INGSA-GESDA Simulation Game

QUANTUM WORLD BUILD

Governance of Revolutionary Technology

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3. Workshop Resources

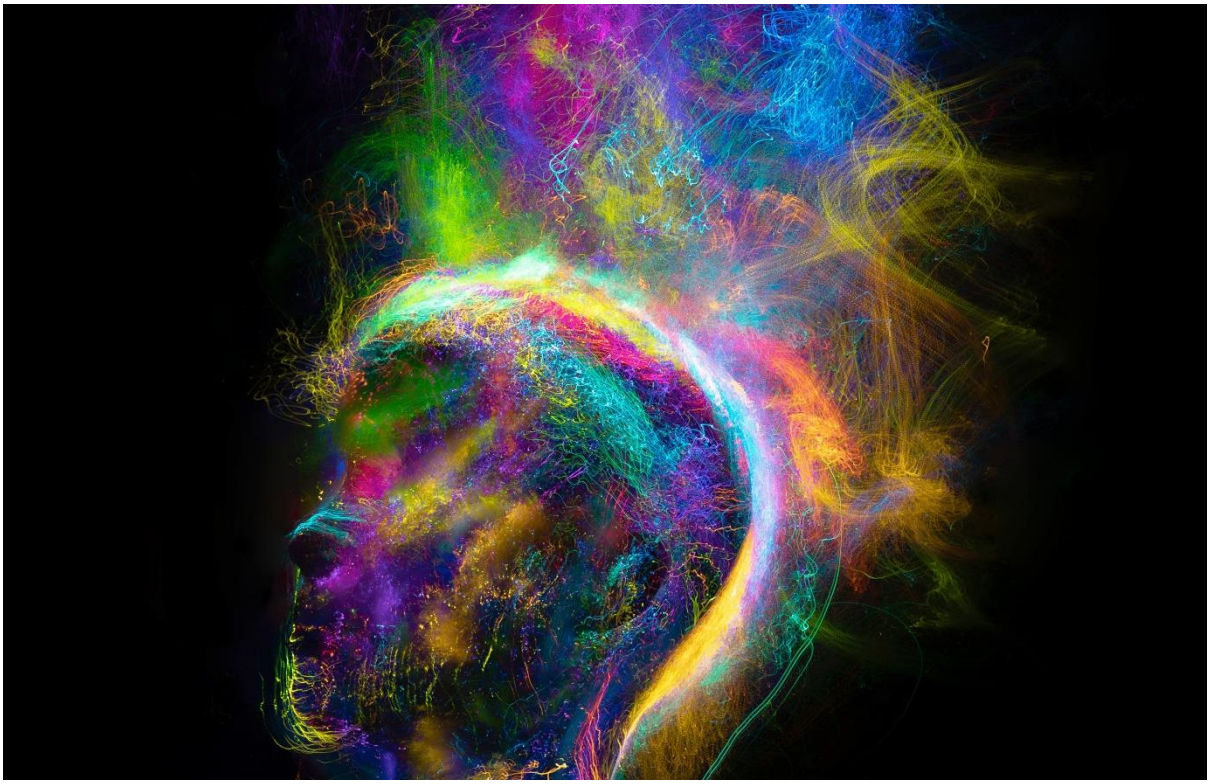
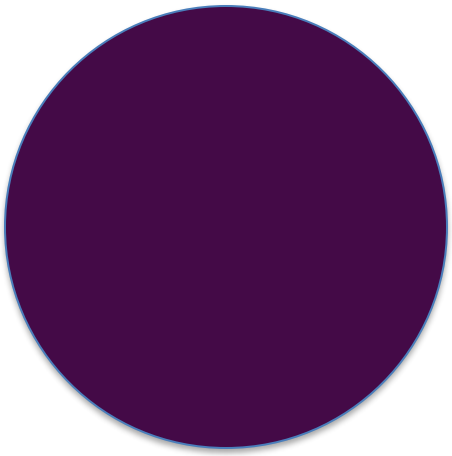
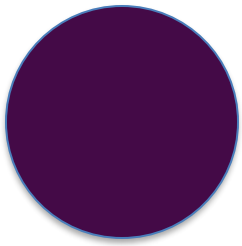


PHOTO CREDIT: Merlin Lightpainting - Pexel





About the Geneva Science and Diplomacy Anticipator Foundation (GESDA): An independent non-profit foundation under Swiss law and a private-public partnership with the Swiss and Geneva authorities, GESDA was created in 2019 to strengthen the impact and innovation capacity of the international community through science and diplomacy anticipation. For more information, please visit the Foundation's website: www.gesda.global

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The Wellcome Trust ● International Development Research Centre, Canada ● Royal Society London

INGSA is a New Zealand-based International Organisation hosted at the University of Auckland by *Koi Tū: Centre for Informed Futures*, and operating under the auspices of the *International Science Council*.

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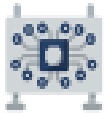
QUANTUM WORLD BUILD

Governance of Revolutionary Technology

Response template

The blank template on the following page should be copied and issued to each team for each round of 'world-building' the workshop allows. 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! On the table below, we have listed some possible responses that facilitators might use as prompts if teams get stuck.

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 good 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

	Hardware and Supply Chain Access	
	Targeting Investment and Funding	
	Intellectual Property Rights and Regulation	
	Scientific and Cultural Collaboration	
	Building Awareness and Social Licence	
	Capabilities Building and Workforce Development	
	Other ideas...	

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 would need to decide which characters to leave 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 we recommend sharing with the team members. These a prompts for the characters motivations and possible conflicts of interest. Recommended: Each Character outlines can be included on the back of the matching 'Character Card' for participant's easy reference.

List of potential characters

Bria (Large Global North) represented by:

- Head of Department, Physics - Bria National University
- CEO Medormar Corporation
- Minister for Science and Technology - Bria Government
- Chief Executive of Bria Intellectual Property Office

Lauze (Large Global North) represented by:

- Vice-chancellor - Lauze National University
- CTO Betude Corp
- Director of Lauze Patent and Trademark Office

Solte (Small Global North) represented by:

- Minister for Foreign Affairs - Solte Government
- Professor of Human-Centred Technology - Solte Technical University

Wakke (Small Global South) represented by:

- Wakke Ambassador to Lauze
- Managing Director - Ideas Commons

Independent:

- Policy Lead for Computing Technologies - UNESCO

Facilitator guide to character tensions and interests

BRIA

Bria (nation)

- 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.

Head of Department of Physics at Bria National University

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

CEO Medormar Corporation

- Conflict with nations of Lauze and Solte: Merdormar 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.

Minister for Science and Technology

- 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 Corp: 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.

Chief Executive of Bria Intellectual Property Office

- Interest in Merdormar Corp: 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

Lauze (nation)

- 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

Director of Lauze Patent and Trademark Office

- 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.

Vice-Chancellor of Lauze National University

- 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.

SOLTE

Solte (nation)

- Conflict with the nation of Bria: disputed region at border, which has great hydropower capacity. There has been ongoing military activity between the two states in the area.
- Conflict with Medormar Corp: due to perceived impacts on local economy from ongoing brain drain of skilled tech workers

Minister for Foreign Affairs (Solte)

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

Professor of Human-Centred Technology – Solte Technical University

- Conflict with governments of Solte, Bria, Lauze and Wakke, and in particular Medormar Corp and the CE 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

Wakke (nation)

- 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

Wakke Ambassador to Lauze

- 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.

Managing Director - Ideas Commons (non-state actor, NGO)

- Interest in Director of Lauze Patent and Trademark Office: common interest in public good exclusions to IP rights.
- 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.
- 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.

OTHER

Policy Lead for Computing Technologies - UNESCO

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

ABOUT INGSA

INGSA provides a forum for policy makers, practitioners, academies, and academics to share experience, build capacity and develop theoretical and practical approaches to the use of scientific evidence in informing policy at all levels of government.

Anyone with an interest in sharing professional experience, building capacity and developing theoretical and practical approaches to government science advice is welcome to join INGSA.

By signing up to the INGSA Network you will receive updates about our news and events and learn of opportunities to get involved in collaborative projects.

Go to http://www.ingsa.org for more information.

This simulation was developed under the auspices of the Geneva Coalition on Anticipatory Science and Diplomacy, initiated in 2021 by the Geneva Science and Diplomacy Anticipator (GESDA) encompassing 14 Swiss and global institutions to empower the current and next generation of leaders with a multilingual mindset in science and diplomacy.

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