



Committee on Data of the International Science Council

CODATA Workshop on Advancing Interdisciplinary Global Challenges Research Through Data Integration CNIC, Beijing, 30-31 July 2018

The pressing global challenges of the 21st century to which science is expected to respond, such as climate change, sustainable development and disaster risk reduction, are inherently complex phenomena, and demand interdisciplinary and transdisciplinary responses if knowledge is to be translated into action. However the ability to integrate the abundant and diverse data generated by the digital revolution to expose deep relational patterns in these phenomena is inhibited by the use of different data standards between disciplines or inadequate vocabularies and ontologies. As a consequence, the maximal exploitation of data and its interdisciplinary integration can only normally be achieved within and between closely allied fields. Although some disciplines have made dramatic progress in their ability to generate and analyse data, there are many that are lagging in this capacity, with the consequence that the general capacity to expose and model deep patterns in the complexity characteristic of the great global challenges remains relatively rudimentary.

The Committee on Data (CODATA) has responded to the creation of the new International Science Council (ISC) – which provides a unified voice for the social and natural sciences – by developing a programme designed to ensure that interdisciplinary science develops the capacity for deep, interdisciplinary data integration in addressing global challenges. This is likely to be the work of a decade, but has the potential to create a dramatic shift in the way that interdisciplinary science is done in the 21st century, and magnifies its impacts. The programme has two strands:

- Strand 1: Pilot projects in specific interdisciplinary research areas that demonstrate the power and useable benefits of online data integration, and provide solutions to the current difficulties, leading to generalisation of widely applicable methods.
- Strand 2: Support for disciplines that have not yet developed the standards that are necessary for effective online data integration and real time programmatic access to data.

The conception of the programme has been supported by the International Council for Science (ICSU) and the International Social Science Council (ISSC) that have merged to create ISC. As part of its contribution to this development, the China Association for Science and Technology has generously supported the foundational stages of the programme. In this, three interdisciplinary pilots have been identified: infectious disease, resilient cities and disaster risk reduction. In each of these areas there is a strong interface between science and action and a need to draw on data and research about human activities and natural processes. The three pilots will be supported in their work by a data science and standards team, which will explore

how the interoperability and integration of the heterogeneous data essential to these research areas can be achieved:

1. How can the development of standards and shared concepts, controlled vocabularies and ontologies be advanced to assist the integration of data to understand complex systems?
2. How can such endeavours become more easily scalable so that research initiatives can invest more in analysis and planning interventions, rather than laboriously cleaning data or extracting it from outdated formats?

This initiative builds on a series of CODATA Workshops supported by ICSU and ISSC <http://dataintegration.codata.org/>. After its further development at the Beijing meeting, the developed initiative will be presented to the ISC for its endorsement as a strategic programme of the new Council. The initiative also aims also to promote the engagement of disciplinary communities, as represented by International Scientific Unions, with the development and governance of standards, particularly with respect to interdisciplinary research and interoperability.

The purpose of the workshop is three-fold:

- 1. To acquaint Chinese colleagues with the programme, and seek their engagement and involvement in it.**
- 2. To invite collaboration with major Chinese and international research programmes, such as the Digital Belt and Road, Integrated Research on Disaster Risk and Urban Health and Well-being.**
- 3. To plan development of these strands of work as a basis for major funding and so that they may be presented to the new International Science Council (ISC) as a fundamental part of its future work programme.**

Data Integration Workshop – Draft Programme

Day One: Sharing Knowledge – the ISC-CODATA Programme and Chinese and International Initiatives

Monday 30 July 2018: 09:00-18:00

Opening of the Workshop: 09:00-09:45

Introduction and Welcome from:

- Geoffrey Boulton, CODATA President and member of the ISC Governing Board
- Liao Fang Yu, Director General of CNIC, CAS; Vice President of CODATA-China
- WANG Qinglin, Deputy Director General, Department of International Affairs, China Association for Science and Technology (CAST)
- Huadong GUO, previous CODATA President and President ISDE

Part 1.1: 09:45-11:00

Data Integration Initiative Overview: Chair, Huadong GUO

Geoffrey Boulton, CODATA President, Data Integration as a Decadal Initiative for 21st Century Science.

Simon Hodson, CODATA Executive Director, Introduction to the pilot initiative, the case studies and the challenges of data integration.

John Broome, CODATA Officer (Treasurer), Engaging with disciplinary research areas and International Scientific Unions.

Discussion

Break: 11:00-11:30

Part 1.2: 11:30-13:00

Data Integration Initiative Pilots and Data Science Support: Chair, Jianhui LI

Simon Cox, CSIRO, Australia, Standards and ontologies for interdisciplinary research: current developments and opportunities.

Phil Archer, Semantic Web Expert, Plinth and data brokerage: a basis for scalable, inter-disciplinary data usage.

Virginia Murray, Public Health England and IRDR Scientific Committee, Data Integration and Standardisation Challenges in Disaster Risk Reporting: the case of mortality.

Qiyong LIU, Chief Scientist for Health and Climate Change in China,

Interoperability and Integration Challenges for Infectious Disease Data [to be presented by Xiaobo Liu]

Discussion

Lunch: 13:00-14:00

Part 1.3: 14:00-15:30

Chinese Initiatives, International Programmes and Data Integration – Opportunities for Collaboration: Chair, Virginia Murray

Lucy LU, IRDR, Mission and Vision of Integrated Research on Disaster Risk

Franz Gatzweiler, Executive Director of Urban Health and Well-Being, Data Integration in Systems Approaches to Urban Health and Well-Being

WANG Changlin, ISDE

CHEN Fang, CAS-TWAS Centre of Excellence on Space Technology for Disaster Mitigation, Building DRR Data Capacity and Partnerships for Developing Countries: Perspectives from the CAS-TWAS SDIM

Discussion

Break: 15:30-16:00

Part 1.4: 16:00-17:30

Chinese Initiatives, International Programmes and Data Integration – Opportunities for Collaboration: Chair, Bonnie Carroll

LIU Jie, DBAR, Digital Belt and Road Program: Big Earth Data for regional sustainability,

Juanle WANG, Institute of Geographic Sciences and Natural Resources Research, CAS, 'Disaster data integration and comparison between web news media and professional institution website in China'

LI Guoqing, Data Integration Challenges in Satellite Carbon Observing.

Discussion

Close of Day One: 17:30-18:00

Conclusion of MoU between DBAR and CODATA

Day Two: Data Integration Programme - Planning Workshop

Part 2.1: 09:00-12:30 with a break

Substantive Challenge for Data Integration: chair, Simon Cox; rapporteur, Simon Hodson

The second day of the workshop will build on the knowledge shared on day one, but will be almost entirely discursive, with some work perhaps taking place in break out groups.

Where are we?

What aligned work is going on?

What key standards issues do we need to address?

What partnerships need to be built?

What role can Plinth play?

Lunch: 12:30-13:30

Part 2.2: 13:30-16:00 with a break

Planning the Programme: chair, Geoffrey Boulton; rapporteur, Simon Hodson

What opportunities for collaboration are there?

What funding opportunities may be available ?

Discussion of the final outputs:

- 1) Proposal to the ISC Board
- 2) Funding proposals and programme design.