare diseases so far, often with broad symptoms. This means not only lengthy and difficult diagnosis but also a lack of available data for treatment, given that only a handful of people living in the same country suffer from the same disease. National approaches to rare-disease research fall short because of lack of access to a broader international pool of data. In fact, treatments underway in one country may be unknown to patients in another.

A more integrated system designed to gather and share data on a global scale would enable individual countries and hospitals to diagnose and start treating rare diseases faster. More data can lead to better outcomes.

With an estimated 15.2 million people expected to have clinical genomic testing for a rare condition within the next five years, we urgently need to evaluate the potential benefits of developing a system that can share the data without compromising privacy. One way would be to adopt a federated database system, allowing autonomous databases to interconnect without merging. Users of a federated database can access voluntarily shared information through a uniform interface, but each data set remains under local control and security.

Weak genomic data policies expose communities to the risk that certain individuals or companies will extract genetic and biological information and use it for their own benefit rather than for the greater good. There is also the less nefarious risk that people will simply mishandle this sensitive data absent protection policies and standards. These risks can be minimized through the development of ethical policies, regulations, and standards that support scientists and other researchers but guard against abuses. A federated data system ticks all four boxes of the data OS and has the potential to accelerate benefits safely and to all of society.

Feeding the world

Headlines about AI often highlight the dangers and the problem of inclusivity. Discussions are necessary on the ethical use of facial recognition, how companies can ensure that algorithms are not perpetuating bias, and how self-driving cars can be safe for drivers and pedestrians. Less noticed is a quiet revolution underway to develop AI to combat world hunger and the role data plays in keeping us from sleepwalking into a global food crisis.

The food challenge ahead is almost overwhelming. Current unsustainable agricultural practices could lead to the degradation of 95 percent of the world's land

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by 2050. Some 2 billion people do not have access to safe, nutritious, and adequate food. To address these challenges a comprehensive transformation of food systems is needed. And 4IR technology can help.

Some agricultural AI start-ups are training algorithms on large new data sets to improve farms' performance. Tel Aviv–based Prospera, for example, collects 50 million data points from 4,700 fields every day. The company then uses AI to identify pest and disease outbreaks and to uncover new opportunities to boost yields, cut pollution, and eliminate waste.

Other companies are developing AI tools to hasten the transition to plant-based meat. NotCo of Chile and Fazenda Futuro of Brazil have both developed AI tools that analyze vast amounts of plant data to identify the best approaches to replicating the taste and texture of meat. Firmenich has introduced the world's first flavor made entirely with AI. With meat production accounting for almost 50 percent of the world's agricultural emissions, the growing shift to plant-based meat is also poised to yield enormous environmental benefits.

These case studies show that companies around the world are capitalizing on the benefits of 4IR technologies, yet in many parts of the world, data is trapped behind borders. Our food challenge is global, and to ensure that we have enough food to feed the planet we must unleash the full power of AI. That means sharing data across borders and removing silos.

A decoupled architecture such as a data OS could help countries and companies share their development of food solutions and, potentially, financially reward them for sharing the data. If we can define data ownership—including the right to use the data and reap the rewards—we could scale up projects on a global level.

Building trust

Underpinning progress across 4IR technologies, whether it's diagnosing rare diseases or improving agricultural yields, is trust. Without trust in the data we are sharing, the system could collapse. If we are sharing data across borders and across industries, how can we ensure that the information is authentic?

One obvious answer is to use blockchain or distributed ledger technology—this is a tamper-proof digital bookkeeping system in which "blocks" of time-stamped transactions are recorded and distributed in an accessible database. Blockchain's peer-to-peer security architecture, transparency, and rapidly evolving features—such as smart contracts and tokens—make it an ideal platform for building a system of accurate and trusted policies.

This system is already used around the world by companies and countries trying to build trust in areas where this has been a challenge in the past. The benefits can be seen at StaTwig, an India-based company that has piloted the use of blockchain ledgers to track deliveries of vaccines to children. Multinational brewer Anheuser-Busch InBev has used the technology in Zambia to facilitate transparent pricing for locally sourced crops such as cassava, for which farmers had been historically underpaid. Colombia is exploring how blockchain might help root out corruption by improving oversight in public procurement.

Blockchain technology is still in its early phases; however, it is proving to be a path forward for building trust where it is needed most. If we can show that the data we are using is trustworthy and accurate, we can expand and build on its uses.

Benefiting people and planet

Right now, 4IR technologies are evolving without any guidelines. The development and application of these technologies should benefit people and the planet. Harnessing this revolution requires cooperation between all stakeholders: government officials, business leaders, members of civil society, and international organizations.

By acting now, government leaders can keep their economies competitive and boost the well-being of their citizens. Future-oriented technology policies that incorporate the framework of the new data OS will help build trust and accelerate the right kind of progress. A sustainable recovery will ensure that individuals can live free, prosperous lives with fair access to the rich opportunities of a globalized market. FD

MURAT SONMEZ is the head of the Centre for the Fourth Industrial Revolution Network and managing director of the World Economic Forum.