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BIG DATA AND SUSTAINABLE DEVELOPMENT OBJECTIVES

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Abstract

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Keywords: *Big Data, sustainable development, sustainable development objectives, digitalization, environmental protection.*

JEL Classification: Q01, C8, O44, P18, P28

Introduction

The International Society for Digital Earth, an affiliate member of the International Science Council, published a special issue of "Big Data in Support of Sustainable Development Goals" in its journal "Big Earth Data" to celebrate the inauguration of the International Center for Big Data Research Sustainable Development.

The transformation of our world is taking place permanently. The 2030 Agenda for Sustainable Development offers a comprehensive program to collectively

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address several global challenges, such as environmental protection, climate change, disaster risk reduction, food security. However, gaps in data and methods for evaluating several indicators restrict compliance and effective implementation in several countries around the world.

The concept of "Big Data" refers to data that involves a greater variety, being received in volumes and at higher speeds. This aspect is also known as the "three V".

Simply put, Big Data means larger and more complex data sets, especially from new data sources. These datasets are so bulky that traditional data processing software cannot handle them. But these massive volumes of data can be used to solve business problems that could not have been addressed before (https://www.oracle.com/ro/big-data/what-is-big-data).

The term of "Big Data" (big data, metadata) refers to the extraction, manipulation and analysis of data sets that are too large to be processed normally. For this reason, special software is used and, in many cases, specially dedicated computers and hardware. In general, at this data the analysis is done statistically. Based on the analysis of those data, predictions are usually made of groups of people or other entities, based on their behavior in various situations and using advanced analytical techniques. In this way, trends, needs and behavioral evolutions of these entities can be identified. The scientists use this data for research in complex physical simulations, biology, environmental protection, meteorology etc.

Relevance of Big Data

We are all aware that a modern digital framework allows for more innovations in science and technology that have facilitated our analytical capabilities, giving us information about data that was not possible decades ago. Therefore, we are witnessing an exponential growth of digital services and solutions in various aspects of human society. Most scientific fields explore the perspectives of digital applications. In the digitalization process, Big Data offers us new ideas and methods to understand the Earth and undertake the epic mission of sustainable development with a new impetus.

Big Data for Sustainable Development

The transformation of our world is taking place permanently. The 2030 Agenda for Sustainable Development offers a comprehensive program to collectively address several global challenges, such as environmental protection, climate

change, disaster risk reduction, food security. However, gaps in data and methods for evaluating several indicators restrict compliance and effective implementation in several countries around the world.

Thus, it is particularly necessary to improve access to data and the exchange of information between different organizations and countries. This is only possible by democratizing digital resources, information, data and in particular scientific knowledge. This is mainly true for the fields of natural sciences and engineering where a comprehensive knowledge of the complex interactions between different ecological and environmental systems is required to meet common challenges.

There are opportunities within the United Nations technology facilitation mechanism to improve the digitization and networking of scientific data and information. This will not only enable the flow of knowledge and information to all countries, but will also help to encourage and empower young talent to develop and to innovate solutions for their communities using globally distributed resources and information. CBAS, as an international research center, to exploit these opportunities, will work in the context of a "science for sustainability" framework and will develop scientific products, methods and technologies from the global to the local level to ensure global access to the most us, the most reliable information about SDG indicators. It will also work to mobilize technological and data resources useful for analyzing and visualizing information for informed actions and policies, with fair and free access. The SDG (Sustainable Development Goals) set of indicators was developed by the SDG expert group, which was set up by the United Nations Statistics Committee.

Introduction to CBAS

China announced in September 2020, during the general debate of the UN General Assembly Session, that it will set up an international big data research center for sustainable development goals.

CBAS aims to capitalize on big data for dissemination.

Transforming our world includes the 2030 Agenda for Sustainable Development, with multidisciplinary research in the field of Earth system sciences, economic and social sciences, and the science of sustainability. This process is dedicated to monitoring and evaluating indicators of sustainable development objectives in areas where Big Data plays an important role.

CBAS is working on a vision where data is open and accessible at the international and disciplinary level, technology is available to contribute to the

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whole policy-making process, and ideas and knowledge are communicated and developed, especially in developing countries.

CBAS is motivated to ensure collective development. CBAS has five key missions (according to the International Science Council, https://council.science/ro/current/blog/big-earth-data-advances-science-and-engineering-for-sdgs/):

1. Development of SDG data infrastructure and information products
2. Development and launch of a series of SDG satellites
3. Providing new knowledge on SDG monitoring and evaluation
4. Creation of a think tank for science, technology and innovation on promoting the SDGs
5. Providing SDG capacity development in developing countries.

Major Community Scientific and Technological Group of the United Nations

ISC, together with the World Federation of Engineering Organizations (WFEO), is a co-organizing partner of the United Nations Major Scientific and Technological Community Group. To this end, a mandate is provided for science at the UN and for the integration of science into major global policy processes, such as the implementation and monitoring of the 2030 Agenda.

The goals of sustainable development must support both people and the planet.

Following the meetings at the United Nations on the definition of the Sustainable Development Goals (SDGs), a group of international scientists published an appeal in the journal Nature, arguing for a set of six goals linking poverty eradication to protection and sustaining life on Earth. Researchers argue that in the face of growing pressure on the planet's ability to sustain life, adhering to outdated definitions of sustainable development threatens to reverse the progress made in developing countries in recent decades.

In 2013, in Melbourne, Australia, it was proposed that ending poverty and protecting the Earth's life support system should be double priorities for sustainable development goals, according to many researchers. The research team identified six objectives that, if met, would contribute to global sustainability, while contributing to poverty alleviation.

"Climate change and other global threats to the environment will become more and more serious barriers to further human development", said the professor David Griggs of Monash University in Australia. Humans are transforming the life

support system of the Earth - the atmosphere, oceans, waterways, forests, ice sheets and biodiversity – all that allow us to thrive permanently in ways that could jeopardize development gains.

The director of the Stockholm Resilience Center believes that research shows that we are at a time when the stable functioning of the Earth's systems is a basic condition for a prosperous global society and future development.

The team says that the classic model of sustainable development, of the three integrated pillars - economic, social and environmental - that has served nations and the UN for more than a decade, is flawed because it does not reflect reality. Co-author Dr. Priya Shyamsundar of Nepal's South Asian Network for Development and Environmental Economics believes that "as the global population grows to nine billion people, sustainable development should be seen as an economy that serves society within the system supporting the life of the Earth, not as three pillars".

Researchers believe that the Millennium Development Goals (MDGs) have contributed to the focus of international efforts on eight poverty targets. However, despite successes in some areas (the number of people living on less than a dollar a day has more than halved), many millennium development goals have not been met, and some remain in conflict with each other. Economic gains have come at the expense of environmental protection. Some people are struggling to link global environmental concerns with tackling poverty.

The new set of objectives improved lives and livelihoods, food security, water security, healthy and productive ecosystems, clean energy, governance for sustainable societies - aims to resolve this conflict. Each objective includes updates and extended objectives within the objectives of sustainable development, including the eradication of poverty, the fight against HIV / AIDS and the improvement of human health. But they must help: climate stability, reduce biodiversity loss, protect ecosystem services, sustainable use of nitrogen and phosphorus, clean water, clean air and sustainable use of materials.

Mark Stafford Smith, the Scientific Director of CSIRO's Climate Change Adaptation Program in Australia, said: "The key is that the SDGs must really add to sustainability. The SDGs have the potential to block the spectacular gains we have made over the past two decades in human development and to help the globe transition to a sustainable lifestyle. But the link between these two goals needs to be more consistent".

The new research is linked to Future Earth, a new international research program designed to "develop the knowledge needed by societies around the world

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to meet the challenges of global environmental change and identify opportunities for a transition to global sustainability". Many authors are closely involved in the development of this new research program.

Dr. Stafford Smith said: "Ultimately, choosing goals is a political decision. But science can inform what combination of goals can achieve a sustainable future. And science can identify measurable targets and indicators".

About the Future Earth

The Future Earth is a 10-year international research program that provides critical knowledge to societies in order to meet the challenges of global environmental change and to identify opportunities for a transition to global sustainability. The Future Earth will provide the highest quality sciences, integrating, as appropriate, different disciplines from the natural, engineering and human, social (including economic and behavioral) sciences. It is a collaborative project and includes academics, business, government and civil society, encompasses bottom-up ideas from across the scientific community, is solution-oriented and includes existing international projects on global environmental change and related research.

The paper is an early example of the solution-oriented work that Future Earth will undertake, with interdisciplinary teams of scientists coming together across borders to help solve sustainability issues. (International Science Council, https://council.science/ro/current/press/sustainable-development-goals-must-sustain-both-people-and-planet/)

The Concept of "Big Data"

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Typically, Big Data includes datasets with dimensions that exceed ordinary software and hardware capacity, using unstructured, semi-structured, and structured data, focusing on unstructured data (Dedić Nedim, Stanier Clare, Towards Differentiating Business Intelligence, Big Data, Data Analytics and Knowledge Discovery, in Innovations in Enterprise Information Systems Management and Engineering, Springer International Publishing, 2017). Big Data sizes have increased over time since 2012, from a few tens of terabytes to exabytes of data (Science History Institute, Information Overload, 2016). Making Big Data work more efficiently involves learning machines to detect patterns, but this data is often a byproduct of other digital activities.

Another recent definition states that "Big Data is the data that requires parallel computing tools to manage data", this is a turn in computer science, through the use of parallel programming theories and the lack of guarantees assumed by previous models. Big Data uses inductive statistics and concepts to identify nonlinear systems to deduce laws (regressions, causal effects, nonlinear relationships) from large data sets with decreased information density to obtain relationships and dependencies or to make predictions of results and behaviors. (Wikipedia, https://wikipedia.org/wiki/Big_data)

According to "The Ethics of Big Data: Balancing Economic Benefits and Ethical Questions of Big Data in the EU Policy Context", Big Data is a term that refers to the enormous increase in access to and automatic use of information. This refers to the very large amounts of digital data controlled by companies, authorities and other large organizations, which are subjected to extensive analysis based on the use of algorithms. Big Data can be used to identify general trends and correlations.

Conclusions

Therefore, we are witnessing to an exponential growth of digital services and solutions in various aspects of human society.

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