

BUSINESS
FINLAND

REPORT Summer/2025

QUARTERLY FORESIGHT

Signals of Change

Mutualistic Technologies

IFTF Systems Mythology



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:

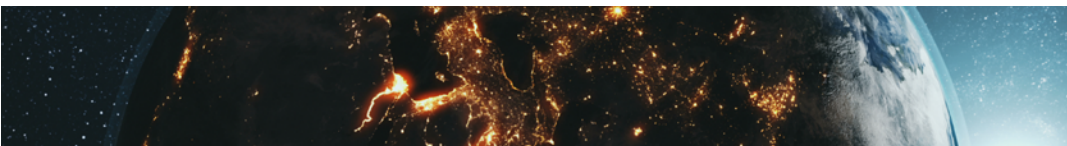
Weak signals often point to nascent trends or technologies that could drive innovation. By recognizing these early indicators, companies can invest in research and development to capitalize on new opportunities and drive growth.

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.

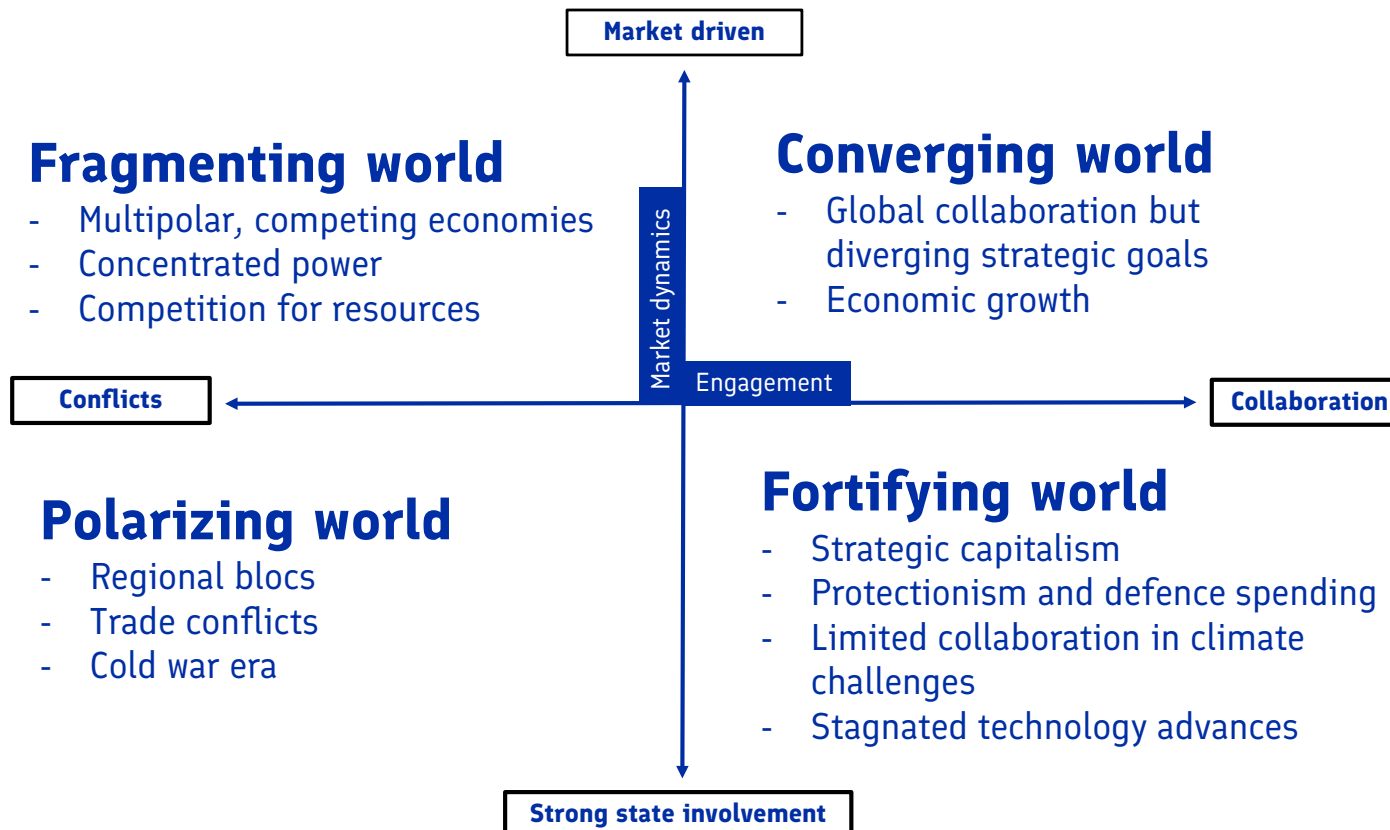
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SIGNALS OF CHANGE

MONITORING GEOPOLITICAL SIGNALS



The ongoing transformation and rupture of the old geopolitical fabric are creating new realities that shape future markets and operational landscapes of businesses. In 2024, Business Finland created four scenarios to better anticipate these developments: Fragmenting world, Converging world, Polarizing world, and Fortifying world.

[Read More](#)

We monitor the change drivers and signals as a continuous process. In this quarterly publication, we demonstrate geopolitical signals that may point to strengthening of Polarizing world.

SIGNALS OF CHANGE

Strengthening: Race for critical minerals has become geopolitical



PREMISE

The competition for vital minerals has become a key aspect of global geopolitics, as countries strive to secure these resources essential for energy shifts, technological progress, and defense sectors.

DESCRIPTION

Critical minerals, such as rare earths, are crucial for manufacturing batteries, renewable energy systems, and advanced military equipment, making their control a strategic priority for nations. Recent statements and actions by the United States, such as suggesting Greenland to join the US and the mineral deals with Ukraine signal the geopolitical significance of these metals.

DATA POINTS

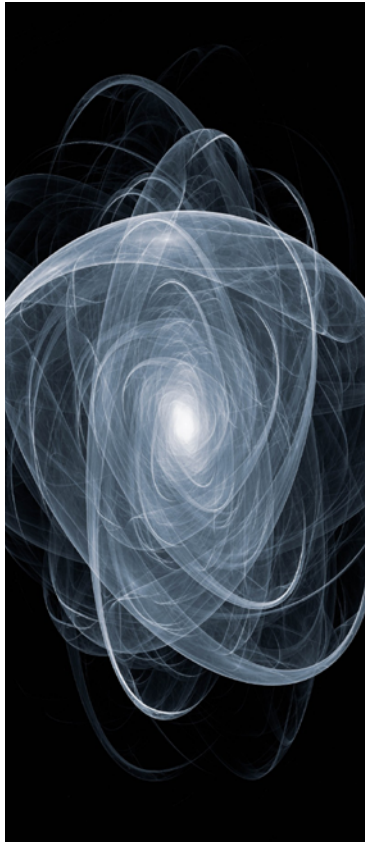
- “Most recycled metal in Europe is sent to competitors outside the continent, driven by soaring global scrap prices.”
(PoliticoPro 13.3.2025)

[Read More](#)

- U.S. coal ash contains significant rare earth elements, which could lessen import reliance, with ongoing efforts to make extraction cost-effective.
(SciTechDaily 17.3.2025)
[Read More](#)
- President Donald Trump plans to use wartime powers to boost U.S. production and processing of critical minerals, viewing foreign dependence as a serious security risk.
(Nikkei 21.3.2025)
[Read More](#)
- Resource Dependency: Exploring the Chinese Monopoly of Critical Minerals (The New Global Order, 10.5.2025)
[Read More](#)
- U.S. President-elect Donald Trump’s pursuit to acquire Greenland could well be motivated by critical minerals.
(CNBC 14.1.2025)
[Read More](#)
- The US is keen on a deal for Ukraine’s mineral resources because it wants to reduce dependency on China, which controls 75% of rare earth deposits in the world.
(BBC, 5.3.2025)
[Read More](#)

SIGNALS OF CHANGE

China is moving towards energy self-sufficiency



PREMISE

Self-sufficiency has been one of the major policies under Xi Jinping. The recent Thorium discovery promises an eternal energy source.

DESCRIPTION

Thorium is three to four times more abundant than uranium. Thorium-fueled reactors could be more environmentally friendly than uranium-fueled reactors. This discovery would not only mean self-sufficiency and dependency freedom of outside energy but also cheap energy for Chinese manufacturing and thus increased ability to compete in international markets.

DATA POINTS

- China's thorium survey finds 'endless energy source right under our feet'. (SCMP 28.2.2025)
[Read More](#)
- Construction of a molten salt nuclear power plant that uses thorium as fuel instead of uranium is set to begin in the Gobi Desert. (SCMP 26.7.2024)
[Read More](#)
- "This should worry Donald Trump: Beijing just found the key to power its country for 60,000 years."
(Business Today, 13.3.2025)
[Read More](#)
- Energy Self-Sufficiency Pointer to Secure Future
(SASAC, 1.4.2025)
[Read More](#)
- China's Energy Security Realities and Green Ambitions
(The China Academy, 30.7.2025)
[Read More](#)

SIGNALS OF CHANGE

Tech War between the US and China Escalates



PREMISE

The technology war between the US and China accelerates as both powers aggressively push their technological and geopolitical agendas. This may slowly lead towards two separate technology entities; one around Chinese AI and technology, and the other around the US.

DATA POINTS

- Chinese AI firm DeepSeek developed innovative models that rival American tech such as OpenAI and Google, bringing advanced AI technology at lower costs. This progress challenges US dominance and showcases China's capability to adapt despite sanctions. (SCMP 11.3.2025)
[Read More](#)
- U.S. Restrictions on Chinese AI Models (Reuters 18.3.2025)
[Read More](#)
- To counter the US sanctions, China has rapidly developed domestic alternatives, supported by intensive collaboration between its private and public sectors. (SCMP 25.2.2025)
[Read More](#)
- America First Investment Policy: Aims to prevent US compa-

nies from funding China's military industrial complex: restricting US investments in the development of China's AI, quantum, semiconductor industries, advanced manufacturing. Restricts inbound investments by Chinese 'affiliated persons' in agriculture, healthcare, and other strategic sectors. (White House 21.2.2025)

[Read More](#)

- China announces high-tech fund to grow AI, emerging industries; The fund is expected to attract nearly 1 trillion yuan (\$138 billion) in capital over 20 years (CNN 10.3.2025)
[Read More](#)
- Talent race: House Republicans are pushing legislation to ban Chinese nationals from getting student visas in the U.S. (Fox News 12.3.2025)
[Read More](#)
- Top Donald Trump official tells Europe to choose between US or Chinese communications tech. (FT 15.4.2025)
[Read More](#)
- Trump's trade war with China in 2025 (Reuters 12.8.2025)

[Read More](#)

SIGNALS OF CHANGE

China to “stand shoulder to shoulder with Moscow against hegemonic bullying”



Picture source: RIA Novosti

PREMISE

Chinese President Xi Jinping has told Russian leader Vladimir Putin that his country will stand with Moscow against “unilateralism and hegemonic bullying” during a visit to the country to commemorate the Victory Day in Moscow.

DESCRIPTION

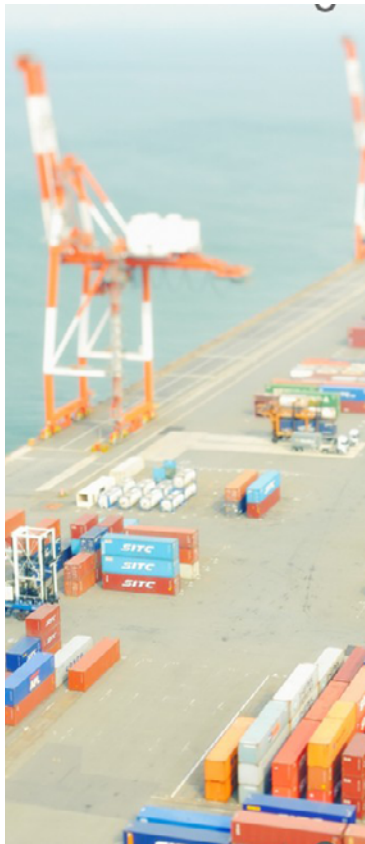
Moscow’s 2025 Victory Day became a ritualized affirmation of the Russia–China strategic alignment—a partnership openly designed to project resilience against Western pressure, institutionalize support for each country’s leadership domestically, and broadcast their vision of a post-Western, multipolar global order. While the symbolism was profound, the underlying realities point to a hardening of “East-West” divisions, and a global narrative battle.

DATA POINTS

- China’s Xi vows to stand with friend Putin against ‘hegemonic bullying’ (Aljazeera 8.5.2025)
[Read More](#)
- Xi and Putin agree to ‘deepen’ China-Russia ties during Moscow talks (CNN, 8.5.2025)
[Read More](#)
- Xi and Putin vow stronger ties at Russia’s World War II Victory Day parade ahead of U.S.-China trade talks (NBC News, 9.5.2025)
[Read More](#)
- ‘Friends of steel’: Xi and Putin pledge to stand together against US (Reuters 8.5.2025)
[Read More](#)

SIGNALS OF CHANGE

Maritime Rivalry Spirals between the US and China



PREMISE

President Trump aims to re-industrialise the United States. Integral part of this is shipbuilding and revitalizing its maritime might. The US is heavily behind in China in shipbuilding capacity which challenges its navy capabilities.

DESCRIPTION

Revitalizing the US maritime might does not only happen by reindustrializing but also by guaranteeing the sea power. In the military dimension, the global port network that Chinese companies began building two decades ago now includes 93 foreign ports in 50 countries, where they own or operate at least one terminal. China's navy uses these ports, concentrated around its main trade routes and global maritime chokepoints, to supplement its sole overseas military base in Djibouti.

DATA POINTS

- US to levy fees on China-built or -linked ships that dock in U.S. ports (Reuters 7.3.2025)

[Read More](#)

- U.S. to engage partners, allies to impose similar measures or risk U.S. retaliation. COSCO, MSC, Maersk, among carriers that could see new U.S. port fees. (Reuters 7.3.2025)

[Read More](#)

- Panama canal to BlackRock: BlackRock CEO Larry Fink orchestrated the Panama Canal port takeover that made President Trump happy, but the cost may be an angry Xi Jinping. (YahooFinance 22.3.2025)

[Read More](#)

- French-based shipping firm CMA CGM would invest \$20 billion in the United States to build out shipping logistics and terminals. (Reuters 7.3.2025)

[Read More](#)

- Trump: U.S. Will Order 40 Big Icebreakers for the Coast Guard (The Maritime Executive, 29.1.12025)

[Read More](#)

- China and US clash over South China Sea operation near disputed shoal (ABC News, 13.8.2025)

[Read More](#)

SIGNALS OF CHANGE

Trump administration deepen alliances that participate in burden sharing



Picture source: [YouTube](#)

PREMISE

In his speech at the Shangri-La Defense Forum, Secretary of Defense Peter Hegseth praised American allies – and gave a clear message that the US is not isolating itself but stands by its allies as long as they participate in the burden sharing.

DESCRIPTION

By directly identifying China as the biggest threat of the United States and its allies, the US Defense Secretary de facto pushed for an increasingly polarizing world amplified further by the response from the Chinese foreign ministry's counter arguments. In addition, the remarks by the European Union's top diplomat, Kaja Kallas, also emphasised how Russia's deepening relationship with China is the "greatest challenge of our time".

DATA POINTS

- US pushes Asian allies, China defense chief absent: 5 Shangri-La takeaways (Nikkei, 2.6.2025)
[Read More](#)
- Remarks by Secretary of Defense Pete Hegseth at the 2025 Shangri-La Dialogue in Singapore (31.5.2025)
[Read More](#)
- Foreign Ministry Spokesperson's Remarks on U.S. Defense Secretary Pete Hegseth's Negative Comments on China at the Shangri-La Dialogue (China MFA 1.6.2025)
[Read More](#)
- China's government has accused Pete Hegseth of trying to "sow division" in the Asia Pacific region over his speech at a Singapore defence conference where he warned China was a potentially "imminent" threat. (The Guardian 1.6.2025)
[Read More](#)

SIGNALS OF CHANGE

It is much about China and not just about defence spending – China defining the US trust on Europe



PREMISE

The US has defined China as its major rival that must be countered in all strategic fronts. Simultaneously, the US increasingly signals it doesn't trust unequivocally on allies that have significant trade relationships with China. This is a challenge to the relationship as China is the EU's largest import partner, and trade dependency has increased in recent years despite the de-risking talk. The Trump administration doesn't believe it will be able to trust Europe precisely for these reasons – for high economic dependency on Beijing. The Trump administration appears to be evaluating the measures the European allies have taken to decrease their dependencies on China.

DATA POINTS

- The president's trade policy is about power and security, not economics. (FT 31.3.2025)
[Read More](#)
- Trump administration has been seeking information in recent weeks on the presence of Chinese suppliers in European 5G networks and are looking at what countries have done since the first Trump administration and whether they have implemented the 5G toolbox from 2020. (GMF, 1.4.2025).
[Read More](#)
- Even the steel tariffs reflect a frustration with the EU for not implementing sufficiently robust measures against Chinese steel imports, particularly because the EU is a big importer of products containing steel. (FT, 11.2.2025)
[Read More](#)

SIGNALS OF CHANGE

Great Split is Coming: the US appears demanding countries to choose between itself and China



PREMISE

During April 2025, the US government signalled that countries may have to choose between the United States and China.

DESCRIPTION

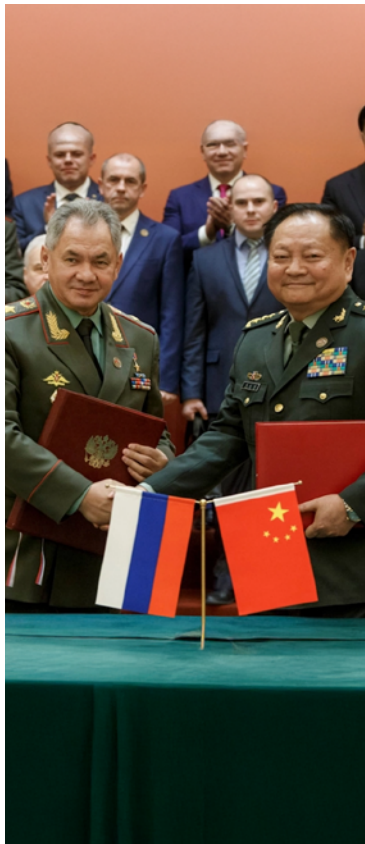
“The US will seek to force the EU to choose between the US and China on trade, according to briefings circulated to senior ministers and officials after Tánaiste Simon Harris’s meeting in Washington in April 2025 with US commerce secretary Howard Lutnick. The briefings, confirmed by multiple senior sources, go considerably further than before in identifying the ultimate US agenda for any future trade negotiations. They suggest that the overall US strategy is to decouple from China, and that any country who wishes to have a trade deal with the US will also have to distance itself from Beijing.”

DATA POINTS

- Countries May Have To Choose Between China And The U.S.: Implications For Markets. (Seeking Alpha, 17.4.2025)
[Read More](#)
- US to demand EU pulls away from China in return for cutting tariffs. (Irish Times, 15.4.2025)
[Read More](#)
- Top Donald Trump official tells Europe to choose between US or Chinese communications tech. (FT 15.4.2025)
[Read More](#)
- Bessent told a summit of bankers in Washington that economies potentially eyeing closer ties with Beijing over the US shift may want to think twice, saying “that would be cutting your own throat.” (France24, 9.4.2025)
[Read More](#)
- “US plans to use negotiations with more than 70 nations to ask them to disallow China to ship goods through their countries, prevent Chinese firms from locating in their territories to avoid US tariffs”. (WSJ 15.4.2025)
[Read More](#)

SIGNALS OF CHANGE

Chinese PLA troops in Russian Army



Picture source: War on the Rocks

PREMISE

There have been various reports on how China is assisting the Russian military in its war against Ukraine. A military alliance and between the two poses a threat to Western alliances and affect cooperation with China, especially as the U.S. aims to encourage its allies to limit their collaboration with China.

DESCRIPTION

Since the start of Russia's full-scale invasion of Ukraine, evidence of Chinese military and dual-use support for Russia has become increasingly robust and a concern to the international business community. As of 2025, allegations and confirmed reports span direct battlefield involvement by Chinese citizens, large-scale transfer of critical components for Russian weapons systems, a persistent pattern of deepening military-industrial cooperation, and operational-level joint military activities.

DATA POINTS

- Ukraine says more than 150 Chinese mercenaries are fighting for Russia in Ukraine (AP, 2025)
[Read More](#)
- China-Russia Relations, November 2024: cooperation between China and Russia remains steadfast.(CFR, 22.11.2024)
[Read More](#)
- Military analyst in Taipei argues that the ranks and skills of the Chinese soldiers fighting in Ukraine clearly shows affiliation with the PLA. He also claims that up to 18,000 PLA military personnel have rotated into Russian units to gain combat knowledge in Ukraine since 2022. (Taipei Times, 28.4.2025)
[Read More](#)
- Joint military exercises signal deepening Russia-China military alignment. (MERICS, 7.5.2025)
[Read More](#)

FOCUS

Mutualistic Technologies for Crucial Technologies

AN EMERGING NETWORK OF MUTUALISTIC TECHNOLOGIES IS CREATING VAST COMMERCIAL OPPORTUNITIES. COMBINATIONS OF THESE TECHNOLOGIES WILL ADDRESS FUTURE NEEDS AND MARKETS IN POWERFUL WAYS.

FOUR CRUCIAL ITC TECHNOLOGIES ARE ADVANCING RAPIDLY — IN CAPABILITIES, TYPES, AND NUMBERS

ROBOTICS

Types ↑
Functionalities ↑
Use Case ↑



DIGITAL TWINS

Types ↑
Nested Apps ↑
Interoperability ↑



SENSORS

Quantity ↑
Types ↑
Costs ↓



AI

Transferability ↑
Performance ↑
Costs ↓



*In-depth discussions are in two Computer Weekly articles:
“The emerging network of mutualistic technologies” & “Spinning the web of mutualistic technologies”*

FOCUS

Mutualistic Technologies are Part of the Smart Spaces Puzzle

**EACH TECHNOLOGY
CONTRIBUTES CRUCIAL
ASPECTS OF REAL-
WORLD AND VIRTUAL
INTERACTIONS**

ROBOTICS

“Execute and
actuate”
virtual → physical



SENSORS

“Sense and extract”
physical → digitized



DIGITAL TWINS

“Understand and
operate”
digitalized → virtual



AI

“Process and interpret”
digitized → digitalized

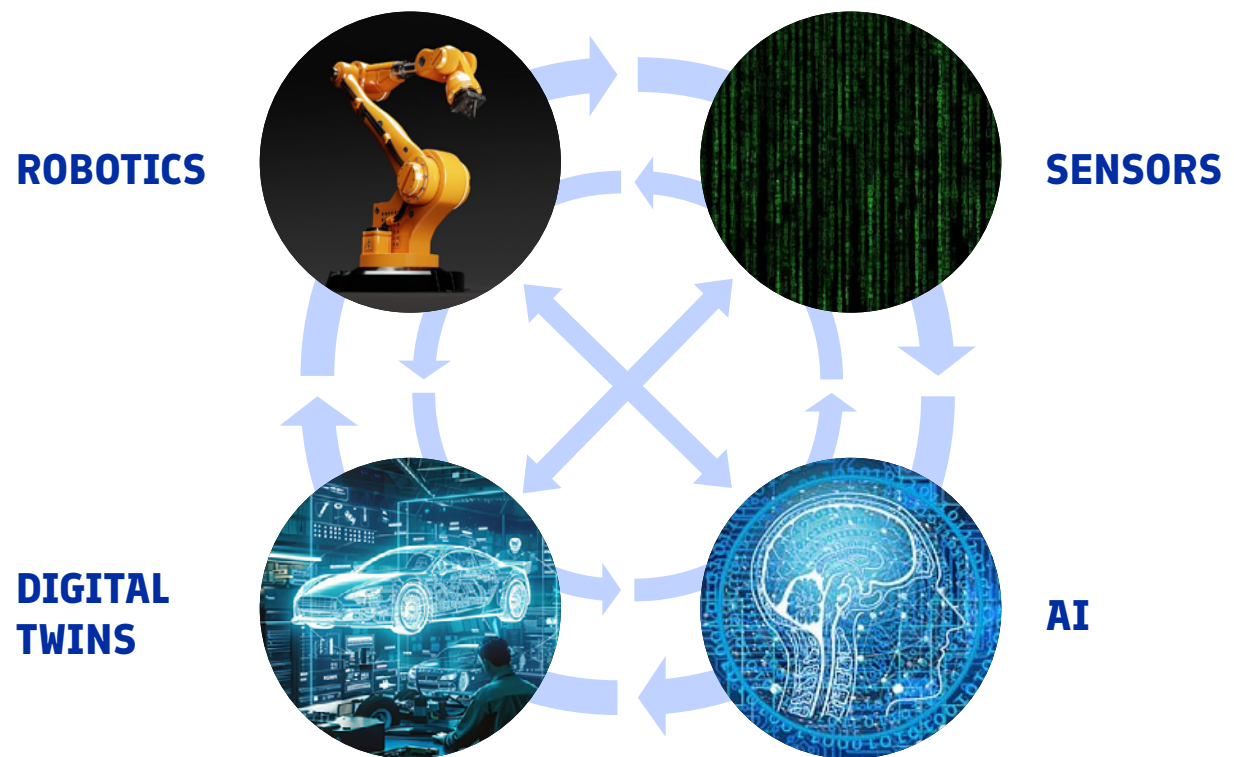


FOCUS

Dynamics Among Mutualistic Technologies

THE WHOLE IS MORE THAN THE SUM OF ITS PARTS

All technologies support each other in a variety of ways. For example, sensors provide information for AI and digital twins. And digital twins help planning robotics applications with the help of AI.



FOCUS

Mutualistic Technologies are Opening Market Opportunities

THE EFFECTS WILL BE SUBSTANTIAL

“We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run.”
(Amara’s Law)

ROBOTICS



SENSORS



DIGITAL TWINS



AI



SPOTLIGHT

Institute for the Future's Systems Mythology



Institute for the Future (ITF) developed Systems Mythology to envision how different types of strategic concept creation and execution can enable unique positions in the market. In particular, Systems Mythology offers a powerful way to consider new technologies and developments to map out forward-looking corporate strategies.

“Systems mythology leverages our intuitive understanding of what a system means to us based on how it feels when we experience it.”

Systems mythology consists of four archetypes: blue, green, red, purple. Colors are clearly differentiated from each other in a non-intellectual way. They evoke a response from us, that can only be experienced to be understood.

They are also non-hierarchical and value neutral. No color is better than any other color, and for the sake of the work we'll be doing, a balance of all four colors is necessary to create a balanced system.

SPOTLIGHT

The four colors represent various aspects to consider

Systems Mythology attempts to examine how the nature of our systems dramatically influences the shared mythologies of our society.



Systems Mythology leverages our intuitive understanding of what a system means to us based on how it feels when we experience it.

SPOTLIGHT

Colors make for very different systems and networks

Blue systems speak for the whole. They strive for objectivity and consistency.

Red values the power of individual will. It views the world with passion and drive, but also with aggression and single-mindedness.



Green systems are emergent and organic. They can't be controlled or scaled directly.

Purple interactions are mysterious and open-ended. It's a new frontier, and exposure to it fills us with both awe and dread.

SPOTLIGHT

Understanding the alternatives of future AI environments

BLUE PERCEPTION

(think Star Trek's Data)

AI should be:

- logical and objective
- consistent, understandable
- follow rules and structures



GREEN PERCEPTION

(think Star Wars C-3PO & R2-D2)

AI could:

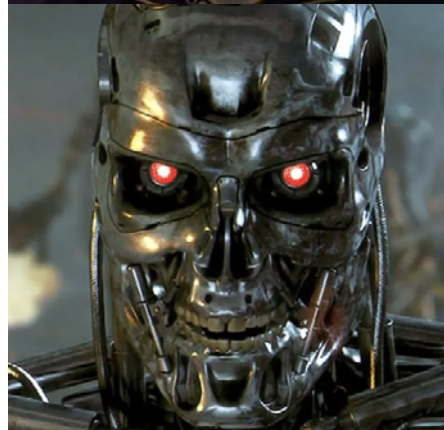
- be expressive and whimsical
- be social and trustworthy
- have feelings, experiences

RED PERCEPTION

(think "Terminator")

AI will probably:

- be weaponized
- watch us
- target us with precision



PURPLE CONSIDERATIONS FOR AI

- "AI" has been a product of speculative fiction
- Assumptions represent the ambiguous nature of humans' own intelligence

SPOTLIGHT

Creating alternatives of systems

”Whole” stories combine all four colors to create a dynamic and rich system that feels well-balanced to a broad group of stakeholders.



The four illustrations represent retail environments by color.

These environments can exist next to each other or mix according to market and applications.

QUARTERLY FORESIGHT
SUMMER 2025

BUSINESS FINLAND

From possibilities to breakthroughs

Business Finland is an accelerator of global growth. We create new growth by helping businesses go global and by supporting and funding innovations. Our top experts and the latest research data enable companies to seize market opportunities and turn them into success stories.

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