

EMERGING TRENDS REPORT





Emerging Trends Report

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This report introduces several emerging trends with the potential to disrupt and transform our markets, governments, and society in the near future. One common idea sparked from this brief survey of trends concerns the problem of flawed assumptions and blind spots and the ways we can overcome them.

At all levels, decisionmakers in both the public and private sectors face difficulties in developing and executing strategies. Part of this stems from “misleading prejudgments,” meaning flawed assumptions. In 2013, Sidney Finkelstein, a business professor at Dartmouth College, co-authored a study that analyzed 83 cases of “failed strategies” and found that in 82% the failures were linked to flawed assumptions.

But why were failed strategies so often linked to flawed assumptions? Psychology offers a plausible explanation. One of the most striking things about human brains is how capable they are in pattern recognition. When faced with a new situation, we make assumptions based on prior experiences and judgments.

However, that same pattern recognition can mislead us. When dealing with seemingly familiar situations, our brains can cause us to think that we understand something when we actually do not. The work of psychologist Gary Klein shows that people tend to leap to conclusions and are often reluctant to consider alternatives. People are also bad at revisiting their initial assessments of a situation or framework.

The trends selected in this issue of The Future is Now are meant to surprise, challenge preconceptions, and reveal potential blind spots. For example, there is currently a great deal of news coverage about the centralization of the Internet under tech giants, the trend of youth leaving rural areas to work in cities, and human activity leading to global warming.

Three of the trends highlighted in this report, the Decentralized Web, Agripreneurs, and Accidental Geoengineering, present counterpoints to the existing narratives.

With the decentralized web, it becomes possible to imagine a radically different way of organizing the Internet, free of monopoly interests but perhaps filled with its own unique challenges. The rise of agripreneurs allows us to imagine the future of work in Asia and the Pacific as agricultural rather than industrial but enhanced by new digital technologies and life science advances. Understanding accidental geoengineering unsettles our understanding of human impact on the environment, since humans are not only warming Earth but also perhaps unwittingly cooling it. Human impacts on environmental systems are even more complex than previously believed.

One area where new thinking may be the most relevant is the future of work. This report presents some pathbreaking trends on that topic. A job-guarantee program would effectively eliminate unemployment, but its knock-on effects on the economy and wider society are difficult to anticipate. And how would this interact with migration trends? Would there be a need for radical changes in immigration policies, like that specified in the chapter on the VIP? Could mandating employee representation on corporate boards help to improve productivity and workers’ well-being? Finally, what role can automation play in scientific discovery and basic research, which are the foundations of innovation and continued growth on the economic frontier?

These possibilities challenge existing assumptions and force us to think more deeply and critically about both future and current circumstances.

The Asia-Pacific and the world may not see a simple continuation of trends over the long term but instead witness total reframing in any number of areas. Considering these possibilities is critical for all decisionmakers hoping to be better prepared in an uncertain world.

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FOR RE MA OR B

1-1

RADICAL
IMMIGRATION

In the aftermath of the Second World War, there was a consensus on promoting open trade among international and regional governance institutions. In the 1980s and 1990s, this consensus spread to include PR China and other parts of Asia as well as Latin America and Africa [1]. The free movement of goods, services, and capital was supported by the creation of the World Trade Organization (WTO) and various free-trade agreements. However, little consideration was given to the question of the free movement of people.

Many argue that these postwar developments have created an imbalanced global order. While capital, goods, and highly skilled labor flow across borders and generate significant wealth, less-educated workers tend to stay at home. At the same time, there is significant evidence that immigration reduces the wages of workers whose backgrounds are similar to those of migrants [2]. There are costs, both economic and cultural, to most workers in wealthy countries who are already buffeted by forces of trade and automation.

Still, easing movements of labor across national borders promises potentially dramatic economic benefits relative to costs. Individuals from Mexico, a relatively wealthy country by global standards, moving to the USA typically increase their annual earnings from around USD4,000 to roughly USD14,000 [3].

Potential gains from migration from poorer countries to wealthier ones, especially if language barriers are low, would involve gains of as much as 10-fold. Gains to those who remain in poor countries could be dramatic as well, since most migrants remit a large fraction of their incomes back to their home countries. This means that easing migration can both promote tremendous growth and reduce global inequality.

What types of systems can spread the benefits of migration more widely, beyond the substantial advantages it brings to migrants, their families back home, and employers and owners of capital? Economists Eric Posner and Glen Weyl proposed a system of visas allowing ordinary citizens to sponsor migrant workers, similar to how employers sponsor foreign workers in many countries. They call this the Visas between Individuals Program (VIP) [4].

The VIP would work by allowing any ordinary citizen to sponsor a migrant worker for an indefinite period. The sponsors would benefit by getting a cut of migrants' earnings in exchange for the right to work in the sponsors' nation. Sponsors would be responsible for providing basic health insurance and subject to fines if the migrants could not find work, commit crimes, or disappear; migrants would not be eligible to collect welfare. Migrants would also be allowed to work for less than the minimum wage, although presumably they would still be earning much more than they would in their home countries.

Such a system would have the theoretical benefit of allowing regular citizens to benefit directly from migrant workers while still allowing migrants to benefit from higher earnings. The VIP would also involve personal relations between locals and migrants and give responsibility to locals for the success of migrants. This sort of mutually beneficial contact could create positive relationships to lessen the social tensions associated with migration.



1-2

GENERATION
ALPHA

Social scientists and marketing specialists take great interest in generational typologies to track consumers', employees', and citizens' behavior on a broad scale. Much of this interest dates to the postwar baby boom in the second half of the 20th century. The underlying idea is that each generation is shaped by a (global) political, cultural, and technological context during different stages of life.

While a great deal has been written about millennials and Gen Z, some are now starting to look at the emerging generation of those born from 2010 onward, called Generation Alpha. Coined by Australian social analyst Mark McCrindle, Generation Alpha will grow up surrounded by digital technology and voice-controlled digital assistants [5]. In their teens, 5G connectivity will be the norm. This means that they will be the first generation to interact continuously with computers and virtual environments. Generation Alpha will also be the first to be digitally recorded from birth onward, in both government records and on their parents' social media sites.

If trends toward media fragmentation and polarization continue, this generation may experience its formative years in much more diverse ways than previous ones. Filter bubbles, in regular media and online, will feed different perspectives on global and national events. At the same time, digital technologies mean that ideas and narratives can move across national borders with ease. This opens the possibility of a truly global generational

culture. These two somewhat conflicting trends suggest a generation that will be both more globalized and more fragmented [6].

Apart from technology, Generation Alpha will come of age in an increasingly multipolar world, where the USA is no longer the undisputed global power and where the Asia-Pacific is likely to be more prominent militarily, economically, and culturally [7]. This generation may experience a much broader palate of cultural materials, for example Asian film, fashion, and music (see the current attention to K-Pop).

Given these broad trends, how will Generation Alpha affect political and economic events? Crystal-ball predictions are not possible, but speculations can be explored. First, socioeconomic technology penetration will be deep, not just available to the elite. They may be more demanding as customers and employees, having grown up with responsiveness and customization as a standard. Second, growing up in an age of protest, as most prominently seen in recent climate change actions, means that Generation Alpha might engage more in direct activism. In the UK, 20% of children between five and nine years of age have already attended their first march or protest about something they care about [8].



2-1

THE DECENTRALIZED WEB

In 1990, Tim Berners-Lee created the Internet, and since then it has become a central technology for millions around the world [9]. The Internet enables instant access to information, creates and maintains social relationships across continents, and creates key spaces for civic debate and expression. It is considered by many experts to be the most transformative and disruptive technology of the past few decades. From its early days, the web has grown from a handful of pages to a vast, complex network of content and connections.

However, as the Internet has evolved and access has become more global, some people are raising concerns about how it is being managed [10]. These voices argue that the web has steadily evolved into an ecosystem of large, corporate-controlled platforms like Google and Facebook that can manipulate online expression. While these platforms have improved usability and allowed people to share and publish content, they have also led to tremendous centralization.

This centralization is troubling because a small number of stakeholders have a disproportionate influence over which sources of information the public can create and consume. This is risky because of the possibility of censorship at the behest of national governments, bias in content curation leading to disinformation, and a lack of accountability on the part of the platforms.

Because of these concerns, more thinkers and advocates are exploring alternative models of organizing the Internet. One major alternative is known as “the decentralized web” or the “DWeb” [11]. On the DWeb, users do not rely on existing intermediaries. There are two substantive differences in how this alternative may work. First, peer-to-peer connectivity plays a central role, meaning that each computer not only requests services but also provides them. Second, the protocols involved in information storage and retrieval are distinct because they are content rather than location based. This allows websites and files to be stored and shared from computer to computer rather than on a single server.

What are the emerging applications of the DWeb? There are alternatives for many existing online services. For example, Textile Photo is an Instagram alternative for storing and sharing photos, and Mastodon is a decentralized version of Twitter [12]. While becoming better known, the DWeb faces a number of obstacles. First, the user experience with many of its apps is clunky compared with their centralized equivalents [13]. Second, since anyone can join a decentralized system, security becomes an issue. Third, some consolidation is perhaps “normal” since platforms often benefit from economies of scale so that even decentralized systems like bitcoin undergo some forms of market consolidation.

2-2

ROBOT SCIENTISTS



The scientific process has been responsible for many of the rapid advances and changes in society. Some argue, however, that science today is in the midst of a data crisis. Every year millions of new papers are published just in a single field like biomedical science, and the average researcher reads about 250 papers per year. At the same time, studies suggest that many results published in journals on psychology, medicine, and other fields are not reproducible [14].

The double challenge of quantity and quality arises from the fact that humans have limited cognitive capacity in terms of memory, attention, etc. Individual scientists understand a smaller and smaller fraction of our collective knowledge, and scientific discoveries depend increasingly on chance.

However, one new strategy to improve scientific productivity is to integrate machines and artificial intelligence (AI) into the process. This would benefit from machines' relative advantages in terms of memory and computational capacity compared to humans. Machines can easily recall vast numbers of facts, execute flawless logical reasoning, learn from large amounts of data that no human could deal with, and execute near-optimal probabilistic reasoning [15].

Integrating AI systems and robotics into the scientific process is termed "science automation" and expected to offer the following benefits: faster scientific discovery, since it can generate and test

thousands of hypotheses in parallel; cheaper experimentation, since it can be easily reproduced and trained more quickly; and its components are able to work 24/7 [16].

Essentially, the scientific process can be broadly understood as having three main steps: observation; hypothesis generation; and experimentation. Experimentation has seen the most substantial recent progress, with some also made in terms of automated hypothesis generation [17]. Collecting observations on a large scale is proving most challenging, since scientific knowledge is decentralized and publishers have placed restrictions on text-mining.

There are already applications of these kinds of systems in functioning labs. One example of such a system is Adam, a robot scientist that can automatically develop hypotheses, devise and physically run experiments, interpret results, and repeat the process for verification [18]. Adam has identified the markers for more than 15 enzymes. The US Air Force Research Laboratory Autonomous Research System (ARES) is studying the best conditions for rapidly growing carbon nanotubes by conducting hundreds of experiments a day [19].

With scientific discovery a key engine of innovation and growth, improving science productivity can lead to transformative benefits to society, from greater food security to improved medicines.

3-1

ACCIDENTAL GEOENGINEERING

Among those looking to mitigate climate change, geoengineering is often discussed as a last-ditch option for saving the planet. Geoengineering is a “deliberate large-scale intervention in the Earth’s natural systems to counteract climate change” [20]. There is a wide range of geoengineering techniques, although they can be mainly grouped into two categories: solar radiation management (SRM), where a small proportion of the sun’s energy is reflected into space; and greenhouse gas removal (GGR), where carbon dioxide or other greenhouse gases are eliminated from the atmosphere. These technologies range from setting sunshields in space to dispersing microscopic particles in the air to make coastal clouds more reflective [21].

Conducting research on or even discussing geoengineering is highly controversial, with some believing that it carries tremendous risks and offers only a partial fix for climate change-related issues. However, there is some evidence that humans may already be accidentally geoengineering the oceans and the atmosphere.

New research suggests that human-emitted iron is accumulated in the ocean in greater quantities than scientists previously estimated, with potentially dramatic consequences. Iron particles released by industrial activities into the atmosphere eventually settle into the sea [22]. A possible consequence of this is an alteration of marine food webs. Iron is a key nutrient

required by ocean phytoplankton and, in regions where levels are limited, iron supplementation can give plankton levels a boost. Growth in phytoplankton would mean an increase in the ocean’s carbon uptake since they naturally suck up carbon dioxide. Furthermore, when phytoplankton die, they sink and become trapped on the seabed, locking up the stored carbon.

Another case of unintentional geoengineering can be found in the shipping industry. Studies have found that ships have a net cooling effect on the planet, despite emitting nearly a billion tons of carbon dioxide each year. This is because ships also emit sulfur, which scatters sunlight in the atmosphere and can form or thicken clouds that reflect it away from the earth [23]. Global mean temperatures might be 0.25°C lower than they would otherwise be because of this effect.

These findings indicate that the effects of human activity on planetary systems are already far-reaching and difficult to grasp fully. With climate change set to have increased effects in coming decades, it is critical for countries to invest in monitoring systems to make informed decisions about the best ways to mitigate and/or adapt to these effects of accidental geoengineering.

3-2

AGRIPRENEURS

Farming is still a critical sector for countries in the Asia-Pacific and beyond, but it is considered an unattractive means of earning a living by many young people. Most farms are small and unproductive. These negative perceptions combined with other factors such as access to information and lack of credit are causing the young to leave smallholder farming at high rates to try and find work in cities [24].

However, a growing number of the young and educated are fighting the stigma around farming and attempting to professionalize it by applying scientific, data-driven approaches to agriculture. They call themselves “agripreneurs,” a portmanteau term combining “agriculture” and “entrepreneurs.”

This trend is widely reported in South Asia and Africa, where the African Development Bank (ADB) is spending USD350 million to support potential agripreneurs with training, advice, and technology. Agripreneurs also benefit from government support. In Ghana, there is a national effort to increase agricultural capacity and entice young people to return to farms [25]. It is hoped that productive farm work can help resolve the issue of high youth unemployment and overpopulated cities. Over 2,700 agricultural officers have been deployed across the country to educate farmers on best practices.

All across Ghana, many young workers are leaving office positions to work in farming. Emmanuel Ansah-Amprofi left

his job in immigration law to start a fruit and vegetable farm. He eventually helped found Trotro Tractors, an app that assists farmers in locating and renting tractors and other equipment.

New technologies open the possibility of different, less labor-intensive agricultural practices. Drone technology enables low-cost precision farming, making it accessible even to smallholder farmers [26]. In PR China, some farmers use drones for cropdusting. Drones can also carry out surveys like infrared mapping, reducing survey times from days to just hours. Drones can work autonomously, and farmers can control them via smartphone apps, thus reducing the need for labor and expensive equipment.

Dozens of startups are introducing drone technology in agriculture throughout developing Asia, targeting young people who understand technology and can apply it to farming. Agripreneurs are attempting to provide services such as on-demand farming to deliver fresh food directly to customers. In the near future, “Uberized” food systems may disrupt traditional agricultural supply chains and cut out middlemen who often take a big slice of farmers’ income in fees.



4-1

WORKERS ON CORPORATE BOARDS



With large companies facing mounting global discontent over economic inequality, poor labor conditions, and harmful products, there are increasing calls for a shift in how corporations are governed from both outside and within the business community. In August 2019, the Business Roundtable, an association comprised of CEOs of major US companies, issued a statement arguing that companies should no longer represent only the interests of shareholders [27]. Instead, the group said, they must also invest in their employees, protect the environment, and deal fairly and ethically with suppliers.

One proposal for reforming corporate governance involves mandating that workers have representation on company boards of directors, sometimes called “co-determination” [28]. Co-determination means that workers are involved in decision-making conversations along with shareholders and executives. This model is most prominent in Germany, where half the members of corporate boards are representatives of employees.

The rationale for co-determination stems from a broader attempt to shift from shareholder-centric governance to stakeholder governance [29]. In shareholder governance, shareholders are primarily responsible for electing board members, who are incentivized to do what they can to please them, often resulting in short-term measures such as stock buybacks. On the other hand, with stakeholder governance, a broader set of groups is thought to merit a role in corporate decision-making, specifically employees.

This benefits both employees and firm productivity. For employees, rebalancing power within corporations creates greater visibility and consideration for the effect of business decisions on workers. For

corporations, introducing worker representatives brings first-hand operational knowledge to decision-making, allowing for improved coordination and better labor relations [30].

Politicians and policy units are beginning to propose worker representation on boards in other countries. US Senator and presidential candidate Elizabeth Warren proposed requiring companies with more than USD1 billion in revenue to let workers elect 40% of board members [31]. French President Emmanuel Macron, after months of confrontations with labor unions, considered strengthening worker participation on boards. Progressive US think-tank the Roosevelt Institute released a working paper advocating co-determination as a response to inequality.

Still, for economies in Asia and the Pacific, a few points should be considered. First, concerns exist about the efficacy of co-determination. In economies where growth is driven by SMEs, largely in the service sector, co-determination rules may not apply compared with export-oriented manufacturers. Also, transplanting single institutional features rarely works because corporate governance is multidimensional and part of a larger package of labor and financial infrastructure.

While there is evidence that, when properly implemented, employee representation on corporate boards can improve working conditions and productive investment in firm productivity, it is unlikely to be a silver bullet for inequality and corporate management issues. It is important to keep expectations in check when exploring the reforms required for putting co-determination mechanisms in place.

4-2

JOB GUARANTEE PROGRAMS

Unemployment is one of the major issues any government is expected to manage. Income inequality, the pain of recession, and persistent poverty are perennial problems of the modern economy.

One policy proposal that aims to directly “solve” unemployment is a job guarantee program (JGP), which would designate the government as an employer of last resort, ensuring that anyone can get a subsidized, private- or public-sector job [32]. Proponents of a JGP argue that it would provide millions of public-sector jobs as well as spur the creation of private-sector ones, thereby boosting growth. It would also help counteract the problem of recessions, with workers squeezed out of the private sector during downturns, since they would be able to find a guaranteed job. Advocates claim that the benefits of this policy would flow directly to society’s poorest, most marginalized members.

A full-fledged JGP has never been implemented, although a government providing jobs for unemployed citizens has some precedent. With the wide adoption of Keynesian economics, countries have had the government provide jobs to unemployed citizens as a form of stimulus. The Indian government operates a sprawling program promising public jobs for the rural poor and there are numerous “workfare” and transitional job initiatives operating in other middle- and high-income countries [33].

Still, there are many design questions that should be addressed before a full JGP could be implemented in the real world. First is

the question of how much to pay and what sort of entitlements, e.g., health insurance, would be attached to guaranteed jobs [34]. A JGP could be designed to provide “last resort employment” at low wages with few benefits. This would cost less, but also might not help those laid off from highly paid manufacturing jobs and others displaced by new technologies. Providing higher-wage jobs and ample insurance would be more costly, but might cause those in the private sector to flood in to fill those positions.

Second, there are the complexities involved in administration and implementation. A JGP would likely necessitate a major increase in public-sector employment at the national and/or local level. If private-sector and civil organizations are involved, then there will be coordination problems among organizations to be addressed [35].


Third, what kind of work will be created under such a program? Critics of the JGP concept argue that it would mostly create quasi-employment, essentially pretend work that does not really need doing. Policy advocates argue that there are existing social gaps that are not being met, especially in the areas of the environment, social care, and the arts [36].

A JGP that is rolled out successfully could match unmet local needs of the under- and unemployed. However, those sorts of programs should be compared with alternatives such as basic income, wage subsidies, increased training and job-matching programs, etc.



5-1

BLOCKCHAIN IN THE BALLOTBOX



Blockchain applications in the public sector reached a milestone in May 2018 when West Virginia became the first US state to allow Internet voting by blockchain in primary elections [37]. Currently, the state is only using blockchain-based voting for military absentee voters. While participation would be small, this allowed administrators to pilot test the technology before scaling up.

Blockchain technology for elections can offer several benefits compared with traditional voting systems. First, mobile voting using a safe interface could help eliminate voter fraud [38]. Second, it could make it more convenient for citizens to vote, irrespective of distance and time from polling stations, therefore boosting civic participation. Third, it could allow election commissions to maintain transparency in the electoral process, minimize cost, and streamline the process of vote counting.

Although different configurations are possible, in West Virginia a voter's identity is first verified using biometric tools like a thumbprint scan on a mobile device. Then, each vote forms part of a chain of votes, where it is mathematically confirmed by a third-party participant. With blockchains, all the data on the election process are recorded on a publicly verifiable ledger that maintains the anonymity of voters.

More secure voting systems are important in maintaining democratic legitimacy, especially when elections have been tainted with allegations of fraud and outside influence. Still, the West Virginia case is not without its critics and there are experts who are skeptical of the current feasibility of blockchain voting.

Election security experts have commented that, as designed, the system does little to fix the problems associated with online voting [39]. In 2015, a team of computer scientists, cryptographers, and political scientists looked at the prospect of online voting and concluded that it was not yet feasible. First, they noted that hacking blockchain-based systems is much different than tampering with mailed paper ballots because with ballots, only small numbers of votes can be affected. With blockchain bases and other online voting mechanisms, there is a risk of system-wide tampering. The ability to track back to an individual's vote also means that the system does not preserve the right to a secret ballot, considered fundamental in modern democracy.

In another case, a French security researcher managed to identify a critical vulnerability in the blockchain-based voting system that Russian officials planned to use in the 2019 Moscow City Duma election [40]. While blockchain-based voting has promise, caution is needed before such systems are implemented and scaled up.

5-2

SCI-FI FOR INNOVATION AND POLICY

Many of our modern technological mainstays, for example, 3D printing, videocalling, and credit cards were first imagined in science fiction [41]. This is not a coincidence. For the past century, there has been a messy, looping process where sci-fi authors imagined the future, and then the generation of readers who grew up on those visions made them into reality.

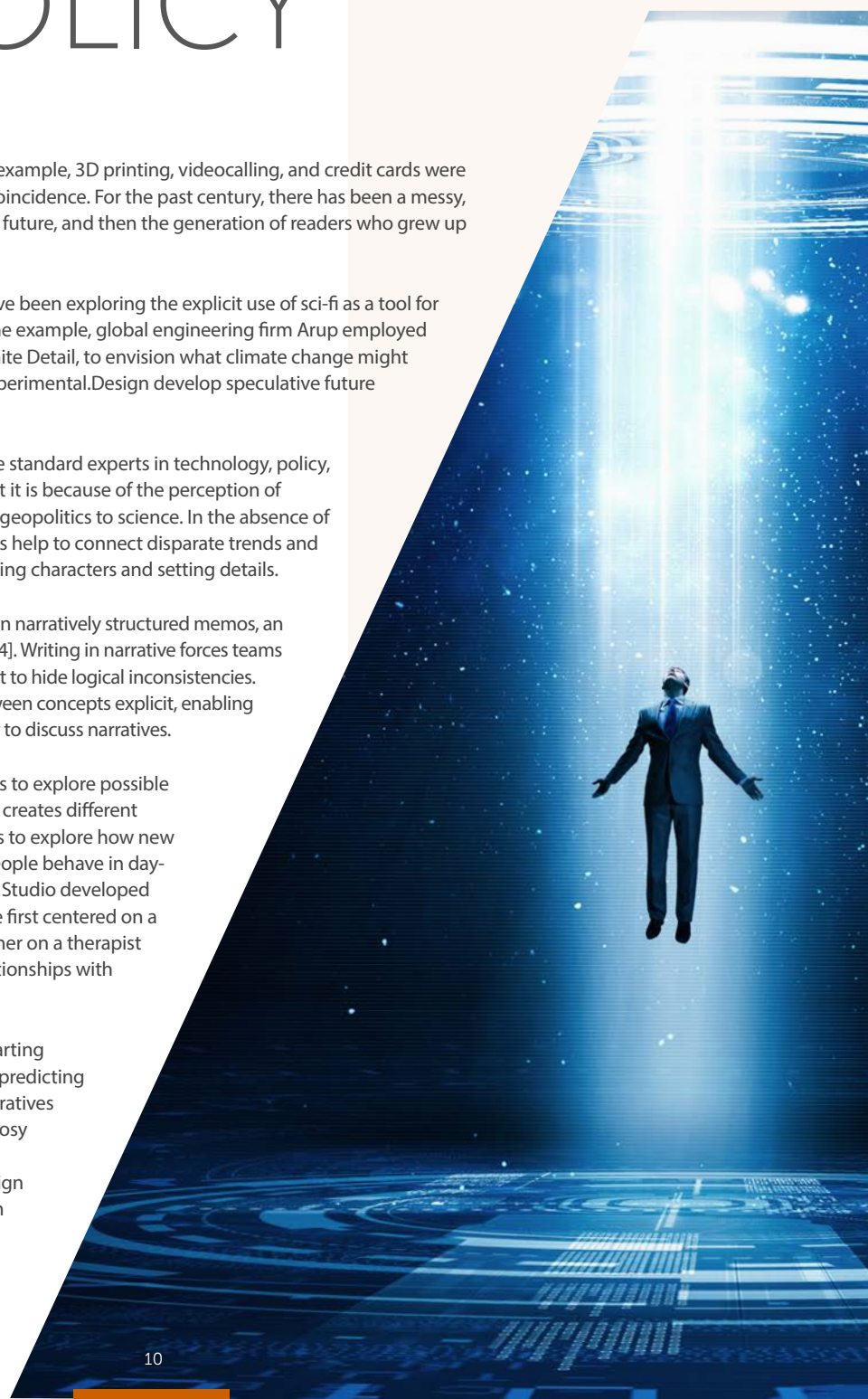
Recently, large companies and public agencies have been exploring the explicit use of sci-fi as a tool for improving innovation and risk management. In one example, global engineering firm Arup employed Tim Maugham, author of the dystopian novel *Infinite Detail*, to envision what climate change might mean for its business in 30 years [42]. Firms like Experimental.Design develop speculative future worlds for clients like Nike, Ford, and Boeing [43].

Why use sci-fi authors and narratives instead of the standard experts in technology, policy, and economics? Some commentators suggest that it is because of the perception of growing uncertainty across various domains from geopolitics to science. In the absence of readily available conceptual frameworks, narratives help to connect disparate trends and communicate them at the human level by employing characters and setting details.

While not sci-fi, meetings at Amazon are centered on narratively structured memos, an idea championed by founder and CEO Jeff Bezos [44]. Writing in narrative forces teams to think through ideas in detail and makes it difficult to hide logical inconsistencies. Clear narratives also make logical connections between concepts explicit, enabling more constructive dialogues as people find it easier to discuss narratives.

In the design field, the use of speculative narratives to explore possible futures is called “design fiction” [45]. Design fiction creates different future scenarios, which act as conversation starters to explore how new products, services, or policies might shape how people behave in day-to-day life. In 2015, Age UK and the Design Fiction Studio developed scenarios surrounding emerging technologies; the first centered on a self-administered euthanasia wearable and the other on a therapist who worked with the elderly to improve their relationships with their smart homes [46].

While sci-fi can be useful for sparking ideas and starting conversations, it is unlikely to be a reliable tool for predicting the future. Organizations can end up selecting narratives that only confirm their preconceptions and paint rosy pictures for their operations. It is important that organizations attempting to employ sci-fi and design fiction to improve are aware of what narratives can and cannot do.



WHAT DO THESE EMERGING TRENDS MEAN FOR THE ASIA-PACIFIC?

Events and trends often reflect larger underlying forces and structures. They also often connect in ways that may be difficult to grasp. This applies to the trends outlined in this report as well; many are linked to broader driving forces that are in the process of impacting Asia and the Pacific, like the future of work and the expected increasing integration of new digital technologies into our world.

One key question for countries in the Asia-Pacific is the future of work, a complex range of issues including new technologies, regulations, and trends like aging populations and the resulting labor shortage. Many of the emerging trends highlighted in this report anticipate the future of work.

For instance, the Visas between Individuals Program (VIP) would deal with between-country income inequalities as well as labor shortages in many areas. With rapidly aging populations in many APO members, workers from abroad under the VIP could address this issue along with concerns about social cohesion. A Job Guarantee Program (JGP) and co-determination would also tackle economic inequality, albeit within a single country, and protect the interests of workers displaced by the integration of new technology.

Emerging trends in disparate areas can be linked in surprising ways. For example, concerns about the increasing centralization of the Internet by large tech companies produced two of the distinct narratives in this report. The first is a possible future with a decentralized web, a peer-to-peer Internet, which would be free of those tendencies. The second involves Generation Alpha, those born from 2010 onward, who are being raised on an Internet accessed through centralized platforms and their associated algorithms. It is assumed that a tech-literate younger population will be better able to apply technologies to benefit agriculture. However, the details, for example, whether they are open source or proprietary, will have major implications for the future of digital agriculture and agripreneurship.

Even outside of the market economy, technology plays a significant role. Automation, often discussed in the context of industry, is already affecting academia and research. AI and

robotics are automating key stages of the scientific process in material science and biomedicine. This report also shows that new technologies are being tested in politics, specifically voting. Blockchain voting may create a more secure, cost-effective, transparent process, although expert opinion on this is mixed. While most of these applications are occurring outside Asia and the Pacific, APO members should observe closely as they continue to be tested.

The ambiguities and complexities surrounding these emerging trends make it obvious why good strategic choices are so difficult for organizations. The future often appears as if it could unfold in any number of ways, and even in ways that we are not able to anticipate. Given that individuals and groups are so attached to the status quo, sometimes it takes outsiders to offer divergent thinking. Strategic foresight practitioners and sci-fi authors alike can provide useful new perspectives on our future.

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