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Open Geospatial Science and Vision 2030

Suchith Anand outlines the evolution of an initiative that sets out to tackle the multidisciplinary challenges posed by growing urbanisation and the advent of Big Data

It is nearly a decade since the initial ideas for Open Geospatial Science were propounded. They build upon the proposition of Open science which argues that scientific knowledge of all kinds develops more rapidly and productively if openly shared (as early as is practical in the discovery process). The key ingredients that make Open Geospatial Science possible are enshrined in Open Principles, i.e:

• Open Source geospatial software
• Open data,
• Open standards
• Open educational resources, and
• Open access to research publications

To further the agenda, the European Commission published *Open Innovation, Open Science, Open to the World – a vision for Europe*[1] in May of last year. The book reviews the way that science works, how it is fundamentally changing, and how an equally important transformation is taking place in the way that companies and societies innovate. In short, the advent of digital technologies is making science and innovation more open, collaborative and global.

Goal setting

In this light, Commissioner Carlos Moedas has set three goals for EU research and innovation policy: Open Innovation, Open Science, and Open to the World. These goals were first outlined by Moedas in June 2015 to highlight how research and innovation contributes across the political priorities of the European Commission.

The goals do not represent a new policy initiative or funding program as such, but as a means to reinforce existing programs such as Horizon 2020, and reinvigorate existing policies such as the European Research Area.

Open Innovation, Open Science, Open to the World – a vision for Europe consolidates some of the conceptual thinking behind the "Three Os" and highlights actions that had already taken place or were being prepared at the time of publication. It is hoped that the ideas and initiatives described in the book will encourage anyone interested in European research and innovation to debate and generate new ideas on what the European Union should do, should not do, or do differently[2].

Open Source, Open Standards and Open Data hold the key for Big Data research in all disciplines and especially in Geospatial Science. European governments and the European Commission are constantly seeking a greater return on their investment in research. Part of the answer is to ensure the better re-use of data, software and technology between research programs; broader cross-disciplinary and institutional participation in major research projects, and more frequent and rapid uptake of research results by industry and government.

"I am convinced that excellent science is the foundation of future prosperity, and that openness is the key to excellence"

Imagery: EC Audio Visual Service / Etienne Ansotte

Carolos Moedas, Commissioner for Research, Science and Innovation, introducing the *Open Innovation, Open Science, Open to the World – a vision for Europe* publication, June 2015. Imagery: EC Audiovisual Service / Etienne Ansotte

So what is Vision 2030?

Geospatial Science = Open Geospatial Science

- **Geospatial Science should always be fully open and inclusive**
- **Transparency of research is fundamental (no "black boxes" or proprietary barriers).**
- **Geospatial Science should be built on Open Principles (Promoting an open research culture)**

In 2015, The Open Source Geospatial Foundation (OSGeo) setup a dedicated committee for Open Geoscience[7]. The wider community is invited to contribute ideas/inputs that can help realise this vision,[8],[9]. either by contributing directly to the wiki[10] or by emailing Suchith.Anand@nottingham.ac.uk by no later than 30th September 2016.

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Geo for All

"Geo for All"[3] was an outreach programme initiated by scientists and academics as a means of laying down strong foundations for Open Geospatial Science. Part of this initiative is to create openness in geo education and to encourage the flair and creativity that is so critical to society's wellbeing, both now and in the future.

The programme now has dedicated research labs world-wide and dedicated journals, etc.[4],[5]. to advance the discipline of Open Geospatial Science. This global research outlook is fundamental to the success of any new discipline, but it is equally important to collate ideas and inputs from the wider community to help shape the vision and build synergies with the three stated goals of the EU research and innovation policy: Open Innovation, Open Science and Open to the World.[2]

It is with this in mind that the Geospatial Interest Group of the Research Data Alliance and "Geo for All" organised a Think Tank meeting in June of this year at the University of Nottingham. The event brought together top scientists, academics and representatives of government agencies to discuss initial ideas for Open Geospatial Science -Vision 2030.

Expanding ideas

To expand on those ideas, the theme of Urban GeoBigData and OpenCitySmart was adopted, largely because growing urbanisation together with the rapid growth in sources and availability of geospatial data present new opportunities for improving the quality of life for citizens in such areas as social inclusiveness, sustainability and resilience, mitigation and adaptation to environmental change, to mention just a few.
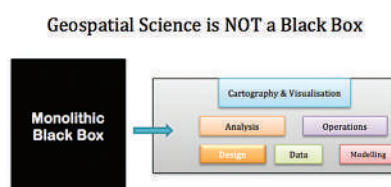
No single research domain or community possesses the broad spectrum of skills necessary to tackle the challenges of Big Data in an urban context in a timely manner. Computer scientists may, for example, be able to effectively visualise large volumes of data but lack the social science skills needed to manage data collection by citizen scientists. As such, there is a need to defragment existing research communities and to consolidate them in a way that fosters knowledge exchange, the development of skills, and the formulation of new ideas.

OpenCitySmart[6] is an initiative of Geo for All that aims to develop a suite of tools for city-related infrastructure management (utilities, traffic, services, etc.). Its purpose will be to continually refine and add functionality that not only streamlines operational efficiency but also considers the need for sustainability and quality of urban life. OpenCitySmart employs Open solutions to build richer toolboxes that empower organisations and individuals to handle spatial (and non-spatial) data. This will create innovation opportunities both globally and locally.

Multidisciplinary challenges

The challenges of Urban Big Geo Data are multidisciplinary in nature. A networked approach is essential to formally bring expert researchers, scientists, stakeholders, and so on together. Transparency of research is fundamental to scientific advancement (no "black boxes" or proprietary barriers), and geospatial science should always be open and inclusive (see Figure below).

Geospatial Science is NOT a Black Box

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