Annex to the G7 Science Ministers` Communiqué 2022
Further Implementation and G7 Science Working Groups

I. Processes regarding freedom, integrity and security in science and research and SIGRE Working Group

The G7 members acknowledge the values and principles articulated in the "G7 Common Values and Principles on Research Security and Research Integrity" paper, which is summarized below. We are resolved to advance the work of SIGRE, by developing best practices, a toolkit and a virtual academy for the research community. Furthermore, we encourage SIGRE to strengthen the linkage between its activities and other processes that pursue similar goals at the multilateral level in order to promote mutual learning and create more synergies.
In addition to the processes mentioned by the G7 Science Ministers, we acknowledge in particular the work of the OECD Global Science Forum on Research Integrity and Security as well as the ongoing work on the freedom in scientific research and academic freedom under the European Research Area and European Higher Education Area.

Executive Summary of the "G7 Common Values and Principles on Research Security and Research Integrity" paper

The G7 Working Group on the Security and Integrity of the Global Research Ecosystem (SIGRE) was established to develop principles, best practices, and a virtual academy and toolkit for research security and integrity. These products will outline the behaviours, systems, and processes needed to preserve the openness and integrity of the research ecosystem through the protection of valuable knowledge and technology assets where necessary. In doing so, it will inform how international collaboration can continue with confidence. The following definitions and lists of common values and principles were developed collaboratively between G7 members and their research communities.

Open and collaborative research underpins domestic and global responses to some of our most challenging and pressing issues. The G7 is committed to promoting open research while affirming that there are circumstances in which it is appropriate to put proportionate limits or conditions around access to research and associated data, including for security reasons. Openness and security are not contradictory, but complementary and mutually reinforcing.

Some bad-faith actors may not respect these justified limits and seek to access and misappropriate knowledge and technology without authorization, and without recognizing or reciprocating the effort of those involved in funding or conducting the work. While such practices may be driven by a variety of economic, strategic, geopolitical, or military objectives, in all cases they breach the norms and values underpinning academic collaboration, undermine the integrity of research, and harm the security of our societies. The G7 members oppose these practices.

As members of some of the world's most advanced economies, we play a crucial role in promoting and safeguarding the fundamental values and principles that advance science and technology and enable international scientific collaboration and innovation alongside our global scientific partners. We, in partnership with the research community, have the responsibility to ensure that the security and integrity of the global research ecosystem is protected. In this context, the G7 members agree to the following definitions.

Research integrity is the adherence to the professional values, principles, and best practices that ensure and uphold the validity, social relevance, responsibility, and quality of research. Research integrity ensures that individuals can be confident in the advancement of research knowledge and in the dissemination of its results. It forms the base on which to collaborate in a fair, innovative, open, and trusted research environment. While these values and principles may vary from country to country, they are key to upholding academic freedom as a universal right and public good.

Research security involves the actions that protect our research communities from actors and behaviours that pose economic, strategic, and/or national and international security risks. Particularly relevant are the risks of undue influence, interference, or misappropriation of research; the outright theft of ideas, research outcomes, and intellectual property by states, militaries, and their proxies, as well as by non-state actors and organized criminal activity; and other activities and behaviours that have adverse economic, strategic, and/or national security implications. Risk-targeted research security measures can enhance the foundations of academic freedom, research integrity, open science, transparency, and trusted collaborations for mutual benefit.

As G7 members look to collaboratively identify and respond to issues of research security and integrity, measures should respect and uphold the following common values on research integrity (articulated in no specific hierarchy or order):

- **Academic Freedom**: The freedom to teach, conduct, and publish research in an academic environment with an emphasis on enabling the participation of all is a fundamental tenet of research. It is fundamental to the mandate of

research institutions to pursue truth, provide education to students, and disseminate knowledge and understanding.

- **Freedom from Discrimination, Harassment, and Coercion**: It is foundational to the success of research that all members of the research community be free from discrimination, harassment, bullying, coercion, or threats to their personal or family safety.
- **Equity, Diversity, and Inclusion**: Equity, diversity, and inclusion (EDI) is the active promotion of the principles of access, diversity, and non-discrimination in all research activities – including recruitment procedures and career prospects. These are necessary for all aspects of research.
- **Institutional Autonomy**: Research institutions can only fulfil their missions to students, faculty, staff, and society if they are free to pursue and disseminate knowledge based on evidence, data, and peer review.
- **Open Science and Access to Research**: All members of the research community should actively support the open sharing and exchange of research results, data, methods, and inputs, while preserving incentives for innovation.
- **Fostering Public Trust**: Conducting and pursuing research in a way that maintains the trust of the public and all those involved in research is vital to the continued success of science and research efforts. Maintaining this public trust also necessitates stewardship, which entails reflecting proper oversight and management at all levels.
- **Transparency, Disclosure, and Honesty**: Fully transparent and reciprocal sharing of research – while maintaining confidentiality when appropriate – is crucial to research collaboration and integrity. This also extends to disclosing researcher affiliations or conflicting interests, such as conflicting financial interests. As a complementary value, honesty entails being straightforward and free of fraud and deception when proposing, developing, undertaking, reviewing, reporting and communicating research.

We – the G7 members – commit to respecting and furthering the above-stated research integrity common values. At the same time, we will seek to develop and implement our research security actions in line with the following research security principles.

As G7 members look to collaboratively identify and respond to issues of research security responses should exemplify and follow these principles of research security (articulated in no specific hierarchy or order):

- **Balancing National and Global Interests**: Funding for scientific and research partnerships should continue to be guided primarily by scientific merit assessments and excellence, and take appropriate and proportionate consideration and mitigation of risks to national and/or economic security where necessary.
- **Maintaining Openness and Research Security**: Open science should not be an afterthought and governments should commit to making research accessible when there is no justification for it to remain closed. Openness should be maintained to the maximum extent, acknowledging the need for safeguards for research that could have adverse ethical or national security implications.
- **Collaboration and Dialogue**: All entities involved in research should strive to support and engage with one another in the pursuit of a community that upholds security alongside openness. Governments should commit to engaging in meaningful information sharing about the nature of the risks, with the goal of addressing common risks alongside researchers and benefiting from shared approaches.
- **Proactive Efforts**: Governments should strive to take proactive and preventative measures that manage and reduce research security and research integrity risks based on lessons-learned and best practices.
- **Risk Proportionality**: Responses to risks should be proportionate and appropriately scaled. Risk-appropriate responses to research security should take into account the potential for misuse of the research and the aggregate level of risk, among other factors.
- **Shared Responsibilities**: To address dynamic and changing research risks, all members of the research community should acknowledge and understand their distinct roles and responsibilities with respect to addressing and managing risks to research security and research integrity.
- **Accountability and Responsibility**: Individuals and organizations should be held accountable for all their actions, including when their behaviours deviate from accepted standards.
- **Adaptability**: There should be commitment to dynamic research security measures, acknowledging that overly rigid approaches run the risk of delaying beneficial research. Static and unwavering approaches can lead to significant research disincentives and do not account for new and emerging risks.

We, as G7 members, commit to working together to uphold the principles that underpin effective international research collaboration in science and research. Our shared and common principles provide the foundational basis for practices that

preserve and protect open and reciprocal research collaborations, while managing known and evolving risks. We openly share these principles to inspire robust research collaboration and the well-being of the global research ecosystem that has become ever more critical for meeting the grand societal challenges of our time.

II. Open Science and Open Science Working Group (OSWG)

We will continue to promote open science with open and rapid sharing of knowledge, data and tools. We recognize and reacknowledge the importance of our universities, research organisations and science academies, as well as the industrial sector and civil society groups. We jointly pursue these common goals, with renewed vigour and determination in the continuation of previous declarations on international cooperation in research and innovation.

We recognize open science as an essential enabler of scientific integrity and good science communication. Making scientific research available to scientists, innovators, students, educators, government and non-government entities, the private sector, and the general public therefore providing the transparency necessary to build trust in science. It also helps to ensure that scientific results are communicated in ways that are open and equitably accessible to all based on mutual trust and confidence.

We also support the continued progress of the activities of the OSWG. Work on *Interoperability and Sustainability of Infrastructures* has included studies of national and international data-sharing infrastructures related to COVID-19, identifying lessons and challenges for the future. The work is continuing to address barriers and solutions for infrastructure and services to enable Findable, Accessible, Interoperable and Reusable (FAIR) research data and efficient integration, and wide and equitable sharing and use including through platforms across borders, domains and disciplines, and is also looking at thematic areas other than the pandemic case. Work on *Research Assessment and Incentives* has surveyed policies and practices and identified barriers and opportunities for recognizing and rewarding open science practices, considering how global cooperation can help promote system wide change, develop responsible research assessment practice, and provide stimuli and capacity for open science. The group is organising a workshop with input from experts on open science related metrics and indicators in research assessment, and it has also identified ways to engage with relevant stakeholder communities. Finally, *Research on Research* activities have included workshops to develop evidence-based policy recommendations to facilitate the adoption of open science. Input from experts has informed the group's deliberations on how to increase data sharing and embed it in research culture, on how research evaluation systems can accelerate the open science journey, and on how reproducibility in science can be improved. Additional workshops, including one on impacts of open science, will inform the OSWG recommendations on overcoming barriers to open science practices.

III. Future of the Seas and Oceans Initiative (FSOI)

The G7 FSOI activities focus primarily on resource mobilization, commitments to implementing the ocean observing system, monitoring and aligning those commitments across the G7, linking science to policy, and translating 'knowledge to action'. The 2021 G7 FSOI Working Group stressed the importance of developing the science-to-policy narrative to advance global ocean observing and data sharing.

G7 FSOI activities are focused on the following Resource Strategy Groups:

- The Global Biogeochemical Argo Array 2030 – Support the development of a sustained Global Biogeochemical Argo Array by encouraging and facilitating G7 commitment for the implementation of the full 1000-float array by 2030.
- Enabling Digital Twin Ocean Capability – Evaluate and support activities and underpinning infrastructure required to enable the development of digital twin ocean capability; bring together digital ocean initiatives from across the G7, the UN Ocean Decade programmes, and related digital Earth initiative to facilitate collaboration and share best practices.
- Governance, Coordination and Funding of Sustained Ocean Observations – review and discuss governance, coordination, and funding mechanisms for ocean observations across the G7 and explore strategies and develop plans to strengthen sustained support for the ocean observing system.
- Net-zero Carbon Emissions Oceanographic Capability – Consider approaches, evaluate developments and opportunities, and share best practices in moving towards low or zero carbon approaches to ocean observations and research.

The G7 FSOI also provides scientific and technical support to the expert panels of the Global Ocean Observing System to promote new globally-agreed strategies on priority issues including:

- A Surface Ocean CO2 Monitoring Strategy;
- Augmented Observing and Forecasting Capacity for Marine Life;
- A Global Ocean Monitoring Indicator Evaluation System;
- An Observing System Evaluation Framework.

The G7 FSOI also has an action area on Assessments and Reporting – Support an enhanced system of ocean assessment through the UN Regular Process for Global Reporting and Assessment of the State of the Marine Environment (World Ocean Assessment).

The G7 Ocean Decade Navigation Plan was adopted by the G7 Environment Ministers and endorsed by the G7 leaders in the G7 2030 Nature Compact in June 2021. The Navigation Plan was designed for G7 members to collaborate and advance collective work on ocean science, ocean observing, and ocean action through the UN Decade of Ocean Science for Sustainable Development (UN Ocean Decade). To support the UN Ocean Decade and to drive transformative change in ocean science and action for societal outcomes, the G7 intend to review its implementation and the associated work.