TRAVEL GUIDE

State of the future

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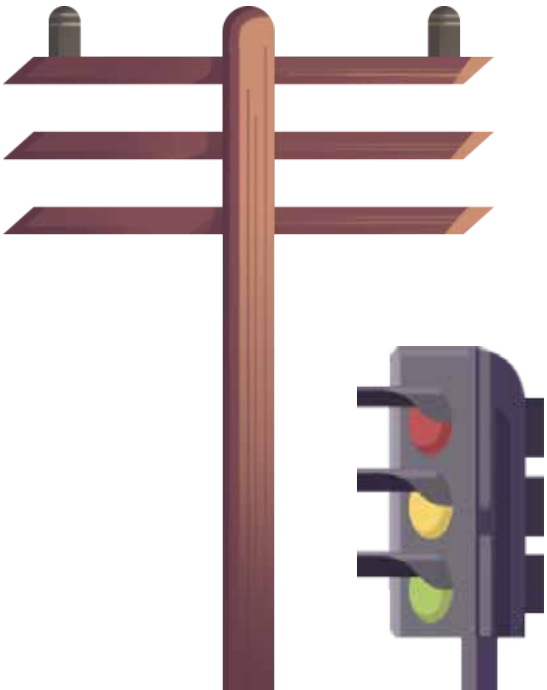
State (noun):
from “status,” referring
to the condition and
structure of a place: its rules,
its laws, its scorekeepers,
and metrics.



INTRODUCTION

In the coming decade, we'll discover that our governmental institutions and infrastructure, though slower moving than the media and retail industries, are not immune to the disruptive forces that have rippled through our companies and organizations over the past 20 years.

The state is itself a technology, and that technology is changing. As we venture closer to 2027, the state of the future will expand to include everything that can have rules programmed into it and that can meaningfully enforce those rules. From a legacy of administration buildings, police stations, and courthouses, the state is joining the global technological stack, embedding itself in our hardware and software, and in many cases leaving our traditional borders behind.

This begins with platforms and devices beginning to look and act more like infrastructure. Uber and Lyft are applying for public transit contracts throughout America, competing with traditional institutions like buses and trams. In Nigeria, where governmental institutions have been historically insufficient, health regulations are often embedded directly into products, using a series of bar codes and scratch-offs that can verify their legitimacy and expiration date.

As our Internet-connected devices proliferate, they also become part of the extended state. We're learning every day how our TVs and smart devices can be leveraged as surveillance devices, both for official intelligence agencies and for networks of hackers and covert groups. The government is spying on us, and we're all spying on each other. One of the repercussions of this is that as technology democratizes access, so it democratizes some of the key powers of the state.

Over time, we will likely see entire governments beginning to look more like code: platforms and protocols that offer similar services and infrastructure as legacy institutions, but more personalized, efficient, and distributed.

They might begin to look a lot like e-Estonia. Every citizen of Estonia has a PIN number, with which they can access their health records, vote, or pay taxes, all managed on the blockchain and available from anywhere in the world. Estonia offers these same services to over 10,000 e-residents, an initiative it calls Country-as-a-Service. If your government doesn't provide the necessary tools for launching your business, e-Estonia's APIs allow you to register and manage it with them instead, even, and maybe especially, if you live in Hong Kong or the Philippines.

As they evolve, these "platform governments" will be more adaptable, more pervasive, and, like the postglobal nations, less tied to specific geographies. You can imagine many different state services overlapping in the same region, creating competition between them for who can offer the best security and reliability.

You also can, and should, imagine existing state powers leveraging these technologies to expand their reach and reinforce their power.

Consider WeChat, the messaging platform in China that has been dubbed the life operating platform by millions of urban users. Similar in ambition to e-Estonia, WeChat provides a common platform for performing dozens of tasks once offered by discrete government institutions: accessing health care, paying your mortgage, or reporting incidents to the police. It also demonstrates how much power these technologies have to amplify the power of the state, as WeChat quietly censors unwanted content sent between citizens. If you send a message the state doesn't like, you aren't told you can't say it—the offending cotent is just modified or quietly erased, making dissent more structurally difficult.

Over the coming decade, the services, policies, and infrastructure that support our organizations and communities will be transformed, amplified, and in some cases democratized by the expansion and proliferation of new technologies and user patterns.

This is your guide to the state of the future.

forecasts

GOVERNMENTS BECOME CODE

As national governments continue to grapple with the capabilities and needs of their hyper-networked citizens, code-based governmental initiatives will offer new opportunities for decentralization, efficiency, and personalization in the coming decade, while setting the stage for longer-term disruptions of the familiar nation-state.

Changing Fictions

With few exceptions, citizen trust in the decision-making of national governments has plummeted in the last few decades. Three-quarters of the American public trusted their government to do the "right thing" in 1958, whereas only one in five trust it today—a trend mirrored in the OECD "average trust in government" assessment, where trust has steadily declined from 45% to 37% between 2006 and 2015 across developed nations.

During this same period, digitally connected populations have grown accustomed to the benefits of digital services across many industries. These services share several advantages over their traditional institutional counterparts: personalizing services for individual users, scaling across heterogeneous populations, and adapting to real-time feedback. Platform-based services don't require centralized bureaucracy or geography-based access; instead, embedding protections, access rights, and even identity directly into the code. Personalized for every citizen, these digital services could be the key to reinvigorating governance in a fractured, post-global world.

Changing Systems

E-Estonia represents the Baltic state's bid for the future of government service provision. Pitching itself as "Country-as-a-Service," its extensive governmental platform provides APIs that allow over 10,000 native citizens and global "e-residents" to vote, pay taxes, start businesses, and check health records as easily as hailing a ride on Uber—wherever they are in the world.

Taiwan's national legislature rolled out the "vTaiwan" process in 2016 to facilitate consensus-building with citizens across social media. Taiwan's premier has promised to bind important national policy issues to this process going forward, providing real-time transparency and grassroots agency to government decision-making.

Meanwhile, the blockchain-based BitNation protocol promises smartphone access to personalized services such as marriage certificates, land titles, global citizen IDs, emergency refugee IDs, and cross-border contract negotiation and mediation services.

BY 2027

As experiments in code-based citizenship services gain traction, the citizen engagement opportunities afforded by these solutions will make them attractive for reversing existing trust gaps, lowering costs while providing more personalized service and accommodating the needs of a globally distributed citizenry. They also create the open-ended possibility for more competition in the realm of government services, as private platforms create infrastructures for providing some traditional state-based services. Such services might well extend beyond the borders of any terrestrial nation-state.

To envision how code-based governance may look further out, it might be useful to compare the shift from traditional broadcast television to media platforms like Netflix. Whereas cable networks produced a single block of programming for all subscribers, Netflix provides a global library of content that is personalized to the preferences and context of each user. While laws and policies today are written with a similar one-size-fits-all mentality to network programming, platform-based policies could be personalized to communities and individuals based on local context, while still retaining coherence at the national or global level. These platforms could conceivably be owned and/or managed by traditional state entities, cities, companies, distributed citizen co-ops, or even distributed autonomous organizations.

Connecting the Dots: **Urgent Futures**

High-delta Markets

In high-delta markets, regulatory enforcement is fragmented and emerges through the interaction of many state and non-state actors in a shifting fabric of affordances. Regulation is not necessarily more or less stringent, nor necessarily more corrupt, but it's less stable and predictable. As traditionally low-delta countries in Europe and the United States redefine their identities over the next decade, this kind of high-delta regulation will be commonplace nearly everywhere.

At the core of high-delta regulation will be the same kind of processes that drive innovation in high-delta markets today: lots of open systems that can be assembled in emergent, iterative, and often niche-focused services. Just like pay-per-use phones and pay-as-you-go solar power, high-delta regulation and protection services are likely to tap into micro-payments for specific benefits rather than large tax payments, making them more transparent and making governments more accountable.

Beyond Blockchain

The software-based ledger afforded by the blockchain provides a key tool for reducing our reliance on centralized institutions to conduct the business of society. As the technology matures, many existing government services, including identity management, welfare, and business incorporation will likely be unbundled as governance-as-a-service applications are offered through blockchain-based markets. Such services will benefit from the smart contracts afforded by the blockchain, allowing regulations and laws to be embedded seamlessly into digital processes while remaining transparent to public scrutiny and criticism.

As e-Estonia has already demonstrated, blockchains will also track and synchronize personal records—health data, financial portfolios, legal records—across borders, further de-emphasizing the need for centralized governance and creating infrastructural pathways for a truly global citizenship to emerge.

INFRASTRUCTURE BECOMES FINTECH

As energy production and resource distribution adopt smart-grid affordances over the coming decade, new business models will emerge to reframe infrastructure, not as a government service, but as an investment instrument. Building on the expanding base of the fintech industry, this new model of infrastructure management will create new opportunities—and new challenges—for governments, communities, and individuals.

Changing Fictions

Since 2004, the global picture for infrastructure investment has evolved into a complex patchwork of strategies. While the growing economies of China and India have invested heavily in modernizing their grid, the largest western economies, including the U.S., EU, and Canada, have significantly reduced infrastructure spending, even as aging networks of roads, bridges, and water supply pipes demand more repairs and restoration each year. A 2015 survey of American mayors revealed that "underinvestment in infrastructure" is their top concern, reflecting the nearly 20% drop in relevant federal funding over the preceding decade.

For rural communities in the West and climate-ravaged countries like Haiti, new distributed solutions for energy, water, and transportation are gaining traction where previous efforts have failed. In the process, they may reposition infrastructure investment from a government responsibility to a community-driven endeavor with entrepreneurial incentives—and even a personal financial strategy.

Changing Systems

As many regions (including over 2,000 municipalities in the United States) turn to private/public partnerships to triage failing transportation and water systems, new business models are emerging to take advantage of technological innovations in service provision. Tesla's solar-powered roof tiles and Powerwall home batteries represent a leading foray in this direction, reframing infrastructure as personal investment products and facilitating a shift in distributed electricity production where each node on the two-way grid stands to benefit when selling excess energy back to the utility.

Energy24 provides portable solar-power generators to Haiti that can be leased for pennies a day. After the unit has been paid off, it becomes unlocked for unlimited use or resale. Ovive represents a similar effort for purifying drinking water, with solar-powered reverse osmosis kiosks selling the filtered water by the gallon or on a subscription basis. While the concept of private infrastructure is not new, low-friction payment platforms and network-activated technologies have significantly elevated the efficiency and practicality of these decentralized approaches.

BY 2027

As pay-per-use and lease-to-own systems proliferate, infrastructure investment will likely continue in this direction for both emerging markets and declining superpowers. While cities and strong central governments continue to expand and innovate their smart grid initiatives, low-density populations may come to depend on these new productized innovations, both as a provider of key services and as a viable source of passive income. In the same way that Airbnb allows homeowners to leverage the economic value of their spare rooms, millions may benefit from long-term leases on modular infrastructural systems that can be recast as revenue-generating "instruments," providing on-demand services to neighboring community members.

As container farms and networked health-screening services grow in capability, these same business models could be applied to local food production and health care services. Though profit-based initiatives will likely exacerbate access issues in regions with high inequality, the distributed mechanisms beneath lower the barrier to access and investment for areas that have traditionally struggled to acquire and maintain viable infrastructure. For people living in regions with high job loss and declining access to clean water, investing in the digitally streamlined private infrastructure business might prove more compelling than far-off dreams of Universal Basic Income.

Connecting the Dots: **Urgent Futures**

Designing for Impermanence

The rise of climate volatility is a key justification for the decentralization of infrastructure. With an increase in impermanent communities and people preparing for the worst, the power will be in the hands of those with access to, well, power. And while disaster relief organizations claim to fill these needs, the slow pace of innovation in humanitarian aid, combined with the massive market potential of digitally enhanced infrastructures, could spark a revolution in privately managed portable-infrastructure solutions.

By productizing infrastructure, companies like Energy24 offer plug-and-play access to resources, as well as employment and other ROI opportunities to those who invest in them. From leasing cars to aspiring rideshare drivers to small-scale drones for delivery, a new cadre of refugee service providers will likely shift the power dynamic within volatile zones. As more of these infrastructure products emerge, the need for interoperability will become clear. Some systems will choose to work as closed ecosystems, while there will be an increased push for refugee design standards that allow for more seamless interaction with publicly provided solutions.

Security and Status

One of the key tenets of successful infrastructure is that it provides consistent and reliable service. Ideally, it disappears into the background entirely. In highly-distributed infrastructure schemes, the increased number of providers makes interruptions and irregularities in service more likely, particularly as these distributed grids initially ramp up and find their footing.

Over time, the buildup of redundant services in a given area may actually prove more resilient than existing centralized systems, facilitating multiple contingencies when primary service providers fail. This model would follow the distributed nature of the Internet itself, which automatically reroutes information around broken servers. Nevertheless, for most people, the combination of established centralized utilities and backup distributed grids will offer the most pragmatic and beneficial solutions, particularly for overhead-heavy services.

RISE OF THE CONTEXT GRIDS

As machine learning systems continue to evolve, dynamic knowledge engines will emerge to help us synthesize and verify relevant information in nearly every domain. From research to strategy to complex simulations, these emerging "context grids" will supercharge our decision-making infrastructure in unprecedented ways.

Changing Fictions

Our global society produces 2.5 exabytes of data every day—the equivalent of 250,000 U.S. Libraries of Congress. Approximately 2.5 million scientific papers are published each year. As the deluge of information increases, it's breaking many of our historic assumptions about how we process knowledge and integrate it into our analysis and decision-making roles. Legal discovery, academic review, and regulatory audits buckle under information loads that have grown well beyond the throughput imagined when they were conceived.

For doctors diagnosing illness or governments setting policy, the number of relevant new studies and datasets available each year well exceeds the capacity of any individual or human team to verify them for factual accuracy, let alone to act upon them. In the coming decade, our assumptions surrounding humans' role in knowledge formation and assessment will evolve and transform alongside powerful new capacities for algorithmic sensemaking.

Changing Systems

IBM's Watson joins Google's Knowledge Graph and others in creating artificial neural networks that construct "knowledge" in a similar way to humans, forming connections between established facts. These algorithmic systems are designed to parse human language and internalize new data points at the scale at which that data is being created, with the added benefit of complete recall and re-contextualization of that data across domains.

The European Union has determined that all academic papers must be released for free to the public by 2020. But for scientists and researchers, the larger change will likely be the looming retirement of academic journals as a primary means of publishing, distributing, and processing new findings. Research organizations like Emerald Cloud Lab already automate the setup and analysis of their life science experiments, as software-based research systems produce studies with millions of algorithmic co-authors.

BY 2027

Over the coming decade, our data-processing systems are unlikely to maintain the appearance of search engines and databases, but will evolve into a network of commodified utilities. These will form a grid or grids that any appliance, device or company process can plug into to derive contextually relevant information about conceivably any subject informed by data.

As the technology allows, we will increasingly leverage these "context grids" as two-sided platforms for producing and consuming relevant knowledge. In health, for example, published studies with vetted outcomes will be incorporated into diagnosis and treatment hardware in real-time, exponentially increasing the speed and efficacy of new discoveries and their practical application. Social media sites will leverage the context grids as an immune defense system to fake news, fact-checking user content as it's posted and providing insight into the origin and veracity of memes and claims.

Once a context grid establishes itself, it will quickly be seen as core infrastructure alongside electricity, running water, and network access. Businesses and governments will rely on it for modeling and stress-testing new strategies and policies. Knowledge workers like lawyers and accountants will find many of their core services suddenly commodified and available for free, or nearly so. As facts and evidence struggle to make themselves heard in an increasingly noisy world, the emergence of this next generation of data-based knowledge infrastructures is likely to be contentious and noisy in its own right.

Connecting the Dots: **Urgent Futures**

Era of Machine Learning

"The Cloud," as it presently exists, is primarily based on the collection, storage, and access to an abundance of data. Massive server farms provide what is, in effect, a public utility, storing images, email, video, and every other form of personally created information. In the next decade, this utility service will expand to include learning and analysis.

Translation services are an early example of this. Cloud-based translation apps and websites provide computational support that can't usefully be gathered into a single portable device. Moreover, the translation systems learn from use, improving their results over time. We see similar emerging services in image processing, audio analysis, and even simple forms of programming.

Over the next decade, this set of utility-like services will expand to include simulations, agent-based personal assistance, and a rapidly expanding list of professional services now performed by humans, including business planning and legal assistance. Having the cloud analyze and provide useful context for a constant flow of information will be as commonplace as the ongoing cloud-based retention of images and video from our personal devices is today.

Authorship of Authority

As artificial intelligence comes to occupy a central role in nearly every aspect of our decision-making, it will inspire intense doubt and fierce debate—not over the mysterious, black-box algorithms that power AI, but rather the flows of information that course through machine-learning systems. Why? Our built-in informational biases will reject them. Just as people today gravitate towards news sources that fit comfortably with their beliefs and ideologies, people will seek out AI agents that match their views of the world or can be molded to do so.

The risk is epistemic fragmentation. The rise of context grids could lead to an explosion of incommensurable bodies of knowledge: different views of everything from drug and vaccine efficacy to the odds of fraud in the next election, based on subtly or dramatically differing streams of evidence. But AI platforms could also be designed to help us achieve consensus. They could highlight our blind spots by demonstrating how different assumptions and data can lead to dramatically different models and outcomes. Or they could find optimal bargains for the design of laws and policies, even where communities deeply disagree on the underlying evidence. Whether context grids entrench our biases or help us confront them will depend on how they are built and what we ask of them.

THE UNIVERSITY OF THINGS

As the physical and digital worlds continue to converge, they will spawn new capabilities for workers of the future to attain the retraining and continuous learning they will require. Powered by mixed reality technologies and the Internet of Things, the world around us will begin to reveal new interfaces for learning, upskilling, and assessment.

Changing Fictions

Traditional educational institutions are already starting to lose their footing. High costs, large bureaucracies, and a growing gap between what students learn and what they need to be successful in the world have put them on edge. Add in the disconnects between any given person's degrees and their practical capabilities, and it's not hard to see the nascent revolution under way.

Enter the Internet of Things. From the ambient tracking of skills to just-in-time personalized coaching, the tide of connected smart objects presents a new frontier for teaching, learning, and certifying skills. Over the next decade, our hyper-connected environments promise to capture and synthesize a more robust picture of the individual learner than any existing test score, degree, or resume.

Changing Systems

Learning that happens outside the classroom isn't anything new, but a new generation of smart objects and sensors are amplifying and tracking these informal learning moments seamlessly and invisibly in the background. Take Carv: designed with both beginners and professionals in mind, this boot-mounted wearable uses both pressure and motion sensors to provide users with personalized ski instruction and real-time analytics. It can coach and correct users as they ski, pinpointing ways to improve, both in the moment and over time.

Worker capacities will also be measured by subtle shifts in the way they interact with the digitally connected physical world. Keymochi, a project by students at Cornell University, is working to use smartphone keyboard analysis to discern a user's mood based on their typing speed, use of punctuation, and other captured metrics. The National Science Foundation recently funded a study employing wearables to gauge students' psychophysiological response when engaging with DIY maker spaces.

The data collected by these objects contains an unprecedented volume of deeply personal information—habits, preferences, daily routines, location, personality, and more. In the right hands, such data holds the potential to supercharge learning and capture deep insights into a worker's competencies and work styles. But in the wrong hands …

BY 2027

From performance evaluations and report cards to classroom management and personal growth tracking, smart objects will proliferate over the next decade, redefining when, where, and how we learn.

Leading-edge users will find themselves gravitating towards object-centered learning programs, attracted to the evidence-based feedback cycles that they provide. Parents will use embedded sensors to follow and advance their child's development, eager to give them a leg up while simultaneously tracking their own transferable parenting skills. Schools will lace together a smart object ecosystem of their preferred devices and trusted providers, and leverage the accumulated data to customize lesson plans and tutoring. Employers will discover many new pathways for tracking productivity, assessing skill levels, evaluating job candidates, and measuring customer satisfaction. Instead of a single final exam or tests along the way, learners will be evaluated based on their performance moment-by-moment as they solve problems within the digital-physical ecosystem of their daily lives.

Connecting the Dots: **Urgent Futures**

Working the System

The evolution of connected learning objects and environments will likely accelerate the blurring of working and learning tasks. It's not hard to imagine that on-the-job training will be baked into occupational hardware and work environments: payment terminals that teach new cashiers how to use them, excavation equipment that assesses the skill of its operators, factory floors that track the activity of each worker and provide real-time guidance.

As the gig economy continues to grow, smart learning objects may also help maintain integrity for work processes performed by a revolving team of on-demand providers. These objects could provide immediate feedback to task-routing platforms, and affirm workers' skills as they're performed. Such devices will require digital-first certification systems, perhaps built on the blockchain, to provide seamless value to workers, learners, and organizations.

Designing for Impermanence

All too often, when someone emigrates, they face the stark reality that all their years of formal education, work experience, and personal and professional reputation aren't seen as valid in their new context. The digital trails provided by smart objects have the potential to serve as truly cross-border "proof of work"—an objective record of your experience as you switch contexts and cultures. Even if the measures for evaluation differ, the raw data has the potential to be reinterpreted through local standards.

Smart objects will also find their place in the realm of cultural adjustment as they silently guide their users through the process of learning how to use them. Sparrow Mobile, a U.S. cellular company, offers refugees free smartphones preloaded with the apps they will need in order to adjust to their new life. In the world of the University of Things, migrants might well find themselves surrounded by new object ecosystems upon arrival—perhaps provided through their Universal Basic Subscription Service?

THE INTERNET OF CITIES

As global trade, work, and culture continue to transcend the traditional boundaries of the nation state, cities will find themselves with new levers for creating and managing on-demand services and infrastructure in the coming decade.

Changing Fictions

In the age of networked globalization, it has become commonplace to scope our strategies and plans at the extreme ends of the scale—assessing how any given issue impacts individuals and local communities, and how it fits into the overall global picture of market dynamics and carbon footprints. Positioned awkwardly between the local and the global, nation states find themselves with few levers at either end for satisfying the needs of their hyper-connected citizens and companies.

While national divides are complex, the easiest predictor of whether somebody voted Democrat or Republican in the 2016 U.S. election wasn't whether they were white or educated, but whether they lived in a city or a rural area. In the Brexit vote, 75% of Londoners voted to stay in the EU against the will of a thin majority elsewhere in the country. Notably, as trust in national governments has collapsed, trust in city-based institutions remains comparatively high in most regions.

Changing Systems

Cities, of course, have always played the role of cultural catalyst during times of historic transition. Democracy was birthed through the powerful city states of ancient Greece. Today, individual cities like São Paulo and London provide the economic engines to power entire countries. In the knowledge-based economies of the 21st century, cities represent natural hubs for catalyzing innovation, particularly as political strife exacerbates the cultural divides between urban and rural areas.

Over the next decade, it should not be surprising to see cities take on a more focused role in determining the policies that will guide their future. The recent rise of distributed platforms plays a major role in this story, as they provide both global coherence and individual personalization for a quickly growing battery of services: media, communication, transportation, accommodations, and even work. These platform-based approaches share the significant characteristic of being defined entirely by software, meaning anyone with an existing user base can feasibly create their own.

BY 2027

While imagining a future in which some level of national governance has devolved back to local regions, picture this: take a white-label version of your favorite platform and restructure it as a city service or as a private/public partnership. The contracts and negotiations for gig workers now become subject to the regulations of the city and its residents. The platform's profit becomes a form of direct revenue for public goods. Now incorporate the full suite of publicly-owned matching services relevant to the domain of the city: transportation, accommodations, up-skilling, task-routing, delivery, community health … perhaps even governance itself.

As a platform of platforms, such initiatives may empower cities to share data, best practices, and case studies in a tangible format that can be implemented and deployed more easily than any current policy device. They may give policy makers and social entrepreneurs a set of tools and clear levers for designing pilots, while offering businesses more opportunities for infrastructural partnerships based on local and regional buy-in.

The cases for the Internet of Things and Smart Cities have both been made. Mayors and innovators may find themselves soon pursuing a productive and economically necessary hybrid of the two: the Internet of Cities.

Connecting the Dots: **Urgent Futures**

High-delta Markets

One of the benefits of high-delta market strategies is the resilience they demonstrate in volatile environments. When production is distributed among many parties, innovation emerges quickly and prolifically, allowing many new offerings to find their niche and many more to fail along the way.

As governments navigate an unprecedented number of quickly moving forces—automation, climate change, demographic shifts—this kind of fail-fast-and-often approach is more necessary than ever, but remains stymied by centuries-old institutions. By devolving power and policy-making back to the cities, the Internet of Cities could create the conditions for a vast network of policy laboratories, prototyping and testing new ideas on a regional basis, while adopting winning policies from other cities. Regardless of how this shift happens, we are likely to see such distributed policy networks emerge as existing national frameworks confront the daunting and overlapping global challenges of the coming decade.

Authorship of Authority

Urban centers will become vital nodes of governance as national governments increasingly buckle under the strain of political polarization, gridlock, and distrust. And just as governments once used flagship social programs to advertise their national ideals, cities will increasingly turn to platforms as a way to define and declare their own distinctive civic identity. Rather than rely on regulation to define how tomorrow's car-sharing or microwork platforms will compensate workers and provide benefits, cities will launch their own platforms, built to the tolerances of local norms and politics.

The upside? Cities will have new economies and platforms that truly reflect their citizens and their civic priorities. But, of course, there's a downside. Like any experiment conducted at scale, many of these platforms will fail, or require iteration before converging on models that work. Unlike corporations, cities don't go out of business. And while some will succeed, others will accumulate financial and trust deficits, potentially reproducing the failure of national institutions at a decentralized and localized scale.

SMART CURRENCIES FOR PROGRAMMABLE ECONOMIES

As digitally intermediated payments go mainstream, they promise to render financial transactions frictionless and invisible. At the same time, a new breed of payment platforms may enable new pathways for software-based currencies and powerful new algorithmic economies.

Changing Fictions

Across the world's emerging markets, digital payments have already gained significant traction as alternatives to a deficient banking infrastructure. Mobile payment companies like MFS Africa and MPesa claim nearly 100 million users across the African continent, a coveted market that spent over $10 billion in mobile transactions in 2015. Projections for this market vary, but they all point to increased adoption as low-cost phones continue to proliferate in every corner of the world.

While adoption of mobile payments has been slower in the West, nearly a quarter of American millennials used phone-based payment systems in 2015. As these payment platforms gain users, they provide a more solid foundation for software-based currencies like Bitcoin, which offers no physical coins but can otherwise be transacted like any other form of money.

Changing Systems

As digital payments achieve mainstream status, Amazon Go represents an effort to reduce the moment of transaction to the minimum possible experience. Within Amazon's pilot store, users can simply pick up their items and walk out, while their phone quietly coordinates with the register from their pocket. China's Alibaba has launched a payment system for virtual reality-based commerce in which customers can initiate transactions simply by nodding their head. As the details of daily transactions move into the background, future generations may not be aware of how they are paying for their goods at all, or what currency they're using for any given purchase.

Over the next decade, software-mediated payments will evolve and mature to offer a trove of opportunities for creating bespoke currencies aimed at accomplishing specific economic goals. Bitcoin-like currencies can be programmed to automatically adjust pricing or spending rules based on context: subsidizing local goods over imports, automatically applying tax incentives, or incorporating carbon footprint costs, for example.

BY 2027

In a future world where digital payments are effectively ubiquitous, customers will be able to exchange "smart currencies" seamlessly, leveraging third-parties to determine exchange rates in real-time. Payment platforms will act like app stores, navigating complex expense accounting and budgetary logic at the moment of transaction. New currency creation, like other networked platforms, will require only sufficient network effects to reach critical mass adoption.

As an extension of state infrastructure, smart currencies may recast welfare payments, fines, and incentive programs as monetary software, furnishing adequate funds for desired purchases and restricting undesired ones. These capabilities will provide financial institutions and governments with new levers for economic influence, while peer-to-peer currencies continue to flesh out gray-area markets in the shadows of formal regulations. Financial institutions will face increasing pressure to reduce or eliminate the per-transaction fees that currently drive many business models, allowing micropayments and machine-to-machine transactions to proliferate. In the coming decade, we will likely discover that money is, ultimately, just another shared fiction, poised to be rewritten for the emerging needs of our hyper-connected global society.

Working the System

As the automation of many work tasks prompts public cries for alternative economic models, the inherent value of programmable currencies may begin to reveal itself. While Universal Basic Income aspires to provide all citizens with enough common currency to meet their survival needs, the much-hyped policy will likely encounter the same hurdles encountered by minimum wages and welfare stipends: across different regions and environments, the cost of basic needs differs significantly, and policy-based interventions often create unforeseen and sometimes perverse incentives.

Regional implementations of programmable currencies could offer an alternative with more focused targets, algorithmically incentivizing the local production of basic goods and services and subsidizing their cost to customers, while self-correcting for flaws and loopholes that are discovered along the way. These software-mediated economies would offer much more granular levers for achieving specific economic goals, but will also require high trust in the institutions and platforms that launch and maintain them.

Beyond Blockchain

As the payment ecosystem around them continues to develop, more people will employ a wide variety of digital currencies to convey the true composite value of their goods and services. The volatility of global economics is likely to buoy these efforts, as people look for currencies that will benefit their specific situation and insulate them from risk.

From a technology standpoint, digital currencies will be divided into miniscule denominations, then transferred as near-continuous micropayments to compensate service providers. AI bots will broker financial agreements on investors' behalf without human intervention, making the payment process seamless, if not somewhat unpredictable.

scenarios

CITIZENSHIP

mandatory visibility

As border patrols crack down on social media identities, new social networks respond in kind.

As usual, it started small. In late 2016, the U.S. government announced that it would request voluntary links to the social media accounts of foreign visitors. Not passwords, just account names, so that the TSA could check to make sure visitors didn't have any unsavory connections. Within a couple of years, this disclosure became mandatory, and a rapidly growing number of other countries began to implement the same requirement. As the 2020s hit, many companies started implementing a similar demand as part of the hiring process.

It became a familiar requirement: Name, Date of Birth, Passport Number, Twitter Handle.

The lack of social media visibility became *ipso facto* evidence of untrustworthiness, and by the mid-2020s customs officials in quite a few countries began to see the absence of an active social media account as sufficient reason to deny entry. Meanwhile, learning algorithmic systems could do enough deep data mining and cross-correlation to be able to sketch plausibly accurate psychological profiles based solely on social media presence. Citizens around the world had to balance any desire for personal privacy with the need to maintain sufficient visibility to be seen as reliable.

All too soon, the need for visibility to cross borders evolved into a need for visibility to prove identity. For users who already saw themselves as defined by their social networks and image stream, this seemed quite reasonable. A handful of social media companies pushed back against the use of their platforms as de facto citizenship tests, leading inevitably to those companies being labeled as subversive. Some activists claimed that the use of privacy-friendly networks increased the likelihood of being stopped and checked by police.

Few were surprised when a thriving black market in fabricated social-network identities emerged. These weren't just faked identification cards—these identities had linked social media accounts with years of history, whether stolen from a real person, purchased from an individual willing to sell their accounts, or even grown by "tribe farmers" who cultivated hundreds or thousands of real-appearing fake accounts. Popular among undocumented immigrants, criminals, and privacy advocates, false social network identities quickly became the target of a global legal crackdown. By 2027, most states had passed laws banning multiple accounts on the same network, and a growing number sought to restrict the use of privacy filters and pseudonyms online as well.

Ghosting—intentionally removing oneself from online social networks—remained grudgingly legal (and heavily discouraged) in most Western countries. Unfortunately for lawmakers, this gave people who "ghosted" a kind of outlaw allure. By the end of the 2020s, "going Casper" had become a standard component of action movie tropes.

POWER

according to my washing machine, my toaster is a spy

The Internet of Things ushers in the age of "dansveillance"—observation from within.

It remains unclear just who decided to give the different types of worm-infected appliances their unique personalities. Toasters liked to surprise people. Washing machines were snitches (since they saw all of the "dirty laundry"). Refrigerators seemed to enjoy making people feel guilty. Home control systems were bossy and argumentative. Robotic vacuum cleaners were obsequious. And so forth.

For several years, the "personality worm" was a piece of malware infecting Internet of Things devices that people actually kind of wanted to get. Becoming infected was a bit of a gamble, however. Destructive viruses would masquerade as the personality worm, even as manufacturers tried to prevent the worm from working in the first place. Much of the propagation of the virus worked the old-fashioned way, spreading via devices connected to an infected network, then connecting to a clean one at home.

Waking up or coming home to find the thermostat in a screaming argument with the electric blanket, or being surprised by the light switch becoming flirtatious, was a cause for celebration in many millions of homes around the world. What made the personality worm even more appealing was that it didn't overstay its welcome. The full range of personalities and behaviors persisted for only a few months; afterwards, the IoT devices would revert to their previous status, with only very occasional observations or comments.

The worm itself was heavily encrypted, and would send out and receive data from constantly changing sites on a regular basis. Security analysts screamed about the obvious risks, but most people assumed that these data flows were language and personality updates; unfortunately, that was only a small part of the data. In 2027, leaked source code for what was officially called the DANSER virus revealed the awful truth: the malware was actually engaged in constant monitoring of residents and their conversations. Usage patterns, guests on the home network, unencrypted data of all kinds streaming around the house, all of these were fodder for the DANSER worm.

Eventually, the worm's origins were traced to the Canadian government. The intent was to create a virus that would rely on the increasing ubiquity of Internet of Things devices to form a "dansveillance" web—observation not from above (sur) or below (sous), but from within (dans). The personality aspect was the hook, the reason for people to accept the virus in their systems. The worm was meant to target only IoT devices in Russia and China, but, unsurprisingly, escaped its enclosure.

Governments were outraged, privacy advocates hurled accusations … and after all of this, studies showed that 40% of infected homes chose not to have the personality worm purged.

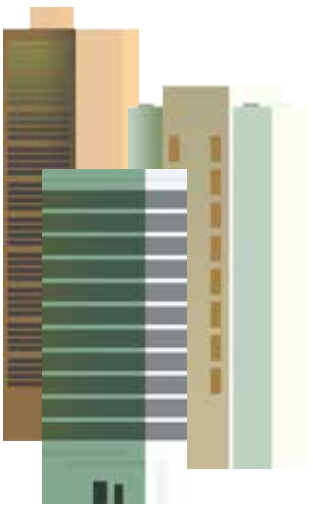
TRADE

fuzzy prices

That'll be 44 dollars, 3 RMB, and 8 WoW gold pieces.

The proliferation of virtual currencies, crypto-currencies, and other non-state-backed (but still trusted) kinds of money could have had two quite divergent outcomes: it might have stabilized global currency markets, providing a clear and secure exchange mechanism; or it might have plunged currency markets into chaos. Unfortunately for most people, and quite fortunately for finance companies, we got the second one.

By being well distributed and highly connected, these digital currencies allowed buyers and sellers around the world to use whichever currency they wanted to at that moment. Exchange rates fluctuated wildly at times, and currencies never stopped re-balancing against each other. While most countries maintained the fiction that there was an official form of money, some locations had more of a Wild West atmosphere. Market stalls in Shenzhen soon held goods with digital price tags, showing the product price in several different popular currencies. Often the prices on display would be shifting second-by-second, and retailer policies varied between those who locked down the price when the product was picked up—"request binding"—or when the product purchase operation was completed—"acquisition binding."



This was, to a significant extent, an unexpected side effect of commerce increasingly mediated by software agents. Digital assistants would assure the user that something was affordable—or warn the user that the price was too high—and the human would let the software bot handle the nitty-gritty details.

With the actual transaction increasingly taking place as a bits-only conversation between a digital shopper (in one's phone, wearable, or active ink tattoo) and the digital shopkeeper, both customers and retailers grew somewhat blasé about how the actual prices tallied. As mainstream retailers adopted the live price tag model, the more cutting-edge and "high-delta" locations started to use combination-currency prices, with the balance between different monetary standards depending upon second-by-second arbitrage opportunities. By 2027 in gray markets around the world, it became unsurprising (if still a bit uncommon) to see a product listed with a price combining dollars, RMB, bitcoins, and Xbox Live points (along with a price amounting to roughly 50% more if paying in a single currency).

At the customer-facing side, the use of multiple currencies meant a spread of pricing formats. Behind the scenes, however, multiple currencies became a mechanism for multiple exchange steps. A purchase in pounds-sterling in London might get traded for dollars to take advantage of a momentary rate mismatch, then shifted to a lesser-known crypto-currency to avoid regulatory fees for international transfer, then finally deposited in the retailer's bank account in euros. The very next purchase might start and end in the same way, but take an entirely different currency exchange path.

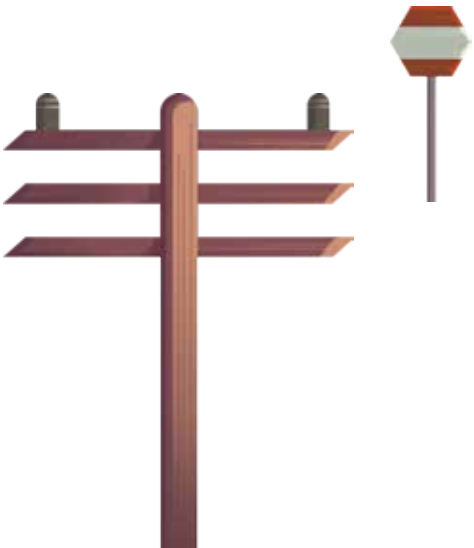
INFRASTRUCTURE

face(book) the nation

The attempt to co-opt a social media platform as a tool for government communication is flipped, giving social networks a modicum of state-level control.

Ostensibly, the Brasilia government wanted the kind of connection with its populace that Beijing had through WeChat. As with China and WeChat, the connection between Brazil and the resurrected Orkut was to be unofficial yet intimate, a way of keeping tabs on the pulse of the nation while giving people a platform for a wide array of daily activities. Brazilian leaders smoothed the regulatory pathway to make it easy for Orkut to offer banking and commercial services, health records, and even electronic voting, all alongside the more typical social network features.

By 2025, some 90% of Brazilian adult citizens had Orkut accounts, and the vast majority were active daily. Other countries attempted to emulate the synergy, but none were as successful as Brazil. In the United States, Facebook fatigue had long ago set in, and none of the squabbling array of alternatives had gained sufficient traction. In the European Union, efforts to create a new, EU-only social network stumbled, then fell victim to a change in European Parliamentary leadership. LinkedIn, perennially an also-ran service, found its calling as a rudimentary official network for a variety of states in the Global South.

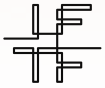


But it was only in Brazil that the social network/government connection truly thrived. Even in China, Beijing was unwilling to grant the kind of power to WeChat that Brasilia gave Orkut. That was, perhaps, ultimately the problem: Orkut remained an independent commercial entity, even with increasing access to, and influence over, the levers of democracy.

This came to a head in 2026, when Ronaldo, the former football superstar who had become the visible face of Orkut's leadership, launched a surprise bid for President. He won, handily, and the populace and media (largely as channeled through Orkut) ignored the voices calling out the unquestionable conflict of interest arising from most of the voting happening via the Orkut app.

In 2027 the Brazilian government became increasingly Orkutified as the network added new functions. Legislative meetings started to take place over group videochat and all new bills and proposed regulations had to be available for public vetting via the social network. Orkut pioneered a number of other tools to allow greater public participation in government activity, from priority access to legislators with registered constituents to real-time advisory voting on any bills under legislative discussion.

Jokes about renaming the country aside, it was clear that when the state institutions combined with the digital network, the digital side won. Around the world, leaders of governments and social network companies wondered aloud not whether this would spread, but how and when.



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