

# RE MODELING TRUST

Whether shopping for a favorite brand of baby food, diagnosing a perceived illness, or deciding where to invest, issues of trust emerge at every step. To guide our decision-making we rely on credible sources of information, enforceable contracts and guarantees, and communities of individuals whose life experiences are comparable to our own. Since the earliest efforts to organize human societies, we've modeled trust from these building blocks of our society.

Today, as our services and interactions reach across the globe through complex digital networks, the bedrock of trust is eroding. Beyond widespread questions about fake news and a post-truth society, we find a more profound set of technological, social, and institutional transformations disrupting the landscape of trust by upending the foundations of our institutions and authority structures across the business, civic, and social spheres.

To help you navigate these risks and uncertainties, we've identified seven future forces reshaping our familiar building blocks of trust. From the rise of nonhuman actors to revolutions in biological science, the emerging landscape will challenge us to remodel trust to build, maintain, and communicate with our partners, neighbors, and customers.

In the coming decade, will we primarily filter distractions and viewpoints to keep out ideas and actors that conflict with our sense of identity and meaning? Outsource the burden of decision-making to smart objects and authorities? Leverage the ongoing flood of data to continuously verify the information behind our decisions? Or reinforce physical and digital boundaries to define who is in and out of our trusted networks?

**As the future unfolds, how will we remodel trust to anticipate risk and clarify action?**



# Future Forces

Reshaping trust across the business, civic, and social spheres

## SHIFTING AUTHORITIES AND EVIDENCE

---

### **Can we believe what we read, see, and hear?**

The last decade was driven by the rise of big data, and the next will be remade by back-end systems transforming data into valuable insight with limited human involvement. Already, machine learning systems make decisions for us from medical diagnoses to hiring. Increasingly high-stakes outcomes are shaped by insight humans didn't generate and may not even be able to understand. These systems are creating intuitive leaps and valuable insights beyond human capacity. With the information environment increasingly polluted by intentional misinformation—threatening the quality of automated analysis—it will be harder for humans to act on incoming data.

## FRAGMENTING IDENTITY AND EPHEMERAL COMMUNITIES

---

### **Which identities will fragment and what new categories will determine who's in and out?**

We're witnessing a transformation of default identities through massive demographic shifts in birth rates, migration, and aging. Such quantitative shifts are accompanied by a reinvention of the concept of identity, as categories of race, sexual orientation, gender, and culture are becoming more fluid and mixed, empowering people to self-identify with a much wider set of mutable identities. Meanwhile, global interconnection is helping more people seek out and connect with others like themselves while amplifying group tensions and anxieties. This fragmentation will play out in all spheres of human activity and challenge the basis of legal, political, and other institutional systems built on conferring rights to hard identity categories.

## MANIPULATING PERCEPTIONS AND PERSUASION

---

### **How can we ethically harness emerging understandings of human decision-making to balance skepticism and trust?**

Fields like psychology and behavioral economics have upended understandings of how people make evaluations and decisions. This process will accelerate as advances in neuroimaging bring transparency into how our brains formulate trust and decompose meaningful distinctions between cognitive processing of trust and distrust. New understandings—coupled with ongoing improvements in the ability to target people with ads and information—will create radical new capabilities to influence perceptions, emotions, and decisions. Setting aside intentional deception, extreme targeting has as much potential to persuade and create confusion, fatigue, and overwhelm as to engage.

## COLLABORATING WITH NONHUMAN ACTORS

---

### **How will humans coexist with machine actors that are quickly becoming our managers, collaborators, and surrogates?**

Machine intelligence shapes us in unseen ways, turning machines into actors in business, social, and civic spheres. Robust networks of intelligent things will take open-ended action based on rules designed for human actors and social systems. Already, jobs are getting unbundled into tasks to be routed, tracked, and reassembled into value by algorithmic managers. In the world of autonomous cars, governments are remaking the rules of the road for nonhuman drivers—a development rapidly infiltrating other domains. Shopping bots are snatching up hot tickets, reselling them at huge markups, and televisions are intelligently breaking the law to bypass regulatory tests.

As we grapple with increasing tensions around trust in the coming decade, external forces will challenge the kinds of evidence we use and compound the many risks we have to navigate, confronting us with the need to remodel trust for a rapidly changing and complex environment.

## BLURRING INSTITUTIONAL RESPONSIBILITIES AND BOUNDARIES

---

### Who makes the rules?

Factors that connect people globally are remaking how we relate to each other. Edelman's 2017 Trust Barometer showed trust in government, media, corporations, and NGOs in worldwide decline. Corporations are being disrupted by the platform economy, and governmental agreements are being pushed aside. Technology companies have become de facto arbiters of global speech, private companies have been targets of cybercrimes by state actors, and US cities and states are committing to treaties that directly contradict federal policy. Enforcement of rules is up for grabs as blockchain advances are effectively turning code into law.

## COMPETING IN EXTREME ECONOMIES WITH EXTREME DISPARITIES

---

### As the disparity between winning and losing continues to grow, how do we operate without vilifying one another and undermining our mutual security?

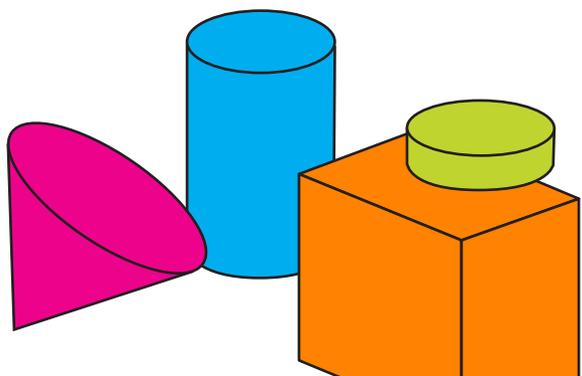
Declining distribution costs and accelerating product cycles are supercharging global markets, creating extreme winners and losers. Newspapers and information companies have spent years in free fall due in part to the success of Facebook, Google, and others in dominating the global information landscape. This example highlights the extreme competition in fields like machine learning, where the costs of achieving global scale are trivial. With talent wars raging at every scale of society, countries like China are turning the pursuit of machine learning talent into a national priority, and startups with deep pockets are purchasing university departments.

## BREAKING OLD MODELS WITH NEW SCIENCE REVOLUTIONS

---

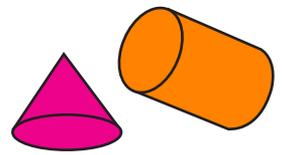
### What principles will emerge to guide our use of new scientific capacities to alter biological and physical systems at global scales?

Expanding capabilities to manipulate everything from microscale biology to global climate are challenging trust models and raising old questions about just how much humans should alter the natural world. Rapid advances have given us practical tools to access and understand human systems, and breakthroughs in brain-to-computer interfaces are moving toward commercialization. Bypassing human trials, biohackers have begun using CRISPR to alter their DNA. And advances in geoengineering with potential to address the impacts of climate change are renewing discussion—and creating confusion—around how to manage global efforts to manipulate climate.



# Building Blocks

## Making new systems of trust



Over the next decade, many of the basic building blocks we use to create trust—INFORMATION we're exposed to and seek out, COMMUNITY networks we interact with daily, INFRASTRUCTURE we rely on to activate our plans, AGREEMENTS we make and ask of others, and POWER structures that shape or constrain our behavior—will be reshaped by the seven future forces described earlier.



### INFORMATION: An era of abundance and noise

The internet has brought seemingly contradictory phenomena. We've gained transparency in countless domains, yet the climate for trusting what we read and hear is noisier than ever. We connect more easily, but these connections can produce greater isolation and tribalism. In part, contradictions emerge due to the sheer abundance and persistence of information. We haven't yet learned how to manage a world in which every message is stored and facts and falsehoods are equally accessible.

#### 1 | Extreme Impacts of Information Insecurity

Security challenges—from human errors to unforeseen technical vulnerabilities—will continue to make digital communication subject to exploitation. These weaknesses will be exacerbated by the speed with which information can spread and affect real-world outcomes, creating an environment in which seemingly benign mistakes can create huge impacts, and renewing fears about sharing and exchanging sensitive information.



theatlantic.com

##### Managing Human Error

The phishing of John Podesta's email was traced to a typo calling a suspect link "legitimate," not "illegitimate."

#### 2 | A (Dis)information Arms Race

Monetizing billions of viewers through advertising underscores a critical dilemma—social networks need attention to drive revenue, regardless of external costs. Attention hacking will be exacerbated by advances in machine learning systems that automatically generate information intended to deceive and spread. Coupled with tools to manipulate video and audio in seemingly authentic ways, an explosion of machine-generated content will aim to maximally engage audiences.



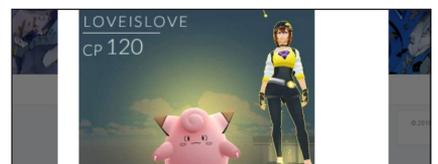
theverge.com

##### The Rise of Deepfakes

A group of anonymous Reddit users developed open-source tools for deepfakes, superimposing celebrities' faces onto pornographic videos.

#### 3 | New Interfaces to Navigate

As questions swirl around the integrity of information technologies, emerging interfaces—from immersive, augmented reality platforms to sophisticated, voice-based systems—will require mastering new platforms and meeting continued information challenges. From questions about product advertising to obviously contentious issues around who owns the digital information layer over physical space, we'll need models for ensuring the utility, quality, and validity of information in these new interfaces.



kotaku.com

##### Augmented Activism

LGBT activists took over naming the Westboro Church within *Pokemon Go*, signaling augmented reality as a future battleground.



## COMMUNITY: Defining who and what belongs

The ways we form communities are changing, as are the value and benefits we expect communities to provide. With so many options, we'll experience new anxieties around who and where community members reside, how to measure and manage our shared spaces, and welcome intelligent machines as peers in unprecedented ways. As these forces reshape the role of community in our lives, trust will take center stage in future communities we form.

### 1 | Formalizing Non-Geographic Communities

Markers of opportunity and community are coming untethered from geography as telecommuting increases and services are consumed globally. Still, we need community within our physical space. Cities are good places to find jobs and tribes, but telepresence tech, automated transport, and online affinity groups encourage people to develop communities beyond urban centers. We'll see peripheral urbanization, with suburbs outside urban hubs optimized for community values.



theatlantic.com  
goldenvisas.com

#### Citizenship for Sale

Estonia, Spain, and other countries sell virtual citizenship, providing access to passports and other rights.

### 2 | Communing with Computers

As intelligent machines communicate more intuitively, gaining power to trigger action in the world, they'll assume more prominent roles in communities, becoming caregivers, mediators, and officers. What forms robots take and how they're accepted will vary by culture and geography worldwide. As technologies become more powerful and adaptable, our cultural perspectives will continue to diverge, with communities incorporating bots in vastly different ways.



cnm.com

#### Rise of the Robocops

Dubai hopes to improve trust by recruiting robots to make up 25% of its police force by 2030.

### 3 | Proliferating Measurements of Community Health

Increasingly we look beyond traditional economic metrics to understand and quantify how communities shape experience, looking instead to metrics like happiness, health, and trust. Each category can become a source of contention and focused action, from decreasing junk food access to creating chemical-free communities. As differing categories emerge and gain traction, they'll reshape questions around access, funding, and who is and is not part of a group.



theatlantic.com

#### Food Deserts and Swamps

Public health researchers identify communities oversupplied with junk food as food swamps.



## INFRASTRUCTURE: Relying on complex systems

We've come to trust our infrastructure to work and our resources—from energy to medicine—to remain sufficient. Ramping up system complexity adds to the nature of this trust, as we understand less about how autonomous systems work and question whether trust is warranted. We're moving toward an interconnected world that simultaneously demands greater trust and relies on external verification. The penalty for trust violations, from net neutrality to legacy drugs, can be dropping out of the system.

### 1 | Interacting with Autonomous Infrastructure

Self-driving vehicles are increasing in complexity and likely to be abundant by 2030. In autonomous vehicle software, the distinction between hands-on and hands-off autonomy is critical. But for human drivers, more telling change will occur with no human controls. As our infrastructure becomes autonomous and mobile, we'll face vital questions about how to coexist and interact with machines that act on their own.



fusion.kinja.com

#### Pedestrians Undetected

Video of a self-driving Volvo hitting pedestrians went viral after built-in safety systems failed to stop the car.

## 2 | Monitoring Access and Violations

Data often contradicts service claims, particularly in speed and throughput statements of internet service providers. Tools testing whether a provider is throttling some services, in violation of network neutrality, will continue to grow in popularity and expand to include tests of other kinds of restrictions. Beyond contentious debates around network access, we'll see similar questions concerning access and validity of information that comes across our digital networks.



techrepublic.com

### Objects as Witnesses

Arkansas police issued a warrant to access an alleged murderer's Amazon Echo recordings, fueling debate about privacy legislation.

## 3 | Circumventing Legacy Systems

Peer-to-peer networks are changing our relationship to basic infrastructure, from utilities to biotech drugs. Some utilities have reduced rates paid to solar customers, undermining economic support. As battery technology improves, the viability of disconnecting from the grid will increase, along with efforts to make this impractical. In response to pharmaceutical companies buying low-volume legacy drugs and raising prices dramatically, medical associations will work together with generic drug manufacturers to provide alternatives.



artstechnical.com

### Hospital Drugs

Responding to shortages and price gouging, four large US hospital systems have banded together to produce affordable generics.

## AGREEMENTS: Distributing and automating enforcement

We've developed systems and institutions to ensure people carry out agreements or face consequences. Recently, highly distributed databases known as blockchains have enabled ways to automatically execute and enforce contracts. These platforms for decentralized, open, trustless systems allow permissionless innovation—such as self-executing contracts, new forms of authentication, peer-to-peer interaction, and self-sovereign identity. Blockchain technologies will create new efficiencies and opportunities to broker agreements while raising questions about how to enforce them and ensure security.

## 1 | Trusting Without Authority

A contract's authenticity rests on trust in its issuing authority. But problems arise if a deed's owner has little control over who accesses it or if data on proprietary databases is hacked. Blockchains will enable owners to store their own documents and decide who has access. Documents on blockchains will be used in zero-knowledge proofs and smart contracts that enable information to be verified without being viewed.



**WHAT IS ZCASH?**  
Shielded transactions hide the sender, recipient, and value on the blockchain

spectrum.leea.org

### Verified, Not Viewed

ZCash cryptocurrency uses a zero-knowledge proof that validates transactions without sharing the details with third parties.

## 2 | Digitally Enforcing Laws

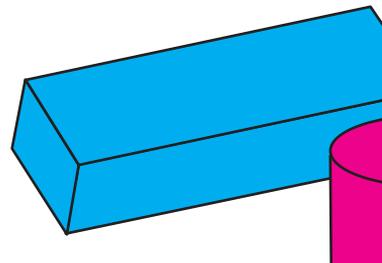
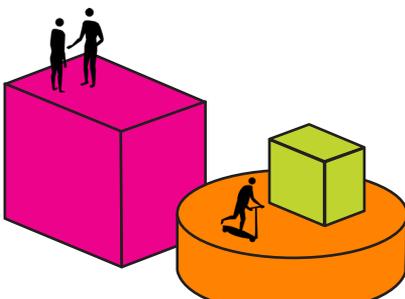
Embedding code into physical objects is becoming a regulatory mechanism. Early versions of embedded governance—such as cameras at stoplights—are giving way to sophisticated smart contracts. Anyone can implement self-enforcing laws and agreements for any purpose. Although such innovations have potential to transform the nature of enforcement, they'll demand a level of transparency and explicitness that isn't always consistent with law enforcement.



byr.com

### Speed on Autopilot

Tesla changed positions on whether its autopilot slightly exceeds the speed limit versus strictly conforming to limits.



### 3 | Validating Provenance and Authenticity

High-value assets such as art and exotic raw materials will be tagged with sensors and tracked through supply chains, allowing stakeholders to verify provenance and reduce tampering, counterfeiting, and insurance fraud. Such tools could be used to ensure food safety or transparency in global trading. As it becomes easier to manipulate ways we communicate and share data, blockchain-based tools will become increasingly critical for coordination and collaboration.



venturebeat.com  
maersk.com

#### Global Trade

IBM and Maersk partnered on a blockchain-based joint venture aimed at creating distributed mechanisms for tracking routes of goods.

## POWER: New ways to force action

Forms of power vary over time, as does our ability to counter unfamiliar expressions of power, whether in diplomacy or propaganda. Variations come from evolutions of forms—from muskets to automatic weapons—and from new ways to exercise power, recently in cyberwarfare, hacking, and mixed reality. If power is a performance, its success or failure is meaningful for those bearing witness and those taking part. Altering witnesses' perceptions may be more important than actual outcomes.

### 1 | Smart Contracts, Smart Bombs

Blockchain-based technologies face the same misuses as other digital technologies, becoming part of criminal and government arsenals. The ability of smart contracts to carry out programmatic functions when certain conditions are met will combine with acts of digital terrorism, ranging from crypto-locker attacks to weaponizing Internet of Things devices. Time bomb malware will increasingly contain an element to activate its malicious payload under precise conditions.



wired.com

#### Viral Criminals

North Korea spread the WannaCry crypto-locker virus, using tools developed by and stolen from the US National Security Agency.

### 2 | Inconvenient Reality Blocked

As mixed-reality technologies move to the market, online information warfare will proliferate. An unfiltered mixed-reality future will be filled with advertisements—and tools to block advertising and other unwanted online content. Anything politically or morally suspect could be censored from the user's view of the mixed-reality world. Face recognition technology will make it possible to filter out not just unwanted ideas but also those who hold them.



en.wikipedia.org

#### Great Firewall

China restricts its internet, censors websites, and blocks foreign products, giving its people the least online freedom on the planet.

### 3 | Weaponization of Deep Learning

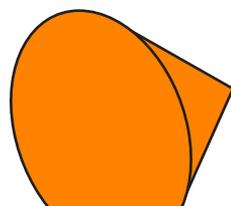
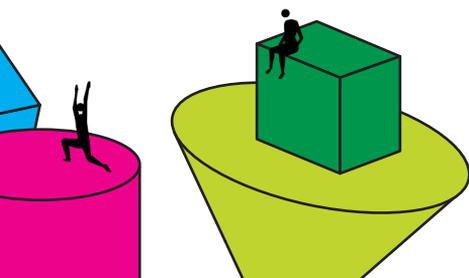
The Politically and socially disruptive advertising the Russian government deployed on Facebook and other social media platforms was actually quite crude, relying on blunt images and terms intended to elicit a reaction from narrow target audiences. The next step will be to use deep learning algorithms to determine the epigenome of beliefs and target not simply surface-level opinions, but underlying values and norms as well.



pogamer.com  
fcc.gov

#### Fake Comments

Spambots corrupted the FCC's comment process for net neutrality, including comments from former President Obama and deceased citizens.



# Continuous Verification | Striving for certainty in a world of infinite data

From Farmer's Almanacs to Bloomberg terminals, we've always relied on troves of trustworthy data to assess the evidence behind our decisions. But how do we adapt to a world flooded with too much data to process, let alone verify?

## SCENARIO 1 CONTINUOUS VERIFICATION

To achieve certainty in the future, imagine a service that leverages networked betting markets to offer the highest-confidence assessments with the fastest possible turnaround. Such offerings might begin in recreational arenas like esports, incentivizing both analysts and algorithms to scour the available data and predict the likeliest outcome.

By putting money on the line, could you anticipate outcomes faster and more reliably than your competitors? If the predictions prove reliable, how long before these kinds of verification services become embedded into legally-binding smart contracts to increase trust (and save money) in higher-stakes tasks like insurance appraisals and fraud prevention? **As decisions take place at an ever-faster pace, are you ready to pair people and machines to continuously verify what you need to know moment-to-moment?**

**INFRASTRUCTURE**  
**CIRCUMVENTING LEGACY SYSTEMS**  
Legacy structures for assessing compliance, fraud, and liability find better outcomes at lower prices from new algorithmic players.

**AGREEMENTS**  
**SMART CONTRACT LEGAL AGREEMENTS**  
Algorithmic decision-making becomes codified into law through transparent and distributed smart contracts underpinned by blockchain-like ledgers.

**POWER**  
**INFORMATION ARMS RACE**  
As institutions acclimatize to our information-dense environment, the most successful strategies will combine the best data sources with the best interpretation frameworks.

**COMMUNITY**  
**COMMUNING WITH COMPUTERS**  
In a hyper-networked information environment, professionals interact continuously with advisory bots to empower high-stakes decision-making in real-time.

## SCENARIO 3 OUTSOURCED AUTHORITY

As continuous breakthroughs in data-rich sciences break our traditional models of understanding, a new wave of "experts" will draw on emerging information sources and algorithmic philosophies to earn our trust and make decisions on our behalf.

Imagine a near-future match-making service that relies less on self-reported data like hobbies and interests, and more on the measurable biochemical reactions produced in the gut when you encounter a potential partner for the first time. Do you choose the algorithmic expert that optimizes for physical attraction, or for financial compatibility? **How important are gut feelings when gut data is readily available?**

**POWER**  
**MEMORY HOLES**  
To navigate complex and interconnected systems, we'll increasingly rely on algorithmic experts to curate and analyze our data, entrusting them to decide what information we see and what we'll never see again.

**COMMUNITY**  
**DISLOCATING INSTITUTIONS FROM GEOGRAPHY**  
Whereas trust has traditionally been managed by regional and national institutions, platform-based experts will create new institutional forces that live only in the cloud and on our devices.

**INFORMATION**  
**NAVIGATING NEW INTERFACES**  
As data-driven advancements in fields from biology to neuroscience become more mainstream, they will spawn new services that require new literacies to assess and navigate.

**AGREEMENTS**  
**VALIDATING PROVENANCE AND AUTHENTICITY**  
Algorithmic experts will require access to a broad range of datasets, requiring new security and authentication practices to separate the genuine truth-tellers from the snake oil platforms.

# Outsourced Authority | Relying on experts in a world of confusion

In previous centuries, we relied on trusted institutions and certified experts to weigh in on decisions beyond our expertise. But as our legacy authorities struggle to retain the trust they once took for granted, what new experts will emerge from our smart objects and connected platforms?

# Boundary Management | Building digital fences in a world without borders

Anybody who has ever participated in office politics or community associations recognizes that building trust in a community setting requires the identification of boundaries—who's in the community and who's not. But how do we manage these boundaries when our communities are spread across physical and digital landscapes, with shared attributes that extend well beyond nationality, ethnicity, or culture?

## SCENARIO 2 BOUNDARY MANAGEMENT

As bespoke cryptocurrencies become easier to design and manage, imagine how future communities might employ them to codify community values and protect local economies. Gentrifying neighborhoods might decide to subsidize lower-income residents with their own take on universal basic income, trading community tokens for electricity generated by rooftop solar and food grown by automated container farms.

As global forces heighten competition and upend traditional assumptions, how many beleaguered communities will seek refuge from the volatility by retreating into digitally-gated communities? **As powerful new tools for rule-making and governance become more accessible, will you build community cohesion by embracing global connection or constructing new digital enclaves?**

**INFRASTRUCTURE**  
**EXTREME VULNERABILITIES**  
With personal digital trails growing deeper and more detailed every day, our histories become searchable and vulnerable to activism and outrage.

**CIRCUMVENTING LEGACY SYSTEMS**  
The ability to produce food, energy, and other basic necessities at local levels enables local groups to disconnect from broader global trends.

**COMMUNITY**  
**PROLIFERATING MEASUREMENTS**  
As we continue down the path of measuring as much as possible, even seemingly qualitative measures like community identity get quantified to shape rules and actions.

**AGREEMENTS**  
**TRUST WITHOUT AUTHORITY**  
The emergence of blockchain technologies enables neighborhoods and other informal groups to create quasi-governmental zoning rules and local laws.

**INFRASTRUCTURE**  
**WATCHING FOR VIOLATIONS**  
Users develop workarounds and strategies to create more selective kinds of privacy—which get automatically enforced by increasingly flexible digital infrastructure.

**SCENARIO 4  
FILTERED PREFERENCES**  
What happens when we get ad blockers for the physical world? Imagine a world not too far from now where augmented reality glasses and virtual reality workspaces have become a fixture of everyday life, enabling a vast array of filters that can add layers of desirable content to our lives, as well as keeping undesired content out of our field of view.

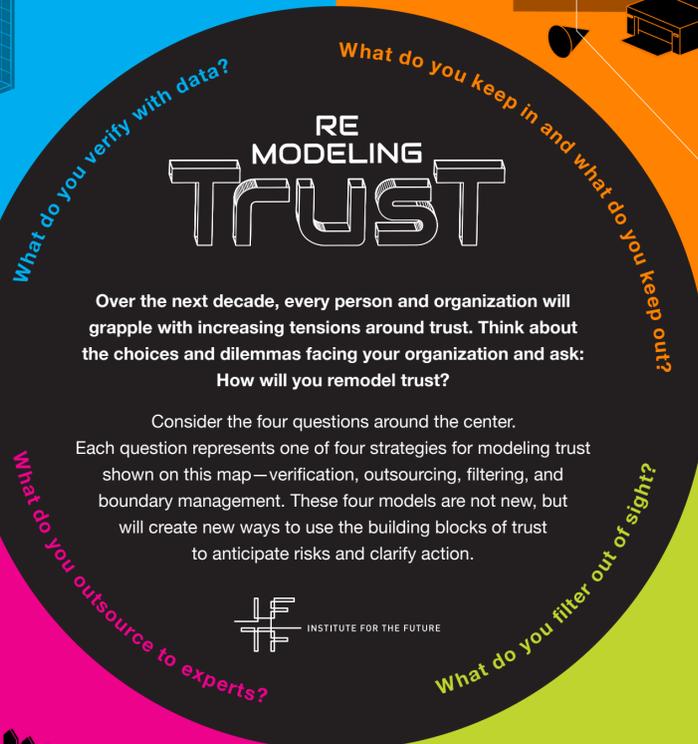
While these perceptual and cognitive filters will empower innumerable new avenues for coercion and manipulation, other benefits will be less expected—such as the ability to block oneself from others' view, or to earn revenue from paid product placement. **What does privacy look like in a world in which anything can be conjured and everything can be filtered out?**

**POWER**  
**INCONVENIENT REALITY BLOCKED**  
As physical filtering goes mainstream, people use these tools to determine who can and can't find or interact with them.

**COMMUNITY**  
**DISLOCATING INSTITUTIONS FROM GEOGRAPHY**  
Virtual and affinity-based communities move into the physical world and further break down traditional local community dynamics.

# Filtered Preferences | Designing custom views in a world of infinite realities

Social media filter bubbles have already created deeply polarized communities within our highly networked culture. But as media manipulation tools mature and AR/VR technologies offer deeper immersions into highly personalized realities, when does trust become more a matter of truth-making than truth-seeking?



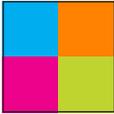
# How to use this map



**IMMERSE** yourself in the seven future forces transforming the landscape of trust across our business, civic, and social spheres.



**UNCOVER** the changing building blocks of trust that will yield new challenges and possibilities for how we share information, make agreements, build community, and wield power in the coming decade.



**EXPLORE** four models of trust that leverage familiar strategies with new tools and practices to help you anticipate risk and clarify action in an era of heightened uncertainty, ambiguity, and possibility.



**DIVE** deeper into the four trust models with our companion workbook that includes full-length scenarios for filtering, outsourcing, verifying, and boundary building between now and 2028.



IFTF's Future 50 partnership is a circle of future smart organizations that think strategically about near-term choices to reshape the long-term future. The Future 50 draws on a half century of futures research from IFTF's labs focusing on society and technology, the economy and the environment, food and health. Its goal is to create the perspectives and expert viewpoints, the signals and the data, to make sense out of disruptive forces in the present. Grounded in a framework of Foresight-Insight-Action, the Future 50 partnership invests in critical research, boundary-stretching conversations, and strategic experiments that will shape the business, social, and civil landscapes of tomorrow.



**For more information:**  
Sean Ness | [sness@iftf.org](mailto:sness@iftf.org)

Invent the new possible

201 Hamilton Avenue | Palo Alto, CA 94301  
650.854.6322 | [www.iftf.org](http://www.iftf.org)