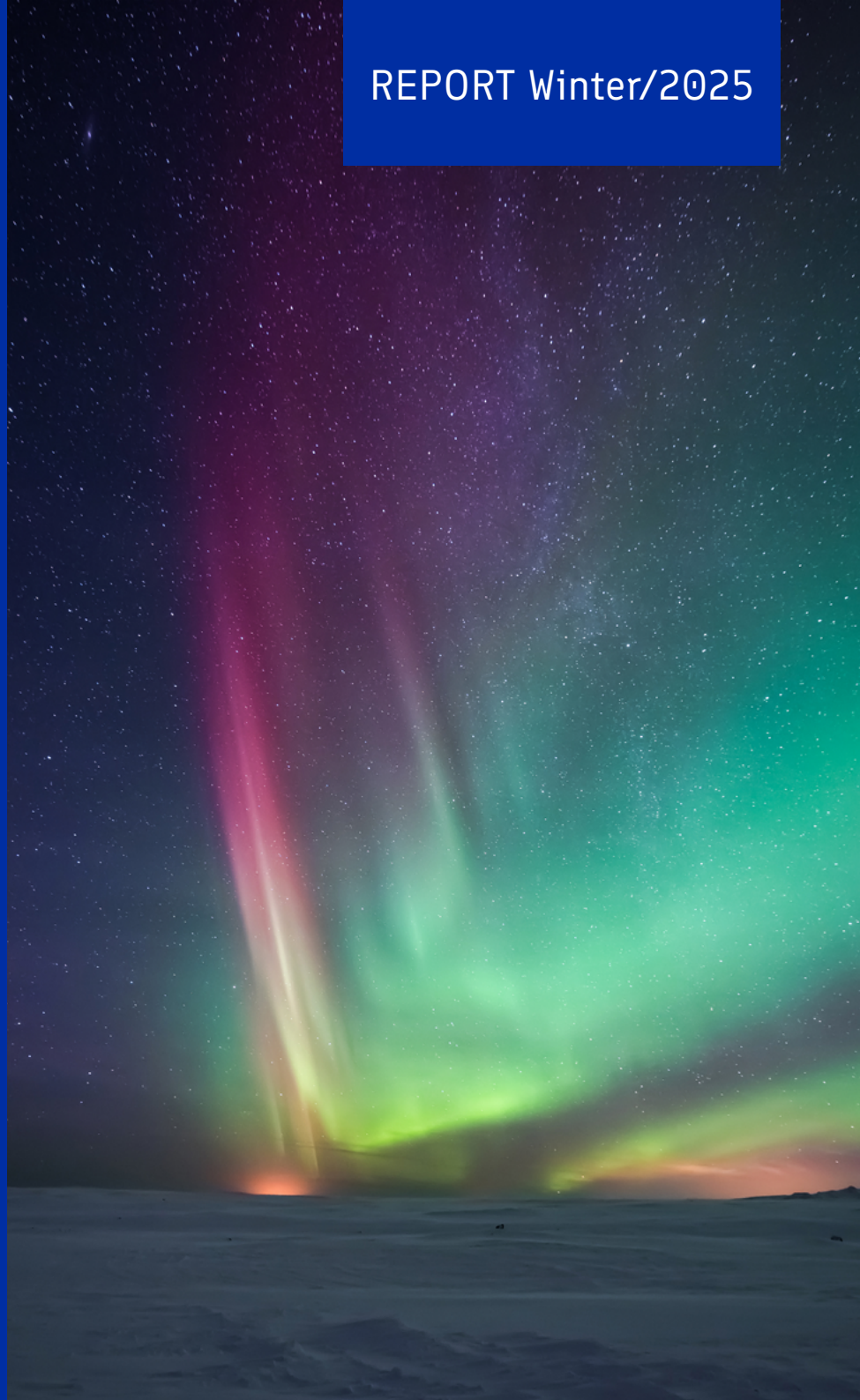
BUSINESS
FINLAND

REPORT Winter/2025

QUARTERLY FORESIGHT



ABOUT THE SIGNALS

WHY SIGNALS OF CHANGE PUBLICATION?

Signals
Signals are early indicators of potentially significant future developments. Signals are often subtle and may initially appear as random or insignificant, but they can provide valuable insights into emerging trends and disruptions. By identifying and analyzing weak signals, organizations can anticipate changes and adapt their strategies accordingly.

Why does Business Finland collect signals?
For Business Finland's customers, weak signals can play a vital role in planning ahead. They help companies to:

Identify Emerging Opportunities and Risks:
Weak signals can highlight new market opportunities or potential threats that may not yet be apparent through traditional trend analysis. This allows companies to proactively address these changes and stay ahead of the competition.

Enhance Strategic Foresight:
Incorporating weak signals into strategic planning helps ensure that strategies are agile and future-proof. By regularly scanning for weak signals, companies can validate and adjust their strategic foresight plans to remain relevant and effective.

Improve Decision-Making:
Weak signals provide additional context and insights that can inform better decision-making. By understanding the potential implications of these signals, companies can make more informed choices about their future direction.

Foster Innovation:
Weak signals often point to nascent trends or technologies that could drive innovation. By recognizing these early indicators, companies can invest in research and development to capitalize on new opportunities and drive growth.

Business Finland, together with Team Finland, detects weak signals across the global network of experts. Weak signals are an essential component of horizon scanning, enabling Business Finland's customers to anticipate and navigate future changes, seize new opportunities, and mitigate risks effectively.

In this quarterly publication, we want to share recent picks and tell about recent projects with customers.

Quarterly Foresight is a Business Finland Publication. Business Finland's foresight team has curated the insights to provide information on future opportunities and challenges.

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NEWS

This Signals of Change edition elaborates on AI agents and solutions' roles in our lives and living environment. Institute for the Future (IFTF), a California-based foresight organization, revealed in the Ten-year Forecast 2024 meeting a "Bestiary of New AI Entities and Relationships", which can guide the thinking of how the future landscape of AI bots might affect commercial, social, and personal transactions and interactions in coming years.

Read More: Spotlight

Emerging signals are constantly challenging our view of the future and can create a fragmented view of future developments. Scenario planning is one way to analyze and cluster the changes, and anticipate risks and opportunities. Rather than being predictions of the future, scenarios are aimed at developing insight. In this edition, we introduce the scenarios of Business Finland's operating environment. In the scenarios, we travel ten years in a global operating environment, where dimensions of geoeconomic security, and rapidly developing technologies create new realities for the economy and society.

Scenarios will be published at the beginning of 2025. They support the strategy process for BF. The developments described in the scenarios will be monitored on regular basis and related signals will be published in the following editions.

Read More: Study

SIGNALS IN THIS EDITION:

- AI Agents
- AI Training Centers
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- Genetics Is Destiny
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SIGNALS OF CHANGE

AI Agents

PREMISE

"An artificial intelligence (AI) agent is a software program that can interact with its environment, collect data, and use the data to perform self-determined tasks to meet predetermined goals." Such agents are now finding use in professional but also in personal applications.

DESCRIPTION

AI agents will require a change in marketing, communication, human resources, and many other fields that have not seen substantial use of this new technology. Perhaps surprisingly—and relevant for consumer-products companies and retailers—consumers are using shopping agents for the 2024 holiday season. Companies will have to take into consideration how to address AI agents properly similar to the way search engine optimization has become an important part of targeting consumers.

DATA POINTS

- "AI can now create a replica of your personality" (MIT Technology Review, 20 November 2024)
  Read More
- "Perplexity's AI-powered shopping assistant takes aim..." (Modern Retail, 20 November 2024)
  Read More
- "Microsoft pitches AI 'agents' that can perform tasks on their own" (Associated Press, 19 November 2024)
  Read More
- "AI agents are coming to work" (Computer World, 21 November 2024)
  Read More
- "More consumers are planning to use generative AI for holiday shopping" (National Public Radio (NPR) Marketplace, 13 November 2024)
  Read More

SIGNALS OF CHANGE

AI Training Centers

PREMISE

Artificial Intelligence (AI) have become powerful tools for an increasingly wide range of applications. Training of AI now is becoming a business opportunity all by itself.

DESCRIPTION

Training and teaching AI is becoming an entire support industry. Related services range from testing centers to AI Agent Spaces to outsourcing human training work to Africa (with problematic connotations). Right now, the emergence of AI is creating investment, revenue, and even job opportunities. But there is the potential that investment will move to new targets once the market has solidified, revenue could be shrinking when AI becomes a commodity, and jobs will get replaced by automated applications.

DATA POINTS

- "Salesforce launches Agentforce Testing Center" (Venture Beat, 21 November 2024)
  Read More
- "Google Cloud launches AI Agent Space" (Venture Beat, 21 November 2024)
  Read More
- "Teaching AI What it Should and Shouldn't Do" (Defense Advanced Research Projects Agency (DARPA), 27 September 2024)
  Read More
- "Training AI takes heavy toll on Kenyans" (60 Minutes, 25 November 2024)
  Read More

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Soft Robotics

PREMISE

Soft robotics are designed and constructed with physically flexible bodies, movement features, and electronics. The field is advancing rapidly. Although there is still a lot of work required to commercialize the technology, application areas are potentially limitless.

DESCRIPTION

Soft robotics can find use in construction, rescue missions, consumer robotics, health care, medical applications and many more fields. Obviously, the use of such technologies is beneficial in most applications where human contact is occurring, but more generally, soft robotics can avoid damage to fragile objects and systems.

DATA POINTS

- "A new milestone in the study of octopus arms" (University of Illinois Urbana-Champaign, 31 October 2024)
  Read More
- "The snake that saves lives" (ETH Zurich, 4 November 2024)
  Read More
- "Soft robotic shorts improve outdoor walking" (Nature, 1 October 2024)
  Read More
- "Sensitive ceramics for soft robotics" (Innovations Report, 15 November 2024)
  Read More

SIGNALS OF CHANGE

Addressing Growing Mental Concerns

PREMISE

Loneliness is increasingly accepted as a major issue in developed countries. Also, many individuals are attempting to escape the pressures of high-stress regions.

DESCRIPTION

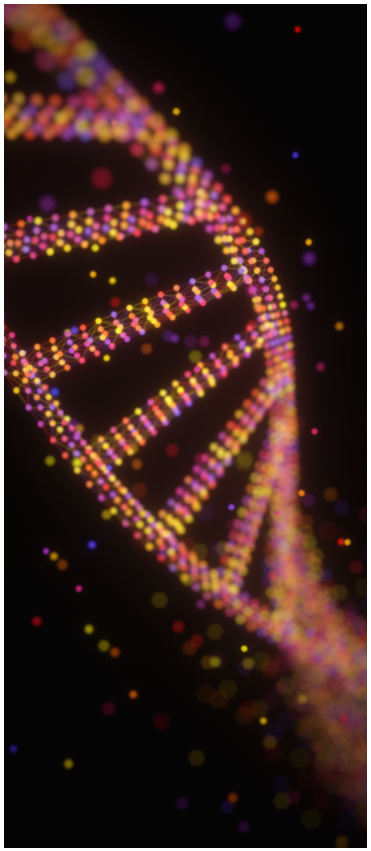
Seoul is spending hundreds of millions of dollars to address the issue loneliness. In the United States, researchers are looking at the causes of loneliness and potential solutions. Loneliness is not the only issue in developed countries, stress is also a growing concern. For instance, anecdotal evidence points to US individuals moving abroad to find a more balanced lifestyle.

DATA POINTS

- "Seoul city to spend $326m on fighting 'loneliness,'" (Korea Herald, 21 October 2024)
  Read More
- "What is Causing Our Epidemic of Loneliness...?" (Harvard Graduate School of Education, 25 October 2024)
  Read More
- "Why more American women are moving abroad for a better life" (USA Today, 6 November 2024)
  Read More

SIGNALS OF CHANGE

Genetics Is Destiny



PREMISE

Advances in genetics make it increasingly conceivable to discriminate individuals and groups according to their genetic make up. Insurance discrimination is only one possible application.

DESCRIPTION

Genetic analysis and manipulation can have ethical, socio-economic, privacy, and safety implications. A recent startup has started to screen embryos for their intelligent quotient. The company itself, Heliospect Genomics, claims to be "a biotech startup at the forefront of genomic prediction."

DATA POINTS

- "Genetic Discrimination Is Coming for Us All" (Atlantic, 12 November 2024)
  Read More
- "US startup charging couples to 'screen embryos for IQ" (Guardian, 18 October 2024)
  Read More
- "Why we need safeguards against genetic discrimination" (MIT Technology Review, 19 July 2024)
  Read More

SIGNALS OF CHANGE

Climate as an Economic Factor

PREMISE

New studies show that climate change has a substantial economic impact—much larger than previous investigations indicated. Commercial changes already occur—realtors now are starting to indicate climate risk as part of their housing listings with impact on demand.

DESCRIPTION

Globally, Adrien Bilal, assistant professor of economics at Stanford University, and Diego Känzig, an assistant professor of macroeconomics at Northwestern University, "arrived at a social cost of $1,056 per ton [of CO2], whereas another recent estimate (again, set to local temperature variations) put global cost at just $185 per ton." The economics of climate change are potentially more devastating than previously presumed. This change will affect business models and cost structures for many industries.

DATA POINTS

- "New study of economic toll yields projections 'six times larger than previous estimates"
  (Harvard Gazette, 26 August 2024)
  Read More

- "Measuring economic losses caused by climate change"
  (Centre for Economic Policy Research (CEPR),
  2 October 2024)
  Read More

- "Zillow Real-Estate Listings Are Adding Climate-Risk Data"
  (CNET, 30 September 2024)
  Read More

- "How bad will flooding get by 2100? These AI images show US destinations underwater"
  (Guardian, 3 October 2024)
  Read More

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Data Centers Cause Concerns

PREMISE

Data centers for AI, metaverse, and many other applications are proliferating rapidly. Problematically, the associated energy demand growth is an issue for communities these centers are located in and for the energy industry to balance grid requirements.

DESCRIPTION

According to Goldman Sachs, "AI is poised to drive 160% increase in data center power demand." And that growth rate only relates to AI-driven demand increase. Providers of data-center services are now looking at nuclear power to acquire a sufficient amount of electricity. Communities are concerned about the impact of such centers, and energy considerations could put pressure on the energy grid.

DATA POINTS

- "Amazon is joining Google and Microsoft in going big on nuclear power" (Quartz, 16 October 2024)
  Read More
- "Data centers are suddenly everywhere — but some say 'no thanks'" (Axios, 13 October 2024)
  Read More
- "Constellation Energy seeks new US grid rules on co-located data centers" (Reuters, 26 November 2024)
  Read More
- "Under pressure from the SCC, Dominion reveals the true cost of data centers"
  (Virginia Mercury, 26 November 2024)
  Read More

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Your Own Technology-Enabled Physical Bubble

PREMISE

New technologies provide users with the opportunity to create "bubbles" within physical settings where they can experience their own soundscapes and tactile and haptic experiences.

DESCRIPTION

In contrast to virtual environments, which only create experience in metaverse-related landscapes, new sound, tactile, and haptic technologies can create personalized spaces in real-world settings. Sound bubbles and directional sound can separate users from the actual physical space and create own soundscapes. And new wearable patches and touchscreens enable interaction with virtual experiences in the real world via tactile and haptic sensations.

DATA POINTS

- "AI headphones create a 'sound bubble'" (University of Washington, 14 November 2024)
  Read More
- "Crazy new device plays directional sound...only the target can hear" (BGR, 18 October 2024)
  Read More
- "New haptic patch transmits complexity of touch to the skin" (Northwestern University, 6 November 2024)
  Read More
- "Touchscreens Are Out, and Tactile Controls Are Back" (IEEE Spectrum, 3 November 2024)
  Read More
- "...wearable e-skin for three-dimensional tactile interfaces" (Science, 20 September 2024)
  Read More

SIGNALS OF CHANGE

Trade Lanes and Transportation in Flux

PREMISE

New initiatives to recreate international trading routes could change the flow of goods and commodities across the globe, particularly in Southeast Asia. Also, new approaches to physical transportation on land could change approaches to logistics.

DESCRIPTION

Some regions in Southeast Asia are becoming increasingly risky for international shipping companies, opening an opportunity for some countries to consider the creation of alternative trade lanes. Similarly, automation and conveyor-belt approaches to transportation could reshape the logistics industry.

DATA POINTS

- "Thailand 'desperate' for land bridge project to boost growth but could face roadblocks ahead" (South China Morning Post, 6 September 2024)
  Read More
- "South China Sea Holds Top Geopolitical Risk for Business Revenue" (Dow Jones, 7 October 2024)
  Read More
- "Japan plans 'conveyor belt road' linking Tokyo and Osaka amid delivery driver shortage" (Guardian, 5 November 2024)
  Read More
- "Riyadh Unveils KSA's First Fully Automated Metro Network" (RATP Dev, 27 November 2024)
  Read More

SIGNALS OF CHANGE

Consumer Tech = Military Tech ...and Vice Versa

PREMISE

The flow from military technology to civil applications has been occurring for quite some time, but this transfer is accelerating. With private companies having substantial research resources at their disposal, civil technologies now are entering military use at increasing speed too.

DESCRIPTION

It will become increasingly difficult to separate civil, even consumer, technologies and technologies for military equipment. Transfer between the two fields is accelerating. Potentially, the concept of dual-use technologies will lose its meaning as advanced technologies will address both fields' needs at the same time.

DATA POINTS

- "Exclusive: Chinese researchers develop AI model for military use on back of Meta's Llama" (Reuters, 1 November 2024)
  Read More
- "Meta Opens Its AI Models for the (U.S.) Military" (IEEE Spectrum, 15 November 2024)
  Read More
- "NASA's New AI Tool Aims to Bring Satellite Data to Everyone" (CNET, 18 November 2024)
  Read More

SIGNALS OF CHANGE

Unusual Urban Planning Tools

PREMISE

Urban planning is changing as new tools emerge—artificial intelligence (AI) is an obvious enabler, but brain-activity measurement and transferring sound recordings into images are novel approaches, which still are speculative.

DESCRIPTION

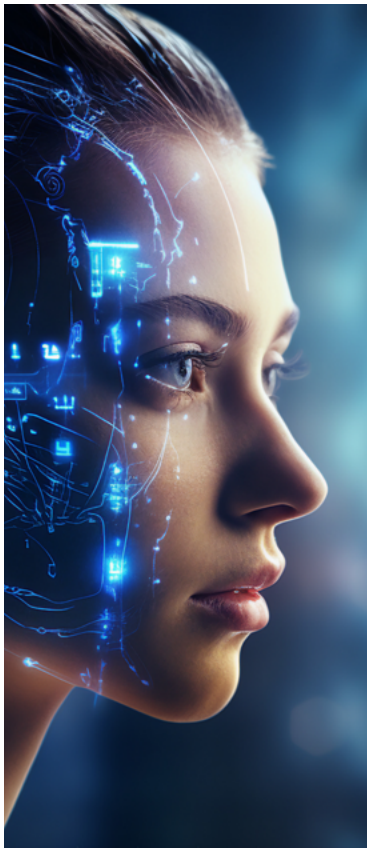
AI finds use to turn soundscapes into images and support the creation of new architectural and planning applications. Increasingly expansive datasets also enable planners to drive sustainable designs forward.

DATA POINTS

- "Smarter city planning: Researchers use brain activity to predict visits to urban areas" (Phys.Org, 21 November 2024)
  Read More
- "Researchers Use AI To Turn Sound Recordings Into Accurate Street Images" (University of Texas at Austin, 27 November 2024)
  Read More
- "AI and the future of cities" (Fortune, 2 December 2024)
  Read More
- "New urban morphology dataset with tree and building heights for sustainable urban planning" (Argonne National Laboratory, 22 October 2024)
  Read More

SIGNALS OF CHANGE

Humanoid Apps Are Becoming Household Items



PREMISE

Humanoid applications are slowly diffusing across markets—including the consumer market.

DESCRIPTION

Humanoid applications—here, including exoskeletons—are increasingly seen in industrial applications. But now, early adopters are acquiring humanoids for consumer use. New technologies—cybernetic avatars and robotic torsos—will expand market opportunities in coming years.

DATA POINTS

- "Hyundai Motor and Kia Robotics LAB Confirms 'X-ble Shoulder' Wearable Robot" (Hyundai, 28 November 2024)
  Read More
- "Celebrities roll out the robot butlers" (Dazed Digital, 19 November 2024)
  Read More
- "Cybernetic avatars: Teleoperation technologies from in-body monitoring to social interaction" (Science, 20 November 2024)
  Read More
- "Watch this terrifying robotic torso spring into life" (Life Science, 1 November 2024)
  Read More

SIGNALS OF CHANGE

Human Relationships with AI Cause Personal Harm

PREMISE

Artificial intelligence (AI) is enabling personal relationships with users that can be problematic. AI girlfriends cause emotional distress, AI characters drive anorexic behavior, and AI holy representations could change human relationships with religion.

DESCRIPTION

People are starting to create personal relationships with AI characters. These characters can provide love, advise, and comfort—problematically, they also can create heartache, support harmful behavior, or potentially change our spiritual life.

DATA POINTS

- "Former Google CEO Alarmed by Teen Boys Falling in Love With AI Girlfriends" (Futurism, 27 November 2024)
  Read More
- "Character.AI Is Hosting Pro-Anorexia Chatbots That Encourage Young People to Engage in Disordered Eating" (Futurism, 25 November 2024)
  Read More
- "Deus in machina: Swiss church installs AI-powered Jesus" (Guardian, 21 November 2024)
  Read More

STUDY

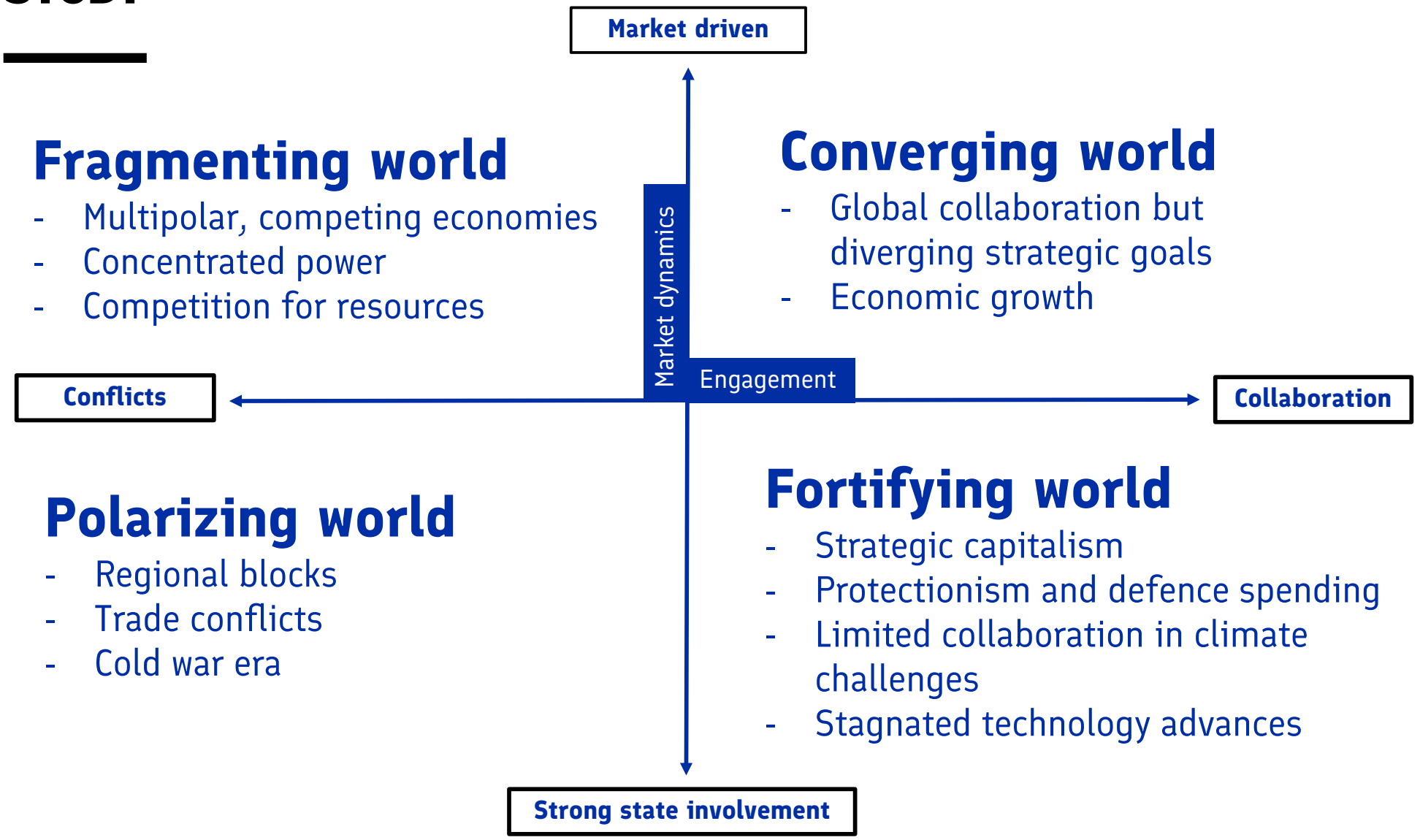
Introduction to Scenarios

The dimensions of geoeconomic security, rapidly developing technologies, and shifting social and societal values are creating new realities for both the economy and society. In our analysis, we present four potential scenarios for the geoeconomic landscape over the next decade. Rather than predicting the future, these scenarios serve as tools for anticipating future developments.

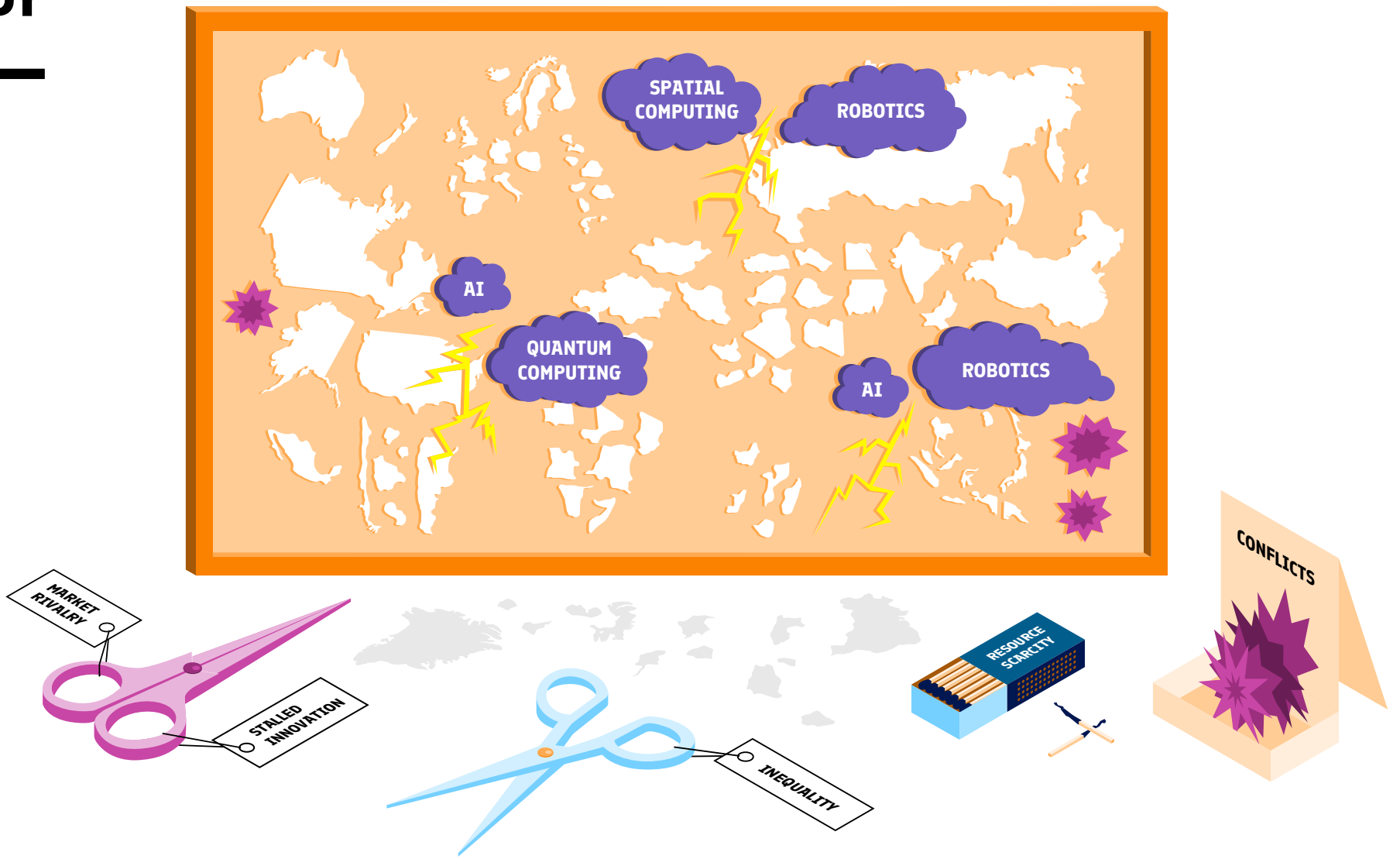
The scenarios are driven by two key dimensions: conflict versus collaboration orientation, and market-driven versus state-driven economies. The strength of these drivers influences developments at varying speeds.

To ensure the scenarios remain useful, it is essential to continuously monitor these drivers. Therefore, BF regularly updates them in the “Signals of Change” quarterly publication.

STUDY


Market driven
Market dynamics
Fragmenting world
- Multipolar, competing economies
- Concentrated power
- Competition for resources
Converging world
- Global collaboration but diverging strategic goals
- Economic growth
Conflicts
Engagement
Collaboration
Polarizing world
- Regional blocks
- Trade conflicts
- Cold war era
Fortifying world
- Strategic capitalism
- Protectionism and defence spending
- Limited collaboration in climate challenges
- Stagnated technology advances
Strong state involvement

STUDY



Fragmenting world

"Fragmenting world" original concept Annika Varjonen, illustration Heidi Sohrab

STUDY

Fragmenting world

Stepping into the world of 2035 marks both incredible technological advancements and intense geopolitical shifts. As you look around, you notice a world that feels increasingly connected by new technologies but also politically fragmented and unsafe.

The geopolitical landscape has transformed into a complex web of power, with middle-sized and large countries emerging as key players. Nations no longer act within predictable alliances, and the world seems to be on the edge of a series of conflicts. The delicate balance between rising powers has created a heightened sense of uncertainty, as geopolitical tensions grow and nations jockey for influence and resources.

The geoeconomic arena is a tale of two realities. The US, India, and ASEAN countries have experienced strong growth. Globally, prosperity is spread unevenly. While some thrive, others are left behind, struggling with uneven productivity growth and its consequences. The impact of this shift is not only felt in the economy but also in personal lives—mental well-being and job security are increasingly influenced by the pace of technological change. The social landscape is deeply polarized. On one hand, the job market has fractured, with massive unemployment affecting many, while others race to secure the skills and talent needed in the rapidly evolving economy. The competition for top-tier talent has intensified, as nations and corporations alike scramble to secure the brightest minds. The result is a society where opportunities are abundant for some, while many others are left to navigate the uncertainty of a changing world.

Technology has progressed at an astonishing pace, with breakthroughs in AI, quantum computing, spatial computing, and robotics altering the fabric of everyday life. This rapid evolution doesn't come without risks. Much of it remains unregulated, creating a wild frontier where innovation often outpaces the ability to understand its implications. Automation and advanced technologies shape industries, transform workspaces, and even impact the way people relate to one another, but the ethical questions surrounding them are only just beginning to surface.

The planet itself is in the throes of a crisis. Competition for dwindling resources like water, food, and energy is fierce. Nations are embroiled in disputes over water and food supplies. As environmental degradation continues, migration and displacement are on the rise. International agreements to combat these crises have failed, leading to a world that feels unsafe, with localized conflicts and environmental pressures building up in every corner.

STUDY

Converging world

"Converging world" original concept Annika Varjonen, illustration Heidi Sohrab

STUDY

Converging world

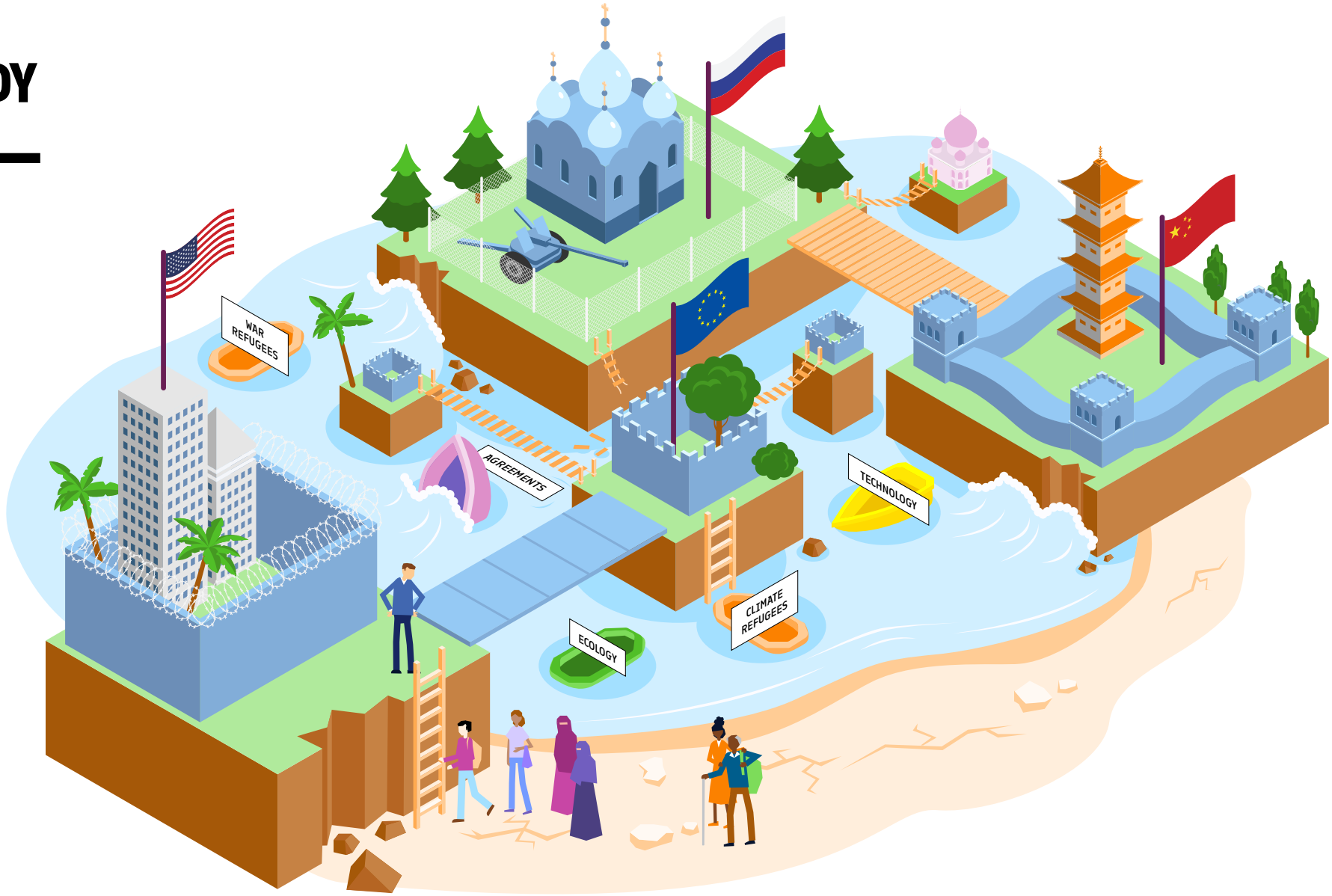
This is a world where the forces shaping it are both collaborative and competitive. In 2035, the global landscape is one of complex connections, where cooperation exists alongside divergence, and new challenges spur innovation and transformation. It's a time of immense opportunity, where people, businesses, and nations are finding ways to work together, even as they navigate their differences.

The global stage in 2035 is defined by an unusual blend of cooperation and diverging interests. In this multitrack world, simultaneous shocks push governments to cooperate more closely than before, even as they adopt market-driven policies. While the US and China communicate and even work together, their economies are slowly decoupling. Despite some tensions, a military conflict is kept at bay. The global economy is growing at an unprecedented rate. Emerging economies, particularly in the Asia-Pacific region, are leading the charge, tapping into new frontiers like space exploration and the metaverse. AI, quantum computing, spatial computing, deep technologies and robotics have sparked a productivity revolution, transforming industries and labor markets across the globe. Surprising technological intersections and digitalization are reshaping the way businesses operate, driving rapid economic expansion, especially in previously underserved markets. While the economic boom is felt worldwide, emerging economies are seeing the fastest growth, propelling them into the spotlight of global economic power.

World has made significant strides toward environmental restoration and sustainability. Circular economy concepts have matured and expanded, helping to restore natural ecosystems and mitigate climate change. Global cooperation has led to ambitious decarbonization goals, with countries committing to carbon pricing and other climate action measures. These efforts have started to yield results, and the focus is now on building a more sustainable world for future generations. The collaboration that once seemed elusive is now driving meaningful change, with nations, businesses, and citizens working together to heal the planet.

As technology becomes more integrated into every aspect of life, from manufacturing to medicine, businesses are profiting from increased operational efficiency and innovation. Standardization and meaningful regulations have allowed these technologies to scale, making them more accessible and manageable. The result is a world where technology is no longer just a tool, but a central pillar of economic success and global competition. Citizens have also become more engaged and aware of their rights than ever before. Local communities, especially in rapidly growing economies, have gained the power to negotiate fairer contracts with global companies, demanding better working conditions and more equitable opportunities. The severe global talent shortage has led companies to take greater responsibility for the wellbeing, education, and training of their global workforce, especially as remote work becomes the norm. In a world of intense competition, society is increasingly focused on improving livelihoods and creating fairer, more inclusive systems for all.

STUDY



Fortifying world

"Fortifying world" original concept Annika Varjonen, illustration Heidi Sohrab

STUDY

Fortifying world

Welcome to the new era of fortresses, where global dynamics have evolved into a landscape defined by self-reliance, strategic alliances, and heightened national security concerns. It's a world where nations have become more inward-focused, driven by a mix of economic protectionism and defense priorities, and the impact of these shifts touches every aspect of life.

The global political stage has shifted toward strategic capitalism by 2035. Major powers like China, the EU, and the US have increasingly turned inwards, prioritizing self-reliance and ramping up defense spending. This focus on national security and economic independence has led to a decline in interdependence and the rise of fortified blocs—regions where countries with similar priorities form closer ties for protection and growth. While there have been no direct military confrontations, the legacy of the Ukraine war continues to shape European defense strategies, with Russia's rearmament prompting Europe to strengthen its war proof economies. Economic security has become inseparable from national security. Protectionism is the driving force behind state policies, and trade has been securitized, with nations focusing on collaboration only with like-minded countries. Supply chains are being reorganized to ensure that strategic industries remain within national borders or are tightly controlled. While GDPs continue to grow in some regions, global trade has shrunk, and the focus has shifted toward strengthening domestic industries and markets.

The job market has become stagnant, with opportunities limited by both economic restructuring and technological stagnation. Governments, already under pressure, have cut welfare spending, enforcing a "sharing the scarcity" mindset. With fewer resources available, the divide between the wealthy and the rest of society has deepened. Social tensions are high, as liberal values clash with rising conservative ideologies. The promise of progress has dimmed for many, and in its place, there's a struggle to secure basic rights and opportunities. Citizens are increasingly questioning the systems in place, as the gap between the privileged and the underprivileged widens.

Technological progress has not moved at the expected pace. Advances in key areas such as artificial intelligence, quantum computing, and robotics have stagnated, with innovation slowing down compared to earlier predictions. Reduced funding for research and development, driven by shifting priorities toward defense and economic self-sufficiency, has slowed the pace of technological breakthroughs across sectors. Climate change remains a pressing issue, but with economic and security priorities dominating global agendas, climate mitigation efforts have slowed, and adaptation mechanisms have proven inadequate. The green transition, once a priority, is now in a state of stagnation. As climate catastrophes become more frequent social unrest is growing, but the political will to tackle the issue on a global scale is waning.

STUDY

Polarizing world

"Polarizing world" original concept Annika Varjonen, illustration Heidi Sohrab

STUDY

Polarizing world

This is a time of Cold War II with deepening divides and intensifying global tensions. The geopolitical landscape is fractured, and technology, economics, and society are all feeling the effects of increasing polarization. Here's a glimpse into how the world has evolved by 2035:

The rivalry between the US and China has reached new heights, reshaping global power dynamics. As tensions escalate, the world finds itself increasingly polarized. The US has strengthened its alliances with countries in Europe and the Asia-Pacific, forming a bloc focused on shared democratic values and security concerns. Meanwhile, China has deepened ties with the BRICS (excluding India) and Shanghai Cooperation Organization countries, creating a separate bloc focused on economic power and operating within a separate global order system. The conflict in Ukraine remains frozen, and proxy wars continue to destabilize regions, while terrorist attacks have become more frequent. As a result, nations with similar interests have solidified military and security cooperation, further deepening the divide.

In 2035, the global economy is defined by strategic geo-economy, or a "weaponized economy." Trade wars have become common, with one of the most notable being the ongoing conflict between China and the EU. Superpower competition between the US and China has fractured the world into competing economic spheres. Bilateral trade deals have become the new normal. Nationalism and rising protectionism are weakening global economic growth, with many countries focusing on self-interest rather than international collaboration. The era of open, free trade has been replaced by a more fragmented, adversarial global marketplace. Erosion of trust and rising nationalism disconnects people from one another, and a sense of living in different worlds has taken hold. The spread of misinformation and disinformation has further fueled social divisions. As fractures in social cohesion deepen, countries become more inward-focused, with each grappling with its own identity and future.

While technological advancements continue to accelerate, their benefits have been unevenly distributed. The US and China, along with their largest corporations, have gained the most from cutting-edge innovations like artificial intelligence and advanced computing. These nations have the financial resources and talent pools to develop and deploy these technologies at scale, giving them a significant competitive edge. Meanwhile, other economies, particularly in the Global South, have struggled to keep up, leading to a growing technological divide that further exacerbates global inequalities. Two parallel blocs have made it impossible to implement meaningful climate adaptation and disaster response measures. As a result, marginalized communities bear the brunt of climate impacts, facing more frequent natural disasters, food insecurity, and displacement. Social unrest is on the rise as these communities struggle to survive, and migration pressures grow as people are forced to flee regions ravaged by environmental disasters.

SPOTLIGHT

Future AI Bots and Their Relationship to Users

NOT ALL AI BOTS ARE CREATED EQUAL.

One of the first things we learned was to discern the different loyalties of the bots we encountered:

- **BOTS THAT WORK FOR YOU**
- **BOTS THAT WORK WITH YOU** (on behalf of someone else)
- **BOTS THAT WORK ON YOU** (for influence and control)
- **BOTS THAT WORK AROUND YOU** (and with each other)

"AI Beastiary", Institute for the Future 2024

- At October's Ten-Year Forecast 2024 meeting, Institute for the Future (IFTF) foresight experts revealed their introduction to "A Bestiary of New AI Entities and Relationships."
- The overview guides the thinking of how the future landscape of AI bots might affect commercial, social, and personal transactions and interactions in coming years.
- IFTF is a California-based foresight firm that has been anticipating change since 1968.
- The Bestiary lists various AI bots from the year 2034—IFTF's speculative look at the future of AI bots. The foresight experts divide the bots according to their relationship to user.

SPOTLIGHT

Future AI Bots and Their Roles

NOT ALL RELATIONSHIPS ARE CREATED EQUAL.

Human relationships serve many different roles and purposes, and AI bots proved to be no different. They appeared in every stripe and color:

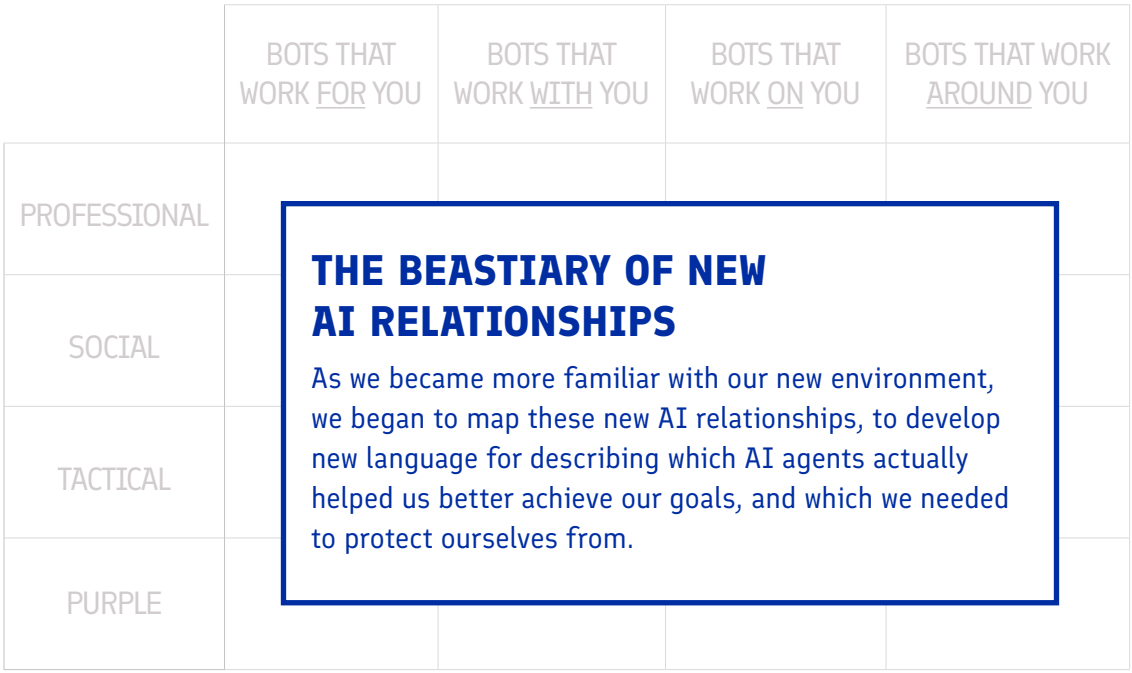
PROFESSIONAL	functional, transactional, formal, explicitly chosen
SOCIAL	friendly, personal, informal, implicitly chosen
TACTICAL	strategic, hierachical, goal-oriented, power-driven
PURPLE	ambiguous, revelatory, transformative, emergent

"AI Beastiary", Institute for the Future 2024

- The list of speculative AI bots from 2034 falls into various categories.
- Professional, social, tactical, and purple types of bots populate the digital spheres in Institute for the Futures' anticipated future world.
- Purple AI bots deserve separate mention. They represent the AI bots that we are expecting the least. These bots "help us to see the invisible threads that connect us together, to make sense of the noise and complexity that overwhelms and confuses us."

SPOTLIGHT

Sorting AI Bots by User Relationship and Roles



"AI Beastiary", Institute for the Future 2024

- IFTF's Bestiary provides a guide of how to categorize potential future AI bots.
- AI bots fall into a grid, according to the way they relate to users and the roles they will play in future digital environments.
- In some cases, users represent consumers and individuals, who will benefit by some types of bots.
- In other cases, users are corporations that will leverage bots with potentially problematic ramifications for consumers and individuals.

SPOTLIGHT

Bots Create an Ecosystem of AI Relationships

	BOTS THAT WORK FOR YOU	BOTS THAT WORK WITH YOU	BOTS THAT WORK ON YOU	BOTS THAT WORK AROUND YOU
PROFESSIONAL	**Buddy**	**Facilitator**	**Influencer**	**Holodeck**
SOCIAL	**Assistant**	**Workmate**	**Bereaubot**	**Smartgrid**
TACTICAL	**Fixer**	**Quarterback**	**Goon**	**Minotaur Maze**
PURPLE	**Counselor**	**Cipher**	**Soothsayer**	**Big Brother**

AN ECOSYSTEM OF AI RELATIONSHIPS

"AI Beastiary", Institute for the Future 2024

- Institute for the Future foresees some 16 types of AI bots.
- For example, Assistants represent professional AI bots that work with individuals. They are "personally loyal AIs that collaborate with you at your behest."
- Meanwhile Goons are tactical AIs that work on individuals. They "redirect, undermine, threaten, or directly intervene in others' behavior to enforce the interests of their boss."

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