Introduction to the GOSC Initiative

Prepared by the CODATA GOSC Steering Group
Presented by Prof. LI Jianhui (lijh@cnic.cn)
CNIC, CAS and CODATA Vice President
28 Jun. 2021
Global Open Science Cloud (GOSC)

I. Motivation
II. Vision & Mission
III. GOSC INITIATIVE
Open science infrastructures around the world

Open science infrastructure is one of the key pillars among many components within open science.

Open science key pillars

- Open science infrastructures
- Open engagement of societal actors
- Open dialogue with other knowledge systems
- Open access to scientific knowledge
- Open science communication
Potentialities and grand challenges pull us ahead calling for open science, open collaboration around the world.

Far in the galaxy (by SKA)

Close to the micro ecosystem (by ISC)

The pandemic and post pandemic

Stressing human needs for a better world (UN SDGs)

Photos from:
https://council.science/actionplan/
Consensus has been building up to co-design and co-develop a globalized trusted research ecosystem. Such ecosystem should bridge institutional, regional, national research e-infrastructures for open science in a sustained manner.

IDW 2018 talk particular on infrastructures and repositories facilitating open data practices

CODATA Beijing Conference 2019 particular in
- Géant-CSTnet session
- CASEarth session
- Coordinating Global Open Science Commons Initiatives

Global Open Science Cloud (GOSC) workshop

International FAIR Convergence Symposium 2020
- Convergence for Global Open Science Infrastructures
- Mobilizing the Global Open Science Cloud (GOSC) Initiative: Priority, Progress and Partnership
Global Open Science Cloud (GOSC)

I. Motivation

II. Vision & Mission

III. GOSC INITIATIVE
GOSC Vision


- Cooperation and alignment between Global Open Science Cloud activities in a robust network of trusted research e-infrastructure to connect research resources and all stakeholders to enable innovative science discovery in the dynamically evolving global open science environment.
GOSC Mission and Objectives

- Encourage cooperation, and ultimately alignment and interoperability between Open Science/Research Clouds/Platforms.

- Help connect various institutional, national, and regional initiatives, laying the foundations for cross-continental, federated, Open Science and FAIR infrastructure, and virtual research environments.

- GOSC Framework: suggestions and examples of areas and topics for discussion, cooperation, exchange of ideas.
**GOSC Framework - Global Research & Education Network**

**Objectives:**
A fully scalable, end-to-end, software-based global research & education network infrastructure providing networking connectivity for global open science cloud.

**Key issues:**
1. Concept, techniques and primitives for federated intra- and inter-cloud networking
2. Application- and service-aware virtual networking, going beyond offering it as a pure infrastructure service
3. Creating homogeneous overlay networks on-demand over heterogeneous clouds
GOSC Framework – Cloud Federation

**Objectives:**
Enhancing open science cloud infrastructures and services by cloud federation. Providing a more flexible, dynamic environment for scientists, and enhance existing computing infrastructure and services with “Cloud” paradigms

**Key issues:**
1. Scalability based on demand: Infrastructure aggregation and sharing across sites
2. Dynamic configuration, provisioning, and orchestration of cloud resources
3. Interoperability and Portability
4. Trust, authorization and identification across sites
5. Minimize cost and energy consumption
GOSC Framework – Global Open Data Fabric

**Objectives:**
Global open data fabric will offer optimal solutions to data management problems, and will increase the ability to generate value from effective big data analytics, which delivers valuable science insights.

**Key issues:**
1. FAIR Guiding Principles for scientific data management and stewardship
2. CARE Principles for Indigenous data governance
3. Data security and privacy management
4. Trust and sharing policy and mechanism
5. Global open data fabric architecture
Objectives:
Design, build and operate a multi-site cloud-based facility and resources to support research across applications, services and systems targeting services research community.

Key issues:
1. Develop once deploy everywhere
2. SLA-based cloud service/application management and QoS monitoring
3. Automatic discovery and composition of services
4. Automatic API Alignment and Software-defined everything
5. Cross-layer cloud service negotiation
**Objectives:**
Transparent combination of tailored services as a virtual research environment or domain-specific problem-solving environment. Promoting global research collaboration on GOSC.

**Key issues:**
1. Research requirements to IT alignment
2. Cross-layer and scalable multi-cloud workflow and application adaptation
3. Novel Orchestration and placement methods for tailored cloud service
4. Bilateral or multilateral cooperation mechanism and policy
5. Flexible cost models
Global Open Science Cloud (GOSC)

I. Motivation
II. Vision & Mission
III. GOSC INITIATIVE
GOSC Initiative

- Initial funding from CAS Program of fostering international cooperation mega-science.
- Support from CODATA to encourage cooperation, alignment and co-design of Case Studies and cross-border testbeds. Initial secretariat support from CODATA and CNIC.
- Invited participation, support and effort in kind from Open Science programmes for a truly global initiative.

**Key Actions**

- **Communication Platform**
  - International Symposium on Open Science Cloud.
- **Policies**
  - Explore governance rules and sustainable operation mechanism.
  - Harmonize policies for cross-border sharing of data, resources and services.
- **Implementation technology**
  - Key Protocols & tool kits for interoperability.
- **Testbed and demonstrations**

**Anticipated Outputs**

- Consensus & global collaboration network
- Framework for GOSC policy and technics
- Cross-border testbed to demonstrate for global science collaboration & open science
- **Launch one Big Science Program for GOSC (2025-)**
GOSC Co-development Approach

Groups building the GOSC cooperation and co-design

Steering Group

Working Groups

Case Studies

6 steps towards GOSC co-development

Science driven → Gap Analysis → Solutions by WG & CS

Progress and Plan

GOSC idea
The GOSC idea proposed during the CODATA Beijing Conference 2019

2019

GOSC Initiative
- GOSC testbed
- GOSC steering group
- GOSC Thematic Working group and case studies plan

2021

GOSC cooperation
- Initial cooperation around WGs and Case Studies
- Sharing ideas, scoping issues.
- Recommendations and agreements.

2022-2023

GOSC co-development
- Initial demonstrators and testbeds in technical WGs and Case Studies
- Recommendations and agreements.

2024-2025

Future GOSC
Sustainable partnerships supporting big science programs in the long run.

Future
Call for International Partnerships

• Open mind, open framework, open collaboration for open data & open science.

• Coming together is a beginning. Keeping together is progress. Working together is success. *Henry Ford* (1863 – 1947, American industrialist)
Thank you for your attention!