



# Governance of Revolutionary Technology

## Facilitator Guide

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# Facilitator Guide

## Use the future to build the present: An introduction to Anticipatory Science Diplomacy

Welcome to the Quantum Diplomacy Game, where you'll learn to navigate the rapidly shifting frontiers of science and technology—and shape tomorrow's diplomatic landscape. Developed by the **Geneva Science and Diplomacy Anticipator (GESDA) Foundation** and the **Open Quantum Institute (OQI)** this experience highlights how scientific breakthroughs expected at 5-, 10-, and 25-year horizons (<https://radar.gesda.global/>) can drive transformative changes in society, geopolitics, and the global economy. You will discover how anticipatory science diplomacy can help leaders in academia, policy, business, and civil society devise informed decisions today to ensure that tomorrow's technologies benefit all humanity.

### The three pillars of Anticipatory Science Diplomacy

- **Science anticipation**

Scientific innovation is accelerating, bringing opportunities to solve our most serious challenges—but also potential risks. By peering into the future of quantum technologies, you will experience how diplomatic strategies can be shaped before new science is deployed. In the game, you'll practice ways to harness the benefits of cutting-edge research while keeping potential ethical, social, and environmental implications in full view.

- **Honest brokering**

Scientific advances open new pathways for society—but only if we can build trust, manage diverse viewpoints, and translate discoveries into real-world applications. In the game, you'll learn to facilitate discussions among stakeholders with different goals and agendas and build public-private partnerships between the academic, diplomatic, business and citizen communities. Expect to test how effectively you can foster collaboration, promote transparency, and expand the range of possible solutions.

- **Global and multilateral action**

No single nation can tackle global challenges alone. Through scientific cooperation and inclusive governance frameworks, we can bridge divides in a multipolar world. During each round of the game, you will broker treaties, negotiate resource-sharing agreements, and design frameworks that ensure quantum breakthroughs remain equitable and accessible across borders—directly supporting the United Nations Sustainable Development Goals (SDGs).

### Why this game matters

This serious game provides an experiential learning opportunity to see firsthand how emerging technologies like quantum computing are reshaping international collaboration. As you negotiate alliances and resolve crises, you will gain insights into the geopolitical, ethical, and normative factors influencing tomorrow's science-driven world. Become an anticipatory leader, harness the transformative power of quantum breakthroughs and drive multilateral action for the benefit of all.

**Think creatively about the world you want to help create – use the future to build the present!**



# Objectives of the game

## To explore issues as

- **Governance imperatives:** What does it mean to own a technology and its outputs, and are there (or should there be) imperatives to limit or share technologies that could better the world?
- **Technology governance principles:** What decisions on governing principles could different parties make that will direct the use of quantum computing towards more beneficial use cases? We will map the stakeholders, their relative influence and their likely interests at the time, to better understand the possibilities for early intervention that could lead to better outcomes in the future.
- **Technology regulation:** What happens in the absence of technology regulation, and what would ideal regulation look like? How can we regulate before we know what the technology might do?
- **Allocation of responsibilities:** What should be done, and by whom, to avoid negative futures and to enable positive futures?
- **Solutions:** What is the interplay between national and international systems, and how might solutions be fostered and develop between the two?

## To provide a stronger appreciation for

### Science anticipation

- The understanding of the **potential of quantum computing** and its applications
- The **importance of anticipation** in science diplomacy to devise governance frameworks for frontier science, but also the cost of not anticipating
- **Navigating scientific uncertainty**, particularly when it relates to anticipating future science and technology advances which are still largely theoretical

### Honest brokering

- The **power imbalances** that can be created by limited ownership of disruptive technologies
- The nature of technology development and ownership of **intellectual property**
- How to steer **science towards benefits for society** and minimize risks, dual-use applications and unintended consequences
- **How to reconcile competing** interests among stakeholders
- The **complexity of trust** in expertise and of the plurality of views within science
- The value of **multi-level technology governance**
- **Perspective-shifting** to understand how scientists, diplomats and other stakeholders operate in their respective mindsets

### Global and multilateral action

- Understanding **multilateral processes**, diplomatic protocol, science advice to governments and the role of science in international negotiations
- How diplomacy is evolving to **encompass stakeholders other than governments** (e.g. academia, private sector) and how corporates (especially tech companies) are becoming more powerful geopolitical actors than governments
- The **acceleration of the dialogue** between science, diplomacy, philanthropy, and society to co-shape the future
- The implications of **scientific developments** on **geopolitical relationships** and vice versa
- The value of **intermediaries/brokers** with the ability to speak to all stakeholders

# Background: Anticipatory Science Diplomacy simulation game

This simulation game is divided into three parts.



## Part 1 Seeing the future

At the opening, participants will be presented with the world in 2035 when large-scale quantum computing has been achieved, issues and conflicts related to the access to the technology are coming to the fore.



## Part 2 Using the future to build the present

The scenario then rewinds to the present and asks delegations from fictional countries and organizations to explore what decisions could be made to mitigate the negative 2035 situation.



## Part 3 Evaluating science diplomacy in practice

The game leads participants to reflect on ideal futures and then respond to the fictional scenario from the perspective of their assigned characters, and in doing so, generate dynamic circumstances to which they must respond.

The game will explore the governance, peace and security, intellectual property, supply chain, human rights, ethics and capacity building aspects of quantum technologies, and teach participants skills such as anticipation, international negotiation, diplomatic protocol, science advice, honest brokering and multilateral science diplomacy.

## Characters and roles

The game has 15 different characters participants can take on. Ahead of the game, characters will be assigned and each participant will be provided with a card containing confidential instructions outlining the interests and objectives for the game, as well as conflicts their character has with other characters.

The characters will negotiate according to the instructions defined in their cards. The objective of the game is for participants to respond to the fictional future scenario from the perspective of their assigned characters in the present (using the future to build the present).

The result should be a 'world' that is moving towards a positive outcome to the challenges outlined in the scenario, a world where quantum computing is deployed for the benefit of all humanity in support of the Sustainable Development Goals (SDGs).



### Head of delegation

These are those participants that act as ministers of foreign affairs.



### Member of delegation

Participants will be organized in delegations from fictional countries, composed of representatives from the government, academia, private sector, civil society and international organizations, all involved in quantum technologies.



### Chair

One participant will act as chair during the negotiations of delegations in the plenary and facilitates discussion within delegations.



# Preparing for the game

Facilitators have full access to the following resources to support their preparation:

**Resource 1:  
Facilitator Guide****Resource 2:  
Game Resources**

A set of game cards, character plaques and the game PPT with embedded videos

**Resource 3: Discussion Guide**

Optional templates to support the discussion flow

**Resource 4:  
Participant Guide**

This resource explains the key objectives of the game, its fictional scenario and presents the country profiles which will help participants to position themselves with their assigned character

The Open Quantum Institute Intelligence Report on '[Quantum Diplomacy for the SDGs](#)' is a good supplementary reading material for those wanting to dig deeper.

In advance of the game, it is recommended to circulate the Participant Guide to all participants. This can be the day before or on the day, prior to the game, so that participants become familiar with the scenario and the country profiles.

Depending on the level of experience, facilitators on average will need 4-8 hours to prepare for the game (content-wise). In addition, the time to take care of the logistics for hosting the game will need to be added.

## Setting up for the game

- Participants will be seated around a U-shaped or square configuration, with the Chair sitting at the head table.
- Character plaques with the character role will be placed in front of participants so that everyone can see their role.
- Provide pens, paper and the Discussion Guide in front of each participant.
- Each participant is assigned a character card describing the role, to be worn in a lanyard around their neck.

## Allocation of characters

- Number of characters: 15
- Option A: If there are more participants than characters, multiple games can be played in parallel, which allows for a comparative discussion and debrief about the different outcomes the groups achieved.
- Option B: Another possible configuration is for participants to play in pairs.
- Option C: You can also combine Option A and B by keeping all players for the intro in the plenary in the same room, split them right after for the negotiation rounds into 2 or more groups, depending on the number of players, and then have everyone join Part 3, the debrief.

# Game structure

**Duration:** The minimum recommended duration for the game is 2 hours, although it can be compressed if time is limited (but it will be very fast-paced).

**Context:** The fictitious context for the game in the present day is the International Multi-stakeholder Symposium on Quantum Computing, convened by Bria National University (BNU) to discuss how to ensure that the core value of common good is upheld in quantum technologies and its outputs.

## Part 1 / Step 1 / 15 min. Seeing the Future

 Plenary

At the opening of the game, the facilitator(s) provide some opening remarks.

+ Game PPT - introduction

The facilitator then presents participants with the world in 2035 scenario, when large-scale quantum computing has been achieved and issues and conflicts related to access to the technology are coming to the fore.

+ Game PPT - videos, presenting the future scenario

The goal of the game will be to negotiate and make decisions to mitigate or avoid the 2035 scenario they have just seen, and to steer towards the preferred outcomes, where quantum technologies are developed and deployed to serve all society, and their risk and negative impacts are avoided.

The facilitators use this time to clarify any questions from participants about the game.

## Part 2 / Step 2 / 15 min. Defining delegation positions

 Convene in delegations (4 groups)

Delegations convene to review and align on their positions, objectives and negotiation strategy. Each delegation comprises scientists, business people, NGOs, and government officials from Bria and other Quantum States, as well as national and international industry and civil society groups and representatives of multilateral organizations. Characters have been designed to be in conflict with other stakeholders, but also in internal tension with other characters from the same country (e.g. business vs government, or government vs academia), which adds realism to the game. The facilitators work with the Chair of the meeting (a neutral representative from a real or fictional international organization, e.g. UNESCO, OQI) to review the procedures and game plan.

+ Game PPT, character cards, character plaques

## Part 2 / Step 3 / 20 min. Negotiation Round 1

 Plenary

Delegations return to plenary around the negotiation table. The heads of delegation (ministers of foreign affairs) deliver an opening statement (2 minutes each), after which the floor is open for discussion among all delegates. If all participants follow correctly their instructions, the negotiation will result in deadlock.

## Part 3 / Step 4 / 20 min. Informal consultations

 Convene in delegations (4 groups)

The Chair pauses the negotiation and instructs delegations to reconvene and engage in informal negotiations. The Chair mediates to help steer the process towards an agreement, proposing a package of initiatives that can benefit all stakeholders – although this will involve trade-offs for everyone.

## Part 3 / Step 5 / 20 min. Negotiations Round 2 and closing

 Plenary

Delegations return to plenary around the negotiation table and continue the negotiations based on the agreements achieved during the informal negotiation phase. After some time, either one delegation or the Chair proposes the terms of an agreement which can be subject to a vote, or the Chair can announce a period for the delegations to flesh out the details and reconvene after 6 months or one year.

## Part 3 / Step 6 / 30 min. Conclusions and debrief

 Plenary

The primary aim of the game is for participants to consider the governance and policy decisions (and the difficulty of implementing these) required to avert a crisis situation caused by the lack of anticipation. It is for them to think about what types of information, action, or collaborations they might require, the difficulties of obtaining it, what challenges their policy decision might result in, and how they might get around these to negotiate an equitable and sustainable future. It is therefore not the final outcome or decision that matters, but the understanding of the dependence, limitations and requirements of global governance of new technologies.



# Debriefing guide

## About the scenario

Throughout the game, participants can use the empty Discussion Guide to ensure they have touched on key themes to discuss.

Facilitators can use the completed Discussion Guide (next page) as a script during the debrief to ensure all important points are covered in Part 3.

## CHANGE

- How can we govern a technology that does not exist yet?
- How were decisions made with incomplete information and scientific uncertainties?
- What were the sources of power and influence of the different actors?
- What helped get to agreement and what blocked it?
- What are the limits of scientific cooperation and knowledge sharing in the face of security, economic and geopolitical pressures?
- What are the risks of acting in your scenario? What are the risks of doing nothing? What are the costs of not anticipating?

• \_\_\_\_\_

• \_\_\_\_\_

## About your experience in the game

- To what extent were you supported or limited in your positions and red lines?
- How did you feel acting in different/opposed role from what you do in real life? What was most exciting? What was most uncomfortable?
- To what extent did your own behaviour and attitudes (in real life) determined the outcome of the negotiation?
- What were the opposing forces you can see and how might these be balanced?
- What were the biggest limitations in your knowledge and the risks involved?
- What were your biggest realizations/aha-moments about science diplomacy?

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• \_\_\_\_\_

## Discussion guide

On the table below, we have listed some possible responses that facilitators might use as prompts if teams get stuck.

The blank template on the following page should be copied and issued to each delegation. It is designed to help guide their ideas about potential areas of intervention. Teams are encouraged to generate possible responses in each sector. Response ideas might range from awareness raising campaigns through to stringent regulations. Deciding on the 'mix' and 'level' of governance response is all part of the debate!



### Hardware and Supply Chain Access

**Develop redundancy** in each country building quantum computing infrastructure (e.g. build their own fabrication plants)  
**Sign free trade agreements** that allow for tariff-less movement of hardware and other goods related to quantum computing  
**Support research** into cryogen-free quantum computing systems to reduce reliance on coolants like liquid helium  
**Discourage standardisation** to reduce over-reliance on common components and encourage diversification of system design



### Targeting Investment and Funding

**Establish strong competition** through funding application processes and sector awards for the best research projects  
**Create a global quantum research fund**, proportional to country research strength, to support the best research globally  
**Match private-led funding** for quantum computing research with government funds one-to-one  
**Use global development funds** to subsidise the development of quantum computers in states that otherwise could not afford it



### Intellectual Property Rights and Regulation

**Increase the length of time** that **patents** for quantum computing technology are valid for  
All parties to the Patent Co-operation Treaty agree to **establish a Public Good exemption for patents** as evaluated by a global Board  
**Establish a quantum computing "patent pool"** so that technology and benefits can be shared between participants  
**Redefine patents** to allow for global coverage across all jurisdictions  
**Develop a unitary patent system** for uniform patent protection and enforcement across multiple jurisdictions, reducing costly validation and examination processes  
**Provide accessible information and financial assistance** to small and medium-sized companies (SMES) to increase the uptake of IP



### Scientific and Cultural Collaboration

**Centralise all the best quantum computing researchers** into a single global centre based in Bria  
**Provide pooled global funding for researchers** to spend time in overseas research institutions  
**Regulate** that a certain percentage of **quantum computing time must be accessible**/allocated to members of the public  
**Set up a global standards committee** for quantum computing with representatives from relevant jurisdictions



### Building Awareness and Social Licence

**Fund public advertising campaigns** to inspire people to take up careers in quantum computing  
**Establish a global Quantum Media Centre** to act as a clearinghouse for journalists/media organisations and quantum computing experts  
**Develop principles for quantum computing science communication** to avoid overhype and false expectations  
Run surveys, focus groups, and polling to **identify the key challenges** that the public wants to prioritise



### Capabilities building and workforce development

**Develop and fund specialised quantum literacy** and skills training **programmes** at all levels of education  
**Develop a formally accredited Quantum Educators training program** to equip educators with learning resources, tools and systems access for teaching quantum  
**Set up a national or regional forum** to improve industry-academy collaborations with the aim of preparing the future workforce for quantum  
**Establish a globally accredited quantum education programme** for further education  
**Develop a global open-access educational platform** to provide the public with free resources and material on quantum  
**Set up funding and scholarship schemes** promoting diverse access to quantum computing education for underrepresented groups, as well as individuals/organisations working outside of the traditional areas of quantum



### Security

**Develop cryptographic systems** that can withstand quantum computers (Post-Quantum Cryptography)  
**Migrate to future cryptography schemes** that are safe for quantum use  
**Monitor standardization efforts**



 <p>Hardware and Supply Chain Access</p>	
 <p>Targeting Investment and Funding</p>	
 <p>Intellectual Property Rights and Regulation</p>	
 <p>Scientific and Cultural Collaboration</p>	
 <p>Building Awareness and Social Licence</p>	
 <p>Capabilities building and workforce development</p>	
 <p>Security</p>	
 <p>Other Ideas</p>	

## Aide-Memoire: All potential characters in the game

This list includes all possible characters in game play. Depending on the number of workshop participants, each group may be bigger or smaller so facilitators may decide to leave some characters out. Each character will bring a new dynamic to the discussions, so to decide which ones to prioritise for their own teaching and learning objectives, facilitators may wish to consult the next section on potential tensions that could be discussed and debated.

Below are 'Character Tensions and Interests' that are printed at the back of each character card. These are prompts for the characters motivations and possible conflicts of interest.

### Bria



Bria has the reputation of being uncompromising in diplomatic negotiations, particularly in order to protect its own economic and political interests (tech supremacy). This has been viewed unfavourably by neighbouring states.

**Conflict** with the nation of Solte - ongoing dispute over a small region that has great hydropower capacity, which has resulted in a few military skirmishes.



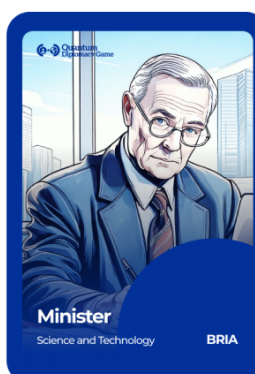
**Interest** in Medormar Corporation: Medormar Corporation has been responsible for lobbying the government to invest heavily in quantum tech R&D, which is the HOD's highest priority.

Medormar Corporation also has first-right-of-refusal with Bria National University to commercialise any IP produced by the Department of Physics in quantum computing, which would potentially allow them to maintain exclusive IP rights over any technology that is developed.



**Conflict** with nations of Lauze and Solte: Medormar Corp has been investing in advanced engineering and manufacturing capacity in Bria, which has led to an influx of skilled workers from neighbouring countries, Lauze and Solte. These countries are concerned about the impacts of 'brain drain' on their economies, but Medormar is not bothered.

**Interest** in Bria National University: Medormar Corp has first-right-of-refusal with Bria National University to commercialise any IP produced by the Department of Physics in quantum computing, which would potentially allow them to maintain exclusive IP rights over any technology that is developed.



**Conflict** with government of Bria: Interest in pushing Bria's quantum tech for global good conflicts with the Bria government's interests in protecting its own innovation and economic interests.

**Conflict** with CEO of Medormar Corporation: Minister would like to see that Bria's quantum computing capabilities can be used for global public good - to address major global challenges. This creates a possible conflict with Medormar Corp's interest in commercialising quantum tech for the international market.

**Interest** in Bria National University: oversaw a major investment from the government into science R&D, which has been popular.



**Interest** in Medormar Corporation: supports the interests of corporations looking to secure IP, with the aim of protecting inventors' rights and incentivise innovation.

**Conflict** with Bria Minister for S&T and the Director of the Lauze Patent and Trademark Office: somewhat willing to compromise on stance on patents to support common good, but only if these changes do not disincentivise innovation. The Bria Minister for S&T and Director of the Lauze Patent Office are more intent on ensuring that quantum technology can be used for global good purposes.



## Lauze



**Conflict** with nation of Bria: General political mistrust of the government of Bria, particularly in light of a disputed border region between the two countries, which has resulted in ongoing military skirmishes.

**Conflict** with Betude Corp and Lauze National university: Less of a national interest in funding or prioritising the advancement of scientific R&D



**Conflict** with CTO of Betude Corp: Director advocates for public good exclusions to IP rights – which places them in conflict with the imperatives of Betude Corp. The CTO is concerned that any regulatory imposition will adversely impact Betude Corp's ability to commercialise their tech effectively and therefore impact on generating returns for investors.

**Conflict** with Chief Executive of Bria Intellectual Property Office: the CE of Bria's IP Office has a generally hardline stance against public good exclusions to IP, with the concern that it will disincentivise innovation.



**Interest/conflict** with CTO of Betude Corp: The VC is aware that technology investment is unlikely to increase under the newly elected Lauze government, and desires to explore new partnerships with industry to generate funding + ensure the viability of Lauze National University's ongoing research programmes. However the VC is also wary of the commercial interests Betude corp represents, and wants to ensure that the University's research agenda has some degree of negotiated autonomy – i.e. is not entirely dictated by corporate profit motives.



**Interest** in government of Lauze: The CTO is concerned that any regulatory imposition will adversely impact Betude Corp's ability to commercialise their tech effectively and therefore impact on generating returns for investors.

## Solte



**Interest** in progressing quantum diplomacy/ collaborations with the governments of Lauze, Bria, and Wakke



**Conflict** with governments of Solte, Bria, Lauze and Wakke, and in particular Medormar Corporation and the Chief Executive of Bria Intellectual Property Office: the Professor is strongly against the use of new technologies by states, billionaires and industry, and believes that no collective accords will avert the potential harms posed by quantum.

## Wakke



**Interest/Conflict** with the nation of Lauze: Lauze provides significant foreign aid to Wakke, although Wakke is conscious that it does not want to be overly reliant on other states. It has been investing in developing its own capacity and workforce over the years.

**Conflict** with Medormar Corp: due to perceived impacts on local economy from ongoing brain drain of skilled tech workers



**Interest** in Lauze: Wakke is highly dependent on foreign aid from Lauze, so the Ambassador has an interest in remaining on diplomatic terms with Lauze.

**Interest** in Bria and Solte: the Ambassador is interested in securing access to quantum resources, so as to avoid being dependent entirely on Lauze.



**Interest** in Director of Lauze Patent and Trademark Office: common interest in public good exclusions to IP rights, and interest in Minister for Foreign Affairs - Solte government: common interest in open research and knowledge sharing of quantum computing technologies

(Potential) **conflict** with nation of Bria: Idea Commons negotiates geographical licenses of patents at low cost, in order to make products affordable and accessible in the Global South. This may be in conflict with the economic interests prioritised by the Bria government, who are generally unwilling to be open to diplomatic compromise unless it is in their best interests to do so. In addition, potential conflict with Medormar Corp and Betude Corp: funding for the Ideas Commons NGO mostly comes from major tech company donors that Ideas Commons often needs to campaign against to get patent concessions.

## Chair



**Interest** in furthering cooperation amongst the nations of Bria, Solte, Wakke and Lauze in the area of quantum computing

## Notes



