The Role of VO in Astronomy for Development

IVOA Interop Meeting, 13th May 2016

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science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

IAU

NRF National Research Foundation | SAAO South African Astronomical Observatory

OAO - OAD - IAU (Divisions)

Knowledge

Access

Development

International Astronomical Union | Office of Astronomy for Development

Astronomy for Development…?

The IAU Strategic Plan 2010-2020:

CULTURE AND SOCIETY

TECHNOLOGY AND SKILLS

SCIENCE AND RESEARCH

ASTRONOMY

PERSPECTIVE IMMENSITY OF UNIVERSE
Tolerance and global citizenship

OPTICS
High-precision adaptive optics

COMPUTERS
Fastest hardware
Complex software

HISTORY
Evolution of Universe
Our roots

ELECTRONICS
Most sensitive detectors
Fastest clocks

ANTHRO-POLOGY
Ancient civilizations
Our roots

SPACE
Satellite Miniaturization
Precision

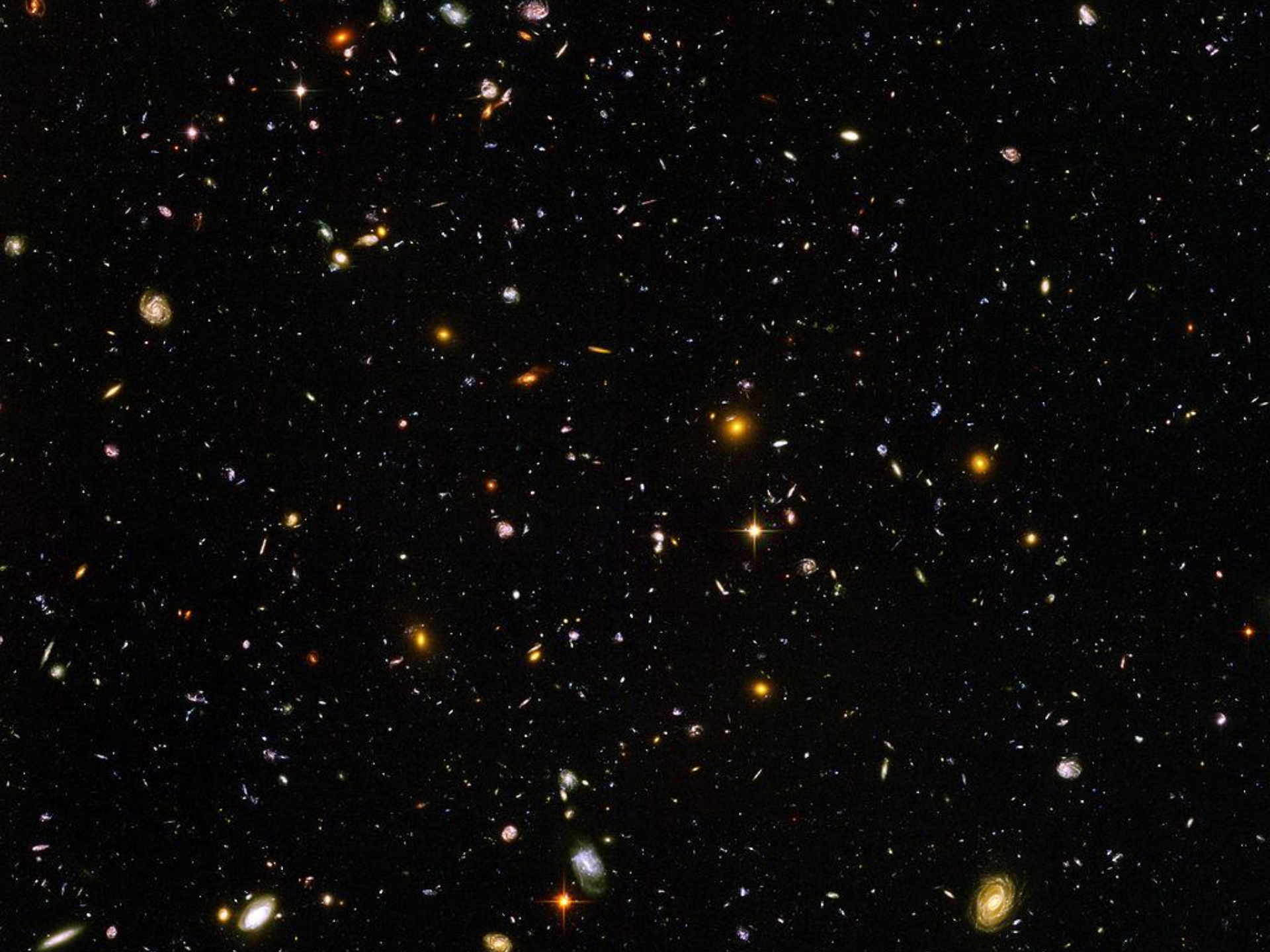
INSPIRATION
Career in science and technology

PHYSICS
Laboratory of extremes
Making heavy elements

MATHEM-ATICS
Abstract thought

BIOLOGY
Building blocks of life

CHEMISTRY
Producing organic molecules

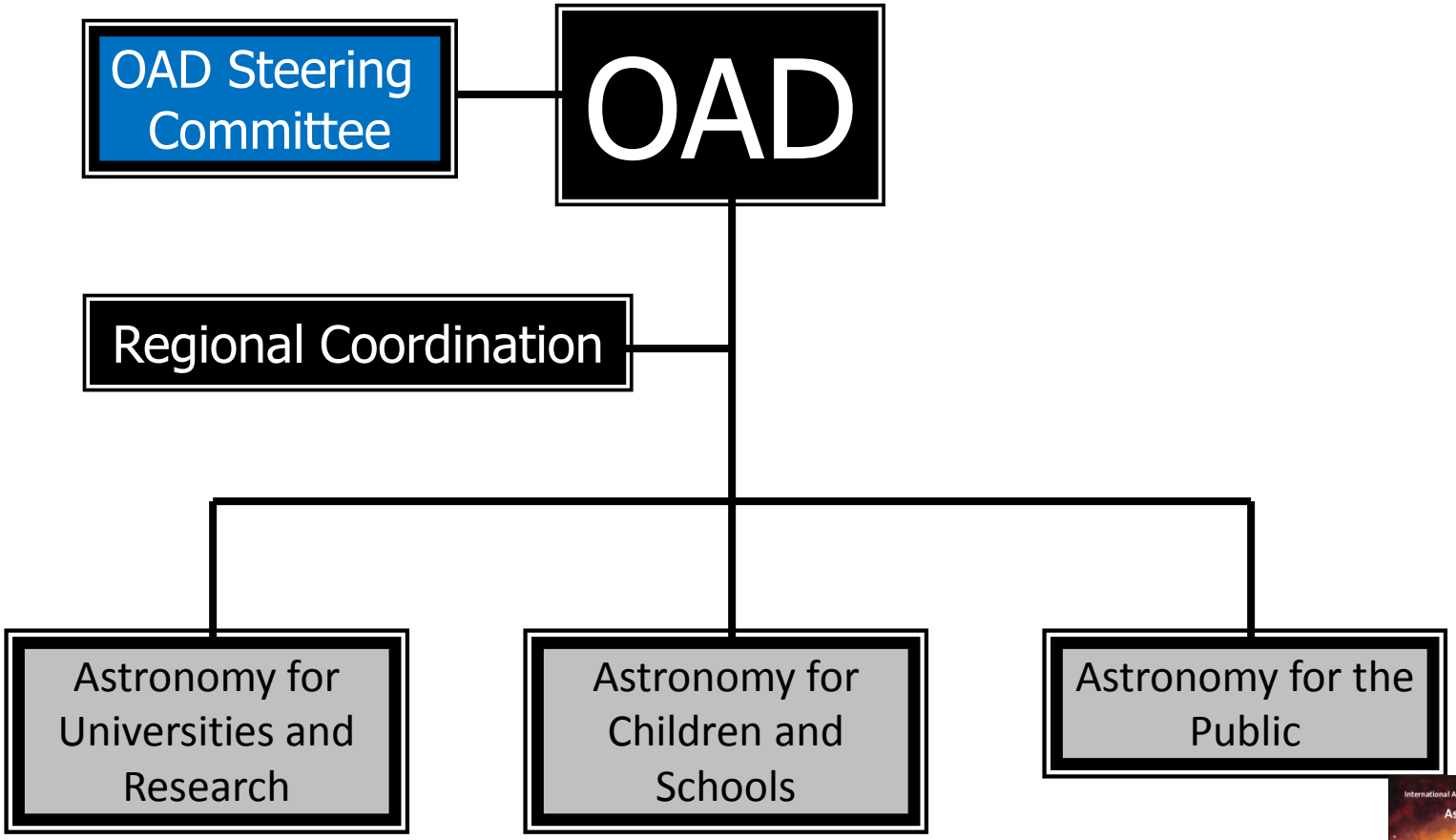



SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

Astronomy for Sustainable Development!

- **Social benefits** (common humanity, scientific engagement & discourse)
- **Human capital development** (education, skills, career choices)
- **Economic growth** (knowledge economy, innovation)
- **Human welfare** (all of the above, technology transfer)

OAD Structure



"Astronomy for a better world!"

Staffing

Director

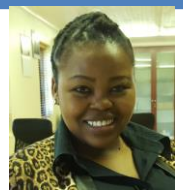
Programme Coordinator

Astronomer

Fundraiser

Office Manager

Interns

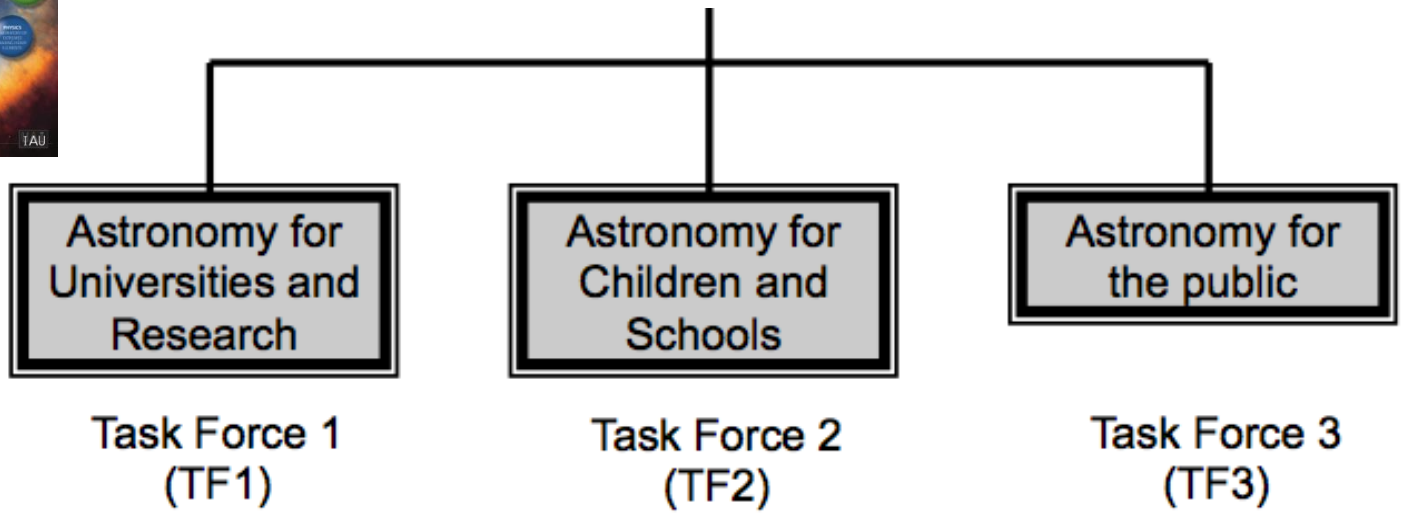


Fellows

Volunteers

Postdocs

OAD Task Force membership



Jean-Pierre de Grève (Belgium, C46)
Richard de Grijs (China)
Michèle Gerbaldi (France)
Edward Guinan (USA – Chair)
Roger Hajjar (Lebanon)
Edward Jurua (Uganda)
Katrien Kolenberg (USA - VC)
Hakim Malasan (Indonesia, Div C)
Shengbang Qian (China)
Nicole van der Bliek (Chile)

Rosa Doran (Portugal)
Edward Gomez (LCOGT,Cardiff - VC)
Mary Kay Hemmenway (USA, **observer**)
Robert Hollow (Australia)
Ofodum Chukwujekwu Nworah (Nigeria)
Rosa Maria Ros (Spain)
Pedro Russo (Leiden/UNAWE/C55, Chair)
Cecilia Scorza (Venezuela/Germany)
Linda Strubbe (Canada)
Akihiko Tomita (Japan)
Jinhua He (China, Observer)

Thilina Heenatigala (Sri Lanka)
Sarah Kendrew (UK - New Media)
Kimberley Kowal (US)
Carolina Ödman (South Africa – VC)
German Puerta (Colombia)
Sze-leung Cheung (Japan, OAO)
Ian Robson (UK - Chair)
Komiko Usida (Japan)
Ziping Zhang (China)

OAD Volunteers

- IAU members, amateurs, professionals, teachers, students, public
- Over 600 worldwide (on this map they are grouped by location)

www.astro4dev.org/volunteers

OAD Regional Offices

Lusophone
Portugal

South West Asia
Armenia

East Asia/Chinese
China

Arab World/Arabic
Jordan

South East Asia
Thailand

Andean Countries
Colombia

West Africa
Nigeria

East Africa
Ethiopia

Southern Africa
Zambia

OAD

中国科学院云南天文台
YUNNAN OBSERVATORIES, CHINESE ACADEMY OF SCIENCES

北京天文馆
Beijing Planetarium

KIAA–PKU

IAU

The International Astronomical Union's

East Asian Regional Office of Astronomy for Development (*EA-ROAD*)

Richard de Grijs[1] and Ziping Zhang[2]

[1] *Kavli Institute for Astronomy & Astrophysics, Peking University, China*

[2] *Beijing Planetarium, Beijing, China*

South East Asia Regional Office of Astronomy for Development

by Supaluck Chanthawan

East African Regional Office of Astronomy for Development

Kelali Adhana Tekle (PhD)

Director

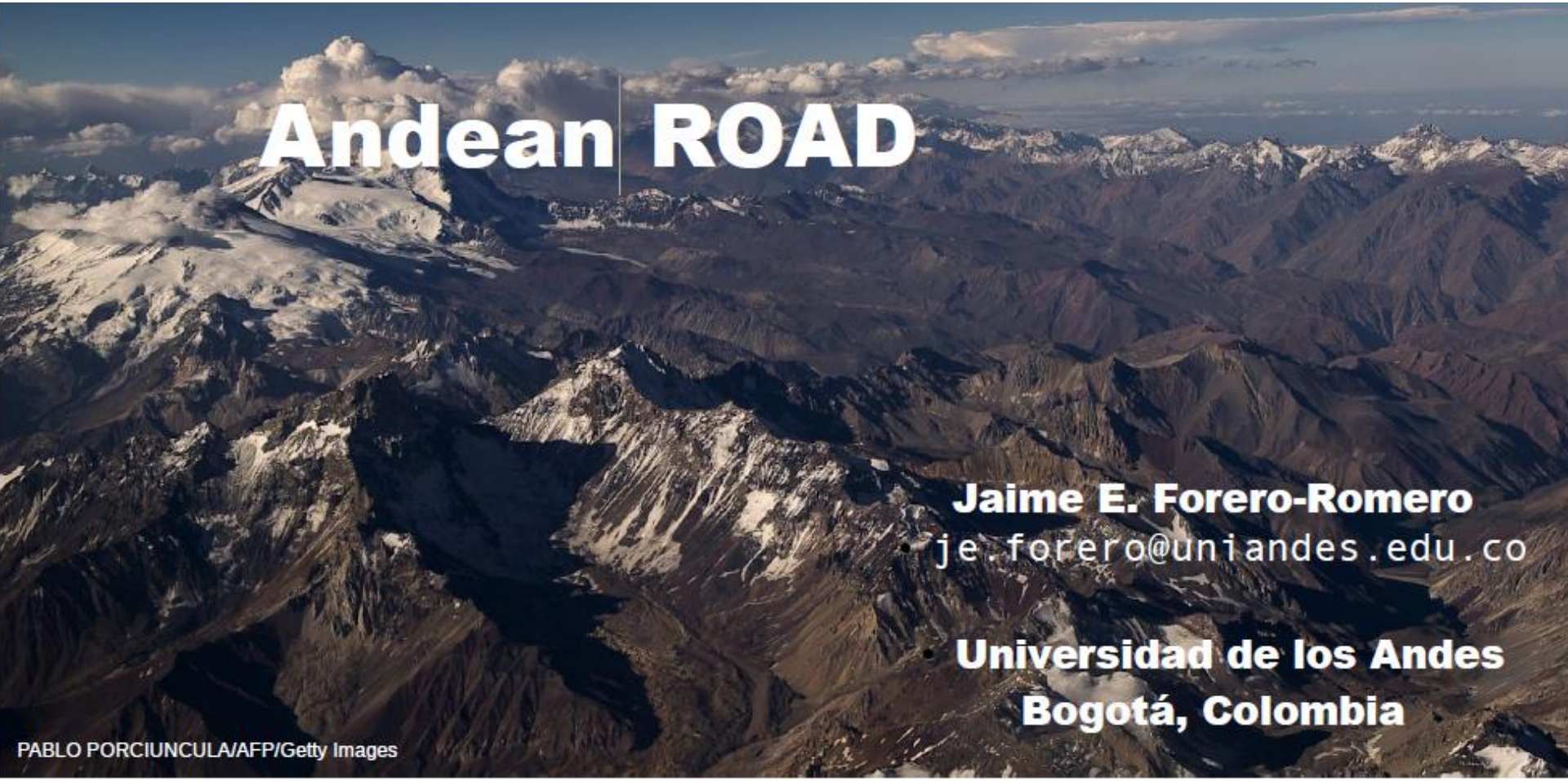
OSC Members:

- Ministry of Education (Chair)
- Ministry of Science and Technology (Member)
- Ethiopian Space Science Society (Member)
- Addis Abeba University (Member)
- OAD global office (Member)

SOUTHERN AFRICA REGIONAL OFFICE OF ASTRONOMY FOR DEVELOPMENT (SAROAD)

BY

PROSPERY C. SIMPEMBA AND LENGANJI MUTEMBO



Jaime E. Forero-Romero
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Universidad de los Andes
Bogotá, Colombia

PABLO PORCIUNCULA/AFP/Getty Images

IAU South West Asian ROAD activities

Areg Mickaelian

Director, IAU SWA ROAD

AW Astronomy

Algeria	Morocco
Bahrain	Oman
Comoros	Palestine
Djibouti	Qatar
Egypt	Saudi Arabia
Iraq	Somalia
Jordan	Sudan
Kuwait	Syria
Lebanon	Tunisia
Libya	United Arab Emirates
Mauritania	Yemen

West African Regional Office of Astronomy for Development

Bonaventure Okere
Regional Coordinator

PLOAD

Grupo Lusófono de **Astronomia** para o Desenvolvimento

IAU OAD

International Astronomical Union | Office of Astronomy for Development

PLOAD

Portuguese Language Office of **Astronomy** for Development

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East Africa
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Southern Africa
Zambia

OAD

Funded Projects (68+18=86)

TASK FORCES

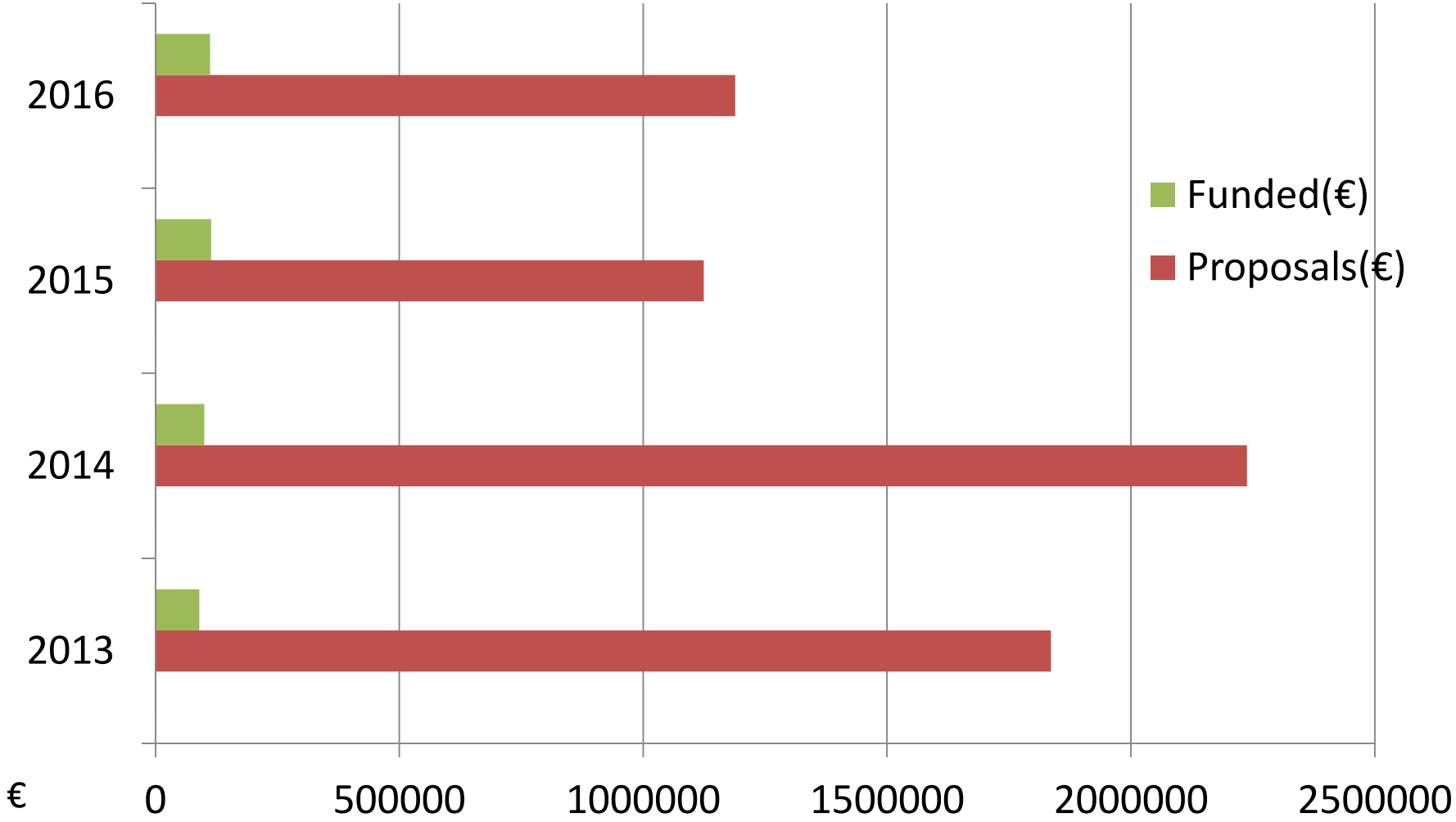
- ASTRONOMY FOR CHILDREN & SCHOOLS (TF2)
- ASTRONOMY FOR UNIVERSITIES & RESEARCH (TF1)
- ASTRONOMY FOR THE PUBLIC (TF3)

www.astro4dev.org/proposals

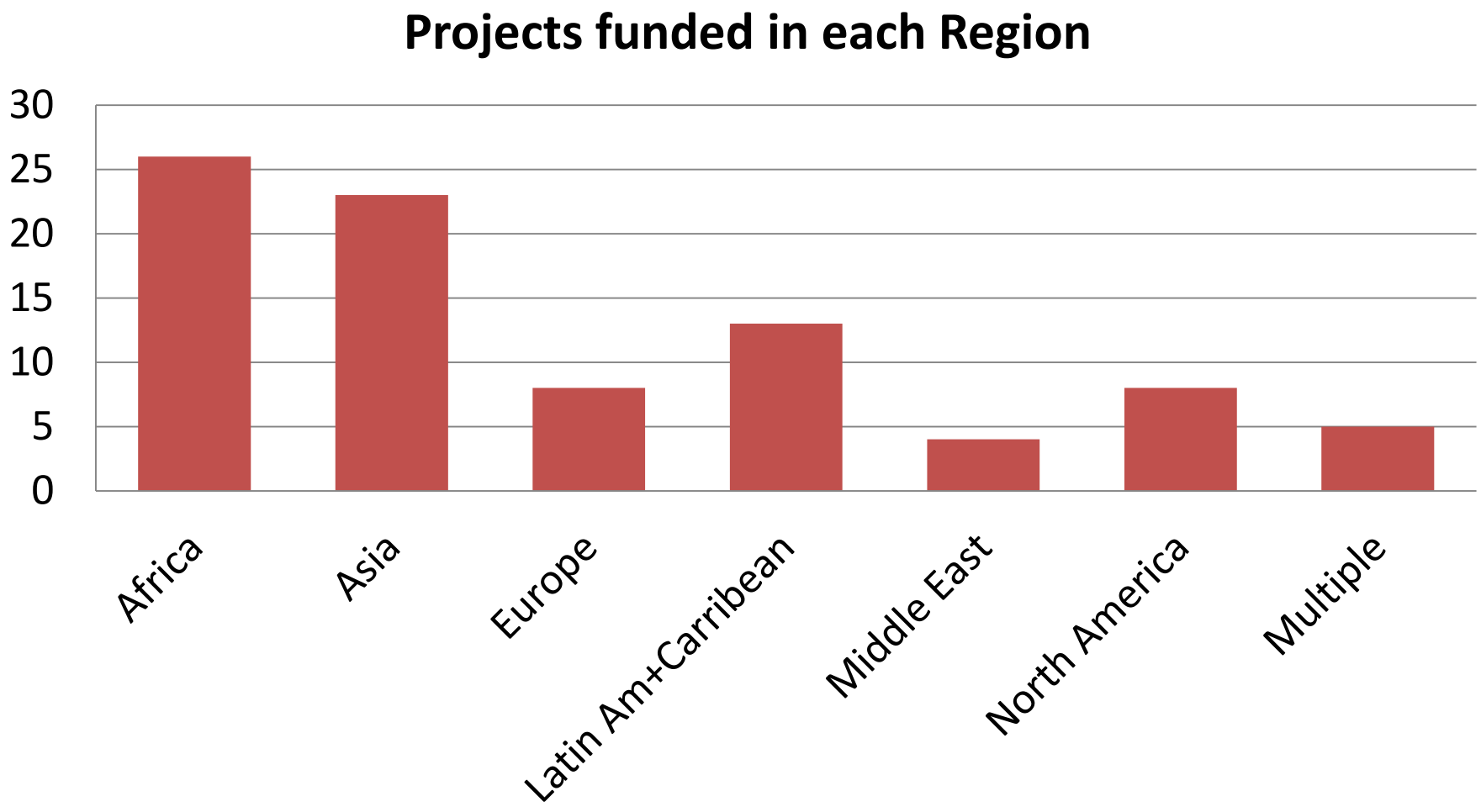
OAD Annual Call for Proposals

	2012 Call (191)	2013 Call (230)	2014 Call (131)	2015 Call (124)
Astronomy for Universities and Research	42 applications € 752,959 requested	54 applications € 919,308 requested	31 applications € 514,103 requested	28 applications € 232,257 requested
Astronomy for Children and Schools	96 applications € 772,079 requested	113 applications € 864,731 requested	67 applications € 431,695 requested	66 applications € 654,802 requested
Astronomy for the public	53 applications € 310,782 requested	63 applications € 453,805 requested	33 applications € 178,254 requested	30 applications € 301,431 requested
Total requested (recommended)	€ 1,835,820 (€ 869,426)	€ 2,237,844 (€1,534,513)	€ 1,124,052 (€535,373)	€ 1,188,490

Trend 2013-16 : Demand vs Supply



Trend 2013-16 : Regions



2016 Recommended Projects

- 80 Projects recommended but not funded
- Listed on the website
- Crowd Funding options

OAD Partners

- Royal Astronomical Society
- Netherlands Organisation for Scientific Research
- International Centre for Theoretical Physics
- Inter-University Centre for Astronomy and Astrophysics
- University of Central Lancashire
- Haus der Astronomie
- Fiat Physica
- Associated Universities Inc. / Leiden University

Funded Projects (68+18=86)

TASK FORCES

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- ASTRONOMY FOR THE PUBLIC (TF3)

www.astro4dev.org/proposals

Ad-hoc Projects

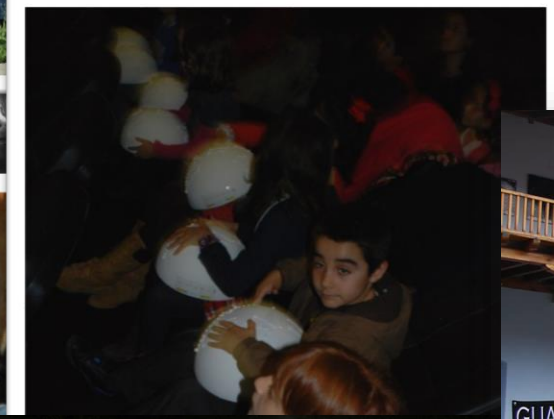
- AstroVarsity
  - provide course and tutorial resources for Maths & Physics lecturers at undergraduate level
- AstroSense
  - Accessibility and Inclusion
- Ultrascope and 3D printing
  - NASA Asteroid Grand Challenge
- Randomized Control Trial

Previous – AstroTruck, AstroPack, AstroComputing

ASTRONOMÍA PERIFÉRICA
arte y astronomía en Bogotá

Home Imágenes y Videos Blog Sobre

erimentos espaciales (espacio)



Do projects work?

- Access ≠ Development
- Humans are complex and embedded in complex social systems
- OAD needs to
  - Identify best practices, allocate resources efficiently
  - Manage risks of unintended consequences

Top student commits suicide over failed exams

December 23 2003 at 08:50am

By Yogas Nair

A brilliant final year actuarial science student ended his life by hanging himself after learning on the Internet that he had failed two examination subjects.

University of Witwatersrand student, Evar Mohan, 21, of Gust Manor Place, Trenance Manor, had apparently gone to a Phoenix Internet cafe to obtain his results on Friday.

According to his devastated mother Roma, 50, her son returned home about midday on Friday and was "upset" at his results.

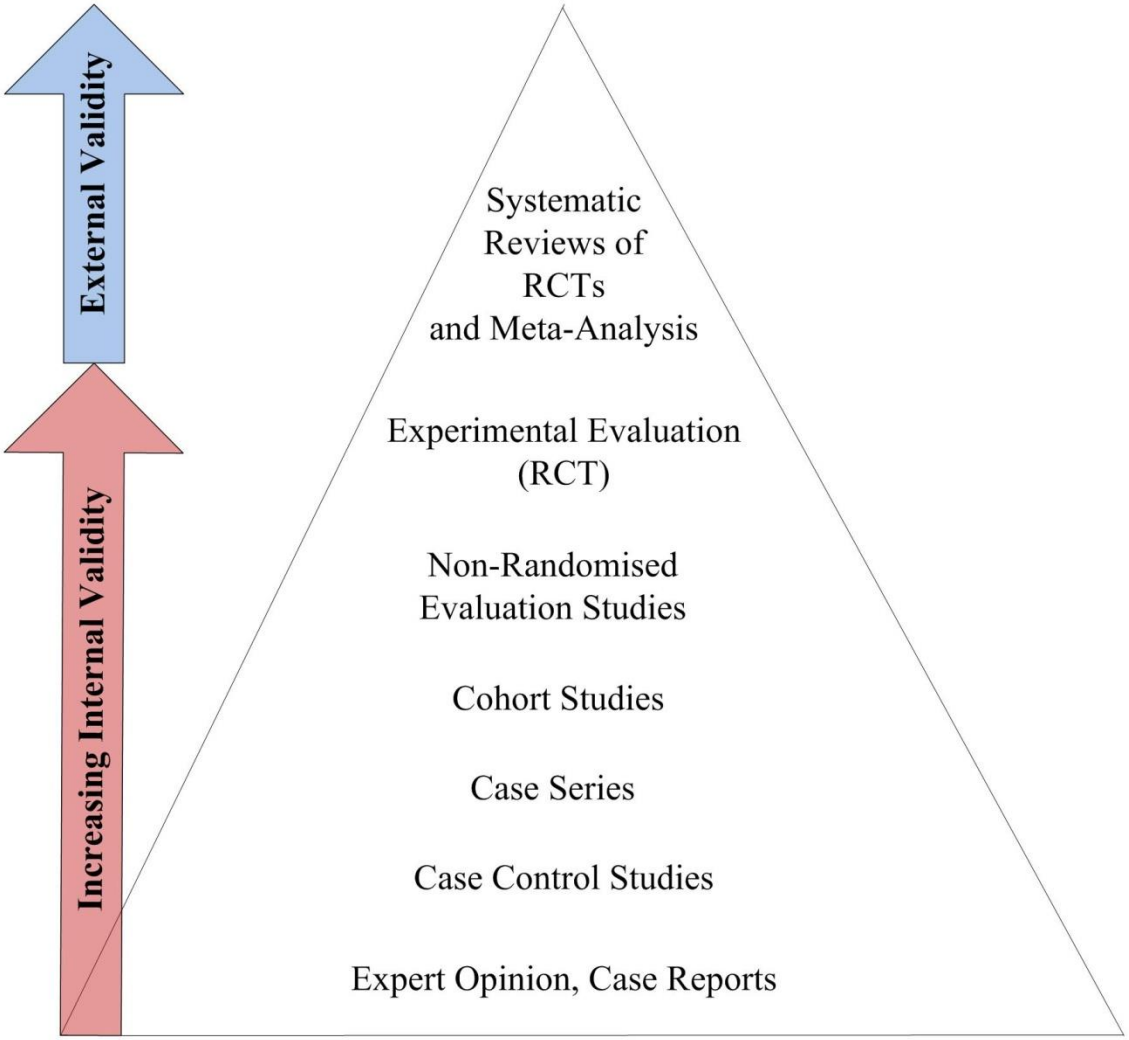
She said: "Evar was a brilliant student and this was his first academic failure.

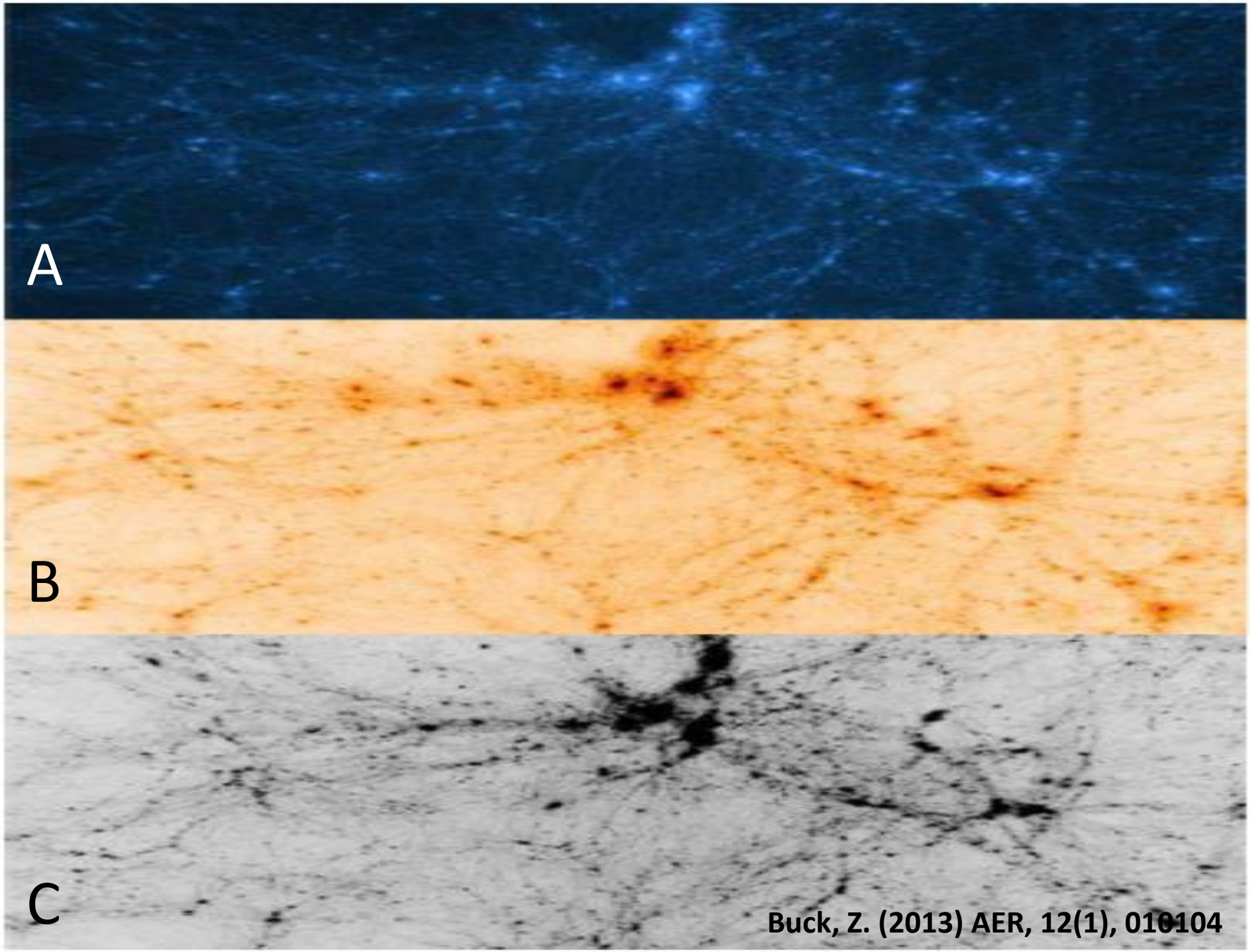
"When he told me he had failed two subjects (stats and actuarial science three) I comforted him and told him not to worry."

Evar passed his matric examination in 1998 with six distinctions. The former Trenance Manor Secondary pupil achieved a 92 percent pass in maths and physical science and was presented with a merit award from the university. He also secured a partial bursary from the university to study actuarial science.

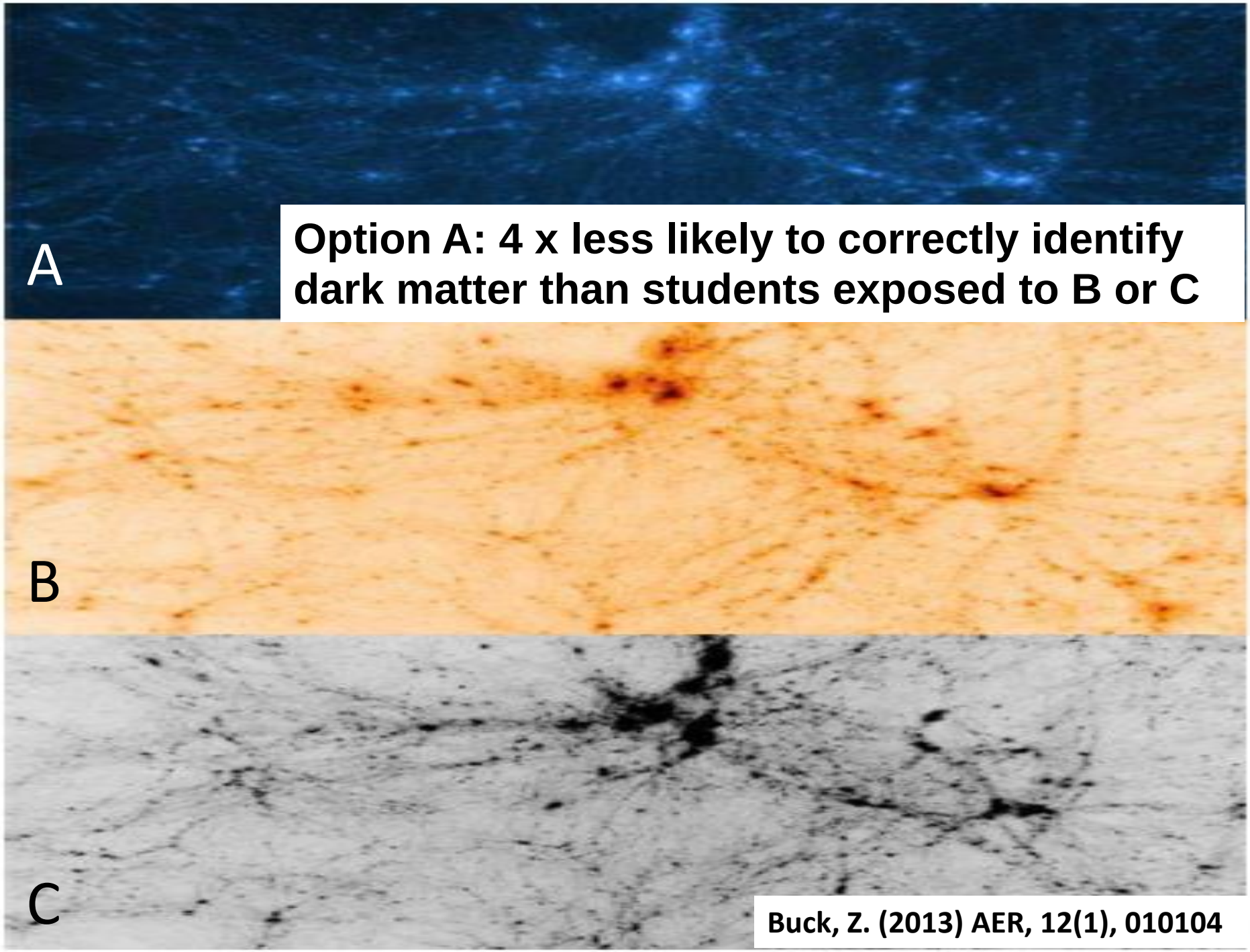
Unintended positive consequences?...

Not All Evidence is Created Equal





Buck, Z. (2013) AER, 12(1), 010104


A
Option A: 4 x less likely to correctly identify dark matter than students exposed to B or C
B
C
Buck, Z. (2013) AER, 12(1), 010104

Program Reviews

Mathematics
Elementary
Middle/High School
Effectiveness of Technology

Reading
Beginning
Upper Elementary
Elementary
Middle/High School
English Language Learners
Struggling Readers
Effectiveness of Technology

Science
Elementary
Secondary (New!)

Comprehensive School Reform
Elementary (CSRQ)
Middle/High School (CSRQ)
K-12 Meta-Analysis (Borman)
Education Service Providers (CSRQ)

Early Childhood
Early Childhood Education (New!)

Methods
Methodological Features and Effect Sizes (New!)

New Reviews Added to the BEE!

The BEE has recently added two major new reviews:

Secondary Science. A comprehensive review of research on science programs for grades 6-12.

Early Childhood Education. A comprehensive review focusing on studies comparing programs for four-year-olds using either "balanced" approaches, which include phonemic awareness and early phonics along with traditional preschool activities, to "developmental" approaches, which include little focus on pre-reading skills.

Other reviews being substantially updated and revised include:

- Elementary math
- Secondary reading
- Methodology effects in systematic reviews

Watch this space!

Spotlight

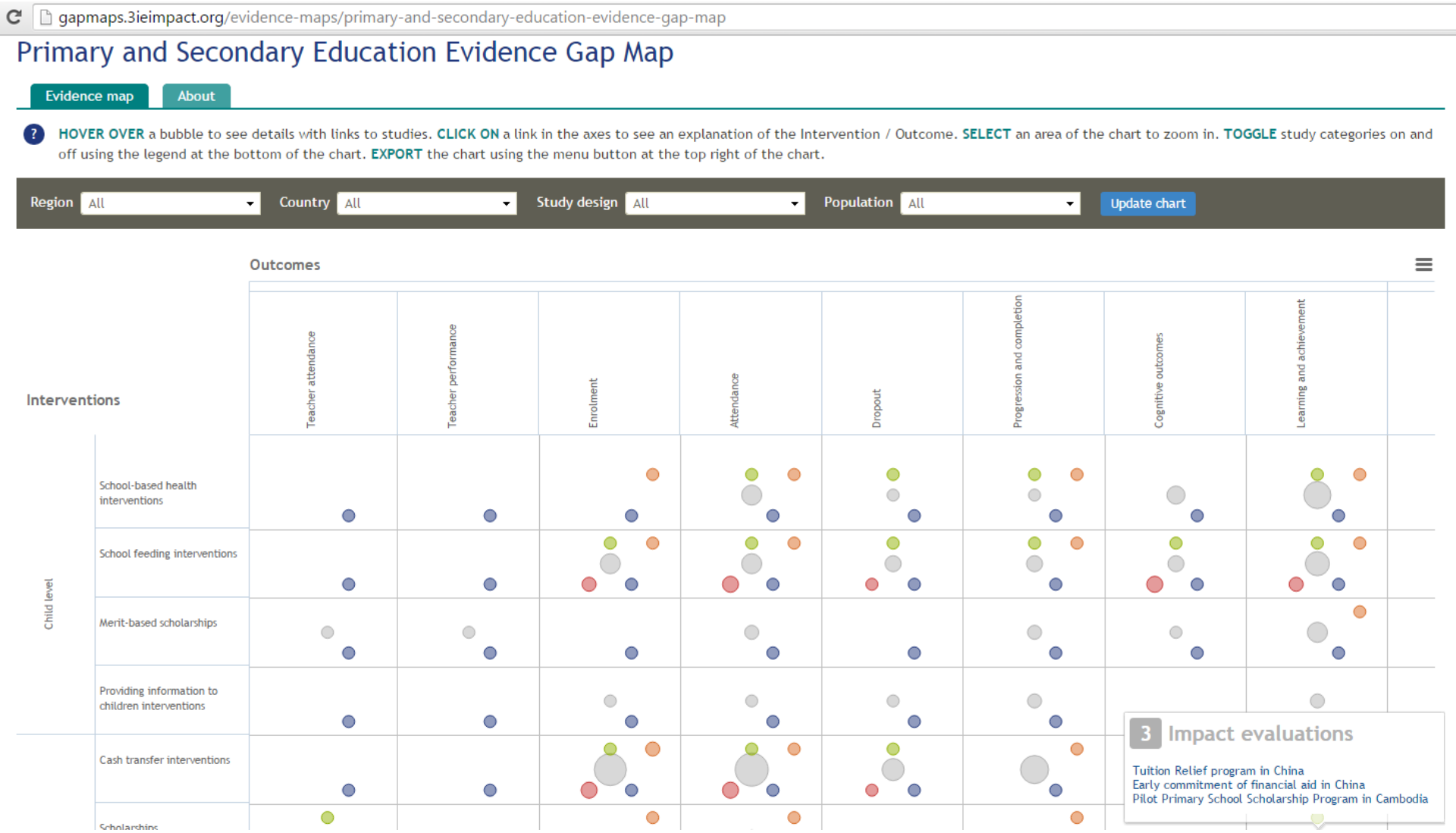
Effective Programs for Secondary Science

Our new review summarizes the evidence on four types of programs designed to improve the science achievement of students in grades 6-12

www.bestevidence.org

International Initiative for Impact Evaluation

www.3ieimpact.org



Project Design: PICO principles

Project idea suggested

Needs analyses
Systematic reviews
Existing project resources

Problem: is there really a problem? on what scale? who is affected? what are the costs? what do we know about the causes of the problem?

Population: why this particular group? what are their needs, concerns, values etc.?

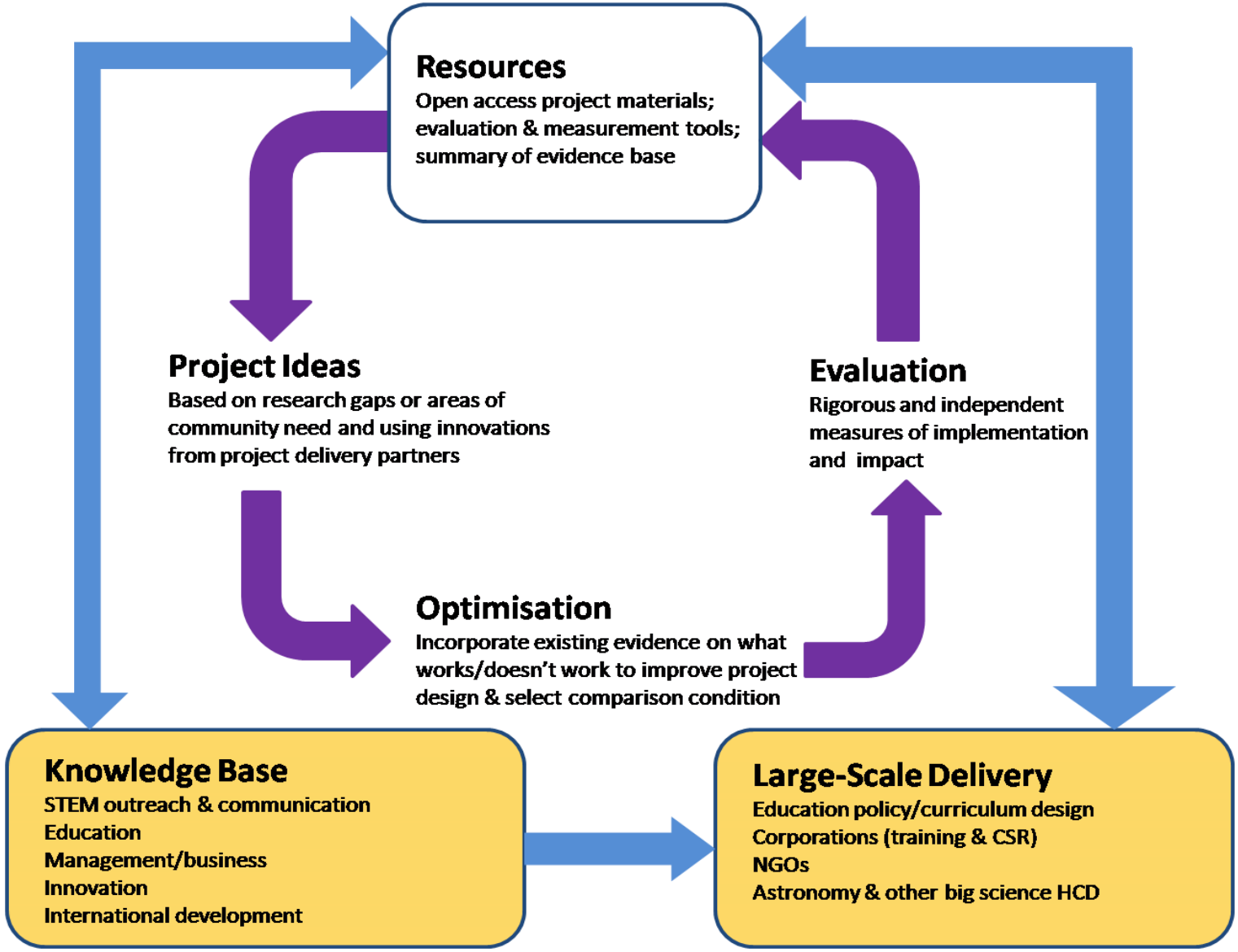
Intervention: content, duration, intensity, costs, materials, replicability, scaleability

Comparison: what would happen otherwise?

Outcome: intended immediate and long-term, identify measures

Evaluation design and implementation

OAD Impact Cycle: Positive Feedback Loop



Role of the VO…

Schools

- Valuable extra curricular activity
- Potential to teach coding/data skills
- Excitement at using real data
- May only be of interest to small group
- What makes VO workshops unique?
- Relies on access to computers
- Astronomy knowledge may be limited
- Astronomy workshop vs VO workshops?

Universities

- Key data skills for science and other careers
- Potential part of a “data science” stream
- University gateway to astronomy (example of Unizul)
- Potential for interdisciplinary learning (physics, computer science)

Research

- Promise of research from otherwise remote areas
- Access to a virtual laboratory
- Collaboration across borders
- Big data skills

Research culture

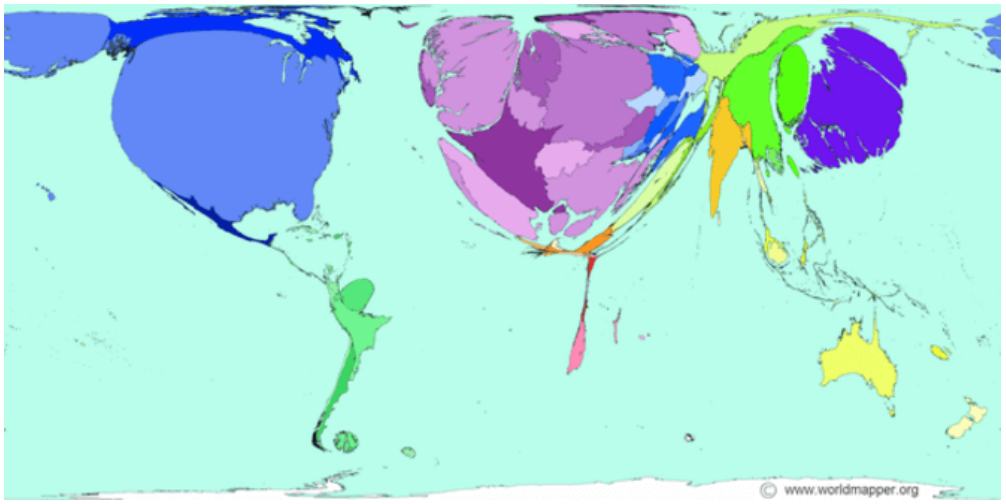
- Challenges the way science is done and measured
- “all metrics are flawed but some are useful” (Merlin Crossley paraphrasing George Box)
- Potentially innovative environments in emerging institutions
- Organisational innovation: the global IVOA collaboration

Accessibility and Inclusion

- !ke e: /xarra //ke (diverse people unite)

Accessibility and Inclusion

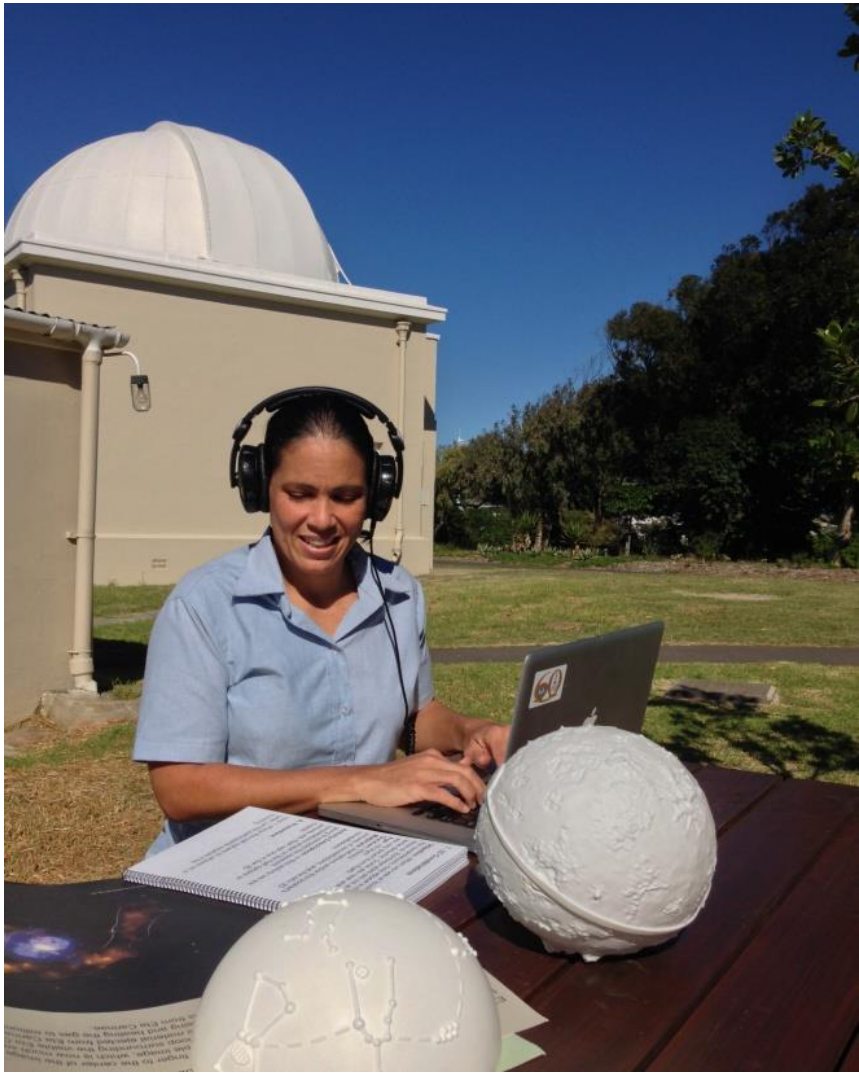
- IVOA represents the philosophy of making information widely accessible in order for the world to apply its best minds to it
- Majority of research is conducted by minority of people - those who have opportunity and access



Accessibility and Inclusion

- Example: Wanda Diaz and AstroSense

- “Inclusion is not about doing a favour for a particular group – it’s about growing the science itself by bringing in new skills and perspectives”



Future…

IAU GA 2015 Resolution

(following positive OAD review)

…

Resolves

1. That the pursuit of the goals of the Strategic Plan: Astronomy for the Developing World should **continue until the XXXI General Assembly to be held August 2021**,
2. That the Executive Committee should present for approval at the XXX General Assembly to be held in Vienna, Austria in August 2018 **an extended Strategic Plan** which addresses the future of the OAD and its activities beyond 2021,
3. That the Executive Committee should **consult existing and potential stakeholders** in the preparation of this Strategic Plan.

Roadmap to 2018 GA

- Strategic Plan
- Regional Offices
- Impact Cycle
- Focus projects
- Volunteers

Opportunities...

- Regional offices coordination capacity
- Content coordination for schools/workshops
- Communicating the benefits of astronomy/data/science for development
- Call for proposals – seed funding
- Volunteers – global network
- OAD partnerships
- IAU endorsement/partnership for fundraising
- Special projects e.g. AstroVARSITY (astronomy and physics departments)
- etc ...

Astronomy for a Better World!

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