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Research Question

How can the FCDO utilise data science to maximise UK influence on strategic technologies through its global network of partnerships?

Approach

Conceptual Framework:

- UK's tech advantage depends on global interdependence and not just domestic capability.

- Strategic tech competition involves complex inter-state relationships.

- Dominance in this field requires international norm-setting, regulation, innovation, research and development (R&D), access to upstream components, and large-scale production capacity.

Data Collection:

- Aggregated datasets from UN Voting Records, Open Alex, UN General Speeches and UN Comtrade.

- Focused on geopolitical trends, multilateral partnerships, and technological influence of the UK.

Analytical Techniques:

- Network Analysis: Examined research collaboration trends and technology networks.

- Natural Language Processing (NLP): Identified key themes in global diplomatic discourse.

- Comparative Analysis: Assessed UK's position relative to key global players.

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United Nations

Voting Patterns

Mapping UN Voting Patterns by Countries

UN countries relative position given their votes

Year: 2024
GDP PP range: 0.00% to 100.00%
Population range: 0.00% to 100.00%
Total countries: 192

Continent
- Asia
- Africa
- Europe
- Americas
- Oceania

Serbia
Armenia
Russia
Belarus
France
UK
Australia
Canada

Europe +
- Turkey
- S. Korea
- Japan
- New Zealand

Global South
- China
- India
- Brazil
- South Africa
- Egypt

Europe outliers:
- Russia
- Belarus

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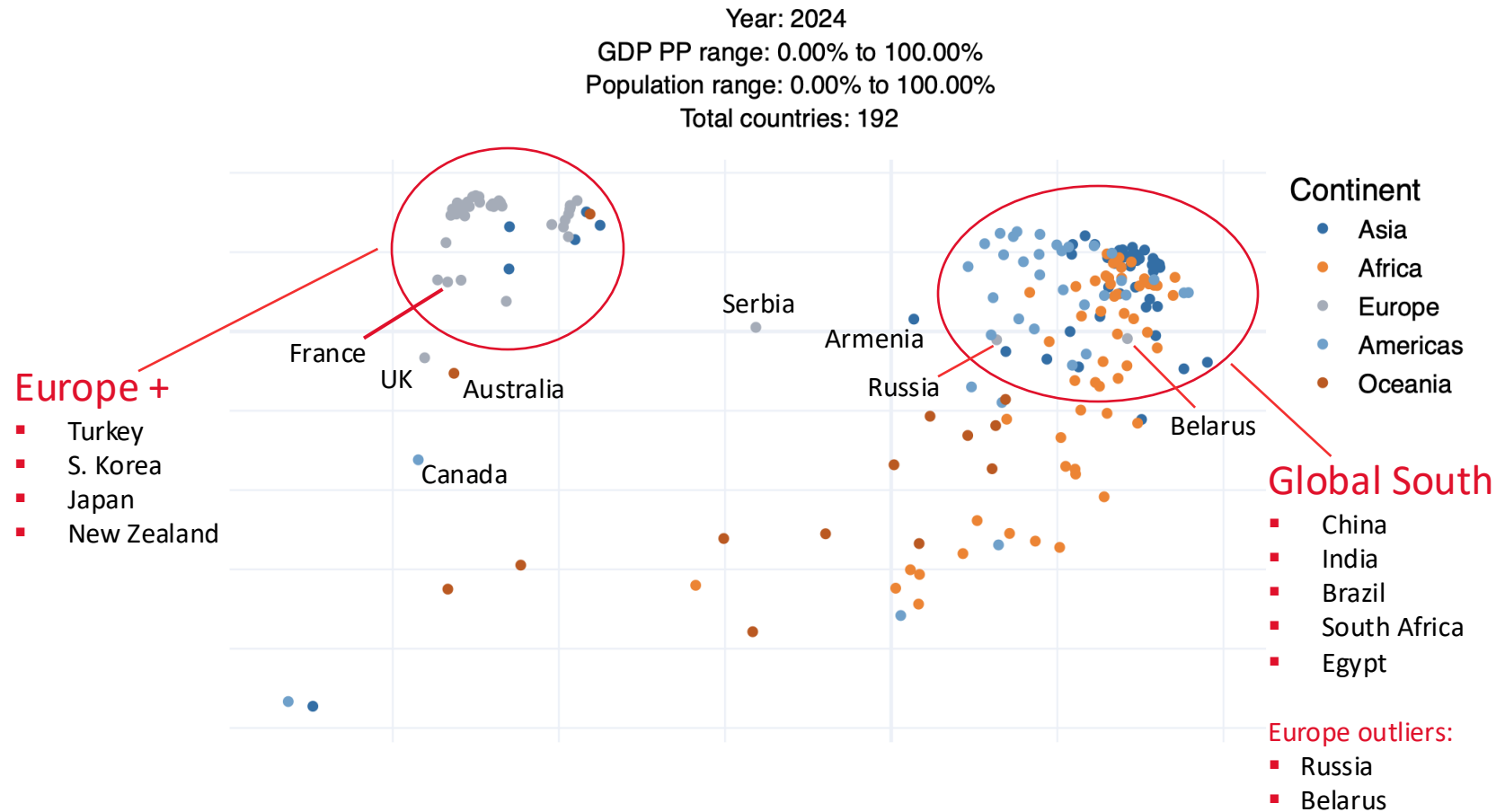
Distance between Countries

Country Pairwise mean distance 1990 - 2024

United Kingdom ▾

Country	Mean distance
France	8.04%
Australia	16.65%
Netherlands	19.74%
Belgium	19.82%
Monaco	20.37%
Luxembourg	20.46%
Italy	20.52%
Hungary	21.28%
Portugal	21.48%

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How Topics Change over Time

2009: Nuclear Weapons Peaks:
- Barak Obama Speaks out against nuclear weapons in Prague
- North Korea Nuclear Tests
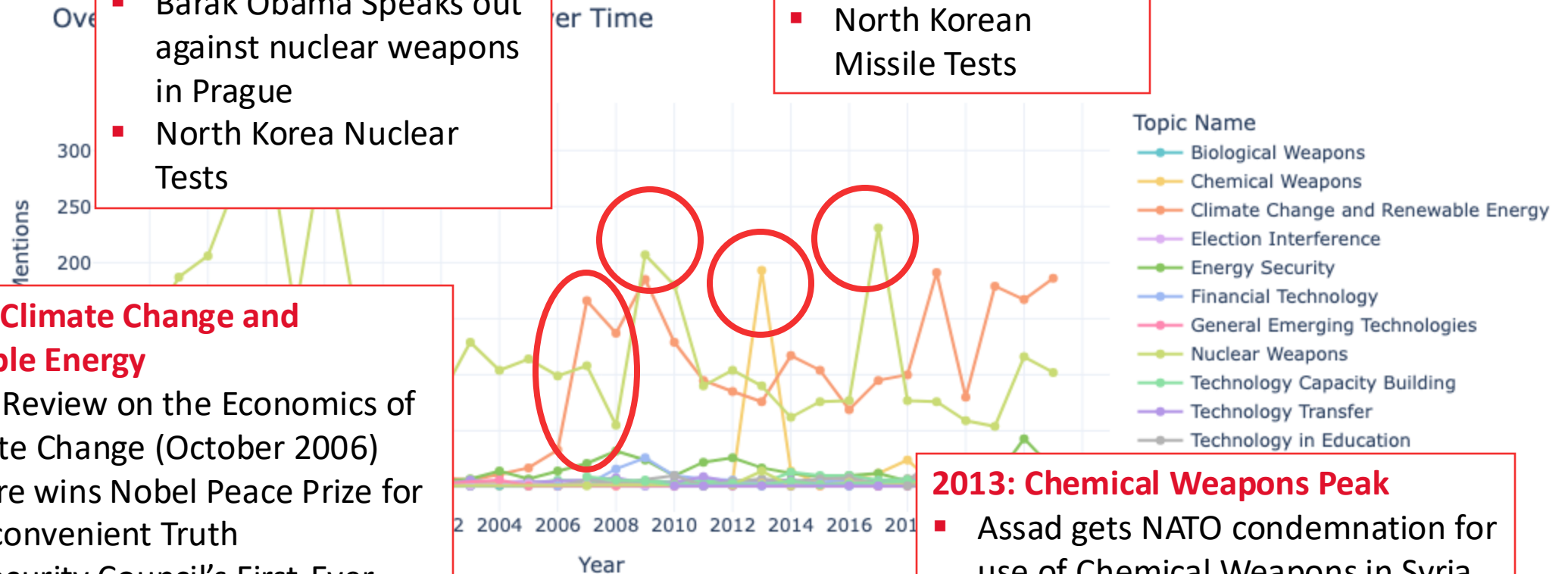
2017: Nuclear Weapons Peaks:
- North Korean Missile Tests
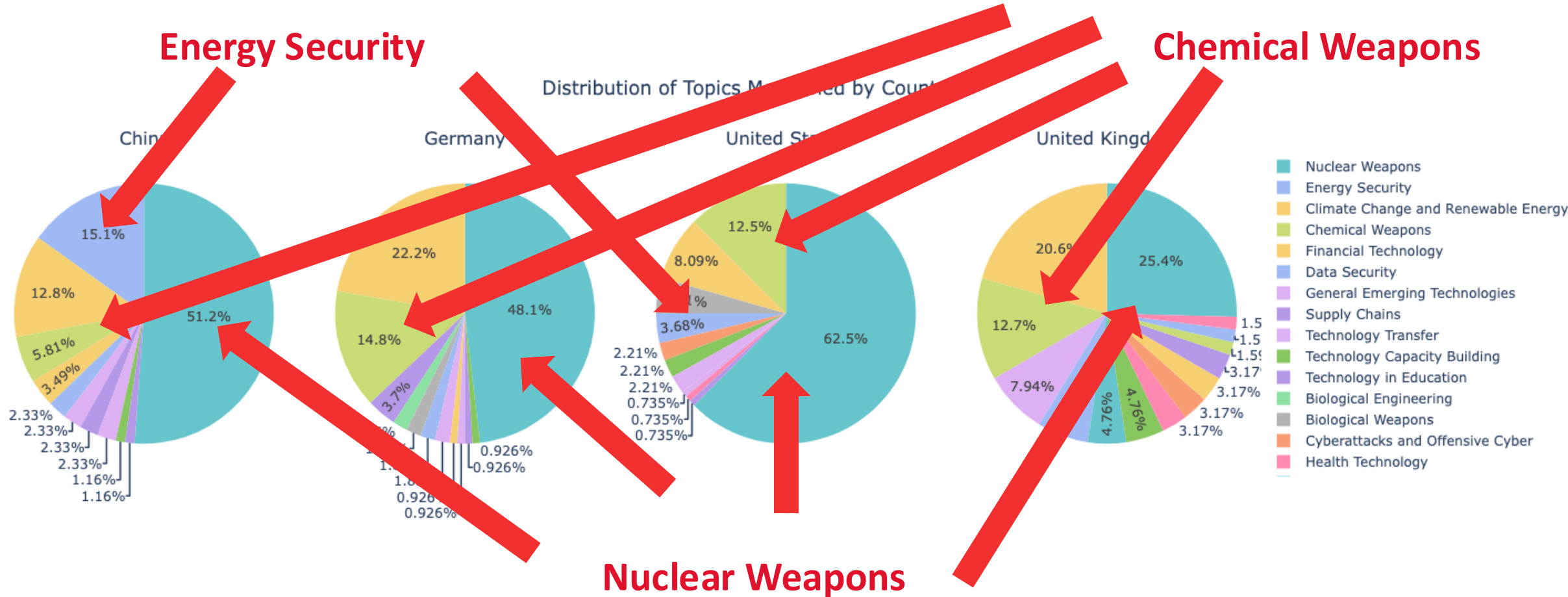
2006 -7: Climate Change and Renewable Energy
- Stern Review on the Economics of Climate Change (October 2006)
- Al Gore wins Nobel Peace Prize for an Inconvenient Truth
- UN Security Council's First-Ever Debate on Climate Change (April 2007)

2013: Chemical Weapons Peak
- Assad gets NATO condemnation for use of Chemical Weapons in Syria

Topic Name
- Biological Weapons
- Chemical Weapons
- Climate Change and Renewable Energy
- Election Interference
- Energy Security
- Financial Technology
- General Emerging Technologies
- Nuclear Weapons
- Technology Capacity Building
- Technology Transfer
- Technology in Education

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How Technology Topics Differ for Key Countries

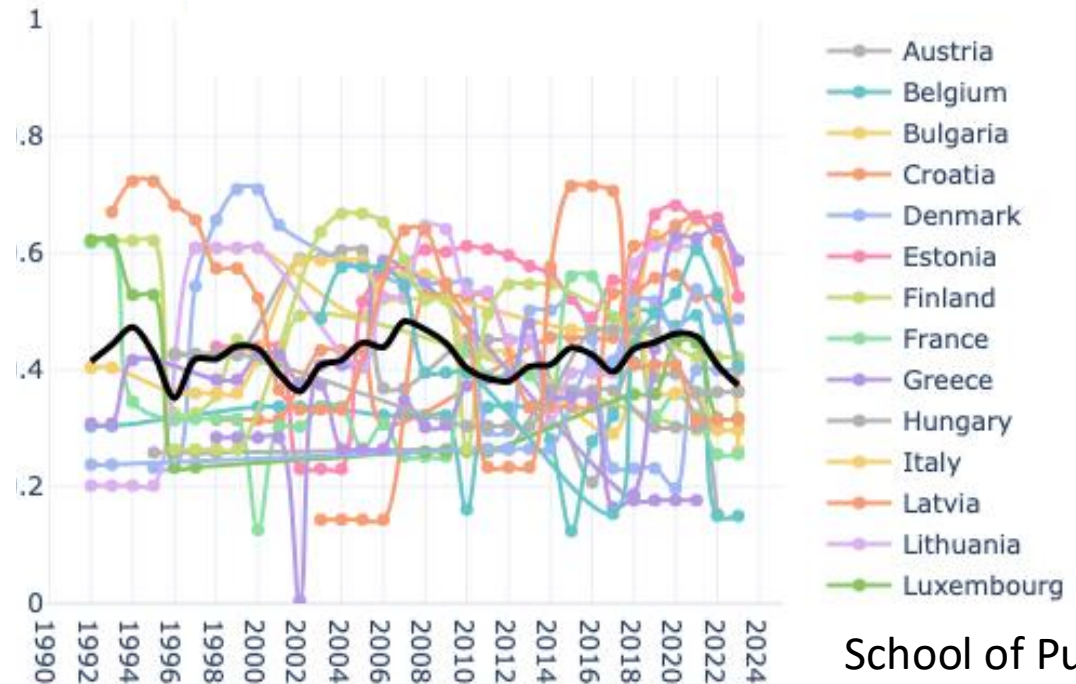# The European Union Aligns More with US than with China – but only by a small amount!
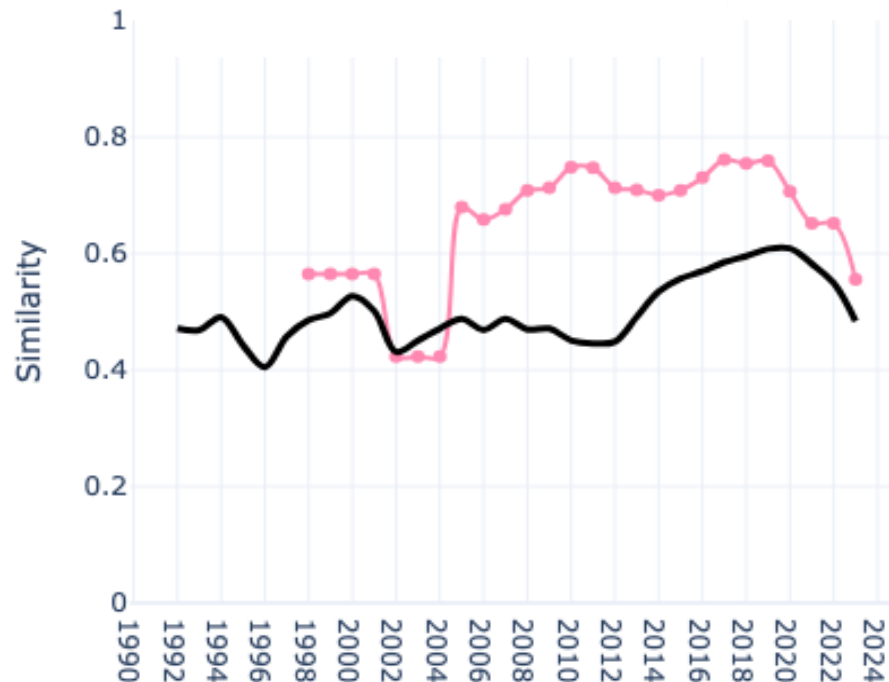
European Union

## Compared with US   Compared with China

Estonia and US Similarity

We are hardening our critical infrastructure against **cyber attacks**, **disrupting ransomware networks** *and working to* **establish clear rules** *of the road for all nations as they relate to cyberspace*

We want to offer our perspective so as to ensure that human beings remain safe in this new world where **cyber-related threats** *are combined with conventional one.*

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Identifying potential collaborators through networks:
Central Africa

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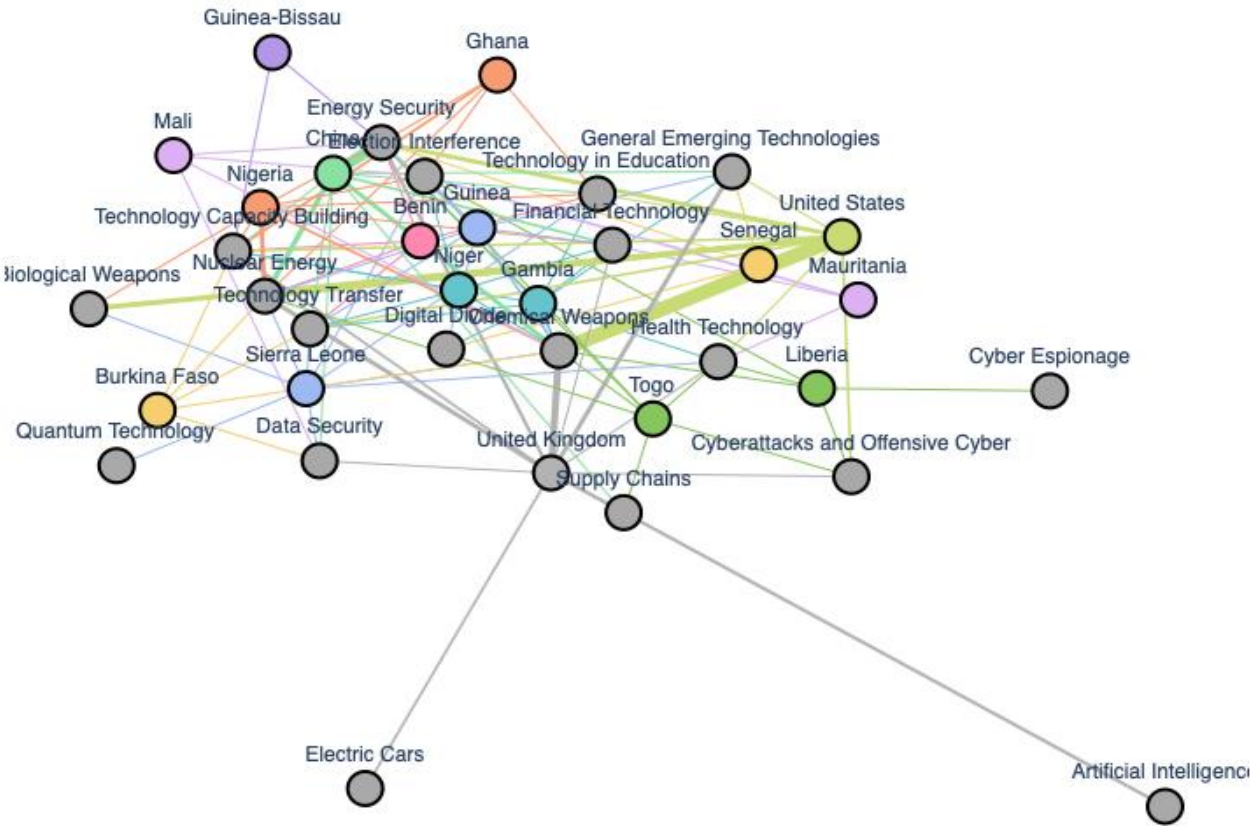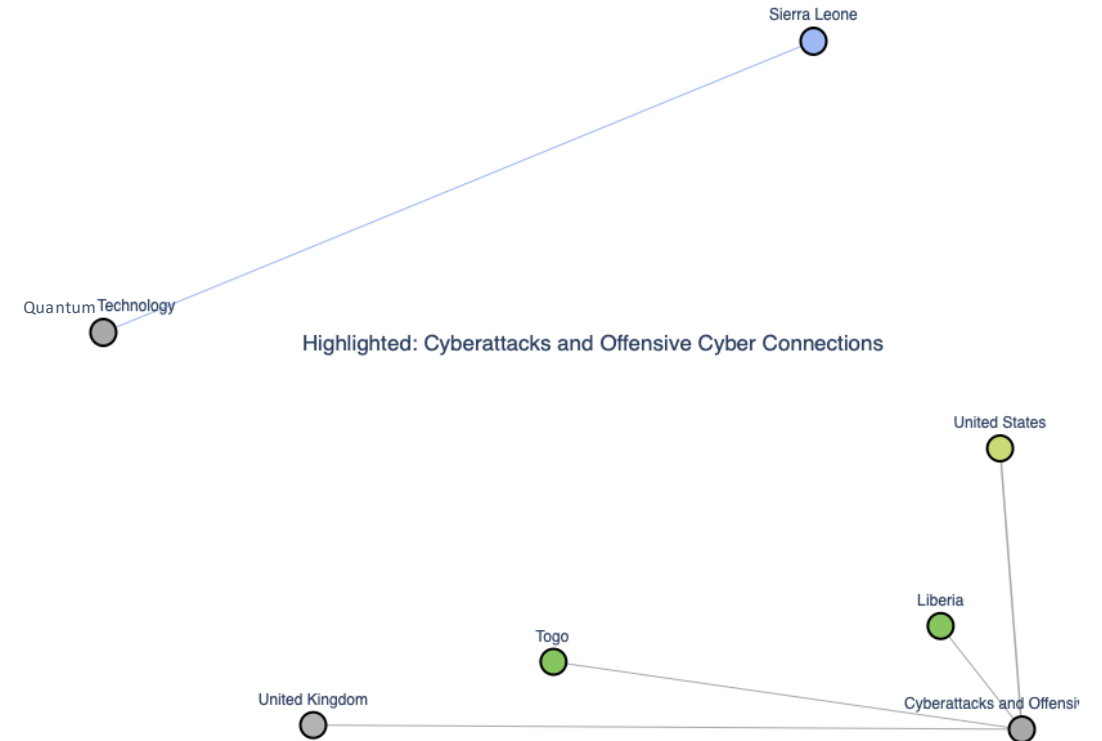
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Network of

Global Trade

Global Trade Network

Semiconductor Silicon Wafer ▾

2024 ▾

○ Full Network   ○ Top 20   ● Top 10
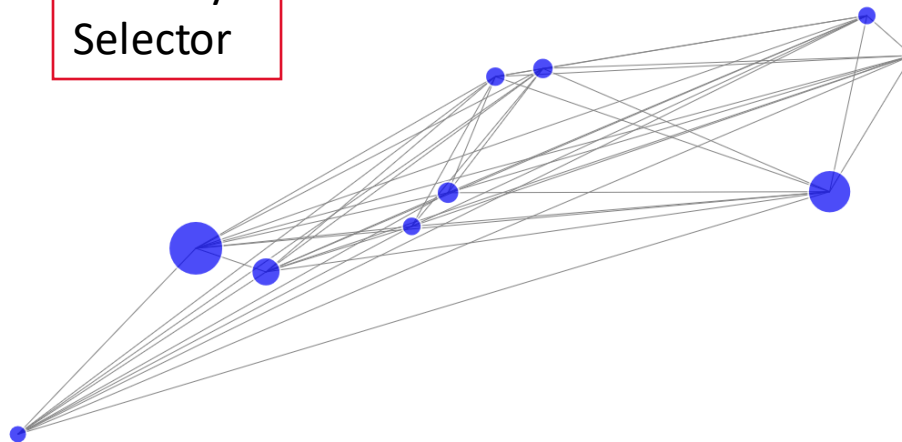
Select Country to highlight

Product Selector:
- Semiconductor Silicon Wafer
- Semiconductor Equipment
- Electronic Integrated Circuits
- Electronic Computers and Components

Country Selector

Year Selector:
- 2010
- 2020
- 2023
- 2024

Electronic Integrated Circuits ▾

2024 ▾

○ Full Network   ○ Top 20   ● Top 10

United Kingdom   ✕ ▾

United Kingdom
Total Trade Partners: 10
Top 3 Trade Partners: USA, Thailand, China
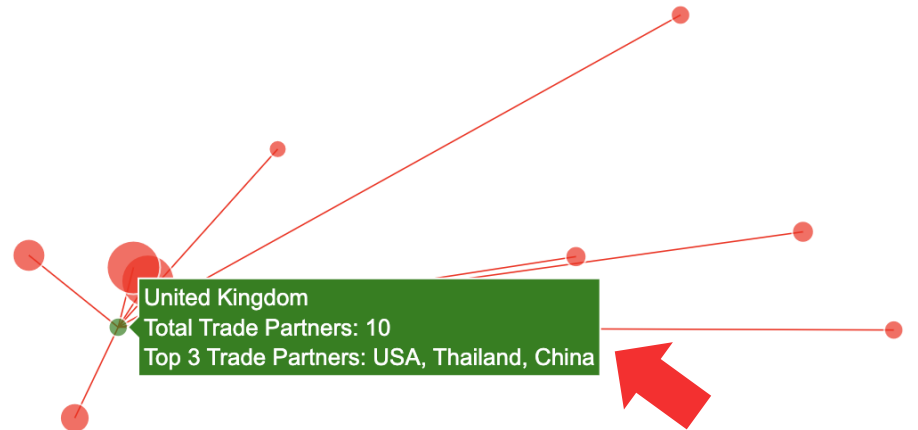
Top Trade Partners

Analysis

- Shift in Dominance: Decline in China & Taiwan export dominance in semiconductor silicon wafers, semiconductor equipment, integrated circuits, and computing components due to geopolitical tensions and strategic diversification.

- Emerging Hubs: Southeast Asia (Malaysia, Thailand, Vietnam) and Europe (Netherlands, Czechia) rising as new manufacturing centres, driven by lower operational costs, regulatory advantages, and reduced geopolitical risk.

- China and Taiwan: Aggregated due to UN Comtrade Database, China makes up for 40% of Taiwan's imports and exports.

Trends in Global Trade - UK Focus

- Despite these shifts, the UK maintains a stable growth in imports and exports of the global supply chain of these technology products.

- UK's growing presence in semiconductor equipment and computing sectors indicates significant potential to strategically engage with emerging global manufacturing clusters and strengthen bilateral partnerships (e.g., UK-Japan Digital Partnership).

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Analysis

Artificial Intelligence (AI)

- **2000-2004**: Once dominated by US and UK, shifts toward diversified collaboration including Hong Kong and Canada.

- **2005-2014**: China emerges as prominent collaboration hub, boosting overall global collaborations.

- **2015-2025**: Research further spreads and becomes priority for Australia, Netherlands and South Korea.

Engineering Biology

- **2000-2004:** Engineering Biology was strongly USA and European Nations, China reliant only on US.

- **2005-2025:** China becomes major research collaborator, rivalling USA, UK, Germany, and Italy.

Quantum Technology

- **2000-2004:** Quantum Technology dominated by Germany, US, and UK.

- **2005-2025**: China grows collaborations with Europe (Germany, UK, and Austria). Towards end of year range, China strategically diversifies with Australia and Japan.

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Analysis

- AI research is transitioning from Western-centric dominance toward inclusive global participation, notably China and Japan.

- Engineering Biology has expanded beyond Europe to more global collaboration, prominently featuring the US, UK, China, and South Korea.

- Quantum Technology remains European-centric but is broadening to include Indo-Pacific collaborators like Australia and Japan.

Trends in Research Networks - UK Focus

- AI research bridge between Europe, North America, and increasingly Indo-Pacific.

- Engineering Biology is pivoting toward China as a key research partner.

- Quantum Technology remains Europe-centric, with Switzerland emerging as a new key partner.

- Germany is the UK's most consistent partner but increase with Indo-Pacific nations shows diversification.

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Policy

Recommendations

1. Strategic Global South Engagement

- Quantum tech: Kenya, Namibia, Sierra Leone, Belize.

- Cybersecurity: Togo, Liberia, Gabon, Mauritius, Panama, Jamaica.

- Emerging tech cooperation: Sri Lanka, Nepal, Pakistan, Bangladesh.

- Champion energy security to offset Chinese influence.

2. Expand Indo-Pacific Engagement

- Tech transfer and digital capacity-building with India.

- Monitor trade with Malaysia, Thailand, Vietnam.

3. Leverage European Allies

- Increase tech cooperation: Germany, Netherlands, Czechia.

- Quantum partnerships: Austria, Greece.

- Cybersecurity & AI: Baltic states.

4. Deepen Transatlantic Alliances

- Strengthen ties with underutilised partners: Canada & France

**Decision Making
for the FCDO**

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Optimise Existing Tools

- Use data insights for targeted diplomatic outreach.

- Track policy effectiveness; inform funding decisions.

- Extend tools to Cabinet Office, DBT, MoD, UKRI, DSIT, RIN.

Expand Data Applications

- Analyse 2024 UN speeches for policy influence.

- Broaden UN Comtrade data usage for defense assessments.

- Use Open Alex data to guide targeted R&D funding.

Integrate New Data Sources

- Regional bodies (ASEAN, AU, OECD), standards orgs (ISO, IEC, IEEE).

- Separate Taiwan-China trade data for more accurate trade insights.

**Data Science
Implementation**

Questions?

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CAITLIN RUSSELL, GRANT BENTON,

JUAN I. PIQUER & RHEA SONI