



**GESDA Foundation proposes the
creation of an Open Quantum
Institute at Geneva within 5 years**

Press Release, 12 October 2022

Geneva Science and Diplomacy Anticipation Summit (12-14 October 2022)

GESDA Foundation proposes the creation of an Open Quantum Institute at Geneva within 5 years

(Wednesday 12 October 2022, Geneva) Peter Brabeck-Letmathe, President of the Geneva Science and Diplomacy Anticipation (GESDA), opened the second annual GESDA Summit on Science and Diplomacy Anticipation in Geneva on Wednesday with a proposal to create an Open Quantum Institute (OQI) within the next three to five years. The goal is to accelerate the availability of this emerging technology to project developers around the world, including those interested in using it to achieve the UN Sustainable Development Goals (SDGs). The proposal builds on the findings from the GESDA Science Breakthrough Radar® released last year and the discussions held on this topic at the first 2021 Summit. The 2022 edition of the Radar was released Wednesday. It provides an overview of the scientific disruptions that are likely to become operational in 5, 10 and 25 years in five areas of importance to humans, society, and the planet.

According to research firm International Data Corporation (IDC), governments and businesses will invest some \$16.4 billion in quantum computing by the end of 2027. GESDA wants to ensure that everyone has a role to play in this journey, and that the transformative impact of this technology is accessible to the entire global population as future quantum computers are eagerly anticipated.

The reason for the excitement is that these devices promise to solve currently intractable problems. Having access to these uniquely powerful computers could accelerate progress in crucial areas by enabling the development of more efficient drugs, cheaper fertilizers, longer-lasting batteries and more efficient solar panels. It could even kick-start advances in artificial intelligence with significant implications for a host of other sectors.

As conceived, the Open Quantum Institute will aim to provide global access to the cutting-edge technology of quantum computing when it becomes operational. The ambition for this Institute, whose possible contours will be presented and discussed for the first time during the 2022 Summit, is to give access to the development of quantum technologies to the most diverse groups and geographical regions so they can best tackle their own development challenges. A full feasibility study of the project is expected in 2023.

First Global Science & Diplomacy Curriculum & Youth Anticipation Initiative

The development and encouragement of science diplomacy is another priority of the GESDA Foundation, which, in light of the successful first Geneva Science Diplomacy Week organized this spring with 20 Geneva, Swiss and international partners, decided to pursue this approach. The aims are to build on Geneva's rich tradition of scientific diplomacy by

offering a comprehensive training program in this field and to disseminate the Science Breakthrough Radar® and make it a key resource for multilateral discussions and actions.

In this perspective and with this training spirit, GESDA launched in the summer of 2022 a pilot digital initiative from South Africa with Professor Mamokgheti Phakeng, a GESDA Foundation Board member and Vice-Chancellor of the University of Cape Town (UCT). She led an initial series of discussions with African youth on the major themes of the Radar. Three participants were invited to follow-up by contributing to the GESDA Summit. They will speak on Friday morning. As with last year, the Summit accords special importance to tomorrow's young leaders, who are invited to attend and share their thoughts during sessions. The three finalists selected from the Youth and Anticipation Initiative competition will be joined on stage by students and young professionals selected by our partners, the Villars Institute, Swissnex Network and Young Academies.

2022 Edition of the GESDA Science Breakthrough Radar®

The Foundation's main tool remains the GESDA Science Breakthrough Radar®, which is produced in partnership with the Fondation pour Genève. The 2022 edition describes significant advances on 28 emerging scientific topics (compared to 18 in 2021) in five areas: quantum revolution & advanced artificial intelligence, human augmentation, eco-regeneration & geoengineering, science & diplomacy, and knowledge foundations.

The number of scientists who contributed to the Radar is 774 (compared to 543 in 2021 = +43%). Their research covers 70 countries this year. It includes nine contributions on exploratory themes and puts greater emphasis on social sciences and humanities, notably aspects of philosophy and geopolitics, by describing trends and questions raised in these fields. It also examines ways that citizens can debate and act on emerging scientific issues.

Next year's geopolitical perspective will gain from a strategic collaboration with Professor Jean-Marie Guéhenno of Columbia University and the Geneva Centre for Security Policy.

Creation of an Impact Forum

To achieve these goals, GESDA is setting up an Impact Forum headed by Patrick Aebischer, GESDA's Vice President, whose mission is to provide the Foundation with the methods, expertise and financial resources needed for its development and growth. In particular, the aim is to obtain financial support from private and public non-commercial partners over the next ten years to finance core activities and to benefit the Geneva and Swiss ecosystems.

International political leaders' perspectives to conclude the 2022 Summit

The Summit will close with a political roundtable on diplomatic and scientific anticipation that brings together President of the Swiss Confederation and Federal Councillor Ignazio Cassis, Swiss Secretary of State for Education, Research and Innovation Martina Hirayama, and government ministers from Estonia, Mexico, Morocco, Singapore, and the United Arab Emirates.

The Summit program includes 20 interactive sessions focused on science and its anticipation. GESDA's proposed solution ideas will also be discussed in panels. Partner organizations such as CERN, the United Nations and XPRIZE will contribute to the program, which will be enriched, as it was last year, by a plenary session that is open to the public. This year's plenary, which looks at synthetic biology, will be held at the Graduate Institute.

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 scientific and diplomatic foresight. For more information, please visit the Foundation's website at www.gesda.global.

The 2022 Summit marks the entry of GESDA into a development phase after a three-year pilot phase. This spring, the Swiss and Geneva authorities who created GESDA came to the conclusion that it had clearly established itself as a major player in the service of multilateralism, and they decided to extend and reinforce their support for GESDA for ten more years (September 2022 - September 2032).

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- Jean-Marc Crevoisier (jean-marc.crevoisier@gesda.global)
- John Heilprin (john.heilprin@gesda.global)
- Téléphone : + 41 79 763 84 10



Fact sheet - Backgrounder

GESDA Foundation in a nutshell

October 2022

Use the future to build the present

with this vision, GESDA was established by the Swiss and Geneva Governments in September 2019 as a Swiss foundation and private-public partnership with global reach working from Geneva to develop an instrument of anticipation and action by focusing on public-private partnerships of international scope and projects capable of providing solutions to current and future technological challenges, turning them into opportunities and broadening the circle of beneficiaries of scientific and technological advances.

In the first three years of existence, GESDA managed to mobilise through its Board of Directors, its Academic and Diplomacy Fora as well as its Executive Team an outstanding global community to help operationalize the vision and develop the a pipeline of activities and products.

The GESDA Science Breakthrough Radar®

as the key flagship product that provides:

- A single point of entry for its various audiences to keep up with the unprecedented pace of science and technology,
- A glimpse of what more than 1,100 scientists predict will be the major scientific breakthroughs in 5, 10 and 25 years in five frontier areas of science: quantum revolution & advanced AI, human augmentation, eco-regeneration & geoengineering, science & diplomacy, and the foundations of knowledge.

The Geneva Science and Diplomacy Anticipation Summit

The Geneva Science and Diplomacy Anticipation Summit functions as an "Anticipatory Situation Room". Its first edition in 2021 brought roughly 1'000 participants to Geneva allowing them

- To debate 16 scientific breakthroughs that could transform the world.
- To take the pulse of what citizens, entrepreneurs and diplomats know, think, and do about the scientific disruptions currently cooking in the laboratories and that will become operational in 5, 10 or 25 years.
- To participate in the construction of solutions to ensure their effective deployment for the greatest number of people and thus accelerate the implementation of the UN 2030 Agenda.

The GESDA Solution Accelerator

The GESDA Solution Accelerator, presented for the first time, at the 2022 Summit, includes a pipeline of eight solution ideas emerging from the last Summit and currently being developed by academic-diplomatic task forces. The two most advanced solution ideas are:

The creation of an Open Quantum Institute in Geneva

the creation of an Open Quantum Institute in Geneva to allow the greatest number of people to have access to quantum computers within five years and to develop an open repository of humanity benefiting use cases for quantum computing. To prototype and crowd source ideas for such use cases, GESDA has partnered with the Californian XPRIZE Foundation, a global leader for large scale competitions, to launch a joint international contest aimed at developing the uses of quantum computing to accelerate the implementation of the 17 Sustainable Development Goals (SDGs);

The setting up of the first Global Science & Diplomacy Curriculum

The setting up of the first Global Science & Diplomacy Curriculum to train the current and future leaders in close collaboration with the University of Geneva, ETH Zurich and Lausanne, the Geneva Graduate Institute, University of Zurich, CERN, as well as with the Inter-Parliamentary Union and other diplomatic partners in Geneva and around the world. This includes a special programme to use the GESDA Science Breakthrough Radar® as a teaching tool called the Youth Anticipation Initiative launched online throughout Africa this Summer 2022 by GESDA Board Member, Ms Mamokgheti Phakeng, Vice Chancellor of the University of Cape Town.

To implement this first set of activities during the three-year pilot phase (September 2019 - September 2022) GESDA managed to raise CHF 10.1 million start-up funding from public partners (CHF 3.6m) and private philanthropy (CHF 6.5m).

Going forward

Based on these results, the Swiss and Geneva governments decided early 2022 (March 4 and April 13, 2022) to renew the Foundation for ten years and give it a long-term perspective. This scale-up phase of the Foundation is starting publicly with the 2022 Geneva Science and Diplomacy Anticipation Summit (October 12-14) and the official release of the yearly edition of the GESDA Science Breakthrough Radar® 2022.

Three main goals of GESDA scale-up phase:

This new phase articulates around three main goals:

- To bring the global scientific community to the table of multilateralism.

- To ensure that the benefits of science can be co-developed and enjoyed by most of the world's inhabitants.
- To offer in Geneva a space and infrastructure for honest debate and development of anticipation-driven solutions open to all.

Towards the creation of an Impact Forum

To achieve these goals, GESDA has just set up an Impact Forum led by GESDA's Vice-Chairman Patrick Aebischer, whose mission is to provide the Foundation with the instruments, expertise, and financial resources necessary for its further development and growth. In particular.

- To secure a strong financial support from private and public non-commercial partners over the next ten years to finance its core operations.
- To set up ad-hoc impact funds to provide the resources necessary to implement the most promising solutions and initiatives that will emerge from its Solution Accelerator.
- To increase the global audience and to make the Geneva and Swiss ecosystem benefit from it by mobilising Swiss assets such as scientific excellence, diplomatic know-how, the interest of citizens in world affairs (direct democracy, community life), and finally entrepreneurial innovation.

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Fact Sheet - Backgrounder

CREATION OF AN OPEN QUANTUM INSTITUTE

October 2022

The creation of an Open Quantum Institute (OQI)

GESDA is working to create an Open Quantum Institute (OQI) in Geneva with the goal of making quantum computing technology more accessible to developers around the world. This is one of the two main proposals (along with the creation of a global curriculum on science diplomacy) presented by GESDA at this year's Summit. As with all the Foundation's work, the goal is to expand the global circle of beneficiaries of scientific and technological advances. This proposal is already supported by several partners with whom GESDA has worked over the past year.

Over the past decade, major breakthroughs have occurred in the field of quantum research, which is gaining increasing attention. Investment in the quantum computing market by governments, publicly and privately funded institutions, venture capitalists and private equity firms is expected to "reach nearly \$16.4 billion by the end of 2027," according to the International Data Corporation's November forecast. IDC says the drive to bring quantum technology to the market mirrors the earlier advent of traditional computing, which will soon lack the power to solve many of our critical problems. IDC believes the industry will continue to grow through the use of quantum in new areas and new market segments.

Established IT giants like IBM and Microsoft are among the biggest players in quantum computing, but younger companies are also competing. The U.S. dominates the sector, but nations like Canada, China and the U.K. are gaining market share. At least 17 nations are working on quantum R&D. Still, too few people have access to quantum computers today, which limits our ability to identify new applications and anticipate how the technology could impact the world in the future.

That's why GESDA wants to create the OQI: to ensure that the transformative impact of this technology is also directed toward humanity's most pressing challenges. The new institute would also develop and host a repository of potential use cases – how users can interact with the new technology – in service of the UN's 17 Sustainable Development Goals (SDGs) for 2030.

The OQI will provide access to a large pool of quantum computers that researchers, developers, and students can use to explore new applications.

Quantum computers could help governments make progress toward achieving five major United Nations goals: the eradication of hunger; health and well-being; clean water and sanitation; clean and affordable energy; and climate action. In some key areas, quantum computers offer a significant advantage, such as when simulating chemical and biological processes. Quantum research also has helped with optimization problems – finding the best solution from a wide range of options.

Convinced that facilitating greater access to quantum technology will help GESDA achieve its goals, particularly in relation to supporting the SDGs, GESDA's president, Peter Brabeck-Letmathe, together with the two co-chairs of the quantum task force, Matthias Troyer, vice-president of Microsoft, and Anousheh Ansari, CEO of the XPRIZE Foundation, proposed the creation of the OQI in Geneva, which is home to a particularly conducive multilateral ecosystem. The proposal emerged from hundreds of ideas generated by the first Science Breakthrough Radar® and the first GESDA summit.

"Quantum computing will change the world. The excitement about quantum computers is based on the promise that these devices will solve currently intractable problems,"

Brabeck-Letmathe said. "Providing wider access to these uniquely powerful computers could accelerate progress in some crucial areas, enabling easier drug development, cheaper fertilizers, longer-lasting batteries and more efficient solar panels."

GESDA's proposal, which still needs further study, already has strong support. Among the academic supporters are CERN, the Swiss Federal Institutes of Technology ETHZ and EPFL, the University of Geneva, University of Calgary in Canada, University of Copenhagen in Denmark, Quantum Delta NL in the Netherlands, Forschungszentrum Jülich in Germany, Raman Research Institute in India, and the National Institute for Theoretical and Computational Sciences (NITheCS) and University of KwaZulu-Natal (UKZN) in South Africa. Compagnia di San Paolo Foundation, one of Europe's largest philanthropic foundations of banking origin, also endorses the project. Initial supporting industry partners include Microsoft, AQT, AWS, IBM, IQM Quantum Computers, PASQAL, Oxford Quantum Circuits and Strangeworks. In addition, permanent missions from several countries – Australia, Austria, Brazil, France, Japan, Malta, Mexico, Morocco, the Netherlands, Pakistan, Singapore, and Switzerland – have been actively involved in defining the multilateral relevance of a future Open Quantum Institute.

At this year's Summit, this solution idea will be discussed during the roundtable, "Building an Open Quantum Institute & GESDA-XPRIZE Contest" from 16:00-17:30 on Thursday, October 13, at Campus Biotech, Main Auditorium. This discussion will focus on technology as an issue of geopolitical importance, involving critical infrastructure for national security and innovation.

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Fact Sheet - Background

TOWARDS CREATING A GLOBAL CURRICULUM ON SCIENCE DIPLOMACY

October 2022

GENEVA
SCIENCE & DIPLOMACY
ANTICIPATOR

Towards Creating a Global Curriculum on Science Diplomacy

GESDA aims to establish anticipatory science and diplomacy as an academic subject, a mindset, and a new professional vocation. This is one of the two main proposals (along with the creation of an Open Quantum Institute) presented at this year's GESDA Summit. As in all our work, the goal is to expand the global circle of beneficiaries of scientific and technological advances.

Future leaders will need innovative educational frameworks, training approaches, and exchange platforms to better understand each other and work together. To achieve this, we focus on training leaders from all sectors: in STEM (science, technology, engineering, and mathematics), government, multilateral institutions, and the private sector. This will enable people who receive this training from the many Geneva-based institutions that are involved to communicate in both science and diplomacy, and to navigate more easily between disciplines and institutions. In short, we want to cultivate the art of "border-spanning".

When scientists make new discoveries in the lab, they typically don't know the practical uses or potential impacts, positive or negative, that those discoveries might have on society. Diplomats negotiating to solve global problems often don't know which scientific evidence or advances are the most likely to turn into solutions, since the technologies are changing so quickly.

Scientists and diplomats lack a common language, a common mindset, and a natural place to engage and exchange views. This is the gap that the global curriculum aims to fill. Initiated by GESDA, the Geneva Coalition for Anticipatory Science and Diplomacy convened 20 Swiss and international institutions from May 16-20 of this year to successfully design and implement the prototype of a global curriculum. This effort, which is part of a continuing process, is what we call Science Diplomacy Week, an immersion program and open forum in Geneva for current and future leaders in science and diplomacy. This interdisciplinary week will continue to encourage interaction and understanding among scientists and diplomats, helping to bridge thematic gaps between communities and make use of opportunities for conflict prevention and resolution.

Innovative new programs and forums like these offer new ways to train future scientists to better understand the potential ethical, legal, and societal impacts of their research and, conversely, new ways to train policymakers and regulators to better understand the balance between the benefits and risks, or misuses, of new scientific and technological advances.

The Youth Anticipation Initiative

Education, one of GESDA's priorities, is a universal concern for young people from all continents. The Foundation partnered with the University of Cape Town to set up the Youth Anticipation Initiative in the summer of 2022. Sessions were held on four themes: quantum revolution & advanced artificial intelligence, human augmentation, eco-regeneration & geoenvironment, and science & diplomacy. These made for interesting discussions with young people from South Africa and other regions. As part of a brainstorming competition on how scientific advances could be used to address local challenges, three young people were invited to attend the 2022 GESDA Summit.

Many challenges, including the COVID-19 pandemic, climate change, and food and energy crises, share three characteristics. They transcend national boundaries; no one country or sector can address them alone; and science is needed to understand them, or technology is needed to solve them. Building on the planned science platforms outlined in GESDA's Science Breakthrough Radar® as a content framework, the global curriculum will also look at innovative methods such as computational diplomacy and negotiation engineering.

"We propose to develop a global curriculum on science diplomacy to put scientific foresight at the center of multilateral decision-making on future global challenges," said Inter-Parliamentary Union Secretary General Martin Chungong, diplomacy co-chair of the Geneva Coalition on Science and Anticipatory Diplomacy.

"A fundamental premise of GESDA's work is that no single individual or organization has all the knowledge, capabilities or facilities needed to merge scientific anticipation and multilateralism," said Marga Gual Soler, academic co-chair of the Geneva Coalition on Anticipatory Science and Diplomacy. *"That's why we are looking at the many existing and emerging educational frameworks, training approaches, and teaching methods to build a global curriculum."*

At this year's summit, the two co-chairs will lead a solutions-oriented discussion, "Creating a Global Science Diplomacy Curriculum," from 14:00-15:30 on Thursday, October 13 at the Biotech Campus, Main Auditorium. It will focus on core competencies - knowledge, skills, networks - and design principles, as well as several pilot training programs.

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Fiche d'information

GESDA SCIENCE
BREAKTHROUGH RADAR®

October 2022

The 2022 GESDA Science Breakthrough Radar®

- A new tool for multilateralism, informed discussions, and concerted action
- A single point of entry to catch up with the unprecedented pace of science and technology
- A factual basis for eye-opening reflections on the impacts of future scientific discoveries for people, society, and the planet
- An interactive, evolving instrument

About the Science Breakthrough Radar

A Swiss foundation with global reach and a private-public partnership working from Geneva, GESDA was started in September 2019 to develop and promote anticipatory science and diplomacy for greater impact and multilateral effectiveness.

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- an interactive, evolving instrument

Scientific Platform	Emerging topics in the 2021 edition that will be updated and enhanced	New emerging topics extended into full briefs	New invited contributions
1 Quantum Revolution & Advanced AI	1.1 Advanced AI 1.2 Quantum Technologies 1.3 Brain-inspired Computing 1.4 Biological Computing	1.5 Augmented Reality 1.6 Collective Intelligence	<ul style="list-style-type: none"> • The Technology Opportunity for Digital Humanities and Art • AI for Science
2 Human Augmentation	2.1 Cognitive Enhancement 2.2 Human Applications of Genetic Engineering 2.3 Radical Health Extension 2.4 Consciousness Augmentation	2.5 Organoids 2.6 Future Therapeutics	<ul style="list-style-type: none"> • Xenobots and Computer-Designed Organisms
3 Eco-Regeneration & Geoengineering	3.1 Decarbonisation 3.2 World Simulation 3.3 Future Food Systems 3.4 Space Resources 3.5 Ocean Stewardship	3.6 Solar Radiation Modification 3.7 Infectious Diseases	<ul style="list-style-type: none"> • Polar Resources • Coral and Ocean Renewal
4 Science & Diplomacy	4.1 Science-based Diplomacy 4.2 Advances in Science Diplomacy	4.3 Digital Technologies and Conflict 4.4 Democracy-Affirming Technologies	<ul style="list-style-type: none"> • The Challenges and Opportunities of Sustainable Finance
5 Knowledge Foundations	5.1 Complex Systems Science 5.2 Future of Education 5.3 Future Economics	5.4 The Science of the Origins of Life 5.5 Synthetic Biology	<ul style="list-style-type: none"> • The Philosophical Lens • The Geopolitical Lens • The Future of Peace and War • Futures Literacy • How Machine Learning is Transforming Regional Economic Development

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