GYA connections

The magazine of the Global Young Academy

Open Science

GLOBAL YOUNG ACADEMY

Issue 4 — May 2016

GYA Connections - Issue 4

01 Open Science

02 GYA Themes

03 Meet the New GYA Members 2016 36

Editorial

by Orakanoke Phanraksa & Eva Alisic
(Co-Chairs of the Global Young Academy)

Open Science has become a defining issue for the current generation of young scientists. It is an issue upon which pragmatists and idealists often converge; but also an issue that can heighten generational differences in viewpoint. The pragmatic argument for Open Science is simple: the more eyes we have on our discoveries, the more those discoveries can be put to good use. The moral argument is equally stark: when we give knowledge to others, we still have it. Should not all of humanity "share in scientific advancement and its benefits"? [1,2]

Today, many academic journals charge significant publication or submission fees to authors. Many more charge high subscription fees to readers. These costs price out authors and readers in many parts of the world. Yet change is in the air. Open Access platforms such as arXiv, PeerJ, eLife, and RIO offer publication models that challenge the traditional approach. The Directory of Open Access Journals [3] now contains some 12,000 entries. Not all of these experiments will succeed, and some may create more problems than they solve. But a diverse ecosystem also raises the prospect of solutions that no one yet foresees.

The Open Science articles in this issue explore different aspects of this emerging ecosystem, including the maker movement, bibliometrics, predatory publishing, and the future of Open Science. Articles on other topics address science leadership, outreach and the rural world, and the intersection of art and science. Change in all of these areas presents opportunities. Our job is to seize them.

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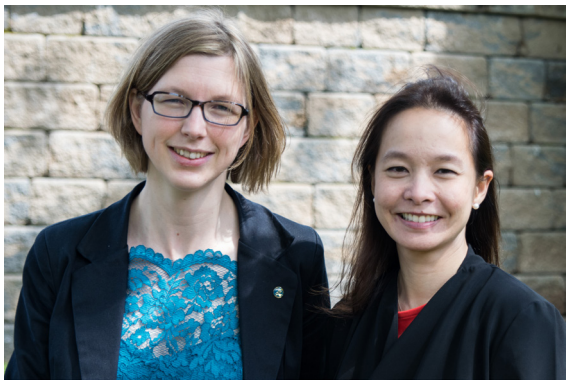


Image : © Florian Wiencek / GYA, 2015

OPEN SCIENCE

The Fab New Geography of Innovation

Image: © Dan Gamache / NRC, 2015

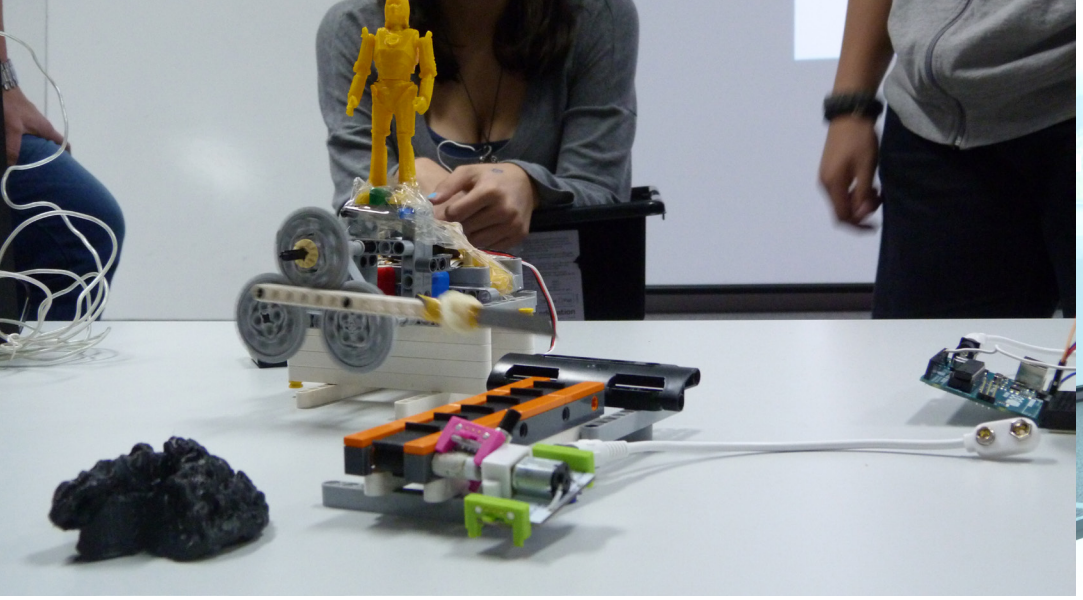
by Ivana Gadjanski and Andrew Pelling

We are now witnessing the rise of a truly global and completely decentralized movement in low cost innovation, which has no centre, no head, no formal structure and driven through community-based, citizen-led efforts [1, 2]. Remarkably, though technological and pedagogical innovations are occurring in health care, education, science and technology, this movement has been largely ignored by established organisations, universities and governments. The Do-It-Yourself (DIY) Maker Movement has grown dramatically in the recent decade, leading to the development of new technology companies, educational strategies, democratisation of science and technology [3] and advances in sustainable development [4].

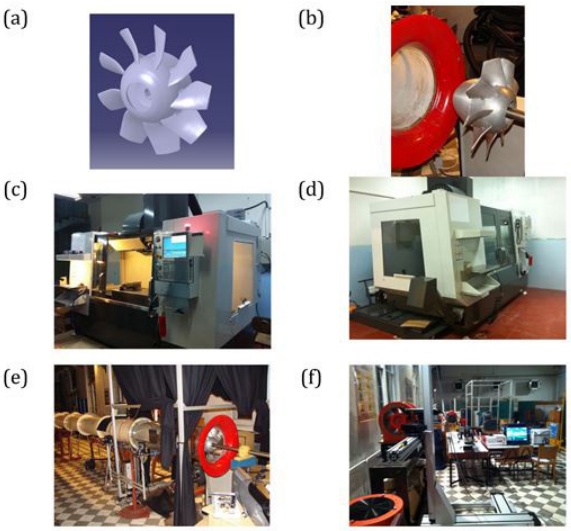
At the same time, we are also witnessing the spread of risk-averse organizational cultures in corporate, government and academic structures. Although the causes of this phenomenon are numerous and complicated, it is clear that "innovation" tends to suffer dramatically in such risk-averse environments. Therefore, we are facing the serious challenge of creating organisational cultures that support and promote innovation and risk-taking in an effective and efficient manner. Understanding where innovation comes from, how to harness it, how to support risky ideas, and how to rapidly translate risky yet worthy ideas into action are key questions that desperately need to be addressed.

Surprisingly, the largely citizen-led DIY movement stands in stark contrast to this backdrop of decreasing innovation and risk-averse cultures in academic, government and corporate spaces. The rising popularity of open source software/hardware, low cost fabrication tools (3d printing, PCB manufacturing, CNC machining, etc) and citizen science labs has dramatically decreased the barriers for the development of innovative projects led by a diversity of people in emerging, developing and developed nations [5]. It is clear that innovation can occur anywhere on the globe and be driven by anyone who has the potential to be creative. This has led to the rapid spread of open community labs, fabrication labs (fab labs) and maker spaces that are already having a remarkable and immediate impact on science and technology.

For example, in Serbia there are several maker initiatives taking place. The country's first educational Fab Lab Petnica is being formed as a joint project by the Fab Initiative non-profit organization, Petnica Science Center and Belgrade Metropolitan University financed by the Royal Norweigan Embassy in Serbia with the aim to provide high school students and teachers in the STEM (science, technology, engineering, math) field in Serbia with knowledge, tools, inspiration and connections to start implementing the FabLab@School concept and STEM entrepreneurship principles in practice.



Impressions from the first course of Fab Lab Petnica.



Images : CC - Djordje Cantrak / UB FME, 2015

Scientific fab lab at UB FME (a) CAD model of the axial fan impeller; (b) Axial fan impeller. [2] (c-d) CNC machines at the UB FME: (c) 4-axis; (d) 5-axis.e-f) Test rigs with new experimental equipment at the UB FME: (e) Stereo PIV (particle imaging velocymetry) system; (f) LDA (Laser Doppler Anemometry) system.

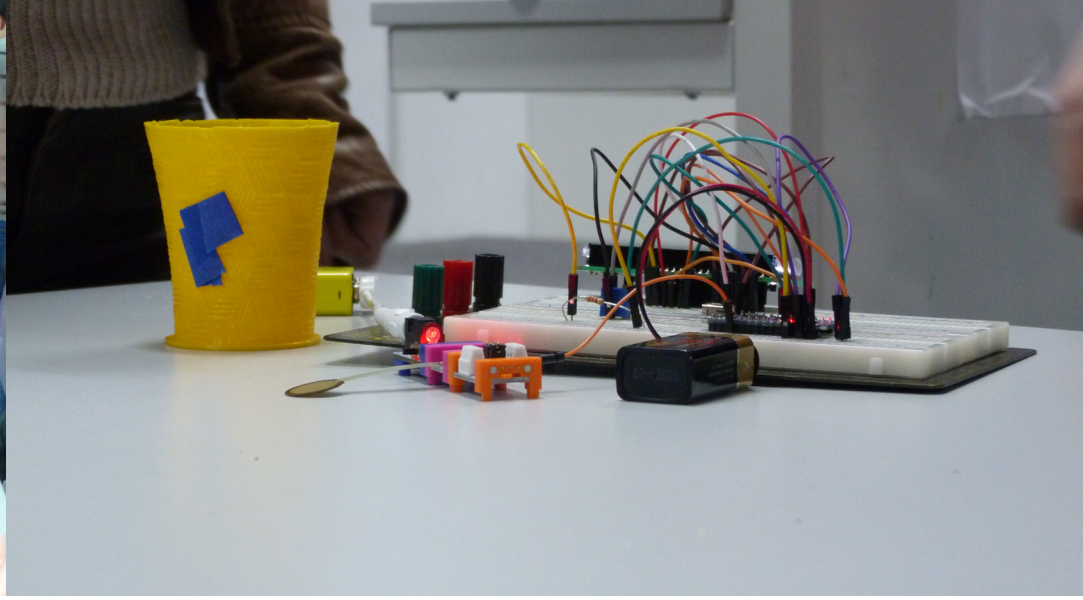
Two other fab labs are planned in Belgrade, the capital of Serbia. Fab Lab Belgrade and Polyhedra fab lab that are already organizing KidsPatch events and workshops in the Creative Hub – a coworking space Nova Iskra in Belgrade.

Another initiative is the formation of the Scientific Fab lab at the University of Belgrade Faculty of Mechanical Engineering (UB FME) with the main goal to enable students to use the FabLab equipment for making their own prototypes of the theoretical models from the university courses as well as to provide skills and knowledge to both the students and professors to produce scale models to be implemented in further STEM education, both at the high school and university level. Another aim is to establish a facility for manufacturing of the DIY instructions for research-grade tools built from low-cost hardware and open-source software. In a nutshell, the main focus is to establish a place where the good ideas of the students and researchers can be realized.

The massive intellectual capital that is proliferating in the 'garage' is being left untapped because it is happening independently of, and without acknowledgment by, established organisational structures.

Many major technology companies that exist today are well known to have started in dorm rooms, garages and basements rand have ultimately been responsible for the so called "IT revolution". Therefore, it is imperative that we understand what is happening in the garage today, as it is likely to lead to tomorrow's innovations. This is important for many reasons, including the fact that the Maker Movement is now having a profound positive impact on the engagement of girls and women in science, technology, engineering and medicine [6] as well as a recognition that new technologies must be affordable, sustainable to all and environmentally responsible.

At the 2015 Annual General Meeting of the Global Young Academy (GYA) [7], we dedicated a major portion of the event to examine the Maker Movement and directly engage with the community who are involved in this phenomenon. On the afternoon of 26 May 2015, the Canadian National Research Council (NRC) hosted the GYA and a Science Fair



Images : © Fab Initiative, 2015

Hack event at its main Ottawa location. The NRC is the major federal research and technology organisation in Canada and is a significant landmark in the history of Canadian science. At the Science Fair Hack, Maker and DIY community groups, school groups, the University of Ottawa Makerspace, university research labs and individuals demonstrated their inventions for the GYA membership and invited guests from major organizations, companies and universities in Canada. The afternoon was a resounding success as GYA members had the chance to closely interact with children of all ages who have been developing new devices, wearable technologies, videos games, and clothing while learning about modern state of the art fabrication tools and computer languages. The importance of these citizen-led efforts clearly made a mark on the GYA membership and gave the young innovators and opportunity to interact closely with a global group of leading academics.

Following the Science Fair Hack, the GYA was honoured to an address from the Governor General of Canada, his Excellency David Johnston. Poignantly, the Governor General began his address by recounting the story of a six-year old boy living in Ottawa, who recently received a new prosthetic hand [8]. As a young and growing child, such prosthetic limbs would need to be replaced once a year at a cost of thousands of Canadian dollars. However, his new prosthetic was not purchased from a biomedical company, but 3d printed by students at the University of Ottawa Makerspace [8]. The Governor General went on to note how important the 3D printing is in the growing DIY movement. Moreover, the DIY hand would not have been possible without the sharing of knowledge and design plans of other 3d printed prosthetics that are freely available online [9]. This is a concrete example of how non-specialists made a health-care technology at home that will dramatically improve the quality of life of this child. Importantly this innovation lowers the cost of health care and removes the financial burdens that come with such medical devices.

On 27 May 2015, the GYA resumed the AGM at the main conference site in nearby Montebello Quebec. The GYA capitalized on the experience of the Science Fair Hack by hosting a panel discussion with the diverse communities from the DIY movement and the leadership from industry and government bodies. Panellists included Hanan Anis (Founder and director of the University of Ottawa Makerspace), Connor Dickie (CEO of Synbiota), Jessie MacAlpine (Student at the University of Toronto), David Pantalony (Canada Science and Technology Museum), Remco Volmer (Managing Director, Artengine) and Katherine Yambao (Public Health Agency of Canada). Moderated by Luc Lalande (Director of the Entrepreneurship hub, University of Ottawa), the panel discussed several questions being poised by the activities of the Maker Movement. In addition to the panel discussion, the GYA and invited guests spent the morning developing ideas and strategies for moving forward and capitalizing on the untapped innovation potential that is growing worldwide in these spaces. Specifically, attendees at the panel event broke out into five working groups to address issues about the regulation of DIY science, the role Maker-DIY culture can play in education, how open access can impact the sharing of knowledge, how citizen-science can change public attitudes about science and the potential of the global maker movement to impact humanitarian innovations. Summaries of the panel discussion and the breakout groups are now online and continue to be available for continued discussion and commentary [10, 11].

These types of close interactions between communities, academic, industry and government are key to answering many of the pressing questions that the Maker movement inspires, including: How can universities, industry and government more effectively engage with groups in emerging, developing and developed nations? How can we facilitate knowledge sharing between the DIY community and established bodies and organisations? Are DIY practices a viable route to enabling and advancing research in emerging, developing and developed nations at a time when many governments are cutting funding to basic research?

The combination of digital and analog that is achieved by digital fabrication through the fab labs and maker spaces is at the base of the third industrial revolution as the maker movement has been also described, namely by Chris Anderson, curator of TED, in his book Makers: The New Industrial Revolution [12]. In this revolution, the physical goods are created with the web's digital innovation model.

At the World Economic Forum - Annual Meeting of the New Champions 2015 special attention has been brought to the importance of new technologies in the coming 4th industrial revolution that comprises many of the 3rd revolution hallmarks, such as 3D printing and the concept of the sharing economy [13].

Leading young scientists are exquisitely poised to mobilise and work with citizens and community groups to advance the goals of the Maker movement and take part in the coming 4th industrial revolution [14]. A wealth of opportunities exist for such collaborations to develop innovative new strategies for engaging youth in education, developing open/DIY technologies to generate economic wealth and contributing to the advancement of new knowledge with widespread applications in healthcare, sustainable development, science and technology. The Global Young Academy with its wide network of member young scientists and collaborating institutions holds an ideal position to influence further development of the Maker movement, possibly through organising a new working group dedicated to digital fabrication and Do-It-Yourself approach.

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top: GYA Co-Chair Eva Alisic (Australia) engaging with a student at the Science Fair Hack during the AGM 2015. Image: © Shoji Komai / GYA

bottom: The Pelling-lab at work on open bio-material. Image: © Colin Rowe, Andrew Pelling and Alexis Williams

Towards a Truly

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by Sabina Leonelli

The term "Open Science" captures the multiplicity of efforts involved in making research processes and results freely accessible, scrutinisable and reuseable online. Achieving this goal includes efforts focused on specific research components such as Open Access to publications, Open Software, Open Data and Open Experiments. As described by the Open Knowledge Foundation, Open Science is expected to enhance the transparency, quality and reliability of knowledge production procedures, and at the same time increase the level of public participation in science. As a result, it is widely celebrated as a transformative force at the global level, and has recently become prominent in science policy agendas around the world. At the World Science Forum 2015, United Nations representative Jacqueline McGlade stressed the remarkable buy-in displayed by governments, with over 140 countries adopting Open Data policies over the last decade. Additionally, many prominent funding agencies and international bodies, such as UNESCO, the European Commission and the Global Research Council, have stressed their commitment to Open Science. The Global Young Academy welcomes this interest in and support for Open Science initiatives, and are contributed to this movement by releasing a Position Statement on Open Science already in 2012 [1]. At the same time, we are uniquely positioned to ensure that researchers, and particularly young scientists whose current and future work will be strongly shaped by these developments, can contribute to these efforts and ensure that they target the present needs of the research community and of society at large.

Ensuring a strong link between researchers and science policy is essential because there are serious deficiencies and inequalities in the ways in which research outputs are being disseminated and used to inform policy and foster global development. Open Science can provide an avenue to critically debate the ways in which knowledge is produced and disseminated, to reform the credit system used to reward scientific activities, and to address the challenges involved in making research activities and outputs more visible, accessible and intelligible within and outside academia. However, these issues play out very differently across research fields and geographical locations, and discussions of how to sustainably support Open Science initiatives within and across varying research contexts should be at the heart of policy deliberations by national governments, funding agencies, publishers and scientific institutions around the globe. For instance, there is strong variation in the extent to which scientists are able to muster incentives, resources and tools to be able to contribute to data sharing initiatives as well as take advantage of data already available online. In my own research, which documents and compares conditions for re-use of Open Data across countries and disciplines, I found that laboratories working on topics that have little international visibility, in languages other than English and with unreliable access to equipment, broadband and other crucial infrastructures are much less likely to make use of Open Data than richer, more visible, better serviced and English-speaking research groups.

Given their cutting-edge expertise, investment in future research landscapes and opportunities, knowledge of information and communication technologies, and understanding of how Open Science could be fostered in their specific fields and countries, young researchers are ideally positioned to identify and tackle the challenges involved in both developing and implementing Open Science policies for the benefit of science and society. The GYA Working Group on Open Science [2] aims to voice the experiences and insights of young scientists from all disciplines and regions of the world, in order to effectively identify and overcome the current obstacles to implementing Open Science in ways that support and enhance existing research capabilities. We want to make Open Science work, which calls for innovative approaches to enhance its viability and competitiveness with respect to traditional forms of scientific work and communication. Our diverse membership enables us to investigate the significance of Open Science across a variety of research environments. Here are some of the questions we are tackling:

What expertise is needed to take advantage of Open Science resources?

Using online resources currently requires a high level of familiarity with specific computational tools (such as data repositories and related software), standards and formats that go beyond one's own sub-discipline and local research community and/or relevant institutional resources (such as open access journals, including the ability to separate scientifically sound initiatives from predatory publishers). To understand better the conditions under which Open Science can operate, we are collaborating with the Global Access to Research Software [GARS] Working Group [3] and the Oxford-based organization INASP. Together, we are working on a report on the use of Open Software by researchers in developing countries, to be released in April 2016, looking specifically at why uptake of these tools remains relatively low. This will be based on the ongoing survey by GARS in Ghana, Bangladesh and Nigeria, where data are being collected on researchers' attitudes to and use of Open Software. In March 2015, we also participated in the International Training School on Big Data organized in Bangalore by CODATA, the International Council for Science [ICSU] and the Indian Statistical Institute. The training workshop successfully engaged young researchers from India, Nepal, Sri Lanka, Indonesia, Vietnam and China. It was part of a broader ongoing effort led by CODATA to train a new generation of data scientists able to effectively use Open Data resources to produce knowledge and innovation, to which we shall continue to contribute.

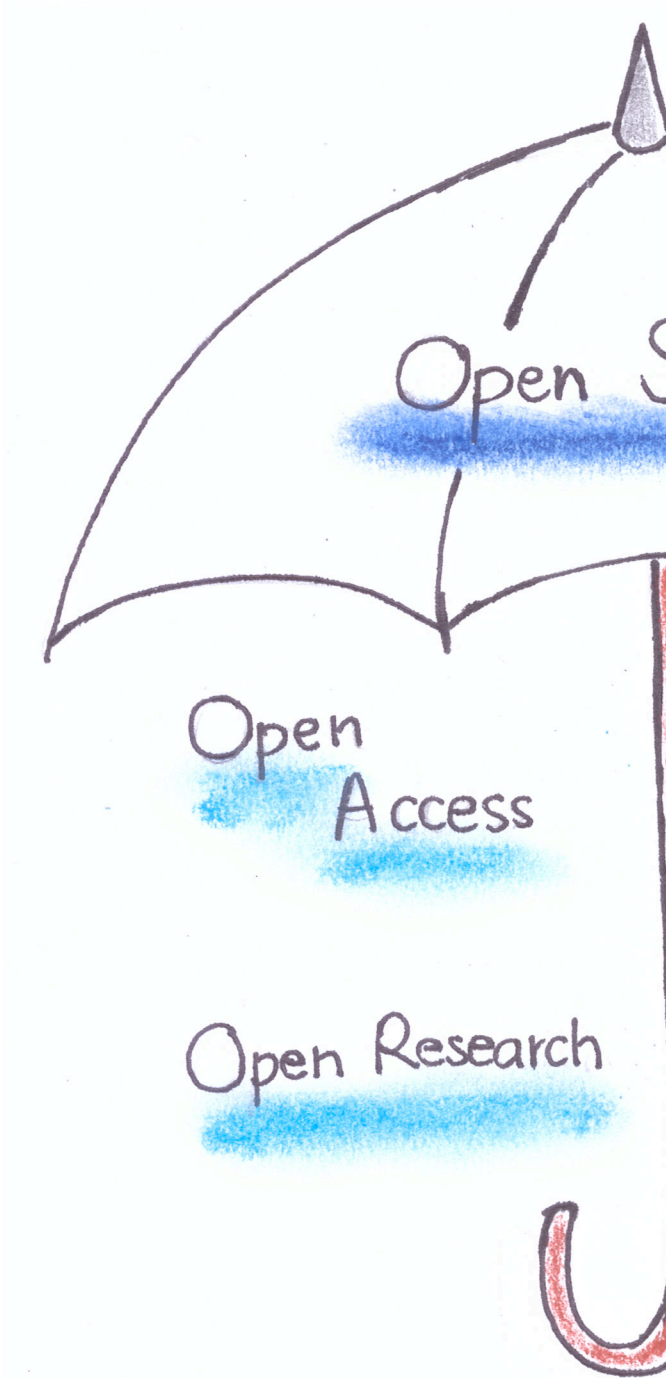

Illustration based on "Open Science Umbrella" by 지우 황 on Flickr (http://bit.ly/26ogVi0)

What infrastructure and material resources are needed for Open Science initiatives to be beneficial?

This is a crucial question given the large disparities in available resources and infrastructure (including broadband, transport and electricity) across regions,

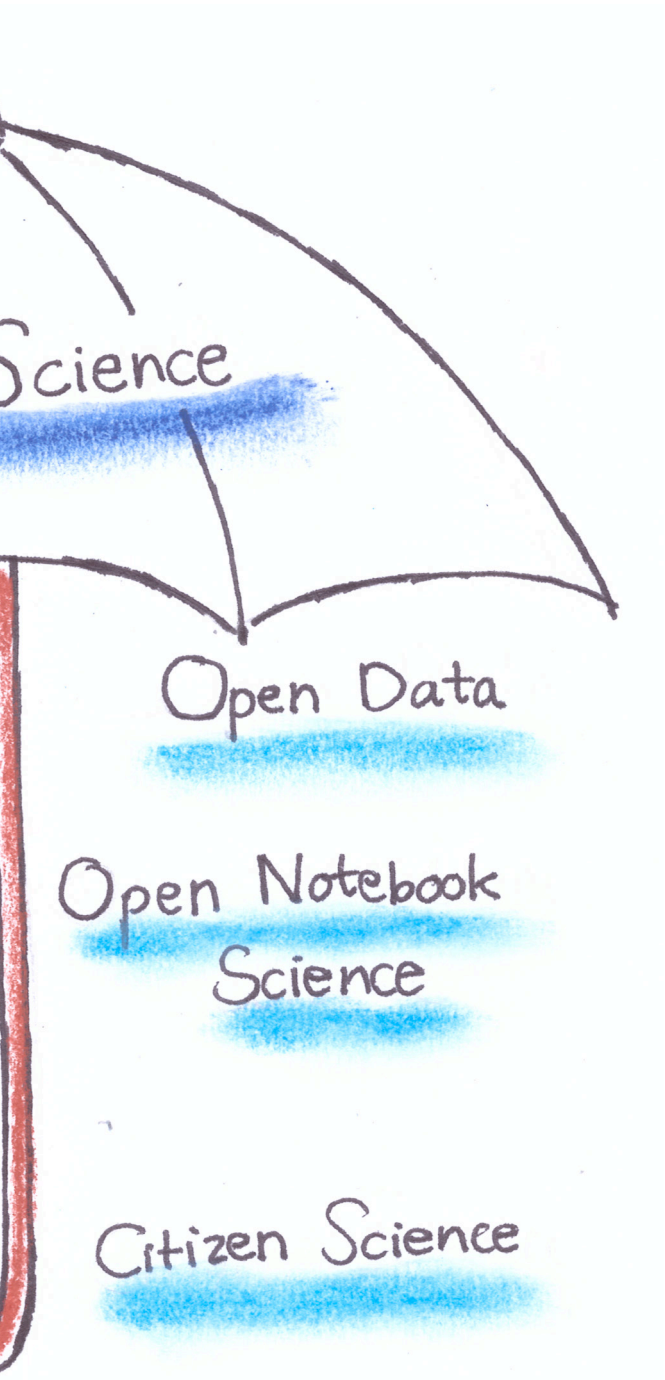

Illustration by Charlotte Bolwin / GYA.

countries and particularly in the developing world. Our working group is raising these issues in a variety of ways, ranging from participation in international discussions on the future of scientific publishing to contributions to consultations such as "Science 2.0" by the European Commission. Most recently I was able to provide feedback on the drafting of the Science International Accord on Big Data/Open Data led by CODATA and ICSU, due to be published in 2016.

How can Open Science help to address vulnerabilities and inequalities across the science world, and help young researchers everywhere to fulfill their potential?

We are gathering suggestions and testimonies from our membership concerning ways to tailor Open Science to a wide variety of research environments. We are also starting to collaborate with the CODATA Early Career Data Professionals [4] towards developing training and policy guidelines on Open Data, with plans to exchange insights and expertise across the two groups in future meetings of the Research Data Alliance [5].

How does Open Science contribute to public engagement with research?

Open Science is often viewed as promoting wider engagement with, and understanding of, scientific research, and particularly the rise of Citizen Science initiatives. The work of GYA member Andrew Pelling in fostering DIY Biology and the Maker movement, which GYA members experienced during the last AGM in Canada, is an excellent instance of this. As a concrete contribution to linking Open and Citizen Science initiatives, and as a way to put our skills to the service of publicly available information resources, we are organising a Wikipedia Edit-a-thon for 2016. This consists of a week in which GYA members and other scientists around the globe will be invited to contribute their expertise towards improving at least one entry on Wikipedia. This is a way to raise researchers' awareness of non-academic means of disseminating research results, and contribute high-quality science into what is now the most accessed source of information in the world.

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Why do we publish?

The future of scientific communication & assessment

by Martin Dominik

On 6 March 1665, the Royal Society published the first edition of "Philosophical Transactions", now recognised as the world's first science journal. Reflecting an age when natural philosophers (the word 'scientist' wouldn't find wide-spread usage for another two centuries) took an interest in almost everything, the content in that first issue is eclectic. Papers on astronomy and thermodynamics rub shoulders with accounts of whaling and a 'monstrous calf' with three tongues. Basic, applied and commercial science are all freely discussed.

To mark the 350th anniversary of this ground-breaking publication, the Royal Society organised a series of meetings to review the history of academic publishing and to inspire thinking about its future. The workshop entitled "The Future of Scholarly Scientific Communication" (April and May 2015) covered core issues including the role of peer review; ways of measuring scientific quality, reliability, and reproducibility; detecting scientific misconduct; using technology to enrich publications and facilitate data-sharing; and the future of current and future business models for scientific publishing.

I was lucky enough to take part in these discussions. A detailed report and full audio recordings of all sessions are available online [1] and are highly recommended. Rather than summarise all of the findings, let me share some thoughts on some of the meeting highlights, and ways in which members of the GYA can contribute to this debate.

From the beginning, publishing scientific papers has been the main method for communicating new discoveries and ideas. However, over the last quarter of the 20th century papers have acquired a second role, providing a metric for evaluating the performance of individual researchers, their institutions and indeed entire nations.

I argue that this change has been to the detriment to the original aims of clear communication and knowledge dissemination. Specialisation and 'salami publishing' have made a significant fraction of scientific articles barely comprehensible to all but a narrow coterie. Students find it very hard to uncover literature that can teach them about cutting-edge work in specific areas; even experienced researchers looking to understand a topic outside their core discipline face similar difficulties. Ever smaller parcels of research are deemed worth of publication, leading to a fragmented literature that lacks a coherent narrative.

Many of these changes have been driven by the rise of bibliometrics, which see researchers being appointed, rewarded and promoted on the number of papers that they produce, the journals in which they are published, and the citations that they garner. An overwhelming majority of scientists now take publication in a high-profile journal as the "gold standard" of scientific output, ignoring the fact that this represents recent historical evolution rather than an optimised design.

Unfortunately, this has become a clear case of packaging triumphing over content: counting publications is like counting boxes, while counting citations corresponds to looking at their sizes, all the while ignoring the contents. It remains a mystery to me why we fail to assess the real quality of research – its rigour, soundness of approach, completeness, appropriateness of methodology, presentation and impact. Much of the necessary information for such an evaluation is created during the peer review process, but is not available publically. It should be straightforward to fix this, but it is just not happening.

We need to explore all ways in which science can be better communicated. Progress is only possible when ideas are shared. New knowledge only generates societal and economic value once advances in basic science are understood and incorporated into new technologies. Significant efforts have been made to encourage academics to engage with a wider public, more recently promoting explicit dialogue models. It therefore seems odd that open dialogues within academia have become rare. What has happened to the culture of constructive criticism and scrutiny? Does it make sense to separate academic and general communication?

New information and communication technologies have blurred the dividing lines between communities, for example giving rise to the "citizen scientist" who embraces new opportunities for sharing data and knowledge, without being restricted by the rules of academic assessment. If academia stays the way it is, the professional scientist could be at risk of losing relevance, with citizen scientists evolving into the most productive scientists of the future.

The traditional journal article is a product of the printing press age. However, technology has moved on, and we now can now easily create dynamic audio-visual and interactive content. Huge data sets can be made available online for others to analyse and interpret. I argue that evaluation models based on the need for discrete, countable pieces of research are keeping academia stuck in the past. Open Science, publishing, and research assessment are intrinsically linked. We need to get communication back to the forefront of scientific publishing, and change our assessment models to allow the Open Science model to thrive.

The current model of science communication is going to change. Now is the time for young researchers – the digital natives – to set the direction in which we are heading.

The GYA is ideally suited to address this challenge. Our working groups on Open Science and Academic Assessment and Excellence are already established. Our members are keen to inject fresh and critical thought into the debate on the future of scientific publishing, Open Science, the efficient use of new technologies. To this end, we organised a 2-day workshop in May 2016 entitled "Publishing models, assessment, and open science". I encourage all members to add their contribution to the GYA's vision for the future of science communication.

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The Need for Innovation in Academic Publishing Practices

Image : CC BY 2.0 - European Southern Observatory, 2013

by Abdullah Shams Bin Tariq

Globalisation impacts many aspects of education and research. Countries around the world continue to adopt the traditional model of peer-reviewed academic publishing and to foster a professional rewards systems based on publication records. At the very top echelon of institutions, scientists, and journals, this approach delivers results, producing, showcasing, and fostering scientific progress. However, unfortunately the globalisation-driven goal to gain competitiveness within the scientific arena has led to an unrestrained and unsustainable globalisation of academic publishing, with almost no control over standards. There are hundreds of so-called 'predatory' publishers putting out thousands of titles. Every day, hundreds of young or naive researchers fall prey to these journals or choose them as a short-cut to meet quantity-of-publication requirements set by their institutions. Some predatory journals profit by using a (semi-) vanity image to lure naive academics into print-on-demand publishing agreements. In many developing countries, the rise of these journals is a major corrupting factor. As globalisation continues to lead to institutionalisation of metrics based on publication records, these publishers will continue to capitalise on the demand for publications, authors will not be held to any sort of standard, and the body of scientific knowledge will become dilute. How can academia regain control over standards in academic publishing? What rewards system, peer-review or subscription model, would encourage a restoration of balance? It is time to start thinking – and taking a stand.

As we all grew up and entered academia, we learned of the importance of publishing results of our research. Journal editors provided us with quality-control and often with thoughtful guidance in carefully considering results beyond our initial conclusions. As our careers have progressed, journals continue to contribute to our professional standing, tenure, and name recognition. Beyond the immediate impacts of peer-reviewed publishing on our career advancement, journals serve as repositories of knowledge. They are the means by which scientists put forth new ideas, challenge current paradigms, and refute the conclusions of others. Journals capture the scientific deliberation of knowledge.

We, as academics, generally consider academic publishers to be partners in academic excellence. Many of us serve as *ad hoc* peer reviewers for various journals for articles in our field of expertise, while others have invested more time and effort into journals, serving on editorial boards. Of course, we sometimes debate the merits of using the publish-or-perish approach to determine professional success. We lament issues such as the slow pace of the peer-review process, its reliability or consistency and the perceived biases in certain titles or publishers. However, we also generally expect that the peer-review process guarantees that certain norms, ethics and ground rules are met prior to publication. But, are these assumptions about the integrity of academic publishers generally correct?

Alarming trends are emerging in the academic publishing industry, trends that threaten the integrity of journal-mediated scientific discourse. In leading institutions and developed countries it may not be immediately obvious that a toxic system is taking root around the globe. In some countries, well-established journals and healthy peer-to-peer competition continue to ensure that questionable operators in the academic publishing industry have little influence and that scientific publishing continues to be held to a rigorous standard. Unfortunately, in rapidly developing countries and nascent institutions, predatory journals have gained a foothold. As these countries and organisations increasingly hold their researchers to traditional publish-or-perish metrics, the foothold only grows stronger.

Academic publishing has traditionally been an exercise largely limited to renowned experts in their fields. Editors provided editorial skills, improved readability, and handled issues related to publishing. Together scientists and editors contributed their skills for the benefit of all. As the western academic system continues to serve as a model for the development of academic systems around the world, so spreads the demand for access to timely publications. Unfortunately, academic publishing has not been adopted responsibly. Rather, the spread of the culture of academia has created a demand for which publishers have created a supply. Academic publishing has grown into a globalised commercial industry, replete with corruption, and profit-hungry, predatory tactics. Regard for the value of building knowledge and promoting scientific discourse through a medium over which experts exert quality control is gone. The emphasis is often wrongly placed on quantity over quality.

Academia has lost any real control over standards in the academic publishing industry. Academic publishing is its own business ecosystem, where money-makers with little interest in academic excellence, norms and ethics, operate with near impunity. Universities include publication records and editorial experience among the metrics they use to assess potential job applicants and to determine tenure. These metrics place pressure on academics to increase their number of publications and to find opportunities to serve as reviewers or members of editorial boards.

The high demand for a low number of academic positions has fueled the proliferation of low-quality predatory journals. We academics proved hungry for the opportunity to support their efforts. We voluntarily promote them as editorial board members or reviewers. Similarly, these journals do not struggle to get authors to submit manuscripts: the pool of graduate students, postdoctoral candidates, and new professors in need of additional publications to make ourselves more competitive continues to grow. With internet, email and online-only publishing, there are practically no operational costs for these journals.

Initially these journals probably struggled to compete with well-established journals. However, being businesses, they quickly adapted to the market, eliminating their competition with renowned journals. They realised that their true market was young scientists, desperate to improve their CVs. These predatory journals shifted their focus from making a profit through personal and library subscriptions. They introduced the concept of "author pays" to publish, the so-called "gold-plated" model of open access. Journals no longer needed to sell to libraries, or to readers. They only needed to sell to authors. Authors no longer needed to meet the rigorous demands of a peer-reviewed journal. Instead, they only needed money to publish.

As the pace of globalisation has increased, so has the rate of innovation and development among predatory publishers. Jeffrey Beall, a librarian at the University of Colorado, started maintaining a list of predatory publishers in 2011. There were 18 publishers on his list. The update in January 2015 had six hundred and ninety-three (693) entries. Many of these publishers manage numerous titles, increasing their base by covering more areas of specialisation. To date, several thousand titles are published by predatory journals.

In some parts of the world, the terms 'open access' or 'online' journals are now synonyms for either 'low-quality' or 'predatory'. Thus, these predator journals are not only lowering the quality of the body of published scientific works, they are also tarnishing the image of open access. Open access journals are an essential resource, as they provide a means by which to gain access to the world's scientific knowledge base at no cost.

Left unchecked, these journals have the potential to destroy early career scientists' reputations, to dilute the body of scientific knowledge and corrupt the

Image : CC BY SA 2.0 - Research to Action, 2008

scientific dialogue currently conducted through journals, and finally they have long-reaching implications regarding the capacity of emerging scientific institutions to access high-quality science. It is part of our responsibility to reach out to the younger scientists around the world raising awareness and saving them from deception.

From me, this is a passionate call for action. I look to the GYA and other bodies around the world to take it up. Suggested solutions include the creation of "white" and "black" lists of journals, but no real lasting and sustainable solution has yet emerged.

The academic community needs to think more innovatively to regain control and ownership of academic publishing. Innovative models of publishing, peer review and subscriptions are needed to ensure that this sector, so central to the creation and communication of knowledge, remains what it was meant to be a quality control and a means of dissemination.

References

1. J. Beall, Nature 489, 179 (13 September 2012) http://www.nature.com/news/predatory-publishers-are-corrupting-open-access-1.11385
2. http://scholarlyoa.com/2014/01/02/list-of-predatory-publishers-2014/
3. Moshe Y. Vardi, Communications of the ACM 55 (7), 5 (2012). http://cacm.acm.org/magazines/2012/7/151235-predatory-scholarly-publishing/fulltext

02

GLOBAL YOUNG ACADEMY

THEMES

Divide Denied

Art and Science are often seen as non-overlapping pursuits. Rieko Yajima has other ideas.

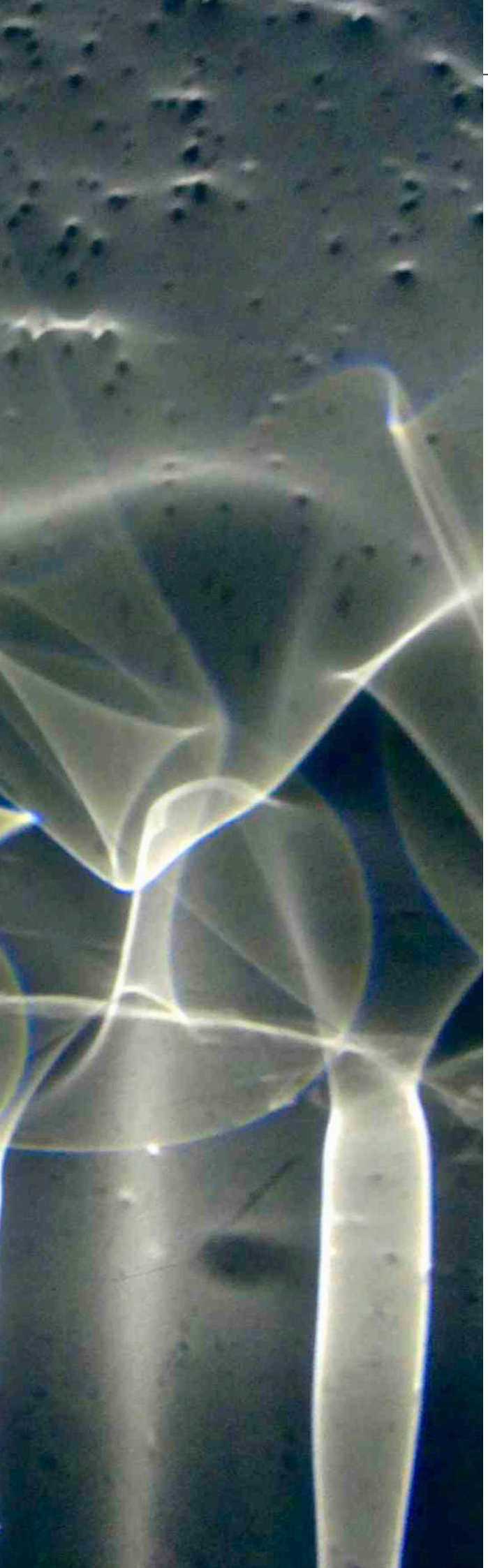


Image : CC BY 2.0 - Jennifer Morrow, 2013

by Rieko Yajima

Creativity is a priceless asset. It drives progress not just in the arts and sciences, but in all human endeavour. As our understanding of the creative process deepens, the importance of bringing together previously remote ideas becomes increasingly clear, and the case for interdisciplinary dialogue becomes ever more compelling. Realising our creative potential promises huge returns in knowledge generation. But the benefits do not end there.

One plausible side-effect is that it will increase our powers of empathy. Crossing disciplinary boundaries exercises and strengthens our ability to see an issue from multiple points of view. And that in turn helps us to engage people with whom we disagree; to make progress on issues that tend to divide us. How do we reconcile opposing value systems? How do we tackle global inequality? These are among the most important problems of our time.

Addressing these challenges will require significant adaptation of our current systems and institutions. So far, many higher education institutions have not capitalised on the intersection between design, art, and science. Nor have they mandated its development. Instead, the intersection is being populated mainly at a grass-roots level by practitioners. These practitioners are driven by their own curiosity and interests, either through collaboration with those outside of their field or by drawing on their own talents in both arts and sciences.

Either path is time consuming, especially when institutional support is unavailable. To pursue it requires not only the commitment to see the project through, but also the tenacity to penetrate culture and language barriers that traditionally keep disciplines apart. Scaling up art–science activities could improve their stability, but effective scaling will likely involve some trial and error — at least until we have a clearer understanding of what works and why.

Fortunately, a few pioneering organisations around the world are blazing a trail. In the USA, the Keck Futures Initiative recently held a bold conference on Art and Science, Engineering, and Medicine Frontier Collaborations in order to explore how collaborations across arts + science could stimulate a renaissance in innovation to solve real-world problems [1]. Hosted by the U.S. National Academy of Sciences, the gathering brought together an international group of scientists, engineers, and artists — two GYA members were among the invitees — to work in cross-disciplinary teams and pitch ideas for pushing the frontiers in educational, cultural, social and scientific issues.

Informal education institutions such as San Francisco's Exploratorium and the New York Hall of Science were established to bridge the art–science intersection, eschewing disciplinary divisions. On reflection, it may not be surprising that art and science should mingle freely in these places. Public-facing institutions must

connect with an audience from a wide range of backgrounds. Perhaps this imperative forces providers to step outside what they already know and to experiment with new ways to carry out their work.

There are lessons here for Higher Education. Universities in particular are organised along disciplinary lines. This is the norm in research and education and in how we train students to think and create. Disciplines that are 'far apart' rarely have ways to connect with each other, and current incentives tend to entrench this position rather than challenging it. Addressing this problem will not be straightforward. At the macro level, maintaining harmony will require changes in different parts of the system to be carefully coordinated. At the micro level, it takes time for teams to learn how to work together effectively. Putting experts in the same room does not make an expert team—at least not right away. The complexity of team dynamics is compounded when its members are steeped in different schools of thought and different modes of inquiry.

A better understanding of the challenges encountered in art–science projects will equip teams to meet these challenges, and increase the chances of success. We could do a great service to knowledge generation by devoting resources to these challenges and developing techniques to overcome them.

References

1. http://www.keckfutures.org/conferences/artsem/

About the Theme "Science & Society"

One of the main goals of the GYA is to provide a voice for young scientists on matters of global importance, from climate change to migration, from global health to the future of clean energy. In its first five years, the GYA has become the partner of choice for senior academies, science networks, and other national and international organisations, including the IAP, JRC, UNESCO, and the WEF. Working independently and in partnership with external organisations, the GYA has published reports, articles and op-eds on the refugee crisis, the demography of talent, sustainable development, and many other topics. The GYA continues to build links with policy-making bodies internationally, and to promote the establishment of National Young Academies around the world.

Current Science and Society projects include Invisible Worlds, Solid Waste and Green Economy, and the Climate Change and Disaster Risk Reduction Working Group. Invisible Worlds is a partnership between the GYA and the Joint Research Center (JRC) of the European Commission. Its remit is to examine under-recognised systems that shape society, such as networks of personal data trails. The Solid Waste Management and Green Economy project is a policy-oriented project that reviews current practice and recommends alternatives. The Climate Change and Disaster Risk Reduction Working Group works to promote the voice of young scientists in climate change dialogue.

To find out more about our Science and Society projects, visit the GYA website or contact the project leaders.

Invisible Worlds: Moritz Riede, [http://bit.ly/gya-invisible]

Solid Waste Management and Green Economy: Sherien Elagroudy, [http://bit.ly/gya-solid]

Climate Change and Disaster Risk Reduction: Laura Petes, [http://bit.ly/gya-climate]

Child experiencing an hands-on experiment at the Exploratorium, San Francisco, USA.

The Africa Science Leadership Programme

Science in Africa faces many challenges
The Africa Science Leadership Programme rises to meet them

Image : © Eyescape corporate photography, 2015

by Bernard Slippers

In June 2015, twenty outstanding academics from across Africa gathered at the University of Pretoria, South Africa, to launch the Africa Science Leadership Programme (ASLP). The year-long programme heralds a new paradigm for science in Africa, one that recognises scientific approaches to the complex problems facing Africa and the global community. Key to its success is a pan-African network of fellows who are trained in thought leadership, team management and research development, and empowered to pursue their common goals. To establish this network, the programme opened with a seven-day workshop, 'Leading a new paradigm for African Science', equipping the fellows with these fundamental skills. The fellows then continued with a year of application and mentorship, with a follow-up meeting held in April 2016.

The design of the ASLP borrows from the Leopold Leadership Programme at Stanford University and incorporates problem-solving tools developed by the international facilitation group KnowInnovation (KI). It also incorporates original content from local partners in South Africa, as well as response to feedback obtained from fellows during the meeting.

At the inaugural workshop, external speakers provided context to the proceedings, addressing participants on topics such as media relations, successful leadership, and the role of research in regional development. Current and former co-chairs of the GYA, Eva Alisic, Rees Kassen and Bernard Slippers were present throughout the week to facilitate. The entire meeting was conducted in an atmosphere of constant engagement—both between fellows and speakers, and amongst fellows themselves.

True to the spirit of the GYA, participants were drawn from a wide range of disciplinary backgrounds—natural sciences, social sciences, arts and humanities—maximising opportunities for creative collisions between different perspectives.

The attendees captured the ideas emerging from these discussions, including analysis of the current situation, future projections, and individual and collective priorities. Fellows then organised these raw materials into five specific projects that they could champion in the year ahead: shaping the science agenda for Africa, government policy on research funding, expanding research leadership, reaching pupils in poor areas, and gender bias in postgraduate careers. In the year that followed, these projects served as a focus for the practice of the leadership skills that were the focus of the workshop.

Voices From Participants

Dexter Tagwireyi - *I liked the mix. On the one hand, inspiring talks on the theory of leadership, on the other hand, structured time for deep discussion with other group members.*

Badre Abdeslam - *What a wonderful week. The people, the programme, the goals, the method… I don't think we should even call it a workshop—it's far too innovative for that.*

Alice Matimba - *This has been a really fantastic week. From time to time I have had ideas about improving science in Africa, but there was never a platform to develop them. Here I met people with whom I felt an immediate connection. Change is possible. And you have to work with different people to achieve it.*

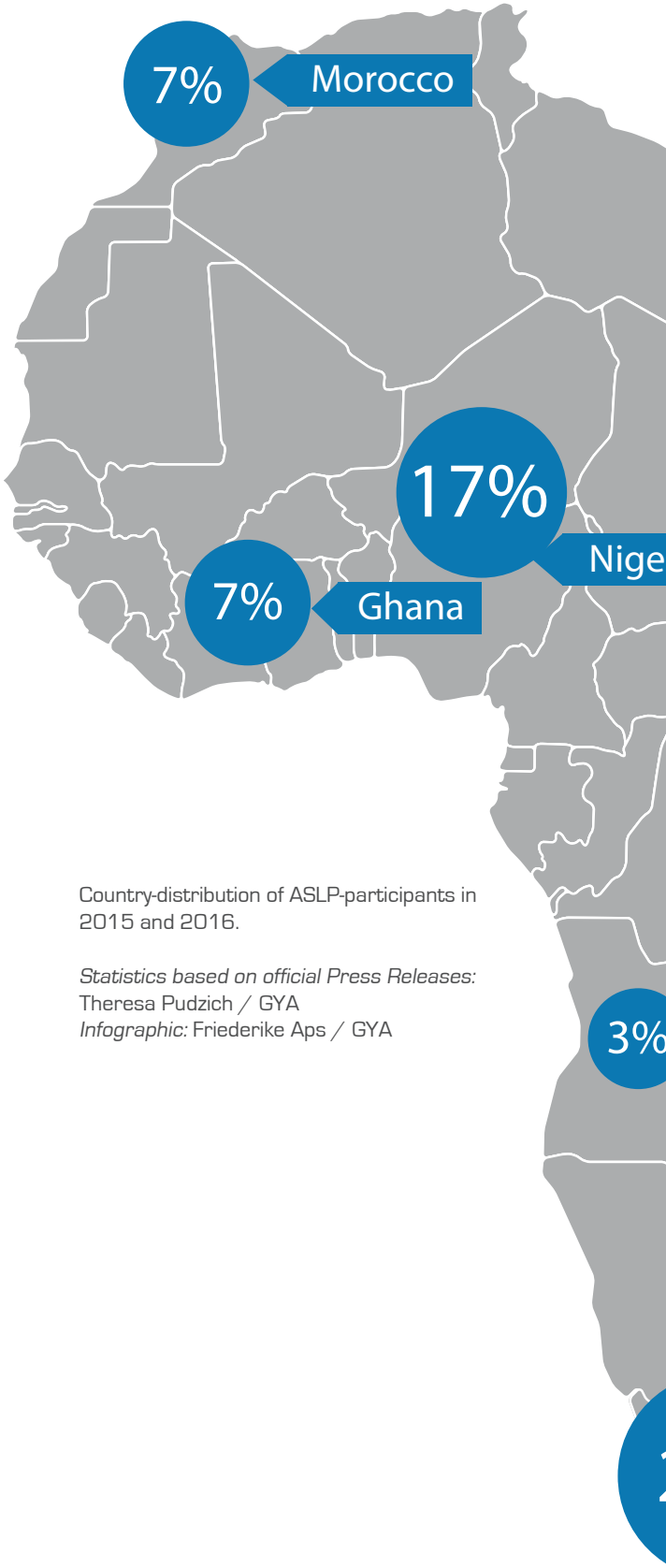
Vidushi Neergheen-Bhujun - *This has been quite an inspiring experience. I am taking a lot of ideas home with me, including thinking tools that I would like to incorporate into my daily activities.*

About the Africa Science Leadership Programme

The Africa Science Leadership Programme (ASLP) is a new initiative of the University of Pretoria and the Global Young Academy, supported by the Robert Bosch Stiftung. Its goal is to provide a platform for research leadership training in Africa and a model that can be replicated elsewhere. The programme has already stimulated the development of an institution-based programme at the University of Pretoria – the Tuks Young Research Leader Programme. The intention now is to introduce that shorter version of the programme at other Universities on the continent.

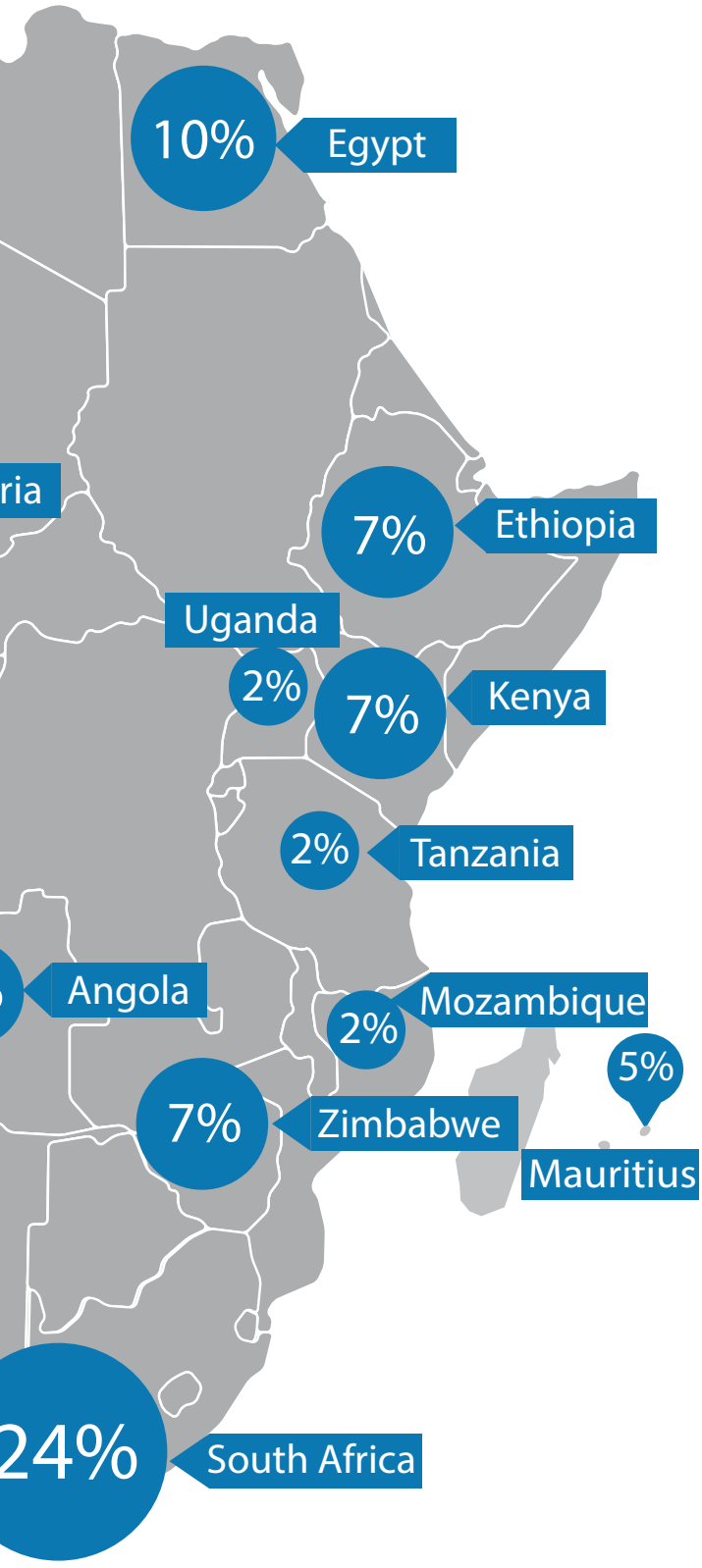
Links

1. ASLP - http://www.up.ac.za/aslp
2. TYRLP - http://www.up.ac.za/en/centre-for-the-advancement-of-scholarship/article/2157959/tuks-young-research-leader-programme



Country-distribution of ASLP-participants in 2015 and 2016.

Statistics based on official Press Releases: Theresa Pudzich / GYA
Infographic: Friederike Aps / GYA



About the Theme "Research Environment"

Capacity building is essential to the fulfilment of the GYA mission and to the flourishing of the Young Academies movement worldwide. The Research Environment theme encompasses topics relating to research infrastructure, career paths, and the flow of scientific information. Its aims include narrowing the gap between research in developed and developing countries, and maximising the global impact of newly-generated knowledge.

Current Research Environment projects include the Global State of Young Scientists (GloSYS), the African Science Leadership Programme (ASLP), and the Working Group on Open Science. GloSYS is a flagship GYA project that collects evidence on young scientists and scholars' working conditions, and brings together researchers, experts, and institutions operating in this area. The ASLP empowers young researchers in Africa to lead international and transdisciplinary projects by strengthening mentorship and support structures. The Working Group on Open Science monitors and informs ongoing transformations in publication systems and promotes Open Science mandates across the GYA and partners.

To find out more about our Research Environment projects, visit the GYA website or contact the working group leaders.

GloSYS: Karen Lorimer,
[http://bit.ly/gya-glosys]

ASLP: Bernard Slippers,
[http://bit.ly/gya-aslp]

Open Science: Sabina Leonelli,
[http://bit.ly/gya-open]

Outreach and the Rural World

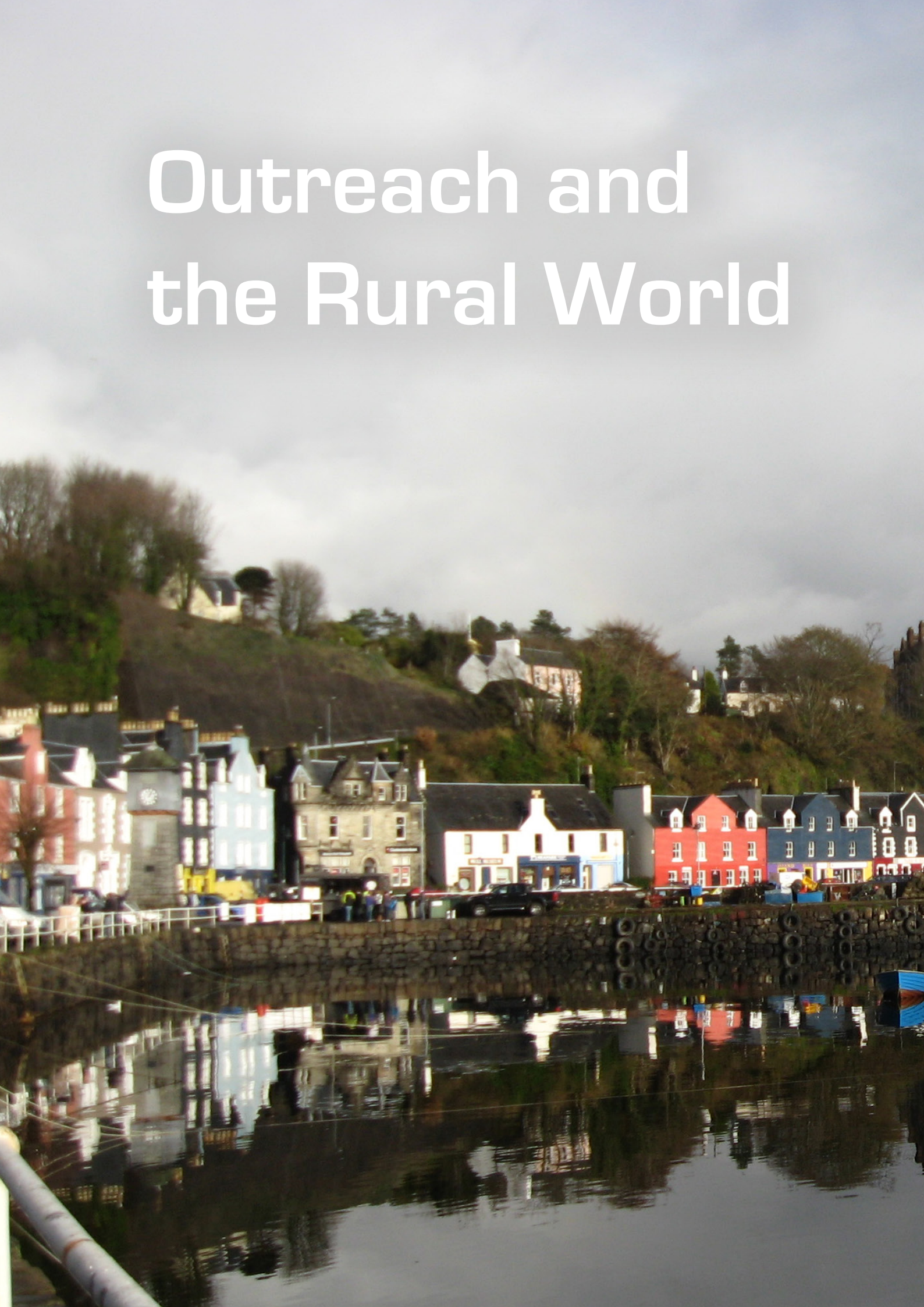


Image : © Karly Kehoe

by S. Karly Kehoe

As things stand now, the rural world can no longer be considered to be either a productive system or an isolated system. The penetration, to a greater or lesser degree, of globalising and urban rationales in rural areas has given rise to profound changes in their economic, social and institutional structure. [1]

As members of the Global Young Academy (GYA), we should pay close attention to statements like these. We should want to understand what 'profound change' actually means and how far it will affect the future sustainability of rural areas. This short commentary considers the influence that research-led outreach can have on the sustainability of the rural world. A number of us come from rural communities and so this will be of interest, but even for those of us who do not, there is an urgent need to consider what the broader consequences of socio-economic, institutional, and cultural change in the rural world will mean for the urban one in which most of us now live.

The vulnerability of the rural world is but one of many reasons why meaningful and research-led outreach is important. While the outreach agenda is ultimately concerned with bringing benefit to society, it is also essential to achieving a better understanding of how the world around us has changed, is changing, and needs to change. It is a process that requires researchers to take their work out of the libraries, offices, and labs and to bring it to communities who can benefit most from it. It enables research to grow because it exposes it to new people, new scenarios, and new questions; thinking and ideas are disrupted and new paths of investigation are opened up. Outreach – genuine and meaningful – inspires collaboration which is the only way to create sustainable, informed and just strategies for development.

Last year's UN Sustainable Development Summit introduced the Global Goals and their aim is to bring people and countries together to 'end poverty, promote prosperity and to address climate change' [2]. Every single one of the 17 goals, which range from Zero Hunger, Life on Land, Life below Water, and Responsible Consumption and Production, to Gender Equality and Clean Water and Sanitation, connects with the rural world in a substantial way and relies upon people collaborating to bring about transformational change [3]. The rural world, we must remember, is a collection of diverse environments, each of which with its own unique past, present, and future. What these environments have in common, though, is that they have consistently sustained life and have demonstrated considerable agency and resilience in the face of socio-economic turmoil, war, ecological disaster, demographic shift and cultural change. The mass rural-to-urban migration and the subsequent growth of cities began in Europe in the early nineteenth century, and today, most of the world's population lives in cities and it has become too easy to forget just how much exists, and needs to exist, beyond these now ubiquitous urban landscapes.

Any historian, economist or ecologist will testify that global empires have risen and fallen on the foundations of the natural resources that the rural world provided, yet we rarely acknowledge just how reliant we all still are upon it. Many of us have forgotten about – or did not recognise – what it takes to build and sustain a city and it is worth remembering that rural areas are neither isolated hinterlands nor disconnected from the outside world. While the rural world remains vibrant, tremendously productive, and plugged in, but is nevertheless in a state of crisis as out-migration continues, as landscapes are exploited to the point of exhaustion, and as cities keep growing and swallowing up surrounding lands and waters.

The situation is not hopeless, but we are at a point where recognising that the survival of the rural world relies upon us, in our various fields, working with local communities to come up with workable and long-term solutions. As people with access to specialist knowledge, we can play a pivotal role in shaping strategies for rural sustainability. We need to begin by asking what we can learn from these landscapes and the people who inhabit them because none of us should be under the impression (or delusion) that we can show communities the way forward. Our strategy must be to engage with rural communities on their own terms to build solutions that communities will accept.

Over the years, many of our predecessors succeeded in barricading themselves behind the walls of universities and because of this a canyon has opened up between universities and local communities. This is a global and very serious problem. The opening quote for this article comes from a UN-supported study of the relationship between higher education and rural development in Italy. It does something very brave – it calls on universities to start rethinking their social function in an effort to regain the societal influence they once had [4]. The problem, of course, is that genuine partnership between universities and communities has been missing for a long time. While this is a legacy that we are all living with, our generation must take the lead in building new and more positive relationships.

Outreach is a way for universities and their researchers to re-engage with their social function and to acquire influence. It can inform policy makers about the value of academic research because outreach teaches us to become better at making a case for the important and ground-breaking work that we do. We assume that policy makers should listen to us because the brilliance of our work should speak for itself – but rarely does it do this. Not only must we learn to become more effective communicators, but we must also learn how to involve non-academic and external stakeholders in our research processes. When we do this, we are likely to find that as communities start to engage with and participate in the research policy makers will start to pay attention. Outreach is the most effective way of showcasing our knowledge and expertise.

We are all big believers in pure research and we understand that this means being brave enough to push the boundaries of our disciplines. Discovery or fundamental research is incredibly empowering because it leads to innovation, which keeps people and societies moving. As GYA members, we support innovation, but we need to be continually asking ourselves if we are being innovative enough about innovation. We need to be careful about how we define innovation and about how we let others define it. We stand at a crossroads and must recognise that we are responsible for questioning whether we are making enough space for research that informs opinions, approaches and discussions alongside research that produces immediate economic outcomes. There are times, such as now, when the innovation ecosystem needs updating. One of the ways we can do this is by creating more space for collaboration between academic researchers and between academic researchers and local communities. Updating this ecosystem has the potential to yield immeasurable economic, social, environmental and cultural benefits.

Most early-career-researchers work for public-sector institutions and are feeling increasing pressure to show the economic benefits of new work. But there has to be a balance. I have highlighted the rural world here because I believe that it can teach us about balance. A strong research-led outreach agenda has the potential to protect the integrity of the research we do. It involves a range of stakeholders and it gives us the chance to speak for ourselves. We are privileged – not entitled – to inhabit the academic world. The profession offers more freedom than almost any other profession on the planet and can wield tremendous influence. Outreach is a unique way to harness the expertise and creativity of the GYA to help to achieve positive societal change. This is why we must continue to champion outreach activities.

Image : © Karly Kehoe

References

1. Eduardo Ramos and Maria del Mar Delgado, Higher Education for Rural Development: The experience of the University of Cordoba (Rome, Food and Agriculture Organization of the United Nations, 2005), p. 22.
2. UN Sustainable Development Summit. http://www.un.org/sustainabledevelopment/ [Accessed 22 October 2015].
3. Global Goals for Sustainable Development. http://www.globalgoals.org/ [Accessed 22 October 2015].
4. Ramos and Delgado, Higher Education, pp. 13-4.

About the Theme "Science Education & Outreach"

Promoting science education has always been a core activity of the GYA. Members of the GYA believe very strongly that scientists need to do more to contribute to society than simply advance their individual research agendas. In different countries, GYA members have engaged in science education at schools and universities in their home countries or in the countries of other members. Whereas science education generally needs to be locally "anchored" and implemented, the GYA has observed that contributions from international scientists make the activities even more attractive and motivating for the target group. At a more structural level, the GYA contributes to organizing the exchange of experience and to globalizing best practice examples.

The Science Education and Outreach theme also houses a number of established working groups, including Young Scientist Ambassador Program (YSAP), Measuring Excellence in Scientific Engagement (MESE), and Expedition Mundus. YSAP facilitates cultural, scientific, intellectual, or educational interactions between countries that are at different stages of scientific development, or that have had minimal scientific contact historically. MESE is developing methods that will allow us to demonstrate, promote, and reward scientific engagement outside of academia. Expedition Mundus is an amazing board game that teaches the scientific methods of data colection and hypothesis testing.

To find out more about our Science Education and Outreach projects, visit the GYA website or contact the working group leaders.

YSAP: Stephen Miller, [http://bit.ly/gya-ysap]

MESE: Kai Chan, [http://bit.ly/gya-mese]

Expedition Mundus: Bettina Speckmann, [http://bit.ly/gya-mundus]

03

GLOBAL
YOUNG
ACADEMY

MEET THE NEW MEMBERS

2016

Monir Uddin Ahmed (Bangladesh)

Microbial epidemiologist

Initiator of bilingual science magazine *Scientific Bangladesh,* dedicated to enhancing the quality of human life by making small changes such as ensuring food safety. He goes into detail, working at the molecular level with pathogenic microorganisms. The present focus of his work: *Campylobacter jejui,* the most frequently isolated foodborne bacterial worldwide.

Nova Ahmed (Bangladesh)

Computer scientist + technology expert

After obtaining her PhD she started working with operating systems, humans, and the space that lies between them. Her aim is to connect man and machine, as this will help to provide low-cost and socially accepted solutions to countless global challenges.

Almas Taj Awan (Brazil)

Environmental scientist

Her wish to contribute to global sustainability led her to become an expert in waste and water recycling. She is convinced that these aspects of recycling are fundamental to environmental sustainability and will provide practical solutions to ongoing global challenges such as the effective use of renewable energy.

Kelly Babchishin (Canada)

Psychologist + blogger

A digitally working scientist, dedicated to researching risk factors for sexual violence against women and children. She actively explores these matters online and offline, also raising her voice as a blogger, thus achieving awareness for sexual violence and harassment and presenting prevention strategies.

Fuat Balci (Turkey)

Behavioural neuroscientist + psychologist

His fascination with the capacity of human beings and animals to measure time without a defined sensory organ brought him to investigate the links between a "sense of time" and decision - making functions. He soon found that this issue leads to fundamental questions of neuroscience and cognitive science.

Anindita Bhadra (India)

Behavioural biologist + blogger

Initially exploring the sociability of insects, the first chairperson of the Indian NYA went on to research the behaviour of wild dogs, leading to new insights into regarding intrinsic behavioural processes and the exciting relationship between dogs and humans. On her blog she follows her passion for behavioural studies and captures moments of her everyday life.

Suzanne Bouclin (Canada)

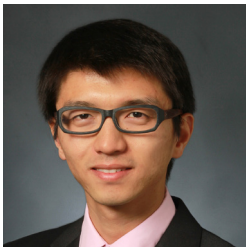
Lawyer + volunteer

An interdisciplinary researcher, at the intersection of law-, film- and media studies, and feminist theory, currently examining whether new communication technologies can help homeless people to access law and justice. Her secondary research project explores the representations of criminalised women in pop-culture, especially movies and cinema.

Kit Yee Chan (United Kingdom)

Global health scientist + sociologist

Studying the relation of policy and health systems regarding so called non-communicable diseases (NCDs). Her research includes the investigation of diseases such as dementia and asthma. Using her background as a social scientist, she also investigates the impacts of national policies – such as China's recent healthy system reforms.



Huanyu Cheng (USA)

Mechanical engineer + bio-mechanist

As he followed his passion for mechanics design and bio-manufacturing, he came to work with wearable tattoo electronics, capable of dissolving in the human body. In his laboratory, he links research and manufacturing by developing biomedical devices that reduce therapeutic risks during medical treatments.

Jackie Dawson (Canada)

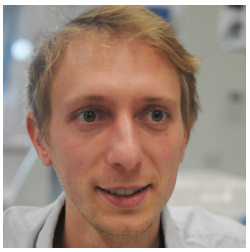
Environmental geographic scientist

Achieving both practical and theoretical advances as a researcher and as head of the Environment, Society and Policy Group (ESPG) in Ottawa, she investigates the human and policy dimensions of environmental and economic change, working on relevant and up-to-date problems in climate change, arctic shipping, arctic economic development, and coastal communities.

Felycia Edi Soetaredjo (Indonesia)

Chemical engineer + environmental researcher

Her aim in researching is to develop efficient and affordable waste water treatments that are fundamental to sustainable and clean industries. She is motivated by the conviction that scientific findings provide answers to global environmental and sustainability issues.



Simon Elsässer (Sweden)

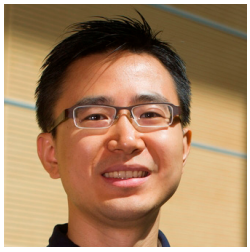
Chemical biologist

Fascinated by epigenetics, and more precisely, by the question how our genetic information is annotated in every human cell. Through his research, he seeks to understand how each of the trillion cells in the human body can actually can 'remember' its purpose. His ultimate aim is a better understanding of cancer mechanisms and prospects for prevention.

Laura Fierce (USA)

Climate scientist

Environmental engineer and chemist investigating climate change as the global challenge of our time. By constructing new frameworks for simulating atmospheric aerosols in climate and air quality models, her research will help to protect the Earth's radiative balance and hence, its climate.



Yun Fu (USA)

Information engineer + computer scientist

Passionate computer scientist working in the thrilling field of machine learning, data mining, and computational intelligence. He not only investigates operation systems, but also researches the encounters of humans and machines, for instance through a human-centred analysis of social media platforms.

Mirabbos Hojamberdiev (Uzbekistan)

Material scientist

In his research he focuses on the fabrication, characterization, and application of visible-light-responsive photocatalytic materials for environmental use. Working on new methods in the production of energy, his current mission is to develop efficient photo-catalysts that can split water and produce hydrogen as an alternative to fossil resources.

Che-Ming (Jack) Hu (Taiwan)

Nano-medical engineer

Passionate about complex biological systems, and dedicated to nanotechnology as it will make therapies safer, more potent and more precise. In his laboratory, he is currently developing novel nanoparticle vaccines against MERS-CoV and influenza.

Nathalie Katsonis (Netherlands)

Chemist + materials researcher

As lead of her own research group she develops smart materials and molecular-scale machines – the foundations of every significant biological process. Her research includes the design, synthesis, and operation of molecular machines, and also the development of bio-inspired and smart materials, extending this approach towards designing artificial muscles and materials for soft robotics.

Mona Khoury-Kassabri (Israel)

Life scientist + violence researcher

Aiming to understand and prevent school violence, she uses a holistic approach to investigate the impact of economic, social, and political factors on child and youth involvement in delinquent behaviors - both as victims and as perpetrators.

Bartlomiej Kolodziejczyk (Australia + USA)

Nanotechnologist + life scientist

Co-founder of two start-ups, passionate about materials engineering. His scientific focus is on nanotechnology and micro-electronics. Through his publications and political activity, he combines research and policy – as when authoring reports on renewable energy and innovation.

Andrey Konevega (Russian Federation)

Radial bio-physician

Life scientist, exploring the secrets of biochemistry using biochemical and biophysical approaches to study molecular mechanisms of protein biosynthesis. As a member of the Russian scientific community, he is actively involved in creating a modern academic system across national and disciplinary boundaries.

Isil Kurnaz (Turkey)

Neurobiologist + molecular researcher

Fascinated by the human brain and nervous system, she came to explore how brain tumour cells are able to spread. Her aim is to use the new knowledge as a foundation for novel therapies. In her laboratory she investigates possible treatments for diseases such as cancer, Alzheimer's and Parkinson's.

Robert Lepenies (Germany)

Social scientist + philosopher

Max Weber fellow with a special interest in the ethics of economics and poverty theory. He is currently working on the question of whether it is permissible to nudge citizens, especially in the contexts of poverty and social inequality.

Daniel Limonta (Cuba)

Physician + health scientist

Medical researcher interested in the interactions between human cells and viruses such as dengue and Zika. Through his work, he seeks to find new therapies to fight globally significant pathogens. He is excited to discuss personal findings and achievements with enthusiastic young researchers from all over the world.

Paul Mason (Australia)

Anthropologist + system theorist

Cross-disciplinary thinker bringing together research findings from the fields of anthropology, bioethics, global health, and complex systems theory. His research on tuberculosis in Vietnam led to the development of an educational book for children that has been translated into several languages.

Srinjoy Mitra (UK)

Biomedical engineer

Having gathered experience in the electronics industry, he went on to specialise in the field of neuro-informatics. His research focuses on neuromorphic systems, an approach that uses state-of-the-art electronics technology to build artificial systems inspired by the brain.

Evren Mutlugün (Turkey)

Physical entrepreneur

Head of a Nano Research Group at Abdullah Gul University, researching the use of colloidal nanocrystal quantum dots for energy efficient applications. As founder of his own company, he turns research findings into products, focusing on nanomaterial engineering for innovative lighting systems and display technologies, as well as the next generation of solar cells.

Rothsophal Nguon (Cambodia)

Social scientist + gender researcher

Her special research interest lies in gender equality and female entrepreneurship in Cambodia. This is inspired by both academic pursuits and personal experiences. Providing practical implications through her research, she is currently dealing with questions of social welfare and gender equity, aiming to improve quality and equality in primary education.

Connie Nshemereirwe (Uganda)

Humanitarian scientist + educationalist

Her research at the interface of humanities and education aims to develop and improve undergraduate classes in Uganda. Alongside her theoretical work, she leads a project to provide offline access to online educational material a project fuelled by the conviction that education is the best instrument for solving global issues of equality and sustainability.

Theresa Nkechi Obiekezie (Nigeria)

Geologist + physicist

Being based in geophysics, her scientific career brought her to atmospheric physics, where she is currently achieving novel insights into ionospheric effects and weather in space.

Tolu Oni (South Africa)

Public health scientist + epidemiologist

Researching disease and wellbeing in the context of urbanisation. In a recent study, she investigated the epidemiology of tuberculosis, diabetes and HIV in urban contexts. Her research is grounded in the conviction that policy and science need to go hand-in-hand to find solutions to our most pressing questions.

Liav Orgad (Germany)

Citizenship theorist + jurist

Having worked on constitutional identity, democracy theories, global migration, and international jurisprudence, his research addresses one of the biggest challenges facing liberalism today: international migration, national belonging, and the future of citizenship in the context of a globalised world.

Gergely Toldi (Hungary)

Immunologist + nanotechnologist

Through academic research and practical experience gained at the Birmingham Women's Hospital, he addresses significant research questions of Neonatal Medicine, providing better diagnostic and treatment strategies for neonates, pregnant women, and patients with autoimmune disorders.

Muhammad Hamid Zaman (USA)

Biomedical engineer + columnist

International health scientist, exploring fundamental questions in cancer progression and treatment. He is engaged in bringing high-quality engineering education to developing countries such as Kenya, Zambia, Uganda, and Ethiopia. His work is based on the conviction that technology can and will change the world for the better.

Imprint

GYA Connections is published annually. Suggestions for content should be sent to the editor.

Publishing Date: May 2016

Publisher:
Global Young Academy
Jägerstr. 22/23
10117 Berlin
Germany

Editor: Rob Jenkins (UK), rob.jenkins@york.ac.uk

Editorial Office: Friederike Aps, Charlotte Bolwin, Theresa Pudzich & Florian Wiencek / GYA

Design & Layout: Florian Wiencek & Friederike Aps / GYA

Images: The image rights remain with the original creators.

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About the Global Young Academy

The Global Young Academy (GYA) was founded in 2010 with the vision to be the voice of young scientists around the world. The GYA empowers early-career researchers to lead international, interdisciplinary and intergenerational dialogue by developing and mobilising talent from six continents. Its purpose is to promote reason and inclusiveness in global decision-making. Members are chosen for their demonstrated excellence in scientific achievement and commitment to service. Currently there are 200 members and 134 alumni from 70 countries.

The academy is hosted at the Berlin-Brandenburg Academy of Sciences and Humanities (BBAW) in cooperation with the German National Academy of Sciences Leopoldina. The GYA received its seed funding from the Volkswagen Foundation and has, since 2014, been funded by the German Federal Ministry of Education and Research (BMBF). It has been supported by the IAP: the Global Network of Science Academies. The GYA has also benefitted from project funding from a variety of donors and partners.

Co-Chairs: Eva Alisic (Australia), Orakanoke Phanraksa (Thailand)

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Find out more at: www.globalyoungacademy.net

GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung

The Global Young Academy gratefuly acknowledges funding by the Federal Ministry of Education and Research in Germany.

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2016