Infrastructure Is Remaking Geopolitics

How Power Flows From the Systems That Connect the World

By Mary Bridges May 10, 2024

A cargo vessel transiting the Panama Canal, May 2024
Daniel Becerril / Reuters

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Falling water levels in Panama's Gatún Lake. A cyberattack on a payment platform. An earthquake disrupting silicon-chip production in Taiwan. Elon Musk deciding which countries have access to the Internet. At first glance, these things have nothing in common other than their recent prominence in news headlines. But

an invisible through line connects them: each one highlights modern society's dependence on complex infrastructure to function. Disruptions in the Panama Canal can delay the delivery of critical shipments around the world. Computer failures can interrupt routine medical care provided by clinics across the United States. A brief halt in the production of semiconductors causes panic. And a billionaire's whim can turn the tide of war.

The complex hardwiring and technological dependence of modern life have made people reliant on a wide array of infrastructure systems, and governments now compete to create and maintain the networks that deliver essential services, from electricity to clean water to telecommunications. A country's power hinges on its ability to influence and manage this vast set of systems. In this infrastructure-dominated world, governments and their officials no longer maintain unilateral control over international relations. Instead, corporations, technology, and environmental conditions combine and interact with governments to shape world order. Even though the landscape of global affairs has shifted, U.S. approaches to policymaking too often remain shackled to outdated conceptions of bipolar competition and great-power rivalry.

It is past time to prioritize infrastructure as the organizing principle of modern life. The infrastructural turn in geopolitics has revealed that the world has a new set of power brokers, from multinational banks to satellite operators, and that solving global problems requires new forums and strategies to coordinate the activities of these actors. Infrastructure's central role in today's world also explains why seemingly small bottlenecks, such as the Houthi rebels' attack on Red Sea cargo ships or production delays at a single electronics factory, can unleash ripple effects that imperil international supply chains and upend geopolitics. Adapting to a new infrastructure-dominated reality requires policymakers to, first, reorganize their thinking to account for the complex material and technological interconnections that underlie geopolitical conflicts and, second, work with a new set of power brokers rather than rely on the traditional channels of government-to-government dialogue.

INFRASTRUCTURE OF YORE

Infrastructure isn't new to the twenty-first century. The term became popular among nineteenth-century French engineers to describe the earthworks that enabled the smooth transit of trains, such as the embankments, trestles, and bridges that undergirded railway lines, rather than just the tracks.

Infrastructure entered mainstream English in the early Cold War as NATO negotiators in the late 1940s and 1950s used infrastructure to describe the supporting systems needed to ensure military preparedness in Europe—air bases, communications networks, and radar systems, for example. In 1950, Winston Churchill scoffed at fellow politicians' use of the term: "Knowing well that there was no such word [as infrastructure], Mr. Churchill … said he must reserve his comments till he had consulted a dictionary," one report noted. In 1952, U.S. Secretary of State Dean Acheson said he found the term baffling, according to the *New York Times*. These objections aside, "infrastructure" caught on. Since the late 1950s, U.S. politicians have used the term to describe everything from interstate highways to organized crime networks to health-care systems.

Governments' reliance on infrastructure is also a centuries-old story. Throughout the 1800s, the British Empire used its supremacy over infrastructure in banking, telegraph networks, and maritime transportation to control distant colonies and punish rivals. Similarly, the United States consolidated claims over far-flung territories by channeling infrastructural power to build the Transcontinental Railway and the Panama Canal.

The pursuit of infrastructure supremacy is an old story, but what's new about today's infrastructure is both our reliance on it and the interconnectedness and interdependence of networks themselves. Nearly three-quarters of global goods—80 percent of the international trade in goods by volume—move on intricately connected maritime networks. These networks are not naturally occurring, but constructed and maintained through hundreds of intermediaries, technological systems, and processes. Sending a shipment across borders—flowers from Kenya to the Netherlands, for example—requires an average of 36 documents and 240 copies.

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And that's just the beginning. The world's most promising breakthroughs in knowledge and technology, from genomics to renewable energy, demand even greater infrastructure complexity. Artificial intelligence computing, for example, relies on billions of "parameters" powered by tens of thousands of high-tech processing units. Those processors are manufactured through intricate supply chains involving thousands of Ph.D.'s, rare minerals, and sophisticated machinery—such as photolithography machines, which require 800 suppliers and can each cost as much as a Boeing 747.

Energy grids, shipping routes, AI networks, and digital payment platforms are, on their own, massively complex systems, and they're also interdependent. Doctors cannot maintain their caseloads without billing software and digital communications. Electronics manufacturers cannot produce smartphones without the international supply chains for silicon chips and strategic minerals. The dense layering of modern infrastructure systems has become so entangled and continuous that it now operates as the substrate of modern existence.

The interconnected networks and systems of modern life enable astonishing complexity, such as gaining permission to cross an

international border simply by walking through a retinal scan. But they also create gaping vulnerabilities. For example, a single cyberattack on an Australian port operator imperiled 40 percent of the country's flow of goods. These massive networks of interwoven systems have become so vital to the functioning of U.S. society that the federal government has designated 16 domains as "critical infrastructure," meaning their destruction would have a debilitating effect on national security. These include everything from nuclear reactors to financial services.

THE NEW POWER BROKERS

Who wields more power, Elon Musk or Greece? According to traditional financial rankings, Musk's net worth of more than $200 billion falls within striking distance of Greece's GDP of roughly $220 billion. But examining financial rankings alone misses the interdependence of today's global actors and the importance of infrastructure to shaping world order.

In terms of geopolitical heft, Musk's infrastructural power is dizzying. His decisions influence—or even outright determine—whether

Ukrainian forces can launch attacks against Russian targets or whether humanitarian agencies in the Gaza Strip can access wireless networks. He wields this power because he controls SpaceX, which provides satellite connectivity via its Starlink service. He decides when and where Starlink's network of low-orbit satellites will provide access to communications networks during a crisis. Musk's infrastructural power far outstrips his wealth.

Furthermore, Starlink is not just an infrastructure system operating in isolation. It depends on and benefits from other systems, from the universities that train its engineers to the U.S. government, which has contracted with SpaceX for classified defense projects for more than two decades, including a recent $1.8 billion deal. Focusing on nation-states as the key actors of global affairs overlooks the layering and interconnections of these new power dynamics.

Thinking in terms of infrastructure pushes beyond ideological binaries.

Traditional international relations tend to distinguish between state and nonstate actors as operating in different spheres, but today,

entrepreneurs, investors, or consultants are often every bit as relevant as political officials. Financiers play a particularly important role in shaping infrastructure politics, as infrastructure investing has become central to international finance and global politics. In 2018, the G-20 developed the Roadmap to Infrastructure as an Asset Class to encourage investors to fund projects from ports to schools to telecommunications networks, especially in emerging markets. Goldman Sachs and McKinsey have created specialized divisions to focus on infrastructure investment and development. In January 2024, the world's largest asset manager, BlackRock, announced its biggest acquisition since the global financial crisis: Global Infrastructure Partners, the third-largest infrastructure investment firm in the world.

Although infrastructure already provides the backbone of daily life, the recent push to transform it into an asset class also makes it a financial product that can be traded on secondary markets. This dual role—infrastructure as both a concrete reality and a financial construct—changes how people interact with large-scale, earth-moving projects in their communities. Decisions about allocating resources and managing the debt of a hydropower project, for example, are shifted to higher, more distant levels of decision-making, where asset managers

and consultants can assess the risk profiles and "bankability" of projects. The pressure from investors to "de-risk" infrastructure can constrain communities' decision-making about what gets built and how it operates. The model incentivizes governments to conform to standards set by the World Bank or the Asian Development Bank, for example, rather than focusing on whether communities' needs are better served by less "bankable" projects, such as hospitals and schools.

Today, global power brokers include not only the countries and companies that build complex networks but also standards-setting entities, such as the International Maritime Organization and the Internet Engineering Task Force, that shape the global protocols for building and operating infrastructure. This shift downgrades the power of local communities and elevates a middle tier of international players—consulting firms such as EY and KPMG, and multinational law firms such as Clifford Chance and White & Case, as the legal scholar Nahuel Maisley has noted. The push to standardize and accelerate "green infrastructure," for example, can constrain the way cities address housing insecurity, and in the process exacerbate gentrification.

BEYOND IDEOLOGY

At the heart of the competition between China and the United States is a fight over who controls today's infrastructure. Beijing seems to understand this. But U.S. efforts to counter China's large-scale construction with its own projects suggest that Washington has not mastered the nuances of infrastructure statecraft. U.S. policymakers constantly portray China as an existential challenge to the current world order. It's "a battle between democracy and autocracy," according to U.S. President Joe Biden. This characterization depicts two systems competing for supremacy over limited resources. A win for China, such as its dominance in software for managing logistics operations, represents a threat to U.S. security.

By contrast, thinking in terms of infrastructure pushes beyond ideological binaries to focus on how different actors shape the terms of engagement and the systems that move information, money, and goods. This approach draws attention to the material networks of communications, finance, military procurement, shipping, and manufacturing, rather than fixating on a clash of worldviews.

The power accrued in operating networks often has less to do with the grand designs of master planners than with the second-order

relationships, long-term ties, and gradual evolution of a project. After all, infrastructure is not just a one-time investment of pouring concrete or bulldozing a ditch. Projects must be maintained, serviced, and financed over decades. It is often the second-order relationships—the enduring work of maintenance firms, financial agents, and ancillary services—that transform isolated procurement contracts into durable connections.

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Under a traditional view of geopolitics, infrastructure represents just another theater of competition between rivals. But this approach mischaracterizes infrastructure power. Meaningful control depends not just on the nationality of, say, a software platform's owner, but also on the functionality of that platform, whom it empowers, and what activities it precludes or enables.

A more constructive framing would do more than denounce Chinese software or seek to "reshore" manufacturing that hasn't happened in the United States since the 1980s (producing, say, container cranes, a

market that China now dominates). Instead, an infrastructure-oriented approach would envision a thicket of strategies to ensure that critical networks such as shipping and payment systems are anchored to market relationships, norms, and regulatory systems that provide transparency and accountability.

Infrastructure's functionality depends on how people use it, not just who builds it. The early history of the Internet provides a telling example: its architecture promised an egalitarian, end-to-end design that democratized access to information. Yet this design was soon transformed, as increasingly oligarchic corporations seized on its potential to amass astounding profits for themselves and their shareholders. The mere act of building infrastructure does not predetermine how societies will adopt it.

In the same vein, the Chinese origins of a software program or platform does not mean it should be tallied on a ledger of great-power competition or classified as categorically antidemocratic. Instead, its international adoption shows how central infrastructure control has become to geopolitical rivalries. It is the substrate—the earthworks and embankments—undergirding "strategic competition," a buzzword of choice among U.S. and European security planners. For the United

States to compete more ably on these terms, policymakers must become attuned to implementation, long-term management, and oversight of modern societies' hardwiring.

CALL TO ACTION

In the United States, the 2022 Inflation Reduction Act and the 2021 Infrastructure Investment and Jobs Act committed over $1 trillion to revamping the nation's infrastructure. The European Union has countered with investments in European semiconductor manufacturing, renewable energy, and climate mitigation. But as the world gets rewired, today's global leaders remain bound to outdated conceptions of state-dominated geopolitics. It is time for policymakers to reorient their thinking about where true power lies in the global system and how that power can be harnessed to address today's problems.

First, policymakers must focus on governance more than governments. The decisions of Musk or BlackRock, for example, might carry more weight than those of the United Arab Emirates or Denmark. Once the U.S. government can identify the gatekeepers, designers,

financiers, and implementers who control different layers of service delivery, it can better understand how networks are managed and what vulnerabilities they create. In a world where a small group of armed rebels can imperil an artery on which roughly 15 percent of the world's trade depends, flexing hard power to combat the rebels' threat to international shipping isn't enough. After all, the Red Sea region is also a communications chokepoint through which 90 percent of the subsea cable capacity between Europe and Asia passes. Downed ships pose a risk to communications connectivity, as the world learned when several lines were severed in March, disrupting a quarter of data traffic passing between Europe and Asia. Improving resilience means not only addressing the proximate threat but also working with insurers, shippers, cable operators, and others to protect critical infrastructure.

Meanwhile, the complexity of world-spanning problems has only grown. Managing the future of biomedicine—unlocking the promise of cloning and gene editing, for example, while balancing their risks—will require high-level negotiations and complex agreements, and not just between governments. Space policy and pandemic response are two areas in which it has been demonstrated that, when working in isolation, national governments lack the power and tools to regulate

effectively. States will play a leading role in an infrastructural order, but they must learn to work with new partners and traditional adversaries in novel ways.

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Because infrastructure projects exist in a quasi-public–quasi-private middle ground, they are often shielded from traditional market competition and public accountability. Building large-scale networks tends to be expensive, time-consuming, and dependent on public commitments and licensing. Centralized decision-making can reduce transaction costs, and network operators tend to benefit from rich-get-richer effects. These features do not lend themselves to democratic governance or public accountability. The world needs better mechanisms to ensure that the infrastructure of modern life can answer to communities' calls for justice, transparency, and an equitable distribution of resources.

As infrastructure blocs fracture into U.S.- and Chinese-leaning domains, go-between locations such as Qatar, Singapore, Turkey, and

the United Arab Emirates will gain prominence and neutral intermediaries will become more important, says Alexander Geisler of the German Shipbrokers' Association. The mutual suspicion with which Chinese and U.S. policymakers view each other's infrastructure increases the likelihood that different specifications and patterns of lock-in will emerge. One bloc's payment platform might be organized around the U.S. dollar while an alternative architecture enables the movement of China's renminbi and other currencies.

Similarly, one network of logistics and shipping businesses could facilitate trade between the United States and its allies, while Chinese-backed technologies and hardware could enable connectivity among other maritime centers. Infrastructure competition means battles over standards will likely escalate in the coming years, and places and entities that can work as trusted intermediaries will become more essential.

As global challenges interconnect and amplify one another, world leaders will miss opportunities if they don't see more clearly how infrastructure is operating today. Global power is no longer defined by stockpiling munitions in bunkers, dominating a single supply chain, or wielding dominion over one technology. High-tech networks are

central to the basic functioning of modern societies, but today's infrastructure is too multifaceted, layered, and interconnected for any one state to truly control it. In the age of infrastructure, shaping world order requires political leaders to find new ways to collaborate with the entrepreneurs, builders, bankers, and operators who manage the interdependent systems that sustain twenty-first-century life.

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