EYE OF EUROPE

# Futures of Science and Conflict

*Workshop Results*

HYPERLINK "http://www.**futures4europe.eu**"www.**futures4europe.eu** -

# Document Information

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# 1 Background and Introduction

Supported by the European Union (EU) as a Coordination and Support Action, the "Eye of Europe (EoE)" project aims to enhance the integration of foresight methodologies into Research and Innovation (R&I) policymaking across Europe. To this end, the initiative encompasses ten collaborative pilot activities that address topics of mutual interest within the R&I foresight community.

The selection of topics for the pilot program was conducted according to a multi-method approach, including a series of expert interviews, surveys, and consortium dialogue focused on collecting and analysing perceptions of future research fields and topics for the European Research Area (ERA) (detailed process is available in Deliverable 3.1(link)).

Citing the war in Ukraine and other conlfict areas around the world, the topic of Science and Conflict was selected as one of the most important issues for the R&I foresight community to address. As geopolitical tensions increase, ongoing conflicts intensify, and the plausibiity increases for new conflicts to emerge, it was deemed importatn to begin mapping the possible impacts on European scientific research communities and technology development stakeholders.

## 1.1 Methodological Approach

The Futures of Science and Conflict workshop was designed to accomplish several goals as aligned with the Eye of Europe project. Namely, the workshop was designed for a limited number (20-30) of expert participants, with parallel goals: a) bringing highly informed, but very diverse perspectives to bear on the complex convergence of scientific communities and various groups associated with defense, diplomacy, and international relations, and b) In accordance with the Eye of Europe project goal of contiuing to build a topic-focused pools of experts with a growing futures literacy to support further strategic foresight initiatives.

While it was noted early in the process that a three-hour online workshop would be insufficient to tackle the complexities and nuances of changing relationships encompassed by this broad topic area, the workshop was also designed to help foster futures literacy regarding the development of morphological scenarios (See Figure 1) . This approach to scenario development included basic research into Factors related to this topic, a pre-workshop participant survey for assessing research results and collecting additional Factors.

During the workshop, participants selected several Key facotrs to consider for the development of future scenarios. To accomplish this, the results of the Factor survey were reviewed, discussed and assessed by participants highlighting factors with both high impact and high uncertainty. Participant suggestions were also reviewed and assessed along the same axes, to support open and reflexive strategies for creating the scenarios.



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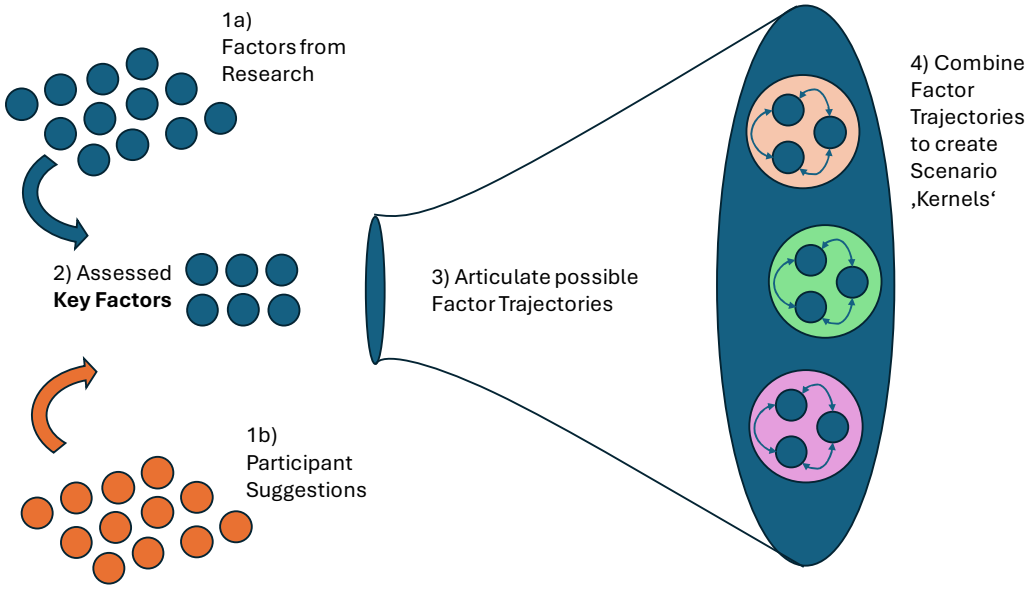


*Figure 1 - The Futures Cone*

The morphological potential for each of the key factors was discussed and articulated through the use of the Tetralemma method – providing a structured process for expanding the spectrum of possibilitiy under consideration. Then, using the results of the tetralemma activity, scenario 'kernels' were developed in small groups – each sketching a scenario narrative for future foresight work to further develop.



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## 1.2 Workshop Results

### 1.2.1 Pre-workshop Survey results

The pre-workshop survey results included questions related to the key factors that had been identified in STEEPLE research preceding the workshop.

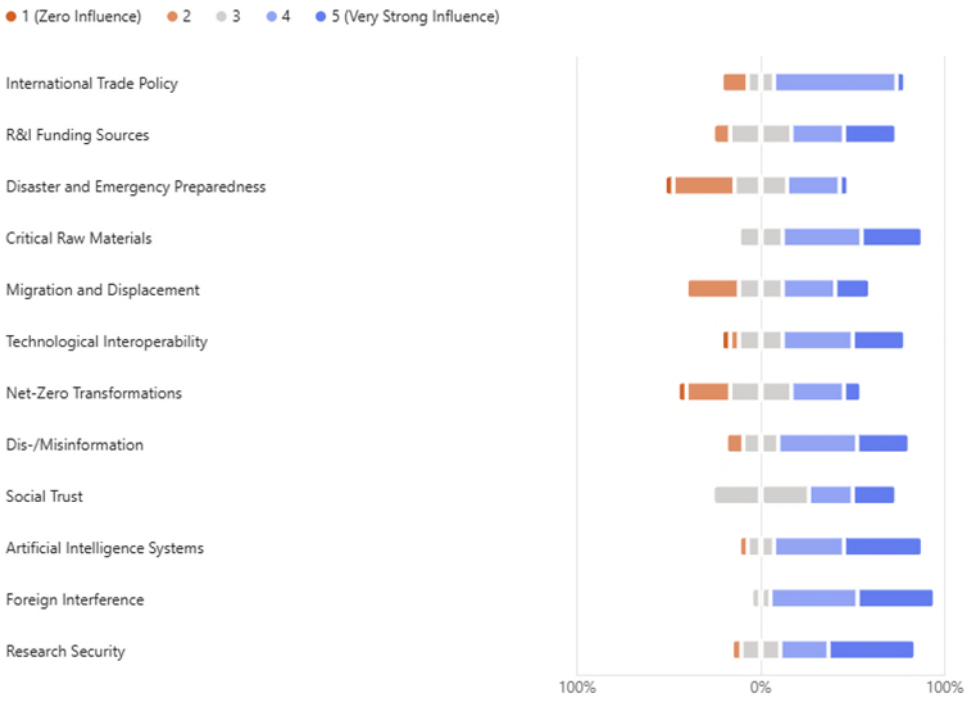


*Figure 2- Results of Factor Assessment survey conducted pre-workshop.*

In addition to the Factors that emerged from the literature review component of the research, the pre-workshop survey included a question field wherein participants could submit additional factors or issues in response to the prompt: *Are there additional factors that you would like to see discussed during the workshop? Issues or topics that you believe will play an important role in shaping the future intersections of science and conflict.*

This prompt resulted in 21 additional topics of interest ranging from more specific aspects of some of the research results on technologies (e.g. AI-enhanced decision making) to legal regimes (e.g. Intellectual property and patent laws) to societal perspectives (e.g. socio-economic representation in science, religion,



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and polarised society). The participant suggestions were reflective of the diverse expert backgrounds that were reflected in the workshop invitees. The full list of suggested factors influencing the Futures of Science and Conflict included:

*Table 1 - Initial factors to be examined*

| Participant Suggestions for Topic and Issues effecting the Futures of Science and Conflict | | |
|---|---|---|
| Military and Defence Research | Intellectual Property (IP) and Patent Laws | Geopolitical Alliances and Regional Influence |
| Cybersecurity and Digital Sovereignty | Global Health Crises | Space Exploration and Technologies |
| Public Health Research | Epidemiological Surveillance | International disparities in research, investment, & access |
| Socio-economic representation in Science | Free mobility, access & Inclusivity | Great Power Politics |
| Polarized Society | Resilience of R&I | Sun Flares |
| Collective Intelligence | AI-enhanced decision-making | Religion |
| Trust and ethical progress | Media narratives public perception of scientific advancements | Anthropological Aspects |

## 1.2.2 Factor Assessment and Selection

During the workshop, the first phase was participants assessment of the factors derived from desk research. This assessment was conducted through a voting system on the digital collaboration board, and asked participants to vote for two of the factors with the greatest future uncertainty. These assessments then focused the first participant discussion towards those factors that were gauged as most uncertain: Artificial Intelligence Systems, Disaster and Emergency Preparedness, Foreign Interference, International Trade Policy, Social Trust. The topics of Dis-/Mis-information, Technological Interoperability, and Migration and Displacement also received votes, and some participants left comments on these topics, though they were not the focus of plenary discussion. Comments and insights from participants were recorded on the digital whiteboard, and the arguments for specific factor's potential impacts were carried forward into the second



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phase of the workshop.

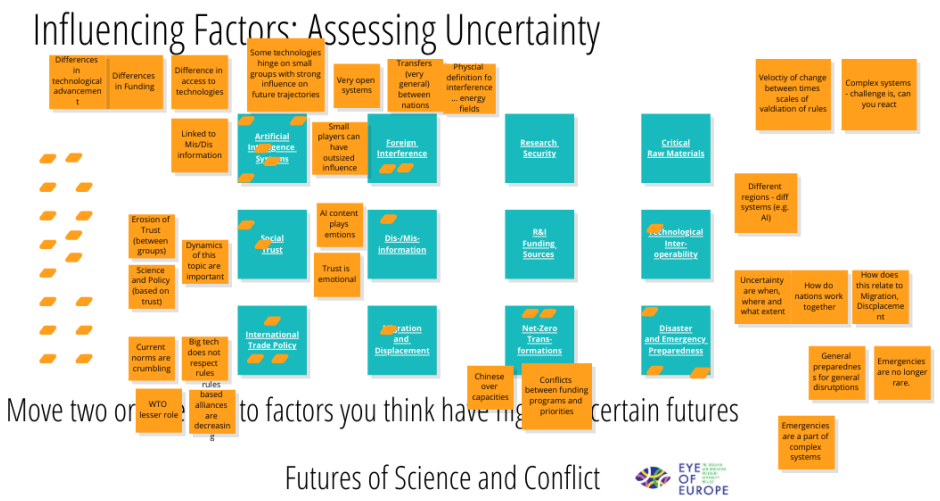


*Figure 3 - Assessing the key factor results during the workshop. Participants assessed the percieved uncertainty and discussed the potential impacts of these factors.*

The additional factors submitted by the participants during the pre-workshop survey were also assessed in this manner, and discussed in a plenary discussion format. This is a critical allowance for scenario development workshops, as it provides new perspectives and opinions about dynamic factors to be brought into the conversation. After the assessment of the participant submissions (see figure X below), the topics of *1)Geopolitical Alliances and Regional Influence*, *2)Cybersecurity and Digital Sovereignty*, *3)Media Narratives and Public Perception of Scientific Achievements*, *4)Great Power Politics*, and *5)Trust and Ethical Progress* were the focus of extended discussion.

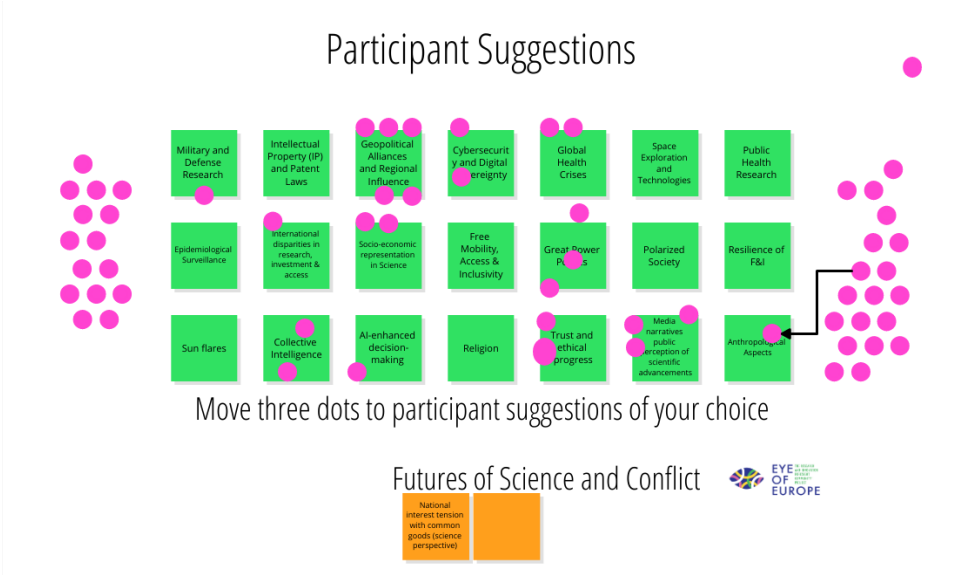


*Figure 4 - Participant voting on the participant suggestionf for additional factors.*



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After these assessment and discussion rounds, the participants were split into two different groups to facilitate more detailed discussions between participants, and to enable the workshop to address more of the highlighted factors effecting change and creating alternative futures of Science and Conflict.

In one group, the factors Artificial Intelligence Systems, Social Trust (in combination with Mis/Dis-Information), and International disparities and representation were taken up for further discussion in the second phase of the workshop. In the other group, the factors International Trade Policy, Great Power Politics and Geopolitical Alliances, and Disaster and Emergency Preparedness were taken up for discussion in small groups.

### 1.2.3 Key Factor analysis and discussion: Tetralemma

To take a more structured approach to examining our present day understanding of the spectrum of potential impacts that each factor may harbor with respect to the topic of Science and Conflict, the second phase of the workshop utilised a recently developed method in foresight know as the *tetralemma*. This method provides a structured way to organise discussions on possible futures using a diagram that outlines four distinct regions: A) Projected/Expected Future, B) Distinctive Divergence, C) Hybrid Futures (intersection of A and B), and D) Paradigmatic Shift (outside both A and B) (see figure below). Using this framework, each small group was asked to discuss what they considered to be a development for each of the factors that could fit inside each of these regions. Justifying how such a future might come about, or what might the factors impacts be if the factor developed toward each of these states, facilitates group conversations and can be a key starting point for scenario development following a morphological analysis.



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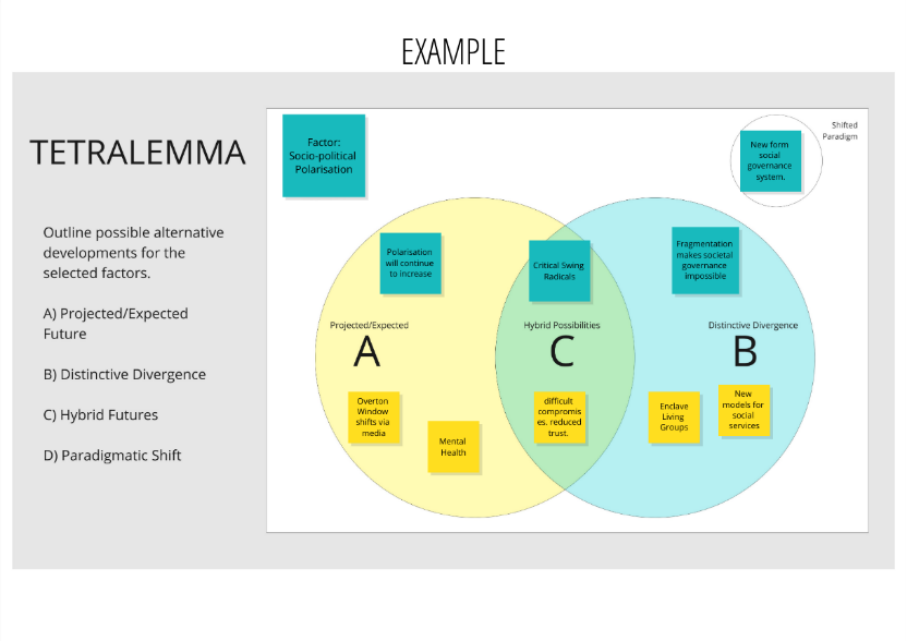


*Figure 5 - The standard template for the Tetralemma process (Credit Fraunhofer ISI)*

The different trajectories for each factor that emerge from the group work, not only help to establish the spectrum of possibilities that the group is willing to entertain for each factor, but also provides evidence of the general types of assumptions or biases of perspective that might be represented in the group. Both of these outcomes can be useful to building and critiquing alternative future scenarios. Below we list the summarised titles for the different trajectories for each of the factor that the groups were able to address in phase two of the workshop.

## Group 1 Tetralemma Results

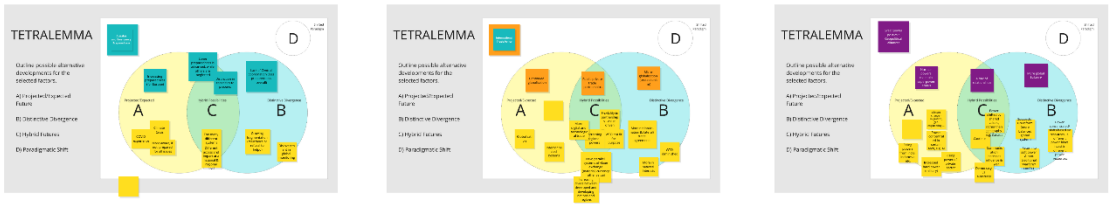


*Figure 6 - The tetralemma analysis of the three factors assigend from each group*

### Artificial Intelligence Systems

- **Projected/Expected Future** - Ecosystems of verified information
- **Distinctive Divergence** - information chaos /sending letters
- **Hybrid Futures** (intersection of A and B) – Human driven but AI supported



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- **Paradigmatic Shift** (outside both A and B) – Moratorium on AI development. Stop of AI / cyber attack.

### Social Trust (in combination with Mis/Dis- Information) – Not completed

- **Projected/Expected Future** - N/A
- **Distinctive Divergence** - N/A
- **Hybrid Futures** (intersection of A and B) - N/A
- **Paradigmatic Shift** (outside both A and B) - N/A

### International disparities and representation

- **Projected/Expected Future** – Increasing gap between communities with respect to access to emerging tech and science
- **Distinctive Divergence** – Parallel ecosystems are developing and highly politicized
- **Hybrid Futures** (intersection of A and B) – N/A
- **Paradigmatic Shift** (outside both A and B)- 1) Global catastrophe OR 2) Artificial General Intelligence (AGI) OR 3) emotional/cognitive advancements shift radically, reframe this conversation (science and conflict).

## Group 2 Tetralemma Results

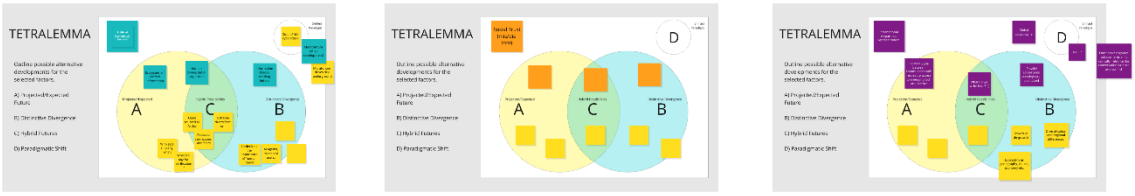


*Figure 7 - Tetralemma results from phase two activities.*

### International Trade Policy

- **Projected/Expected Future** – Continued Globalisation
- **Distinctive Divergence** – Micro-globalisation (protectionism)
- **Hybrid Futures** (intersection of A and B) – Publi/Private Trade Partnerships
- **Paradigmatic Shift** (outside both A and B) – Not Discussed

### Great Power Politics and Geopolitical Alliances

- **Projected/Expected Future** – Nuclear Powers Maintain Superpower Status
- **Distinctive Divergence** – More global Balance
- **Hybrid Futures** (intersection of A and B) – A mix of relationships



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- **Paradigmatic Shift** (outside both A and B)

### Disaster and Emergency Preparedness

- **Projected/Expected Future** – Increasing Preparedness for Europe
- **Distinctive Divergence** – Lack of Central Coordination (less overall preparedness)
- **Hybrid Futures** (intersection of A and B) - Some (member states') preparedness is advanced while others are neglected.
- **Paradigmatic Shift** (outside both A and B)

## 1.2.4 Scenario 'Kernel' Development

The development of scenario 'kernels' is an alternative approach to scenario development that can be particularly fruitful for outlining multi-faceted scenarios through the examination of limited sets of factor trajectories. Given the short time frame for the workshop, this method was used in more of a tutorial mode, though both groups were able to produce scenario kernels that might be of some utility. Participants noted that an extended time frame through which to build upon these kernels, or create entirely different scenario kernels would have been welcome.

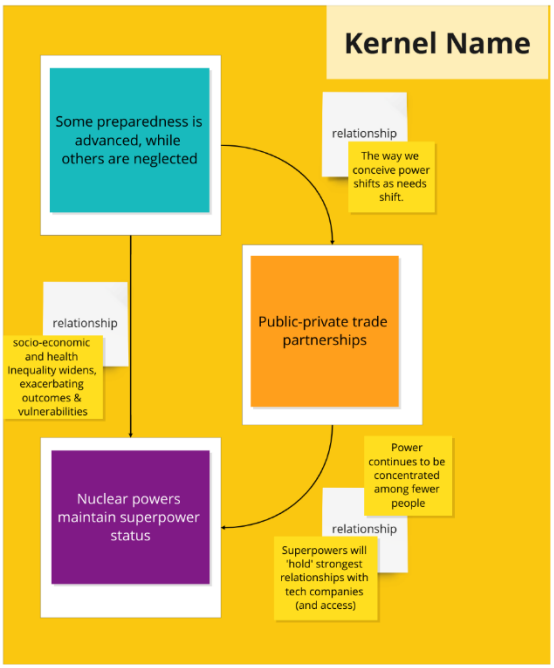


*Figure 8 - Scenario Kernel (unnamed) example of trajectories combined to make initial starting postions for the factors.*

The first kernel that was developed concerned a combination of one trajectory from three different factors:

- Some preparedness is advanced while others are neglected
- Public-private trade partnerships
- Nuclear Powers maintain superpower status

The interplay of these three potentials indicated that socio-economic and health inequality might widen, exacerbating outcomes and vulnerabilities, and power will continue to be concentrated among fewer people, organisations, and nations. With superpowers holding the strongest relationship with technology companies, the conception of power could shift. The implications for this scenario with respect to science and conflict could be that technology companies and superpowers may wield science as tactical and strategic tools or weapons in both cold and hot conflict situations. Reconceptualising how science is done with respect to the power centers it supports has broader implications for how scientific discoveries and inventions would be valued and protected.



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The second scenario kernel that was mostly completed (cut short due to time constraints) outlines a potential future in which:

- Information Chaos /sending letters (analog)
- Parallel Ecosystems developing – politicized
- [AI is an] Ecosystem of verified information

In this scenario, participants imagined that a stae of information chaos so strong that analog communication methods become necessary once more. This development could be enough to encourage the emergence of parallel information and communication ecosystems to emerge, working to maintain the integrity and verifiability of communications. The impact on social trust and the erosion of liberal values, democracy, and human rights were viewed as key possibilities with strong implications for scientific communities. The politicization of information ecosystems may lead to the development of verification systems to rebuild social trust.

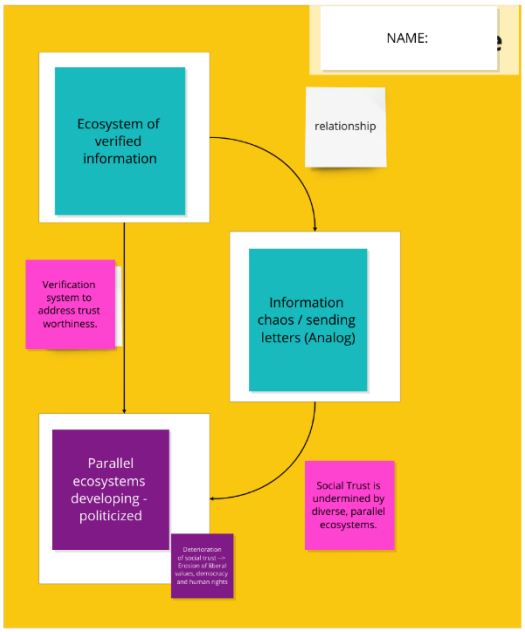


*Figure 9 - Another example of the scenario kernel method*

## Conclusions

In all, the workshop demonstrated how to build a good atmosphere for hosting participant groups composed of diverse experts, and how to move through the main phases of a scenario development process in relatively limited time frame. While participants stated that more time would have been helpful, there was also a sense of accomplishment and desire to go further into the scenario development, and to utilise the scenarios at a later time.

Procedurally, lessons learned include better use of pre-workshop recruitment process to help with the identification of factors before the workshop, and potentially allow for assessment and argumentation to be conducted in a dynamic Delphi program. Also, time estimates for each phase of the workshop could have been better adhered to, keeping the planned agenda on track. Creating more time for participants to engage with the different trajectories and scenario kernels, would have benefitted both the process and reflection on the scenarios with respect to the alternative possible futures .



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# ANNEX 01

## Influencing Factors

In strategic foresight exercises, 'factors' are trends, topics, and issues across social, technological, economic, environmental, political, legal, and ethical (***STEEPLE***[1]) that influence the future development of a system or systems that are the focus of the foresight project. Given the broad topic area of *Futures of Science and Conflict* workshop, the context factors selected for the registration survey were chosen to reflect the very different perspectives that can be brought to bear on stakeholder relationships in times of increasing geopolitical tensions. Below we present an account of the registration survey context factors, and some initial outlines of how these factors both influence and are influenced by scientific stakeholder groups and different types of conflict.

### Artificial Intelligence Systems

Different types of artificial intelligence systems are being widely deployed across both the contexts of scientific research and conflict zones. These systems are radically changing approaches to scientific research and data analysis across multiple fields, including enhanced simulation and automated experimentation. As different fields adapt A.I. systems to their specific needs, they also advanced the capabilities of A.I. systems that might be used in other contexts. At the same time, algorithms and automation are deployed in both conflict zones (e.g. computer vision, data analysis, cybersecurity) and as modes of informing strategic decision making with respect to geopolitical positioning and actions. At the same time, critics and sceptics of the role of A.I. in these contexts would question the accuracy and ultimate utility of such tools in either context. A (very limited) selection of reference material:

- *Morgan, F. E., Boudreaux, B., Lohn, A. J., Ashby, M., Curriden, C., Klima, K., & Grossman, D. (2020). Military applications of artificial intelligence. Santa Monica: RAND Corporation.*
- *Davis, P. K., & Bracken, P. (2025). Artificial intelligence for wargaming and modeling. The Journal of Defense Modeling and Simulation, 22(1), 25-40.*
- *Hunter, C., & Bowen, B. E. (2024). We'll never have a model of an AI major-general: Artificial Intelligence, command decisions, and kitsch visions of war. Journal of Strategic Studies, 47(1), 116-146.*

### Foreign Interference

Foreign interference refers to actions taken by a foreign entity or government to influence or manipulate another country's internal affairs, often to achieve political, economic, or social objectives. In the context of scientific research this can include intellectual property theft, providing financial support to influence research agendas, or the interference with scientific studies through means like data manipulation. With respect to geopolitical tensions and conflict, foreign interference can include many different activities, including but not limited to military or insurgent operations, espionage, influencing domestic political processes, and the destabilisation of governance.

- *Walker-Munro, B. (2025). National security, foreign investment & research security: the current state of art. Griffith Law Review, 1-22.*

[1] Curnin, S., Brooks, O., & Brooks, B. (2025). The Scenario Quality Assessment Method : A New Technique for Verifying the Quality of Scenarios. Futures & Foresight Science, 7(1), e205.



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- *Shih, T., Chubb, A., & Cooney-O'Donoghue, D. (2024). Scientific collaboration amid geopolitical tensions: a comparison of Sweden and Australia. Higher Education, 87(5), 1339-1356.*

### Research Security

Research security refers to the measures and practices implemented to protect the integrity, confidentiality, and availability of research activities and outputs. Security measures help to guard against unauthorized access or misuse of results and provides protections against interference by external actors. These measures include, but are not limited to, scrutiny of collaboration and funding partnerships to help identify problematic conflicts of interest, supporting publication integrity, and maintaining ethical compliance to standards and policies. These measures combined with data security and intellectual property protections can reinforce (inter)national security, counter espionage, and provide resilience against efforts to undermine trust in scientific research.

- *Shih, T. (2024). The role of research funders in providing directions for managing responsible internationalization and research security. Technological Forecasting and Social Change, 201, 123253.*
- *Walker-Munro, B. (2025). National security, foreign investment & research security: the current state of art. Griffith Law Review, 1-22.*
- *Bamberger, A., & Huang, T. Y. (2025). From irreversible openness to protectionism: geopolitics and international research cooperation in the European Union. Journal of Education Policy, 40(1), 19-43.*

### Critical Raw Materials

Critical raw materials (CRMs) are natural resources that are essential for the functioning of modern economies and technologies, particularly in sectors such as energy, defense, electronics, and transportation. Nations face risks related to the concentration of CRM resources in specific regions, leading to potential supply shortages during geopolitical conflicts. As such, during conflicts, control over CRMs can become a strategic objective with nations seeking to secure supply routes or access to deposits. At the same time, these vulnerabilities can spur research into the discovery and development of new sustainable alternatives and advanced materials, creating new methods of extraction and recycling, and leading to new or expanded theatres for interdisciplinary collaboration.

- *Vivoda, V., Matthews, R., & Andresen, J. (2025). Securing defense critical minerals: Challenges and US strategic responses in an evolving geopolitical landscape. Comparative Strategy, 1-35.*
- *Tercero Espinoza, L., Kroll, H., Stijepic, D., Bettin, S., Favreuille, S., Mesbahi, Z., Udrea, T., Forsberg, E.M., Pauna, V., Baxter, J. and Ladikas, M., 2024. The role of research and innovation in ensuring a safe and sustainable supply of critical raw materials in the EU.*
- *Di Ciommo, M., Veron, P., & Ashraf, N. (2024). The EU and China in the Global South: Perspectives from African countries. ECDPM Discussion Paper 373. Maastricht: ECDPM.*

### International Trade Policy

International trade policy refers to the regulations, agreements, and frameworks that govern trade between countries, influencing the flow of goods, services, and capital across borders while promoting economic growth, protecting domestic industries, and supporting fair trade practices. Trade policy can facilitate international scientific research collaboration by allowing for the open exchange of knowledge and expertise, cooperating to secure essential resources, and securing continuous and adequate funding. Tensions and conflict can result in restrictions and sanctions that impact research supply chains by limiting resource availability (e.g. critical raw materials) or access to equipment and reducing opportunities for foreign investment and collaboration. Complex trade regulations also increase the burden on researchers and institutions to ensure they remain compliant with all applicable laws, restrictions, and export controls.



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- *Kelly, M., & O'Rourke, K. H. (2024). Industrial policy in the shadow of conflict: Lessons from the past. Europe's Economic Security.*
- *Klasen, A., Krummaker, S., Beck, J., & Pennington, J. (2024). Navigating geopolitical and trade megatrends: Public export finance in a world of change. Global Policy, 15(5), 1007-1014.*
- *Antràs, P. (2024). The Uncharted Waters of International Trade (No. w33312). National Bureau of Economic Research.*

### R&I Funding Sources

R&I funding sources refer to the various financial resources allocated to research and innovation coming from different stakeholders, including but not limited to public funding, private sector funding, philanthropic funding, venture capital investment, and international funds. These funds are central to scientific research endeavours, but they can be threatened during times of tension and conflict. Disruptions to funding channels (cancelled grants and projects), and shifts in funding priorities (e.g. reallocating research funds to military and security spending) can have significant impacts on scientific research agendas and communities – decreasing current and future talents, hindering international collaboration, and straining relationships in the community given the new, highly competitive funding environment.

- *Brandão, A. S., & Santos, J. M. (2024). Sustainability from Policy to Practice: Assessing the Impact of European Research and Innovation Frameworks on Circular Bioeconomy. Sustainability, 16(6), 2355.*
- *Shih, T. (2024). The role of research funders in providing directions for managing responsible internationalization and research security. Technological Forecasting and Social Change, 201, 123253.*
- *Lima-Toivanen, M., Kulju, M., Sanchez Nieminen, G., Martins, J. T., & Moraes Dos Santos, A. (2025). Science diplomacy in the European and Latin American and Caribbean research infrastructure collaboration. Science and Public Policy, 52(1), 1-15.*

### Technological Interoperability

Technological interoperability refers to the ability of different systems, devices, applications, or technologies to work together and exchange information effectively, regardless of their underlying architecture or design. This can include, but is not limited to, syntactic interoperability (e.g. common data formats and structures), semantic interoperability (e.g. consistent, and shared meaning of exchanged data), technical compatibility (for hardware, software, and network protocols), and the capacity for systems to work together in real-time operations. These capacities can help allied nations in a conflict more effectively coordinate the exchange of information and use of available capabilities, in turn strengthening resilience by fostering common frameworks and reducing dependencies on singular actors.

- *Zaccaro, A. (2024). Securing Europe: safeguarding of the Baltics as a starting point for a more cohesive defence approach. European Policy Review, 16.*
- *Edgell, R. (2025). Sociotechnical Pathways: From Satellites and Stations to Envisioning Commercial Lunar Gateways and Beyond. In AIAA SCITECH 2025 Forum (p. 0612).*
- *Seaman, J. (2020). China and the new geopolitics of technical standardization. Notes de l'Ifri, 34, 20-21.*

### Migration and Displacement

Armed conflicts, political instability and economic factors can all be drivers of migration and displacement with people fleeing to escape violence, persecution and political oppression, ethnic strife, threats to their safety in pursuit of safer environments with better opportunities. This can result in some resources might be reallocated to examine the effects of migration and displacement in fields like public health, social sciences, environmental studies, and economics. At the same time, migration and displacement can result in talent mobility – leading to new pools of skilled individuals in the workforce (including in scientific research pursuits), and new opportunities for scientific exchange and collaboration.



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- *Borrelli, L., Pinkerton, P., Safouane, H., Jünemann, A., Göttsche, S., Scheel, S., & Oelgemöller, C. (2022). Agency within mobility: Conceptualising the geopolitics of migration management. Geopolitics, 27(4), 1140-1167.*
- *Gaweł, A., Mroczek-Dąbrowska, K., Głodowska, A., & Wach, K. (2025). Caught in suspension–the pivotal shift in the career intentions of international students in times of geopolitical tumult: Ukrainians at universities in Poland. Globalisation, Societies and Education, 1-15.*
- *Mastrorillo, M., Scartozzi, C. M., Pacillo, G., Menza, G., Desai, B., Maviza, G., ... & de Dinechin, F. (2024). Towards a common vision for climate change, security and migration in the Mediterranean.*

Dis-/Misinformation

Misinformation and disinformation pose significant challenges to scientific research, as they can erode trust in science and evidenced based policy through the distortion of results and findings, By skewing public understanding and perspectives on various topics (e.g. public health, climate change issues, conflicts, etc.), dis- /misinformation can influence decision-making and policy creation, ultimately impacting societal responses to critical issues. While research continues on modes of tracking and countering dis-/misinformation, their persistence creates barriers against collaboration, conflicting narratives, and sows distrust, thus slowing some scientific research.

- *Herman, B. C., Poor, S., Clough, M. P., Rao, A., Kidd, A., De Jesús, D., & Varghese, D. (2024). It's not just a science thing: Educating future STEM professionals through mis/disinformation responsive instruction. Journal of Research in Science Teaching, 61(8), 1925-1974.*
- *Alonso García, S., Gómez García, G., Sanz Prieto, M., Moreno Guerrero, A. J., & Rodríguez Jiménez, C. (2020). The impact of term fake news on the scientific community. Scientific performance and mapping in web of science. Social Sciences, 9(5), 73.*
- *Diekman, C., Ryan, C. D., & Oliver, T. L. (2023). Misinformation and disinformation in food science and nutrition: impact on practice. The Journal of Nutrition, 153(1), 3-9.*

Social Trust

Social trust refers to the belief in the reliability, integrity, and competence of others within a society, including individuals, institutions, and systems. It encompasses the expectations that people have about the behaviour of others, thus influencing openness to cooperation and social cohesion across a community. Social trust impacts public engagement with scientific research and the acceptance of research findings and the recommendations that are based on scientific results. These impacts can help determine the effectiveness of evidence-based policy, and manipulated or weaponised scientific research can undermine trust eroded social trust can. During times of conflict, maintaining social trust requires transparent communication and efforts to counter misinformation.

- *Mizser, C. (2023, September). The War that also Destroys Trust. An Outlook Towards Some Possible Solutions. In 2023 IEEE 21st Jubilee International Symposium on Intelligent Systems and Informatics (SISY) (pp. 000151-000156). IEEE.*
- *Chen, D. S. (2025). How Can Science and Technology Policy Study Contribute to Better Democracy and Human Freedom?. East Asian Science, Technology and Society: An International Journal, 1-10.*
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Net-Zero Transformations

Net-zero transformations refers to the comprehensive changes required across various sectors of the economy to achieve net-zero greenhouse gas emissions. This implies balancing the amount of greenhouse gases emitted with the amount removed from the atmosphere, ultimately targeting a net-zero emissions goal. Achieving net-zero typically involves decarbonisation, carbon removal, and systemic changes to economic systems, infrastructures, etc. While achieving net-



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zero emissions requires significant advancements in technology, driving scientific research in areas such as renewable energy, energy storage, carbon capture, and sustainable materials. At the same time, conflict and tensions exert a strong influence on the transformation: destabilising science communities, redirecting resources away from research, and increasing energy costs and emissions in some cases.

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### Disaster and Emergency Preparedness

Disaster and emergency preparedness are developed to help limit the impacts of crises and ensuring effective responses and scientific research plays a role in enhancing preparedness through data analysis, innovative solutions, and policy development. However, conflicts and geopolitical tensions can significantly hinder these efforts, impacting resource allocation, infrastructure integrity, and public trust. Addressing these challenges requires a coordinated approach that prioritizes resilience, community engagement, and collaboration among various stakeholders. This type of preparedness often entails risk assessment activities, contingency planning and training, acquiring storing and maintaining supply lines to resources, and opening lines of engagement with communities, all of which can see funding drained off in the face of conflict.

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