

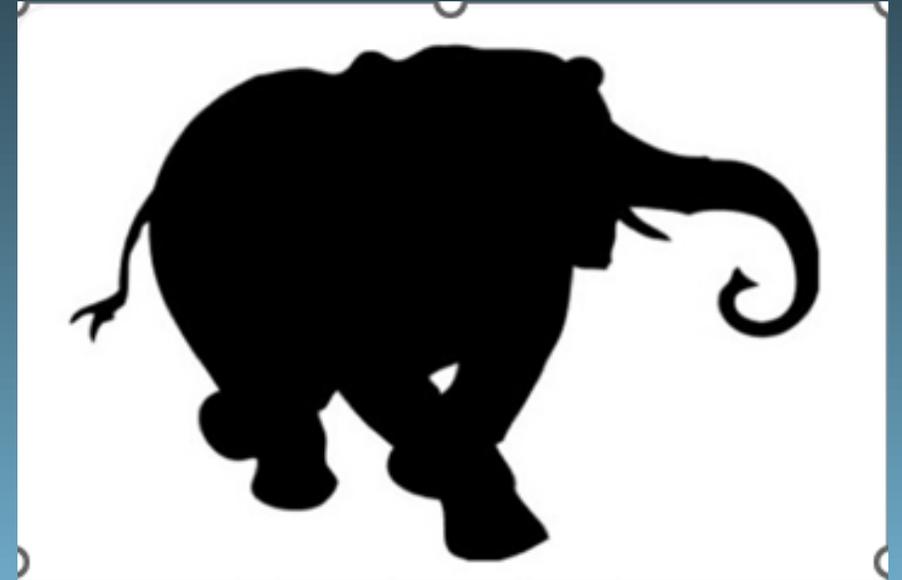
**BUSINESS
FINLAND**

Key Geopolitical Disruptions Shaping Our Futures



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Foresight supporting strategic planning

European Commission Foresight Report: Future challenges will not divert the European Union from its long term objectives – TWIN TRANSITION. The report identifies 10 areas where action is needed

European Commission DG RTD – Foresight to support the Strategic Plan of Horizon Europe 2025-2027 / Mutual Learning exercise

European Space Agency foresight working group and work

Business Finland – Foresight Europe as part of the global strategic foresight team and strategy unit – how the operational future landscapes are changing and what do the changes mean for Finland and Business Finland, including innovation planning



On the path towards 2050, twinning will depend on the ability to deploy existing and new technologies at scale, as well as various geopolitical, social, economic, and regulatory factors (PESTEL)

Foresight supporting innovation planning

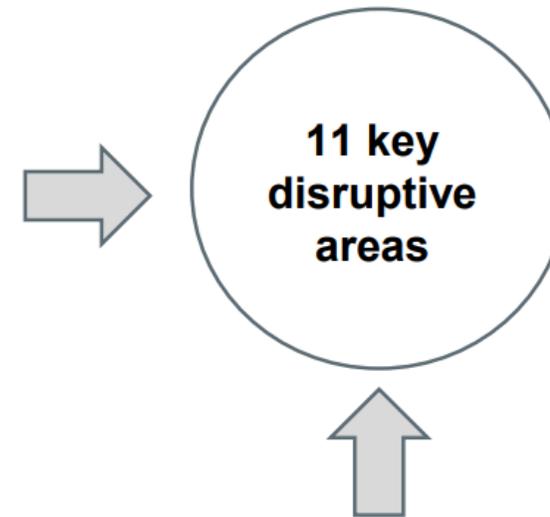
EXPLORING POTENTIAL FUTURES IN KEY „DISRUPTIVE“ AREAS

Deep dives into **disruptive trends** and contexts

- EU in a Volatile New Geopolitical World
- Global Commons
- Transhumanist Revolutions
- Climate Change
- Hydrogen Economy

Explorations of other **potential disruptions**

- General AI and Autonomous Machines
- Future of Health
- Rising Social Confrontations
- Criminal and Lawful Economic Activities



Key areas of STI for future ecosystems

- Resource disruptions: from managed exploitation to caring and immersing for nature
- Converging technology disruptions in the₅ micro-, nano- and virtual world

FORESIGHT FOR THE 2ND STRATEGIC PLAN OF HORIZON EUROPE - The best access to the recent foresight work at DG R&I-G1 can be found on the platform www.futures4europe.eu
Matthias Weber, AIT Austrian Institute of Technology

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THROUGH FRAGMENTATION TOWARDS A NEW WORLD ORDER

- **Protracted systemic instability**
- **Fragmented world – Multipolar, Bipolar?**
- **World is bifurcating between two great powers, also ideologically: the US and China, like-minded democracies and like-minded autocrats, new alliances**
- **Trade war, Tech war, Ideological war, Cold war II, increasing military buildups**
- **Decoupling or Derisking?**
- **De-Westernisation, illiberalism, autocratisation, securitization of everything**
- **Roles of states, governments strengthening, international organisations weakening**
- **De-globalization – from China yes, but otherwise not necessarily**
- **Ukraine War – system transforming war, European security architecture, Chain of wars, Taiwan – Western allies losing focus**
- **Shared Future for Mankind – China's proposal for the new global governance – successful implementation**



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SECURITIZATION OF EVERYTHING: EUROPEAN ECONOMIC SECURITY

- The EU's **economic security strategy plan** aims to reduce dependences on e.g. China for critical resources and preventing EU technology from ending up in the wrong hands
- **The EU will launch a new investigation into China's alleged dumping of cheap electric vehicles** – one of the crucial areas in the EU's green transition: "Global markets are flooded with cheap Chinese Evs and their prices are kept artificially low by huge state subsidies, this is distorting the EU market" VDL 13.9.
- Same situation earlier with solar industry, which China has dominated for over a decade – and now also with wind industry
- **China has restricted critical minerals gallium, germanium and recently graphite** (crucial in green transition) – further evidence in Europe of the importance of de-risking
- Solution will likely be more tariffs, which could provoke a response from Beijing – **risking a potential trade war with China**



Sari Arho Havrén

Technology Area	Technologies*
ADVANCED SEMICONDUCTOR TECHNOLOGIES	<ul style="list-style-type: none"> • Microelectronics, including processors • Photonics (including high energy laser technologies) • High frequency chips • Semiconductor manufacturing equipment at very advanced node sizes
ARTIFICIAL INTELLIGENCE TECHNOLOGIES	<ul style="list-style-type: none"> • High Performance Computing • Cloud and edge computing • Data analytics technologies • Computer vision, language processing, object recognition
QUANTUM TECHNOLOGIES	<ul style="list-style-type: none"> • Quantum computing • Quantum cryptography • Quantum communications • Quantum sensing and radar
BIOTECHNOLOGIES	<ul style="list-style-type: none"> • Techniques of genetic modification • New genomic techniques • Gene-drive • Synthetic biology
ADVANCED CONNECTIVITY, NAVIGATION AND DIGITAL TECHNOLOGIES	<ul style="list-style-type: none"> • Secure digital communications and connectivity, such as 5G and Open RAN (Radio Access Network) and 6G • Cyber security technologies incl. cyber-surveillance, security and intrusion systems, digital forensics • Internet of Things and Virtual Reality • Distributed ledger and digital identity technologies • Guidance, navigation and control technologies, including avionics and marine positioning
ADVANCED SENSING TECHNOLOGIES	<ul style="list-style-type: none"> • Electro-optical, radar, chemical, biological, radiation and distributed sensing • Magnetometers, magnetic gradiometers • Underwater electric field sensors • Gravity meters and gradiometers

Commission Recommendation on critical technology areas (10) for the EU's economic security for further risk assessment. The 4 agreed technology areas by the member states

7. SPACE & PROPULSION TECHNOLOGIES	<ul style="list-style-type: none"> • Dedicated space-focused technologies, ranging from component to system level • Space surveillance and Earth observation technologies • Space positioning, navigation and timing (PNT) • Secure communications including Low Earth Orbit (LEO) connectivity • Propulsion technologies, including hypersonics and components for military use
8. ENERGY TECHNOLOGIES	<ul style="list-style-type: none"> • Nuclear fusion technologies, reactors and power generation, radiological conversion/enrichment/recycling technologies • Hydrogen and new fuels • Net-zero technologies, including photovoltaics • Smart grids and energy storage, batteries
9. ROBOTICS AND AUTONOMOUS SYSTEMS	<ul style="list-style-type: none"> • Drones and vehicles (air, land, surface and underwater) • Robots and robot-controlled precision systems • Exoskeletons • AI-enabled systems
10. ADVANCED MATERIALS, MANUFACTURING AND RECYCLING TECHNOLOGIES	<ul style="list-style-type: none"> • Technologies for nanomaterials, smart materials, advanced ceramic materials, stealth materials, safe and sustainable by design materials • Additive manufacturing, including in the field • Digital controlled micro-precision manufacturing and small-scale laser machining/welding • Technologies for extraction, processing and recycling of critical raw materials (including hydrometallurgical extraction, bioleaching, nanotechnology-based filtration, electrochemical processing and black mass)

The remaining six will likely come up again at a later stage.

Sources: Politico, SCMP, Financial Times, discussions with diplomats in Brussels

FORTRESS EUROPE: RESILIENCE, SELF-RELIANCE AND DE-RISKING

- Anti-Coercion Instrument
- The Carbon Border Adjustment Mechanism
- The EU International Procurement Instrument
- Mandatory Supply Chain Due Diligence
- European Chips Act
- Critical Raw Materials Act
- Digital Services Act DSA
- Action Plan on Critical Raw Materials
- Economic Security Plan
- IPCEIs (Important Projects of Common European Interests)
- Action Plan on Synergies between Civil, Defence and Space Industries
- Industrial Alliance for Processors and Semiconductor technologies
- Framework for Screening Foreign Direct Investments
- Anti-subsidy investigation on Chinese EVs

WHAT DOES EUROPE WANT – WHAT DOES IT GET?

- Europe visions: Strategically autonomous third major power in a multipolar world
- Contradictions: no great power attributes, cannot decide whether it wishes to be an ally, a bridge or an individual power
- Strategic autonomy risks turning inwards, swing states, common foreign policy voice missing
- Brussels effect waning – if the EU loses its regulatory power, what is the alternative?
- France and Germany are at odds in many questions, Eastern Flank countries and Nordics trust the US more than Western European nations as their security guarantor
- European democracies, values, way of life challenged
- Europe is not as dependent on e.g. China as much as we imagine – and yet acts in fear of retaliation
- Republican tribes – elections in 2024 => Europe's Security Infrastructure <= Taiwan / Indo-Pacific
- Russia's war against Ukraine – system transforming war – who will bear, and for how long the burden?



GEOPOLITICS

EUROPE IS IN DECLINE

In 2000, Europe had 41 of the biggest 100 companies. Now 15. 63% decline in two decades.

Europe's market capitalization has been on the decline since 2000, where Europe missed out the first wave of Internet and tech innovations

Since 2003, Europe's GDP and share of global market capitalization have been shrinking, signalling waning economic competitiveness

Europe is behind with R&D investments and 8/10 critical technologies, lack of patents, R&D budgets

This suggests:

- Europe loses its economic edge to the US and Asia and loses its technological sovereignty, with all the implications that come with it
- Europe relies on established, dominant corporations – old giants often resist change to safeguard their current positions (such as German manufacturers safeguarding their China presence)

5. Now, let's examine some hard truths. Here are some of the most valuable companies in Europe, based on market capitalization:

1. LVMH (Fashion) 🍷 (176 years old)
2. Novo Nordisk (weight loss company) 🍌 (100 years old)
3. ASML (Semiconductor equipment) 🏭 (39 years old)
4. L'Oréal (make-up) 💄 (114 years old)
5. Hermes (more fashion) 🧣 (186 years old)

Google is 25, Amazon 29, Apple 47, Meta 19, Tesla 20.... you get the point.

Sources: McKinsey, 5.6.2021, 17.06.2021, 6.10.2021

Europe's Red Lines: Russia's war against Ukraine and Taiwan – are they so red after all?



Shift in demographics

Sari Arho Havrén



Challenges to prevalent societal systems and the world order



Shift in values, erosion of shared experience and trust



Global knowledge scarcity and race for talent

Where is
Europe in
these, in
around
2050/2060?

FUTURE DRIVERS CAN LEAD TO DIFFERENT, ALTERNATIVE FUTURES

ARTIFICIAL INTELLIGENCE RUN GLOBAL GOVERNANCE

Drivers: rapid technological development, crumbling of global institutions, countries and blocs compete over norms of AI governance, climate change

TWO HEGEMONIC POWERS

Drivers: Chain of wars, confrontations, global institutions crumbling, rapid militarisation, multilevel competition – trade, technology, ideology, education, science, military

CHINA LED WORD ORDER

Drivers: Democracies in decline, rules-based order has crumbled, division, Ukraine war system transforming war, chain of wars, de-westernisation, China's and Russia's joint efforts in changing the world order and domination of the United Nations has succeeded

CARBON AND SOCIAL CREDIT LED WORLD ORDER

Drivers: States taking more power, rapid technological development allows more control, climate change

PRIVATE CORPORATIONS RUN THE GLOBAL ORDER THROUGH PRIVATE MEGACITIES

Drivers: tech corporations gain more power both in critical technologies and in areas such as space, warfare, governments become increasingly dependent on these corporations as they fail to respond to rapidly occurring major challenges and to secure lives of their citizens

