Geospatial Interest Group Charter

Background

Geospatial information – i.e., information that is related to a location or place on Earth – was originally limited to specific communities and application domains. Nowadays it is used pervasively across scientific disciplines as well as sectors of public administrations - a proverbial statement says that 80% of all data is spatially referenced. [1] In fact, it reaches the general public through desktop and mobile devices, making the Web the main channel for the distribution and consumption of geospatial information.

However, the effective use of geospatial information across domains and applications is strongly limited by barriers to data sharing and integration. Examples include:

- Heterogeneous representations of space and time.
- Adoption of different levels of complexity.
- A non-existent or non-rigorous approach to quantifying data uncertainty.
- Use of different and not easily compatible technological platforms.
- Geospatial data products which are not available through open data arrangements.

The BoF session on Geospatial Information, held on 26th March 2014 at the RDA 3rd Plenary in Dublin[2] recognized the importance of addressing issues related to the interoperability and re-use of geospatial information in the framework of RDA.

In order to achieve this objective, the Geospatial Interest Group will follow the work of RDA as a whole and will discuss measures to build synergies using "information about location and places" as a cross-disciplinary integrator.

Scope

The Geospatial IG aims at being a support-oriented interest group to coordinate and build synergies inside RDA on topics related to geospatial information. The group aims also to bring together all major stakeholders dealing with the whole data value chain for geospatial research and innovation. It will take stock of existing problems and experiences, and serve as a competence center and contact point regarding issues of geospatial data handling and management within RDA.

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[1] Caitlin Dempsey Morais. *Where is the Phrase "80% of Data is Geographic" From?* http://www.gislounge.com/80-percent-data-is-geographic/

[2] https://rd-alliance.org/blogs/bof-geospatial-information-meeting-rda3.html

Due to this overarching perspective, and long-term perspective of these challenges, the topic requires an Interest Group (IG) to be established rather than a short-term, narrow Working Group. The Geospatial IG itself will spin off Working Groups (WGs) to address topics of interest that have been isolated by the Interest Group itself and its collaboration with other RDA groups expressing needs in geospatial data handling.

For example, developments in standards of the Open Geospatial Consortium (OGC) allow the implementation of geospatial web services, enabling GIS 'mashups' to be seamlessly assembled by combining datasets from various sources and semantic frameworks. However, to derive intelligent outcomes there needs to be understanding on the methodologies to quantify the uncertainties of the spatial data that these results produce.

Activities

The Geospatial IG will focus its activities on the three main areas, illustrated below (with an initial question added that aims at sparkling discussion to eventually crystalize WG topics):

Geospatial data modeling, management, analyzing, and sharing

Initial question: "*why can't we correlate two datasets offered by different data centers in different domains (such as satellite data centers and climate data centers)?*"

Initial WG topic suggested: "*Leveraging OGC Big Geo Data standards for INSPIRE – a case study for SDIs"*.

Uncertainty in geospatial data

Initial question: "*How does uncertainty add to uncertainty in a processing chain step?*"

Initial WG topic suggested: "*Interoperablity testbed to understand uncertainity issues in multiscale Geospatial Data analysis (use cases: Transport, Environment)"*

Geospatial data re-use across domains, and cross-domain interoperability of location information

Initial question: "*how can we exchange data between domains X and Y, where X and Y are RDA IGs with geospatial data?*"

Initial WG topic suggested: "*Interoperability experiment on geo data and services provided by RDA IG/WG members*".The members will work to integrate knowledge across the RDA by providing different viewpoints and requirements and also promoting a common/harmonized approach considering geospatial information handling within different RDA groups.

Outcomes and success criteria

Geospatial IG will be considered a success if the Interest Group:

- serves as a competence center and contact point regarding issues of geospatial data handling and management within RDA
- creates opportunities for establishing new WGs on themes related to GI which can then develop actions on specific focussed themes
- has visibly impacted relevant standardization
- has established demonstrations of innovative services
- has published journal and conference articles, via its members

Collaboration

The Geospatial IG has a specific interest in data interoperability and quantifying uncertainty in collected datasets, and will work in close collaboration with other RDA groups and efforts will be made to get an active participation of the major international initiatives related to geospatial information and its cross-domain re-use. We are also interested in building synergies and collaboration opportunities with citizen science, Volunteered Geographic Information (VGI), smart cities initiatives.

RDA groups

Metadata IG, Metadata Standards Directory WG, Data in Context IG

The Geospatial IG plans to collaborate with this groups on issues concerning cross-domain metadata interoperability and re-use, with a particular focus on alignment across standards and the spatial/temporal dimension of data context. The Geospatial IG co-chairs are already in contact with these groups, with the objective of identifying and promoting coordination on mutually relevant issues.

Big Data IG

Coverages (as per ISO and OGC) represent regular and irregular grids, point clouds, and meshes, which together make up the larger part of Big Geo Data. This constitutes a thematic overlap and synergy with the BigData IG. In fact, one of the BigData IG use case is devoted to Big Geo Data, specifically: spatio-temporal satellite and climate datacubes, based on OGC's Big Geo Data standards suite, Web Coverage Service (WCS). These activities establish a strong link and common grounds for collaboration of and interaction between the two Interest Groups, implemented by the pertaining Working Groups on the overlapping topic of Big Geo Data. One specific activity will be to establish agile analytics on Petabyte datacubes under the umbrella of the EU-US-AUS initiative EarthServer, starting in summer 2015.

Quality of Urban Life IG

This RDA interest group is being set up to contribute to this challenge by identifying a minimum set of interoperable open access datasets across the social,

environmental, economic and cultural domains that can be used to build comparable indicators of Urban Quality of Life (QoL) in a global setting. There is good synergies with the Urban QoF IG specifically for exploring activities using spatio-temporal components as key integrators for linking data from disparate sources and to understand underlying patterns.

Other relevant RDA groups

- Agriculture Data IG
- Publishing Data IG
- Data Citation WG

Groups, projects, initiatives external to RDA

Open Source Geospatial Foundation (OSGeo)

OSGeo's mission is to support the collaborative development of open source geospatial software, and Geospatial IG co-chairs are actively contributing to many activities for this. Through the "Geo for All" initiative (lead by Suchith Anand), one of thematics that is on Urban Science and City Analytics (led by Chris Pettit)which will lead to many joint Working Group activities in the future. Further the IG will strongly support Open Principles in Geospatial Domain.

Open Geospatial Consortium (OGC)

OGC is a natural collaboration partner for the Geospatial IG. Through the co-chairs there are manifold links already existing, such as co-chairing of the OGC Big Data Domain Working Group, the Web Coverage Service Working Group, and the Coverages Domain Working Group. In addition, Geospatial IG co-chairs are actively contributing to Web Processing Service Standards Working Group; GML Standards Working Group; Temporal Domain Working Group. This will lead to a mutual cross-fertilization of activities. For example, OGC Testbed results of the IG members will be brought into the IG for discussion. Further, the IG will be involved in the open consensus process of OGC.

World Wide Web Consortium (W3C)

In January 2015, W3C and OGC jointly chartered the Spatial Data on the Web Working Group (SDW WG), with the purpose of better integrating standards and technologies of the geospatial and the Web. The outcomes of this work are going to have huge impact in terms of data interoperability, and are therefore very much relevant to the Geospatial IG. Some of the co-chairs are involved in the SDW WG, and they will ensure alignment and possibly coordination with the Geospatial IG on these activities. This includes contributing relevant requirements gathered from RDA.

Infrastructure for Spatial Information in the European Community (INSPIRE)

INSPIRE is a Directive of the European Parliament and the Council, defining a legal and technical framework for the creation of a cross-border spatial data

infrastructure at the EU level. Major INSPIRE stakeholders include public administrations (e.g., environmental, mapping and cadastral agencies), the private sector, as well as the scientific community). Some of the Geospatial IG co-chairs are actively involved in INSPIRE, at both the implementation and governance level. As such, they will be able to ensure a liaison between the Geospatial IG and the INSPIRE community.

Other relevant groups, projects, initiatives with Geospatial IG engagement

- International Cartographic Association (ICA)
- Group on Earth Observations (GEO)
- National Science Foundation EarthCube Initiative
- Earth Science Information Partners (ESIP)
- Association of Geographic Information Laboratories for Europe (AGILE)
- University Consortium for Geographic Information Science (UCGIS)
- Earth and Space Science Informatics (ESSI) Focus Group of the American Geophysical Union (AGU)
- EarthServer
- Belmont Forum

Timeline

Before the 6th RDA Plenary

- Finalize the Geospatial IG charter and get the IG approved and endorsed

Before the 6th RDA Plenary

- Use cases from other RDA IGs and WGs on interoperability and re-use of geospatial information: Based on the synergies identified so far, use cases will cover the following tentative list of areas:
    - Metadata (Metadata IG, Metadata Standards Directory WG, Data in Context IG)
    - Quality of Urban Life IG
    - Urban Science and City Analytics (for example we have already build up a vibrant research community in Urban Science and City Analytics lead by Chris Pettit. The online document *"Geo for All" Urban Science and City Analytics: 'CitySmart'*[3], includes many of the ideas, that may be the basis for different WGs after the IG is formally established.

Before the 7th RDA Plenary

- Call for interested WGs to be setup: The use cases collected in the previous

[3] http://wiki.osgeo.org/wiki/GeoForAll_UrbanScience_CityAnalytics

phase will help identify the major horizontal issues across RDA groups in the scope of the Geospatial IG. The call of interest is meant to promote WGs addressing these issues.

Before the 8th RDA Plenary

Outlining the possibilities to, and advocating the possible benefits of including geospatial information in other RDA groups (Agriculture IG, Big Data Analytics, etc)

Mechanism

The work of the Geospatial IG will be coordinated by a Chair and three Co-Chairs (representing different regions). Face to Face meetings of the group and of eventual working groups will propose, and may conduct activities alongside the regular RDA meetings and also at other meetings (for example in parallel to ICA, OSGeo conferences). The Geospatial IG will use the RDA structures for a monthly on line collaboration between the face to face meetings.

Chairs:

- Suchith Anand (University of Nottingham, UK)
- Peter Baumann (Jacobs University Bremen, Germany)
- Luciene Delazari (Federal University of Parana, Brazil)
- Helena Mitasova (North Carolina State University, USA)
- Andrea Perego (European Commission DG JRC, Italy)
- Chris Pettit (University of Melbourne, Australia)

Participants

On 2 March 2015, The Geospatial IG counted more than 90 members, from the following geographic areas:

- Africa (Guinea and South Africa): 2
- Asia (Bangladesh, China, India, Malaysia and Turkey): 7
- Europe (from 14 countries): 56
- North America (USA and Canada): 24
- South America (Brazil): 1
- Oceania (Australia): 4

The full list of participants is available online at:

https://rd-alliance.org/group/geospatial-ig.html

Annex (for TAB assessment only)

BoF on Geospatial Information @ RDA3, Dublin

The proposal to establish an Interest Group in Geospatial was presented by Suchith Anand at the BoF session on Geospatial Information[4], on 26th March 2014 at the RDA 3rd Plenary in Dublin chaired by Simon Cox.

The BoF meeting was attended by the following RDA members:

Ester Conway	STFC/NCEO	UK
Parinaz Ameri	KIT	Germany
Christopher Jung	KIT	Germany
Roger Proctor	IMOS	Australia
Christian Muller	B.USOC	Belgium
Marko Peterson	UT	Estonia
Tim Duffy	BGS	UK
Andrea Perego	European Commission	Italy
Matt Harrison	BGS	UK
Tim Haithcoat	MSOIS/GRC- UMC	USA
Bart Jagers	Deltares	The Netherlands
John Howard	University College Dublin	Ireland
Robert Cartolaro	Columbia University	USA
Phil Archer	W3C	UK
Tom Bunting	Contractor for APA	UK
Natalie Meyers	Uni. Of Notre Dame	UK
John Watkins	NERC	UK
Fergus Olayis	Osaka University	Japan
Gary Berg Cross	SOCOP	USA
Dimitra Mauraki	Hellenic Centre for Marine Research	Greece
Francoise Pearlman	IEEE	USA
Bebte Lilda Dye	BLB	Norway
Johanne Schwarz	Springer-Verlag	Germany
Reinhard Budich	MPI for Meterology	Germany
Chris Hill	University of Southampton	UK

[4] https://rd-alliance.org/blogs/bof-geospatial-information-meeting-rda3.html

Suchith Anand	University of Nottingham	UK
Simon Cox	CSIRO	Australia

Meeting @ RDA4, Amsterdam

See: https://rd-alliance.org/geospatial-ig.html

Agenda

- Introduction and welcome to new members
- Updates on current status of Geospatial IG & joint paper on Geospatial Data Science - Suchith Anand (University of Nottingham)
- Updates on Joint W3C/OGC Spatial Data on the Web WG - Phil Archer (W3C)
- Updates on Urban Quality of Life Indicators - Chris Pettit (University of Melbourne)
- Spatial ontology design patterns - Gary Berg-Cross
- INSPIRE and geospatial data in the EU - Andrea Perego (European Commission - Joint Research Centre)
- Recent Progress in Geo Standardization - Peter Baumann (Jacobs University)
- Semantic Pathways for Building a Spatially Thinking Society: GEOTHNK - Suchith Anand (University of Nottingham)

Minutes of the Geospatial IG meeting @ Plenary 4 – Prepared by Christophe Debruyne

- The meeting attracted more than 25 participants with diverse backgrounds during which five presentations – including the introduction by the chair – were given, followed by a Q&A.
- A quick introduction by all participants in the room showed that people came to the IG's meeting sparked by their own particular interests; some of the participants develop file systems or software systems for geospatial data where others are using such data. The combination of temporal and spatial data was mentioned four times, and five of the participants explicitly mentioned their interest of geospatial data for marine or environmental purposes.
- Before starting the meeting, Suchith Anand presented the agenda and forwarded Gary Berg-Cross' apologies for not making it to the meeting. Suchith started the meeting with conveying the message that open geospatial science is key for innovation in GIS and therefore one must strive for open standards, open data, and open software. The IG aims to contribute in reaching that goal. The groups came into existing after a BoF held in Dublin during the third plenary meeting in March 2014 by Simon Cox. Six months have passed, and until now the group managed to create a group on the RDA website; coordinate several activities (e.g., with respect to the reuse across domains or sharing policies); updated the case statement. It is worthy to note that the group has over 50 members and many people are willing to join the initiative on working on a joint paper. Suchith ended the meeting by asking

the question what the future of geo data is and the importance to (i) identify key geo data issues, solutions and (non-)technical challenges as well as (ii) train students in using geo data.

- The floor was then given to Phil Archer from W3C who reported on work conducted to harmonize OGC and W3C standards; quite a few commonalities were identified in the two standards during a workshop in which the two bodies were involved. A charter has been created that looks great, but is still open for review. The working group is having some difficulties mainly due to the member-ship model adopted by both organizations, but Phil hopes this to be solved by mid-October as to have the working group start in November.
- Chris Pettit then reported on the work conducted by the Urban Quality of Life Indicators Working Group who aim to crate comparable, open and interoperable indicators. At the moment, they aim to interact with other working groups as well as OGC. The discussions they held were on the alignment with standards, the creation of mappings between indicators and those standards, and the creation of an indicator ontology. They currently investigate case study cities to select as well. The university of Groningen expressed their interest in this project.
- Andrea Perego reported on the INSPIRE and Geo Data projects in the EU. Relationships with public administrations were created and synergies in other working groups are aimed for. A conference in the context of the INSPIRE project lead to some interesting conclusions. One is the complexity of implementing the legal and technical framework provided by INSPIRE in 28 members states. Another observation is the tension field between usability and usefulness of the data models; stakeholders expressed access to data with different layers of complexity depending on the use case. INSPIRE is now working on regulations at a European level as well as one a European and pan-European open data portal. At this moment, Suchith makes a point about funding; to talk about opportunities after the session. In short, the challenges identified by Andrea were: interoperability, usability and sustainability. Work is currently conducted on Authentication, authorization and accounting (or AAA); licensing schemes and data sharing; adoption of RDF and PIDs; To this end, the WG will look into the outcome of relevant working groups. After this presentation, two important comments were made. The first, on the use of structured data and semantic technologies, one remarked that the scientific community culture does not want to add structured data in Web pages as there is no direct gain (e.g., citation). The second comment was on education, which needs to change to include geo data to create data specialists.
- Finally, Peter Bauman presented recent progress in geo standardization. The presentation started off by noting that, albeit being a standard, ISO 19123 provides an abstract model and no implementation model, the latter being covered by OGC GMLCOV. Both ISO and OGC wish to revise the standard to take into account a concrete implementation model. Progress in OGC includes time and index CRSs and a CRUD model for data so data can be

propagated. Peter provided examples of four-dimensional time series and weather groups and the feasibility that is demonstrated with huge amounts of data of a couple of years ago with data of increasing complexity. INSPIRE coverage model has been harmonized with OGC GMLCOV and coverage data and services are going to ISO for standardization. He then presented work done on the inclusion of arrays in SQL for adding and querying images in databases, followed by an example of a query and noting that this implantation works faster than similar queries using RDF and SPARQL after this question was raised. Finally, the noted that user oriented services – interfaces that make it easier for end-users – is something that needs to be focused on.

- The meeting closes with Peter Baumann suggesting structuring the paper – which the IG is currently working on – according to different models (enterprise model, information model, …) which not only provides a logical framework, but also allows the authors to focus on their expertise and section. Finally, Suchith invites all to network and discuss funding opportunities, to which Phil Archer notes that W3C is also able to be involved in EU projects as well.

Planned meeting @ RDA5, San Diego (Joint meeting with Big Data IG)

See: https://rd-alliance.org/ig-geospatial-p5-joint-session.html

Meeting agenda

Session Chair - Chris Pettit

- Introduction and session overview (Chris Pettit)
- Updates on Geospatial IG (Suchith Anand)
- Updates on Big Data IG (Peter Baumann)
- *Geospatial, Big Data: Quo vadis?* (Sven Schade, Max Craglia, Andrea Perego)
- COBWEB presentation (Mike Jackson, Didier Leibovici)
- Mark Gahegan's presentation
- Tuong Thuy Vu's presentation
- Urban Science - City Analytics - The Road Map Challenge discussion (joint ideas in Geospatial and Big Data) led by Chris Pettit - See ideas in place at: http://wiki.osgeo.org/wiki/GeoForAll_UrbanScience_CityAnalytics
- Q& A and discussion for future actions

Current members

On 6 March 2015, the Geospatial IG counted more than 90 members, from the following geographic areas:

- Africa (Guinea and South Africa): 2
- Asia (Bangladesh, China, India, Malaysia and Turkey): 7
- Europe (from 14 countries): 56
- North America (USA and Canada): 26

- South America (Brazil): 1
- Oceania (Australia): 4

The full list of members, updated to 6 March 2015, is included below.

1.	Aaron Addison	Washington University in St. Louis	USA
2.	Adam Shepherd	Woods Hole Oceanographic Institution	USA
3.	Adrian Tear	University of Portsmouth	UK
4.	Alexandra Archibald	M4 Technologies Ltd.	UK
5.	Amir Pourabdollah	University of Nottingham	UK
6.	Amy Hodge	Stanford University	USA
7.	Andrea Westerinen	Nine Points Solutions, LLC	USA
8.	Andrea Perego	European Commission - Joint Research Centre	Italy
9.	Andrew Hunter	University of Calgary	Canada
10.	Andy Turner	University of Leeds	UK
11.	Anne Thessen	The Data Detektiv	USA
12.	Anthony Beck	1Spatial & University of Leeds	UK
13.	Antonie Haas	Alfred-Wegener-Institute Helmholtz Centre for Polar and Marine Science	Germany
14.	Ari Jolma	Aalto University	Finland
15.	Barbara Entwisle	University of North Carolina at Chapel Hill	USA
16.	Barend Köbben	ITC-University Twente	The Netherlands
17.	Benjamin Gross	UNAVCO	USA
18.	Bente Lilja Bye	BLB	Norway
19.	Charles Vardeman II	University of Notre Dame	USA
20.	Chris Badurek	Drexel University	USA
21.	Chris Pettit	Australian Urban Research Infrastructure Network	Australia
22.	Christian Schäfer-Neth	Helmholtz / Alfred Wegener Institut	Germany
23.	Christine Malinowski	Massachusetts Institute of Technology	USA
24.	Christophe Debruyne	Digital Repository of Ireland - INSIGHT @ NUI Galway - Vrije Universiteit Brussel	Ireland
25.	Christopher Crosby	UNAVCO	USA
26.	Chrysi Tsinaraki	European Commission – Joint Research Centre	Italy
27.	Claire Ellul	University College London	UK
28.	Conor Smyth	University of Edinburgh, EDINA	UK
29.	Dawn Wright	Environmental Systems Research Institute	USA

30.	Didier Richard	IGN	France
31.	Didier Leibovici	University of Nottingham	UK
32.	Dietrich Schroeder	University of Applied Sciences Stuttgart	Germany
33.	Dimitra Mavraki	Hellenic Centre for Marine Research	Greece
34.	Dimitrios Koureas	Natural History Museum London	UK
35.	Dražen Tutić	University of Zagreb, Faculty of Geodesy	Croatia
36.	Erich Seamon	University of Idaho	USA
37.	Gary Berg-Cross	Spatial Ontology Community of Practice	USA
38.	Georg Gartner	TU Vienna	Austria
39.	George Percivall	University of Nottingham	UK
40.	Glen Hart	University of Nottingham	UK
41.	Godwin Yeboah	Aberdeen University	UK
42.	Gregory Giuliani	University of Geneva	Switzerland
43.	Helena Mitasova	North Carolina State University	USA
44.	Heli Väätäjä	Tampere University of Technology	Finland
45.	Herman Stehouwer	RZG	The Netherlands
46.	Hermann Klug	University of Salzburg, Interfaculty Department of Geoinformatics	Austria
47.	Hervé L'Hours	UK Data Archive	UK
48.	Hyoungjoo Park	UWM	USA
49.	Ionut Iosifescu	ETH Zurich	Switzerland
50.	J. Y.	RADI	China
51.	Jason Sadler	GeoData Institute, University of Southampton	UK
52.	Jörg Meyer	Karlruhe Institute of Technology	Germany
53.	Jorge Gil	TU Delft	The Netherlands
54.	Kate Lance	info:infrastructure, LLC	USA
55.	Kevin Dyke	University of Minnesota Libraries	USA
56.	Laura Kostanski	Geonaming Solutions	Australia
57.	Luciene Delazari	UFPR	Brazil
58.	Lucy Bastin	Aston University	UK
59.	Mahroof M	CU	India
60.	Maria Krestyaninova	EAWAG	Switzerland
61.	Maria Brovelli	Politecnico di Milano	Italy
62.	Marius Appel	University of Muenster, Institute for Geoinformatics	Germany
63.	Martin Hammitzsch	GFZ German Research Centre for Geosciences	Germany

64.	Michael Finn	U. S. Geological Survey	USA
65.	Mike Brown	Centre for Ecology and Hydrology	UK
66.	Mike Jackson	Nottingham Geospatial Institute	UK
67.	Mohammed Abdur Razzak	GOB	Bangladesh
68.	Murat Komesli	Yaşar University	Turkey
69.	Parinaz Ameri	KIT (Karlsruhe Institute of Technology)	Germany
70.	Peng Yue	State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing (LIESMARS), Wuhan University	China
71.	Peter Baumann	Jacobs University	Germany
72.	Phil James	Newcastle University	UK
73.	Phillip Delaney	The University of Melbourne	Australia
74.	Reinhard Budich	MPI für Meteorologie	Germany
75.	Robert Jeansoulin	CNRS	Canada
76.	Robert Berry	University of Gloucestershire	UK
77.	Roger Longhorn	The Coastal & Marine Union (EUCC)	Belgium
78.	Sandra Vieira Gomes	National Laboratory of Civil Engineering	Portugal
79.	Sandro Fiore	Euro Mediterranean Center on Climate Change (CMCC)	Italy
80.	Seraphim Alvanides	Northumbria University, Newcastle, UK	UK
81.	Serena Coetzee	University of Pretoria	South Africa
82.	Sharlynn Sweeney	University of Florida	USA
83.	Simon Cox	CSIRO	Australia
84.	Steven Chong	University of Arizona	USA
85.	Steven Morris	North Carolina State University Libraries	USA
86.	Suchith Anand	University of Nottingham	UK
87.	Sylvia Ofosua Adjei	Avocet	Guinea
88.	Thierry Badard	Laval University	Canada
89.	Timea Biro	Trust-IT Services	Italy
90.	Tobias Weigel	German Climate Computing Center (DKRZ)	Germany
91.	Tony Mathys	EDINA, The University of Edinburgh	UK
92.	Tuong-Thuy Vu	University of Nottingham, Malaysia campus	Malaysia
93.	Vincent Razanajao	Griffith Institute, University of Oxford	UK
94.	Vyron Antoniou	UCL	Greece
95.	Xiaogang Ma	Rensselaer Polytechnic Institute	USA
96.	Zhijie Zhang	Fudan University	China