



ALL-ATLANTIC OCEAN RESEARCH ALLIANCE

Creating an Atlantic Ocean Community by Implementing
the Galway and Belém Statements

AA-DATA2030

Report:

White Paper for the All- Atlantic Ocean Data Space

– Draft Zero –



**BUILDING AN ALL ATLANTIC
OCEAN COMMUNITY**
Implementing the Belém Statement



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JOINT PILOT ACTIONS

ALL-ATLANTIC JOINT PILOT ACTIONS

Following a year-long collaborative process among more than 70 stakeholders at the Atlantic level, the All-Atlantic Ocean Research Alliance Multi-Stakeholder Platform, divided into 5 sub-multi-stakeholders platforms, identified more than 1000 initiatives towards strengthening marine research and innovation collaboration at the Atlantic level, 56 gaps and 79 needs/recommendations to achieve the All-Atlantic Ocean Research Alliance ambition, guided by a total of 20 Strategic Objectives, 20 Operational Objectives, and 10 Key Performance Indicators.

Based on these findings and on the idea of collaboration, alignment, and use of existing resources, they have developed six ambitious and long-term collaborative Joint Pilot Actions:

- [All-Atlantic Training Platform \(AA-TP\)](#)
- [All-Atlantic Aquaculture Technology and Innovation Platform \(AA-ATiP\)](#)
- [All-Atlantic Marine Biotechnology Initiative \(AA-BIOTECMAR\)](#)
- [All-Atlantic Data Enterprise 2030 \(AA-DATA2030\)](#)
- [All-Atlantic Blue Schools Network \(AA-BSN\)](#)
- [All-Atlantic Marine Research Infrastructure Network \(AA-MARINET\)](#)

This report was developed by the **All-Atlantic Data Enterprise 2030 (AA-DATA2030)** Joint Pilot Action, that aims at creating a one-stop, user-friendly transatlantic platform for gathering natural, social, and social-scientific data: The All-Atlantic Ocean Data Space (AAODS). AA-Data2030 is supporting transatlantic information and data sharing in the spirit of 'open science' and the FAIR/CARE/TRUST principles. The establishment of the All-Atlantic Ocean Data Space will ensure that, in the future, all stakeholders have free access and can also contribute to relevant data, thus safeguarding sustainable stewardship of the Atlantic Ocean

This report is a deliverable in scope of JPA All-Atlantic Data Enterprise 2030, Task 3. Implementation of AAODS customized data services. The task, aimed at the implementation of the All-Atlantic Data Space, which entails the drafting of this white paper. The white paper provides recommendations for governments of countries bordering the South Atlantic, enabling them to address critical issues arising from the need of sharing scientific data. This report corresponds to AA-DATA2030 D3.3.





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1. Objective

Data matter.

Data are the ultimate resource for evidenced based political decisions.

Globally, governments seem to be both divided and overwhelmed in making effective sustainable climate policy, health and safety, and economical decisions. This could be due, among other things, to an insufficiently available information resource. Here, science can make an important contribution to achieving the agreed climate goals by investing maximum energy in making relevant data available.

However, the fundamental social, political and economic difference between the Global South and the Global North also leads to diverse positions in the global context.

The overall objective of this white paper is to (1) recommend the establishment of a sustainable *Competence Centre for Marine and Coastal Data of the Global South* and (2) give the Global South its appropriate voice.





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2. Background

Climate Change and the Global South

The fact that uncontrolled climate change could also affect international security was first addressed at the Toronto Conference on the Changing Atmosphere in 1988¹. In the same year, the UN General Assembly declared climate change to be a common concern of mankind². To address climate change through cooperation, the 196 Parties to the UNFCCC - United Nations Framework Convention on Climate Change - adopted the Paris Climate Agreement in December 2015. This agreement aims to keep the increase in the average temperature of the Earth compared to pre-industrial levels well below 2 degrees Celsius and to make efforts to limit it to 1.5 degrees Celsius. In recent years, climate change induced floods, storms, forest fires, extreme drought and temperatures and other natural disasters have caused economic losses of many hundreds of billions of dollars worldwide, with losses skyrocketing³.

In addition, there is the increased acidity of the oceans due to the highest CO₂ emissions ever measured⁴, the changing jet stream with its increasingly extremely cold winters despite rising temperatures on average⁵, the thawing permafrost⁶, irrevocably changing ecosystems⁷, melting ice sheets⁸ and dying glaciers⁹, erosion of carbon-rich soils¹⁰ and much more.

¹ Peter Usher, »World Conference on the Changing Atmosphere. Implications for Global Security«, in: Environment: Science and Policy for Sustainable Development, 31 (1989) 1, S. 25ff

² UN General Assembly, Protection of global climate for present and future generations of mankind : resolution / adopted by the General Assembly, 6 December 1988, A/RES/43/53, available at: <https://www.refworld.org/docid/3b00eff430.html> [accessed 26 January 2023]

³ United Nations Security Council (UNSC), Security Council Elections 2019. Research Report, New York, 14.5.2019 (Nr. 2). ders., Current Members United Nations Security Council, 2019

⁴ Jurikova, H., Gutjahr, M., Wallmann, K. et al. Permian–Triassic mass extinction pulses driven by major marine carbon cycle perturbations. Nat. Geosci. 13, 745–750 (2020). <https://doi.org/10.1038/s41561-020-00646-4>

⁵ Kim, B.M., Son, S.W., Min, S.K. et al. Weakening of the stratospheric polar vortex by Arctic sea-ice loss. Nat Commun 5, 4646 (2014). <https://doi.org/10.1038/ncomms5646>

⁶ Nichols, J.E., Peteet, D.M. Rapid expansion of northern peatlands and doubled estimate of carbon storage. Nat. Geosci. 12, 917–921 (2019). <https://doi.org/10.1038/s41561-019-0454-z>

⁷ Grooten, M. and Almond, R.E.A.(Eds) (2018). WWF Living Planet Report - 2018: Aiming Higher. WWF, Gland, Switzerland, ISBN 978-2-940529-90-2

⁸ Hörhold, M., Münch, T., Weißbach, S. et al. Modern temperatures in central–north Greenland warmest in past millennium. Nature 613, 503–507 (2023). <https://doi.org/10.1038/s41586-022-05517-z>

⁹ Henley, J. (2019) Iceland holds funeral for first glacier lost to climate change. Guardian

¹⁰ Thaler, E.A., Larsen, I.J., Yu, Q. (2021) The extent of soil loss across the US Corn Belt. PNAS 118 (8) e1922375118. <https://www.pnas.org/doi/full/10.1073/pnas.1922375118>





Globally, the average carbon emission per capita in 2018 was 4.8 tonnes. This statistic is led by the countries of the industrialised Global North¹¹. In particular, their energy consumption over the last hundred years has been a major cause of the climate changes that are already taking place. In contrast, all countries in Africa - except South Africa and Libya - had emitted less than 0.5 tonnes per capita¹². The social consequences of climate change cannot be ignored. Evidence shows that environmental change affects political decisions: while for the Global North it is a race for prosperity, in the Global South it is a fight for a basic resource. The costs of climate change are shouldered primarily by those who have contributed least to it and earned the least from it. The Global South sees itself as a region that is economically, politically and culturally oppressed by the countries of the North. This manifest itself in the form of unequal trade agreements, exploitation of resources and political influence. Many countries of the Global South see themselves as victims of colonialism and imperialism and feel disadvantaged compared to the richer countries of the North.¹³

Climate Change and data

Mankind is on a quest to digitise the world. The focus of this digitization is anything and everything that intersects our professional workflows and private streams of life. Data is at the heart of digital transformation, the lifeblood of this digitization process. The Global Datasphere is experiencing tremendous growth. The International Data Corporation (IDC) predicts that the Global Datasphere will grow from 33 Zettabytes (ZB) in 2018 to 175 ZB by 2025. Every geographic region has its own Datasphere size. For example, China's Datasphere is expected to grow 30% on average over the next 7 years and will be the World's largest Datasphere of all regions by 2025¹⁴. Not only is digitalisation the basis for our economic competitiveness, but digitalisation also contributes to the protection of our natural environment and the fight against climate change¹⁵.

¹¹ <https://www.climatewatchdata.org/> [accessed 31 January 2023]

¹² Muntean, M., Guizzardi, D., Schaaf, E., Crippa, M., Solazzo, E., Olivier, J. and Vignati, E. (2018) Fossil CO2 emissions of all world countries - 2018 Report, EUR 29433 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-79-97239-3, doi:10.2760/83904, JRC113738

¹³ Melber, H. (2012): No future without justice. Report of the Civil Society Group on Global Development Perspectives, No. 59, Dag Hammarskjöld Foundation Uppsala. ISBN 978-91-85214-67-9

¹⁴ Rydning, D., Reinsel, J., & Gantz, J. (2018). The digitization of the world from edge to core. Framingham: International Data Corporation, 16.

¹⁵ <https://www.bitkom.org/EN>



At the same time, the global science system is currently undergoing a fundamental change in values, in which openness and the opening up of research have become increasingly important principles. As a result of this development, both the framework conditions and the requirement profile of science are changing towards open practices. Open Science for and with society is becoming a central strategic field of action. Open Science - understood as the opening up of research, disclosure of necessary methods, required infrastructures and the results achieved - is an integral part of implementing and ensuring good scientific practice in internal scientific exchange as well as in the dialogue between science and society. Open practices promote the transparency, accessibility, traceability and re-usability of scientific results and scientific practices. They increase trust in research results, provide conditions to review the quality of research, accelerate scientific progress and innovation, reduce inequalities, and ensure that results obtained from publicly funded research are available to the public.

In the last decade, the call for sharing research data has intensified. This development has been spurred by research funding organisations mandating researchers to share their research data. High-quality data sets that were generated with public funds should be made available for re-use in order to grant all fair and free access to these data ¹⁶. However, certain limits must also be observed to openness and opening up, e.g. for economic, legal or ethical-moral reasons, so that the principle "as open as possible, as closed as necessary" must generally apply. The problem of dual use, for instance, which refers to the potential misuse of scientific knowledge, needs careful consideration in the context of Open Science. Commercial or legal logics of exploitation or applicable data protection regulations may prevent or restrict an opening, too ¹⁷.

Open access is the overarching principle for unrestricted and free access to scientific data, meta data and information of any kind for all people everywhere.

Open data is to be understood as data and metadata which is made available for free use, distribution and further use (re-use). The FAIR principles ¹⁸ - referring to data being findable, accessible, interoperable and re-usable - increase the potential for new research questions as well as for new insights.

¹⁶ Neuendorf, Claudia, Malte Jansen, and Lisa Pegelow (2020): Assessing the re-use potential of research data in empirical educational research. RatSWD Working Paper 270/2020. Berlin, German Data Forum (RatSWD). <https://doi.org/10.17620/02671.49>

¹⁷ European Commission. Directorate-General for Research & Innovation. H2020 Programme. Guidelines on FAIR Data Management in Horizon 2020. Version 3.0 (2016): https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf [accessed 30 January 2023]

¹⁸ FAIR Principles: <https://www.go-fair.org/fair-principles>



Open infrastructure enables open access to or the exchange of digital objects and is based on open source software as well as on open standards (interfaces, protocols, formats). This includes, for example, repositories which offer support when storing and publishing outputs, including data and research software - in a legally compliant way.

Open research methodology serves as the transparent, publicly accessible documentation of the scientific process (e.g. through preregistration, laboratory protocols) and the publication or at least referencing of all hardware and software used therein (e.g. equipment, institutional software and research software, analysis code).

Two aspects play a central role in promoting Open Science practices: (1) Promoting a culture of openness and (2) creating suitable incentive structures.

At the same time, ocean protection requires better progress metrics, reversing the trend of too much data and very poor quality.



3. Addressing Needs and Gaps in Data Management / Data Stewardship

This white paper provides recommendations that specifically target policy makers of the South Atlantic, thus enabling them to address critical issues arising from the need of sharing scientific data. Such recommendations were discussed in the framework of the All-Atlantic Ocean Research and Innovation Alliance in particular in two AA-DATA2030 activities: (1) ALL-ATLANTIC DATA2030 - AFRICAN DATA INFRASTRUCTURES & STAKEHOLDER FORUM, South African Webinar & Virtual Workshop (24 & 25 May 2022) and (2) ALL-ATLANTIC DATA2030 STAKEHOLDERS WORKSHOP - Towards a Sustainable Competence Centre for Marine and Coastal Data of the Global South, Buenos Aires, Argentina (28 November – 1 December 2022).

■ Recommendations towards OPEN DATA MANAGEMENT

- Promote a culture of (meta)data sharing via a Metadata catalogue (therefore addressing the need to create a Global South Atlantic Metadata Catalogue)
- Encourage open data exchange among different societal actors, including scientific, education, governmental and non-governmental, public, and private institutions
- Foster data standardization (e.g., among regional institutions) for data harmonization
- Support international data integration of national data to produce long-term time series of South Atlantic areas, and global data products.
- Address the need of tools for data analysis, visualization and quality control processes.
- Define data policies based on national jurisdictions and laws.
- Identify South Atlantic areas lacking of information in order to promote data inclusivity
- Promote and cultivate a layer between science and policy
- Stimulate (indigenous) data governance to enhance discoverability, accessibility and usability of marine data.

■ Recommendations towards EDUCATION

- Motivate data training for teachers and other stakeholders from the educational sector
- Boost outreach towards FAIR^{16, 18}/CARE¹⁹/TRUST²⁰ principles

¹⁹ The CARE Principles for Indigenous Data Governance. <https://www.gida-global.org/care> [accessed 12 February 2023]

²⁰ Lin, D., Crabtree, J., Dillo, I. et al. The TRUST Principles for digital repositories. *Sci Data* 7, 144 (2020). <https://doi.org/10.1038/s41597-020-0486-7>



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- Enhance capacity development activities including investments on infrastructure
 - Engage with youth, Early Career Scientists, and citizen scientists regarding data standardization and best practices
- **Recommendations towards FINANCIAL SUPPORT**
- Approach policy makers for financial support and resources availability
 - Promote science diplomacy with data focus
 - Lobby for further stakeholder engagement, particularly from the private sector
 - Create financial mechanisms for inclusion of all nations' data from the South Atlantic

An important outcome from the ALL-ATLANTIC DATA2030 STAKEHOLDERS WORKSHOP — Towards a Sustainable Competence Centre for Marine and Coastal Data of the Global South, Buenos Aires, Argentina 28 November – 1 December 2022) was the identification of apt South Atlantic Stakeholders. These, include, among others:

- Lic. Diego Alejandro Galeano, Ministerio de Ciencia, Tecnología e Innovación (MinCyT), Argentina
- Ana Franchi - Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina
- José Luiz Moutinho - The Atlantic International Research Centre (AIR Centre), Azores, Portugal
- Juan Emilio Sala - Pampa Azul Initiative, Argentina
- Oscar Padin - Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP), Argentina
- Other institutions in Argentina:
 - Instituto Argentino de Oceanografía (IADO)
 - Centro Nacional Patagónico (CENPAT)
 - Centro Austral de Investigaciones Científicas del ConSe (CADIC)
 - Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata
- Mariana Ríos - Ministerio de Ambiente, Uruguay
- Marcelo Barreiro - Universidad de la República, Uruguay
- Leonardo Ortega - Dirección Nacional de Recursos Acuáticos (DINARA), Uruguay
- José Domínguez- Ministerio de Defensa Nacional (MDN), Uruguay
- European Commission, Belgium
- AANChOR coordination, Portugal
- National Funding Organisations
- Instituto Nacional de Pesquisas Espaciais (INPE), Brazil
- Instituto de Investigación Marina (INMAR), Brazil





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- Rede Clima, Brazil
- Sistema Nacional de Observação dos Oceanos (GOOS), Brazil
- Aliança Regional para a Oceanografia no Atlântico Sudoeste Superior e Tropical (OCEATLAN), Brazil
- Oceanography and Marine Sciences institutions in Brazil
- Ministries of Foreign Affairs
- Private sector: oil and gas companies
- The Benguela Current Convention (BCC), Namibia

In an ensuing step, AA-DATA2030 should galvanise the above-mentioned stakeholders towards the joint action objectives and goals.





4. Structural concepts of a Competence Centre for Marine and Coastal Data for the Global South

All-Atlantic Data Enterprise 2030 (AA-DATA2030) Joint Pilot Action focuses on Atlantic data and data products, recognizing that quality-checked data are fundamental for sharing information and knowledge within the wider Global Ocean Data Ecosystem:

Raw data is the basic variable. Scientific expertise creates quality-assured data from raw data. The synopsis of quality-assured data of a specific question becomes information. The sum of information on a specific topic becomes knowledge. And knowledge is the basis for evidence-based political decisions.

Marine data services around the Atlantic can join the momentum towards a fully interoperable common data space by engaging in cross-regional dialogue, and by implementing already existing standards and best practices that underpin the FAIR approach for scientific data management and stewardship. This community is key to create trust and to stimulate further sharing of data with national, regional, and international data services.

AA-DATA2030 is at the hub of the effort to promote collaboration within Atlantic scientific communities towards data sharing, thus contributing to the objectives of the UN Ocean Decade.

The creation of a Competence Centre for Marine and Coastal Data for the Global South, acting as repository of knowledge and resources pool for the federated institutions, can support the vision and goals of AA-DATA2030 by reviewing and analysing the knowledge produced to (1) process science-based evidence, (2) inform policy-makers, and to (3) provide tools and services for all policy areas in the Atlantic realm.

Such a hybrid structure would take advantage of the strong stakeholder engagement provided by a federated organisation, while benefiting from centralisation in terms of data quality awareness, best practices compliance, standardisation and consistency of common approaches.

Connecting a Competence Centre for Marine and Coastal Data for the Global South with other competence centres around the world (in a wide-reaching, all-inclusive network) would effectively support the long-term sustainability of the All-Atlantic Data Space and promote unrestricted knowledge to all, under the All-Atlantic Ocean Research Alliance's motto: Connecting, acting, cooperating!

Technically, facilitating the connection of competence centres should be a rather simple task. But, can we energise the next generation of marine/coastal researchers, data managers/stewards, decision makers and the society at large to collaborate in such a network?



The establishment of a Competence Centre for Marine and Coastal Data for the Global South (encompassing a community of data producers and data users that speak in one voice) would bring about a cultural change within universities and research institutions and enable not only FAIR/CARE-compliant data stewardship but also, ultimately, open science.

4.1 Common Standards for Information and Data Sharing

Establishing common standards for information and data sharing to be used by local, regional, and national initiatives in the Atlantic basin, is at the very core of the competence centre. This implies to recommend (and even to define and develop) standards and best practices in accord with the community of practice, solidly established practices and emerging ones, and latest industry trends. The members of the competence centre, by cultivating a continuous-learning culture and curiosity should promote the acquisition of new knowledge and expertise paired with strong discernment of what needs to be developed and supported from what has become obsolete and needs replacement.

4.2. Human resources

The need for capacity development around the Atlantic basin can be addressed by investing in the pool of people equipped with the skills and expertise to foster the Blue Digital transformation. In fact, the biggest bottleneck for such an achievement is the lack of human capacity to assimilate all the existing information, and to ingest and implement it ²¹.

The competence centre can act as facilitator for «bottom up» conversations focused on practical data science problems and promote synergies with existing capacity development initiatives, with other All-Atlantic Joint Pilot Actions, and with EU Sister Projects. Additionally, AA-DATA2030 stakeholders should have interest and time to contribute to the initiatives of the competence centre. The relationships established with the competence centre should not be restricted to academia, but include industry and the society at large — the society as whole should be invited to participate, thus promoting data inclusivity and democratisation of the marine sciences.

4.3. Measuring Performance

Key performance indicators for AA-DATA2030, have already been identified in the report “Proposed Joint Actions Addressing Common Standards for Information and Data Sharing”. Such indicators, divided into Stakeholder demographics and Outcome indicators, as shown below, should be considered (and further

²¹ All-Atlantic Data & Policy Forum. [E-REPORT of the All-Atlantic Data & Policy Forum, 2021 May 31 \(ONLINE\)](#).



developed) by the competence centre in order to evaluate the impact of the joint action, manage resources, and provide feed-back relatively to the value creation.

Stakeholder Demographics:

- The stakeholders that are promoting an All-Atlantic Data Space for all (and common standards for data sharing) are varied and include: academia, private sector (fisheries, tourism, etc.), military-industrial complex, governmental and non-governmental organisations, schools, and the society at large.
- The stakeholders originate from several countries around the Atlantic (good geographical coverage).
- Relevant Atlantic institutions are actively participating and providing high-quality data to be shared.

Outcome Indicators:

- National legislation changes towards promoting open science and open data activities.
- Government policy or a policy at the level of the South Atlantic community incentivizes businesses to release data that are required in support of the greater good.
- A Tropical and South Atlantic community of practice promotes and supports the practices of data sharing for the South Atlantic.
- Best practices for curation are introduced and standardized, including in the private sector.
- Common standards for data and metadata and an extended agreement between stakeholders are introduced in the Tropical and South Atlantic to facilitate data sharing.
- Guidelines are produced, including a metadata catalogue for emerging pollutants.
- National authorities provide incentives to facilitate and promote data sharing, namely the allocation of a dedicated budget and/or human resources.
- Formal support is given to academic/research institutions for the practices of data sharing and the promotion of open research data.
- Data sharing practices feature in researchers or academics' key performance indicators.
- The military-industrial complex releases (at least partially) data from fisheries.

Measuring performance allows the Competence Centre to set expectations for current and new work, decide on the execution of the foreseen strategies, on their improvement or even their replacement.



5. The Road to Excellency

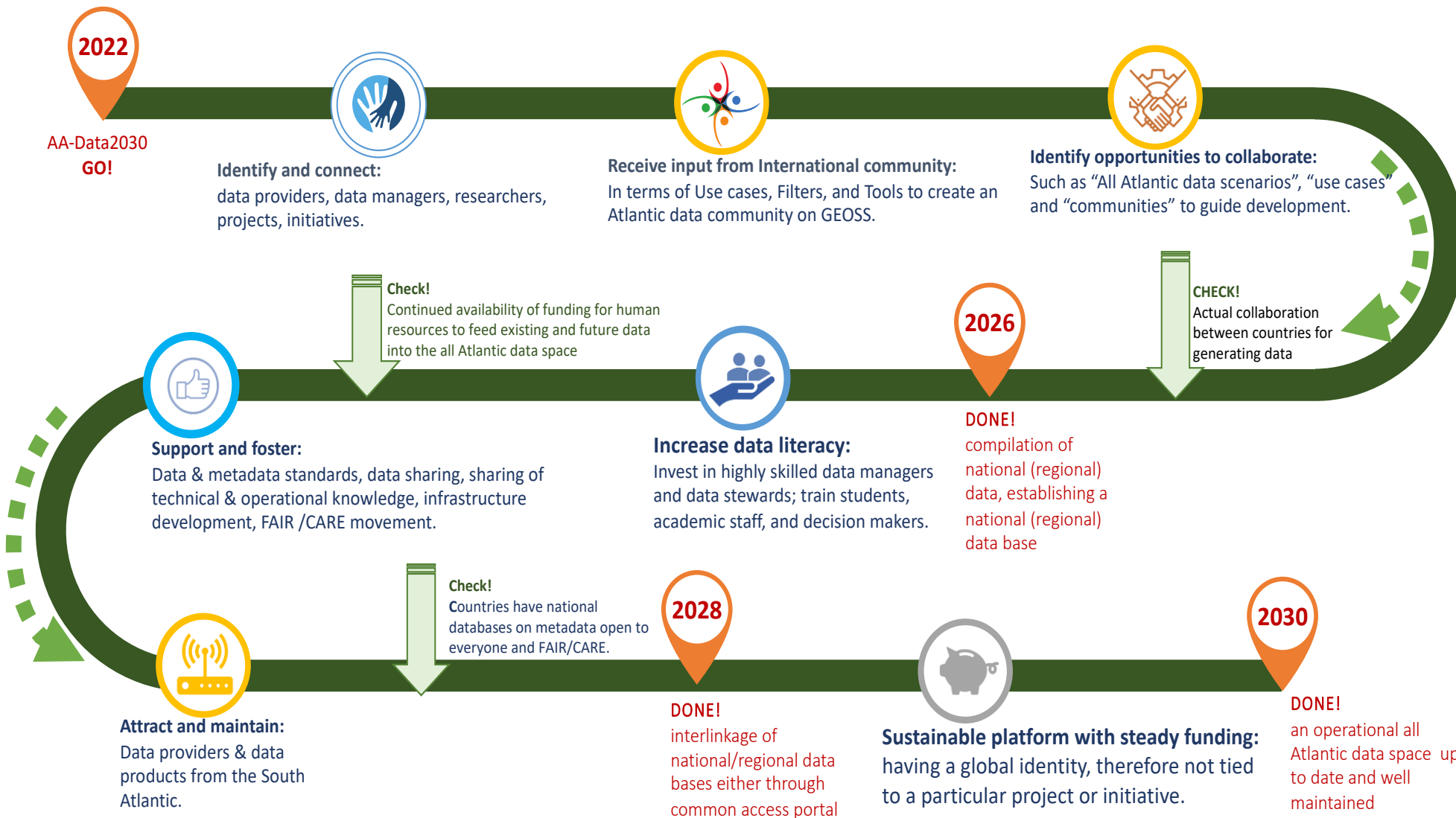
By jointly promoting the establishment of a structure geared to the future, AA-DATA2030 encourages all stakeholders to reach the shared goals at their own pace. The competence centre will help to coordinate those efforts with actions and approaches that will largely depend on the needs of the community of practice and the level of maturity of each member. The competence centre should evolve to a centre of excellence, eliminating inefficiency and promoting advancement to the next maturity level.

The All-Atlantic Data Space roadmap (attached to this white paper) has already identified an action plan for the next decade. Its implementation and success will largely depend on the political motivation to adhere to it. The roadmap is, in fact, the basis for implementing and conducting the joint action AA-DAAT2030.



ANNEX 1. Roadmap for the All-Atlantic Data Space (AAODS)

ANNEX 1. All-Atlantic Data Space roadmap as envisioned by AA-DATA2030.





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