

2017



Alexander von Humboldt
Stiftung/Foundation



Trust in Science and Scholarship – A Global Societal Challenge

Proceedings of the 11th Forum on the Internationalization of Sciences and Humanities

December 10–11, 2017 • Berlin

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**Trust in Science and Scholarship –
A Global Societal Challenge**

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Internationalization of Sciences and
Humanities
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Preface

Dear Reader,

The rise of populism in many countries around the world goes hand in hand with increasing distrust in elites, including scientists and researchers. The “March for Science” on 22 April 2017 – an event the Alexander von Humboldt Foundation and its partner organizations in Germany supported – was intended to make a visible statement against willful misrepresentations of scientific research results and disparaging comments about scientists and scholars by populist politicians. But the problem of distrust in science and scholarship cannot be solved simply by researchers taking to the streets.

With trust in science and research on the decline, unsubstantiated assertions by non-experts can gain more traction in public discourse – and by extension, public policy – than scholarly insights based on evidence. This development does not just raise questions with regard to the future of public funding for science and research, it threatens one of its core missions: to achieve progress through knowledge. In times like these, individual scholars and the international academic community as a whole have to confront the question of their individual and shared responsibility to society more urgently than ever.

Under the heading “Trust in Science and Scholarship – A Global Societal Challenge” the International Advisory Board of the Alexander von Humboldt Foundation invited leading scholars, science managers, and representatives of funding organizations from across the globe to the 11th Forum on the Internationalization of Sciences and Humanities. The Forum convened in Berlin in December 2017 and discussed three broad questions: First, how important is the role of communication in engaging public trust? Are there “best practices” for the communication of research results? Second, how can public engagement by scholars and scientists help to engage trust? And finally, how can funding organizations help to increase trust in science and scholarship?

This special supplement documents the Forum discussions and makes them available to a wider audience in Germany and beyond. We hope that the contributions in this publication spark further debate within the global academic community.

Sincerely,



Helmut Schwarz
President (2008-2017) of the
Alexander von Humboldt Foundation



Katharina Boele-Woelki
Chair of the International Advisory Board of the
Alexander von Humboldt Foundation



Helmut Schwarz
President (2008-2017) of the
Alexander von Humboldt Foundation



Katharina Boele-Woelki
Chair of the International
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11th Forum on the Internationalization of Sciences and Humanities

“Trust in Science and Scholarship – A Global Societal Challenge”

Central Points of Discussion

1. Uncertainty is a defining element of science and scholarship. This is a major challenge for trust-building.

The work logic of science and research contains a fundamental paradox. The ultimate goal of scholarly and scientific research is to create new knowledge, but doing so requires the disruption of established knowledge. Therefore, while research is intended to acquire certainty about a given question, this certainty is by definition always relative. The challenge is to foster trust-building against the backdrop of uncertainty.

2. Communication is central to trust-building, but it has to be the right type of communication. Personal contacts between researchers and the public are important.

Communication between people is indispensable for a trustful relationship. But trust in science and scholarship will not increase if researchers merely talk more about their work. To communicate successfully and to build trust, researchers have to take into account the mechanisms by which people come to understand the world. They need to use narratives, tell relatable stories, and focus on problem-solving. It helps if scientists and scholars meet members of the public eye-to-eye and build a personal rapport.

3. Reaching those who are not normally interested in science and research is a key challenge. The use of social media by scientists and researchers may be one element to support trust-building among these groups.

When scientists and scholars use traditional communication channels, such as newspaper articles or open days at universities, they are often only 'preaching to the converted'. Reaching audiences who are not normally interested in science and research is a key challenge when it comes to increasing overall trust in science and scholarship. Social media like Twitter and Facebook at least in theory offer the opportunity to reach such audiences. However, there is as yet no clear understanding as to how much the use of social media by researchers can really contribute to increasing trust.



Helmut Schwarz, President (2008-2017) of the Alexander von Humboldt Foundation

4. Some of the societal mistrust in science and scholarship is caused by failures by individual scholars as well as the global academic community as a whole.

Fraudulent behavior by individual scientists fosters mistrust in research in general. Likewise, the widespread tendency to over-sell research results creates false hopes in ordinary citizens and in the end leads to disappointment. All scientists and scholars therefore have to live up to the high moral and professional standards that the academic community has set for itself in order to regain trust.

5. Public engagement by researchers can increase trust in science and scholarship.

Scientists and scholars can help increase trust in their work when their research results help improve public policy. Yet researchers need to be aware that when they engage with policymakers they become part of political processes and thus expose themselves and their work to challenges of politicization.

6. International cooperation can help to build trust in science and scholarship.

When researchers from countries where trust in science is low go abroad and receive recognition for their work in other countries, this can have a positive effect on respect for their scholarly achievements at home. In this sense, trust in science and scholarship may to some extent be transferable through international cooperation. ■

"...we need to fight, and fight, and fight again to make our voices heard."



J. Fraser Stoddart

2016 Nobel Laureate in Chemistry
Board of Trustees Professor of Chemistry
Northwestern University
Evanston, USA



Eleanor Catton, Man Booker Prize winner in 2013 for her novel "The Luminaries", commented after receiving an Honorary Doctorate from her alma mater, the Victoria University of Wellington in New Zealand:

The purpose of a university is not to replicate
but to enlarge;
not to simplify but to understand;
not to reflect or serve the world in which we live,
but to enrich it through the creation and exploration
of an infinity of possible other worlds.

Let me reflect on the bond between exploration and creativity. Exploration is the practical expression of curiosity. Curiosity and zeal are the yin and yang that need to be combined to create something new. The first requires openness to outside stimuli, the second demands inner focus. The first is playful, passionate and fun-oriented, the second is serious, competitive and achievement-directed. The first is about concepts and ideas, the second is about their implementation. Both are required for creativity to be realized. From kindergarten through primary and secondary schools to technical colleges and universities, we need to turn the spotlight on creativity as a skill set that can be acquired. It is not gifted.¹

¹ Cf. M. Csikszentmihalyi (1996), *Creativity. The Psychology of Discovery and Invention*, New York: HarperCollins.

My own life's journey began on a tenant farm south of Edinburgh, the capital of Scotland — a small country with a centuries-old tradition of excellence in school education. I was an only child living in a remote enclave without electricity until aged 18. From a young age I became addicted to solving jig-saw puzzles, a childhood pursuit that was to lead to my early engagement in molecular self-assembly and recognition processes. I also fell in love with Meccano, a toy which made it possible for me to create my own contraptions from a vast array of parts held together by tiny nuts and bolts. This addiction whetted my appetite to take up the construction of artificial molecular machinery later on in my life as a scientist. It was to land me in Stockholm last December. The citation for the Nobel Prize in Chemistry in 2016 reads "for the design and synthesis of molecular machines." Boys and girls the world over need to be given the space and time to formulate their dreams at an early age and to foster their passions during their teenage years.

It was at the University of Edinburgh where I became enamored with carrying out research in chemistry, primarily because of the opportunity it afforded me to be creative in the crafting and making of molecules, much as in the same manner a painter would produce a picture, or a sculptor, a statue. Empowerment, not indoctrination, should be the focus of an innovation-oriented curriculum in our schools and universities. Questioning traditional practices should be encouraged, breaking with the established order should be tolerated.

On leaving Edinburgh in 1967 to carry out research at the postdoctoral level in Canada, my professor, Sir Edmund Hirst, gave me one piece of advice along the lines of "whatever you do in research, Stoddart, tackle a 'big problem' in science." Although I was fortunate in being able to

identify that ‘big problem’, it was to take 50 years to bring it to fruition. Long-range accomplishments cannot be measured by short-term evaluations. Unwavering confidence in talent is a better assurance of big achievements than the constant validation of productivity. In an enlightened academic environment, there is no place for the continuous assessment of research and teaching at the state or national levels. Each institution should set their own standards.

I must stress that the ‘big problem’ bore no relationship to the subject matter of my doctoral thesis which was entitled, “Some Studies on Plant Gums of the Acacia Genus.” Pressures imposed by expectations of immediate and metered productivity coerce far too many students, on becoming independent researchers, to continue to pursue the very same lines of research that they practiced in their mentors’ laboratories during their graduate and postdoctoral years.

All my students leave my research group with the following words ringing in their ears, “whatever you do in science, don’t continue to do Stoddart research!” Recall Eleanor Catton’s dictum, “The purpose of a university is not to replicate but to enlarge.” Here too, a supportive and enlightened educational policy is needed in order to clear the path for exploration and shun delusions of grandeur arising from trivial metrication.

Helmut Schwarz, President of the Alexander von Humboldt Foundation, published an essay in *Nature* at the beginning of this year (2017) in defense of the usefulness of “useless” knowledge. Our inability to predict what basic research will eventually become useful is exactly what makes basic research so valuable in cultivating innovation. Professor Schwarz argued that long-term continuous support of creative individuals out-performs project-specific funding for creating economic competitiveness.

He proffered that a country’s best investment is in curiosity-driven research, led by the passion of excellent young investigators, contingent on a combination of creativity, intelligence, curiosity, perseverance and serendipity. We need to have the courage to put our faith in curiosity-driven research where mentorship of students by professors can be honed to perfection.


Serendipity often intervenes in an intellectually stimulating environment. Recently, in 2014, I established a start-up company after stumbling across an environmentally friendly way to isolate gold from ore, using a starch-derived product, obtainable microbiologically from corn/maize.

The prospect of phasing out cyanide from gold mining the world over holds other benefits: If the spent ore is not contaminated with cyanide, it can be used in clean-fill applications or in the construction industry. It’s a win-win situation. Inadvertently, those of us in universities can end up serving our countries – as well as the rest of the world – with new technologies.

There are other forces at work in the Western world today which are not so positive. Two of the world’s leading so-called democracies have been hijacked, in each case, by a few politicians, supported by rich and

powerful magnates, who have no interest whatsoever in upholding the search for truth and the understanding that has become the bedrock of informed and educated citizens: these times are troubled ones indeed. Science and scientists are under attack. Political leaders in Washington DC have more than simply turned their backs on science. They refute its findings, they question its value, they ignore its predictions, they denigrate its worth.

“Science and scientists
are under attack.”



It is said that in democracies, we get the governments we deserve. This adage presumably implies that the politicians and the people who elect them are acting in unison. It seems that an increasingly important part of this process is the media – in all their many different forms – that lie between us, the people, and our politicians. It strikes me that if we, as individuals, and as institutions, wish to influence this dialogue, then we have no option other than to become part of it. We need to be active on social media.


“We need to be active on
social media.”



It is in these arenas that I argue we need to fight, and fight, and fight again to make our voices heard. It is for this reason that I was persuaded just over a year ago to join Twitter. In the past nine months, I have earned the reputation of being a Twitter monster! I ply my trade as a self-appointed media guru, according to a very strict set of self-imposed conditions. My tweets about science, in all its aspects, are factual and positive. They are carefully crafted and appropriately illustrated.

My ‘Likes’ extend beyond science into the political arena. I look upon them as votes in support of movements I support very strongly, one being my ardent and passionate desires that Scotland stays in the United Kingdom (UK), and that the UK remains in the European Union and the single market.

“... if scientists were to embrace
Twitter in massive numbers, they
could do much to put science
center-stage in our societies.”



I am firmly of the belief that, if scientists were to embrace Twitter in massive numbers, they could do much to put science center-stage in our societies. I fear that history will not look kindly, when it comes to issues like climate change, on the fact that a large majority of scientists remained on the sidelines. I am possibly the only Nobel Laureate who is on Twitter. Why should it be this way?

Here is why I believe it’s important that our voice is heard. The politicians, who have seized power in the United States (US), are intent on sending scientists – along with academics across the board – to the doghouse. They threaten to tax graduate students out of existence, they hold expert scientists’ warnings about the consequences of ignoring climate change in contempt, they fire scientists who are doing their utmost to protect the environment, they indicate their desire to undermine the sources of





federal funding which provide the bedrock of research support for most scientists in the US.

In London, the government of the UK appears to be hell-bent on delivering a body blow to all and sundry, including scientists, many with immensely fruitful collaborations with other European colleagues, and more than quite a few who have either chosen to come from other European countries to pursue their scientific research in the UK or have come from continental Europe as students at universities in Great Britain and Northern Ireland.

Historians will surely ask why a country which struggled to get back on its feet following the loss of its empire over half-a-century ago would decide to shoot itself in the foot based on an ill-conceived referendum which yielded the equivalent, in chemical parlance in asymmetric synthesis, of a 3.6% enantiomeric excess! Using this statistically insignificant result as a reason to provoke a constitutional crisis in the UK beggars belief.

It was my own lasting experience, during the 1980s and 1990s while I was still in the UK, that bringing young scientists as visitors, as postgraduate students, and as postdoctoral fellows into my research group from other European countries was a game-changer. It was a Royal Society Exchange Student from Madrid who made our first donor-acceptor catenane, published with front-cover status in the October 1989 issue of *Angewandte Chemie*. It was a postdoctoral researcher from Milan who designed and prepared the very first molecular shuttle in the form of a two-station degenerate rotaxane. This seminal contribution to the chemistry of the mechanical bond was recorded in the literature in a short communication to the *Journal of the American Chemical Society* in 1991. It was in the conclusion to this short paper that I used the term "molecular machine" for the first time.

It is my guess that no one in this room would dispute the assertion that science is a global calling. When one reflects on the all-important transfer of scientific understanding and knowledge, science has always been global and will continue to be in its outreach and impact for the rest of time. Yet, when one considers the ability of scientists at all stages in their careers, I suspect we would all agree that it is only during the past 35 years or so that scientists – whether they be young recruits with fires in their bellies just finding their feet, or the well-established aficionados setting the heather on fire by pursuing cutting-edge research and promoting enlightened mentorship – have taken to travelling the world in search of inspirational exchanges and collaborations, cultural and intellectual stimulation, and global appreciation and recognition.

While many scientists find travel invigorating and uplifting, the internet and social media allow the fruits of scientific endeavors and achievements to be shared globally at one fell swoop and at the speed of light. All other things being equal – which sadly they are not, yet could

"... the internet and social media allow the fruits of scientific endeavors and achievements to be shared globally at one fell swoop and at the speed of light."



become so, with inspired political leadership, before too long within the haven provided by an enlightened world order – science is becoming quite quickly a pursuit that is being exercised on a level playing field by scientists with opportunities that could become available in increasingly equal measures. Science knows no boundaries, science is global, scientists will scale walls, scientists will resist attempts to put them in silos.

"... changing places and mixing cultures helps the creative juices to flow. Diversity begets creativity."



All my experience tells me that changing places and mixing cultures helps the creative juices to flow. Diversity begets creativity. My 50 years as an academic researcher and mentor to close on 450 students from more than 45 different countries has been spread over three continents between one multinational company and seven universities. A fourth continent and the eighth university are about to come into my life. There's no stopping me!

"Scientists, the world over live, in a global village."



I repeat, science is global and there's no going back. Scientists, the world over live, in a global village. There are no better words to catch this sentiment than those of the Scottish poet Robert Burns, who has more statues dedicated to his memory across the globe than any other person in the history of the human race. In an epic poem, he emphasizes that "we're all the same under the skin." It is a statement of egalitarian sentiments: the poem reads —

Then let us pray that come it may
(As come it will for all that)
That Sense and Worth over all the earth
Shall have pre-eminence and all that
For all that, and all that,
It's coming yet for all that
That man to man the world over
Shall brothers be for all that.

I trust I have left you with some food for thought as you set out to discuss "Trust in Science and Scholarship – A Global Societal Challenge." Please ask yourselves if you can afford to overlook the power of social media in today's world. Please contemplate the influence you could bring to bear upon tomorrow's world by opening a Twitter account. ■



*“Trust, once fading or even lost,
cannot be summoned or forced to return.
Either it reappears by itself or it does not.”*

Peter Strohschneider

Katharina Boele-Woelki

Chair

International Advisory Board

Alexander von Humboldt

Foundation



The one cannot do without the other, or better, the level of trust depends on integrity, which has been severely violated by some people in the recent past. Allegations of plagiarism in the humanities and social sciences and disquieting news about low or even zero reproducibility rates in some fields of science have attracted attention within and beyond the academic world. The disciplines to which these people used to belong are still suffering from the unscholarly attitudes of their former colleagues. It goes without saying that scholarly integrity is the prerequisite for a positive image of science and scholarship in the public eye.

Opening Remarks

Last year, the members of the international advisory board decided that this year's forum should address the decline of public trust in science. This is the next logical step after having discussed scholarly integrity the year before.

Approaching our topic raises three basic but interrelated questions:

Who is the public?

What is science?

What is trust?

First question: "The public" is a heterogeneous group; it is not a uniform body with a common set of interests and the degree of trust differs, which in turn is dependent on various aspects. Sociological research in the United States of America shows that more highly educated societies trust science more; yet, within advanced societies the expansion of public education over time has not brought about greater public trust. One possible interpretation, supported by a growing number of studies, is that social factors such as race/ethnicity, income,

"... within advanced societies the expansion of public education over time has not brought about greater public trust."

religiosity, social capital, and political identifications are at least as important as knowledge and education in predicting trust in science.

Second question: It is also unlikely that the public has uniform ideas about "what science is". However, it has been proffered that it can be defined in three distinct ways: (1) as an abstract method (e.g.,

Impressions

- 1 Michal P. Heller
(Max Planck Institute for Gravitational Physics)
- 2 Cathleen S. Fisher, Jeffrey Peck
(American Friends of the Alexander von Humboldt Foundation)
- 3 Nili Cohen (Israel Academy of Sciences)

1



replication, empirical, or unbiased); (2) as a cultural location (e.g., science takes place in a university or is practiced by highly credentialed individuals); and (3) as one form of knowledge among other types such as common sense and religious tradition.

From the perspective of scholars and scientists, we can be more specific regarding both the process of doing research and communication about our findings. We all know: scientists do the research which gets written up and peer-reviewed before publication as a paper in a journal or as a monograph in a book series. Getting published means that your research is credible enough to warrant entering the literature for ongoing scrutiny. Published papers and books are the benchmark of academic success. We explore and explain, we analyze and

“Our research is not primarily aimed at our colleagues but at the outside world. We want to inform our people, our societies, our nation, the whole world.”

predict. Our research is not primarily aimed at our colleagues but at the outside world. We want to inform our people, our societies, our nation, the whole world. How can problems be solved and challenges be coped with? When doing scientific research, we do not only ask where we come from, where we are now and where we are going, but also how and when we will solve the problem and ever reach our goal. In this process, colleagues from our own discipline are of paramount importance – it is they who test our research and decide whether or not it is for inclusion in the scientific discourse. And once again, this requires integrity, honesty and transparency on all sides.

Two weeks ago, I listened to two well-known psychologists of international standing who were talking about rational decision-making in cases of uncertainties and risks. Each criticized the approach taken, or better explanation given, by the other, each tried to convince the other – a fine scholarly debate. However, I was amazed at how they communicated with each other. You may expect them to have used a demanding vocabulary, but that was not the case: the non-experts in the room like me could easily follow the argumentation. It was something else that made me think. Neither argued and responded in terms of “I wonder if you should not take into account this or that” or “Research

has shown or demonstrated that...” or “Your hypothesis should be tested” or “My research provides evidence for...”. Instead, both repeatedly started their argument by saying: “I believe that...”. I was surprised, and wondered why they both used this turn of phrase – I believe that – since science is emphatically not a belief system. It does not require faith. As a result, the way of communicating among scientists and with the public is of paramount importance in order to enhance trust in science.

This brings me to my **third and final question**. What is trust, in our context “public trust”, in what and whom?

First, it has been submitted that society trusts researchers with public resources. One expects from them that they exhibit good stewardship of research resources, adhere to ethical standards, and generate knowledge that has useful applications.

Second, society trusts researchers to provide knowledge and expertise that can inform public policy. Scientists serve on government advisory bodies and regulatory boards, and give expert testimony to legislative committees.

Third, society trusts scientists to provide knowledge that will yield beneficial applications in various domains. Trust in scientific researchers is especially important in gaining public acceptance of new technologies. It is essential when the risks and benefits of new technologies are not well understood, because the public must rely on scientists to make informed judgments about those new technologies.

Having answered my basic questions in a nutshell, it is time to focus on the theme of today’s conference. How to cope with the decline of public trust in science? How can the situation be improved? Which measures are successful? How to regain public trust in science on a large scale? Are there positive predictions or will scientists’ efforts be in vain?

At this forum, we will be listening to experts coming from ten different countries: the US, Kenya, the UK, Sweden, Israel, Japan, the Republic of the Congo, Poland, India and Germany. In each panel, a winner of the Sofja Kovalevskaja Award will talk about his or her early career perspective. In total, a nicely selected group of panelists. I wish you all an enriching and insightful conference day and good discussions. ■



Peter Strohschneider

President

German Research Foundation
Bonn, Germany

Societal Trust and Research Funding: Thirteen Theses

1. The goal of research is the generation of knowledge that can be reasonably called both new and methodologically sound.

2. The sciences and the humanities, as well as their respective research, do come at a cost – regardless of their positive effects. Methodologically sound knowledge and its technical and technological results are ambivalent: they can be used for benevolent or malevolent ends (whatever the area of use). Knowledge is only new if it disrupts an established order of knowledge and, where appropriate, redefines it. Scientific knowledge as well as technical and technological capacities reshape the world in ways unimagined and faster than ever before. As a result, power and individual opportunities are radically redistributed. The outcomes of research create winners and losers.

3. If, in principle, publicly funded research comes with the aforementioned costs, then the funding can only be successful if the research system enjoys societal trust in the first place. However, the expansion of the research system itself or its growing significance for individual and collective identities does not mean that societal trust builds automatically or is similar in scope.

4. Today, societal trust in research seems particularly at risk. In fact, there are signs of a looming crisis. Furthermore, there are concrete sources of and reasons for distrust. The research system itself contributes to this impression with the apparently limitless

growth in the financial demands of sciences and the humanities and with a culture of exaggerated promises of immediate practical benefits – from the creation of jobs to the curing of major widespread diseases. Needless to say, the further growth in society's expectations of impact encourages such promises, even though they are yet to be fulfilled. And, finally, shortcomings in the processes of research itself are likewise indications of crisis; these include plagiarism and fabrication of results, false claims of authorship, hasty and lax ways of conducting research and the replication crisis. It should be added, however, that these shortcomings are part of systemic dysfunctionalities (such as the commercialization of publications and the increasing significance of bibliometric instruments).

5. Autocratic hostility towards the research system and populist anti-intellectualism are exploiting the trust crisis for their own political interests, which in turn brings about an intensification of the trust crisis.

“... the trust crisis cannot be overcome by claiming that scientific and scholarly research will provide ultimate certainty ...”

6. The same is true for what I call the scientocratic fallacy. Modern sciences are intrinsically pluralistic. For this reason, the trust crisis cannot be overcome by claiming that scientific and scholarly research will provide ultimate certainty instead of generating

Impressions

- 1 Ulrike Albrecht (Alexander von Humboldt Foundation) and IAB member Helen Siu (Yale University)
- 2 Enno Aufderheide (Alexander von Humboldt Foundation) and Michal P. Heller (Max Planck Institute for Gravitational Physics)
- 3 Eric Koenig (Chairman, Board of Directors of the American Friends of the Alexander von Humboldt Foundation)



methodologically sound knowledge or that it can tell not only what the case is and what that means but that it can also tell what the case should be. Hence scientocracy is simply mirroring the anti-plurality of global populism by confusing unambiguous facts with ambivalent political consequences; by forgetting that what is evident to me is by no means evident to everybody else; and, most importantly, by ignoring the fact that political power is legitimated not by truth but by majorities and the constitution.

“Trust, once fading or even lost, cannot be summoned or forced to return. Either it reappears by itself or it does not.”

7. Trust is a special type of social bond and it is particularly unstable. It is easy to lose, yet hard to rebuild. Trust, once fading or even lost, cannot be summoned or forced to return. Either it reappears by itself or it does not. Trust emerges, and emergence takes time.

8. Trust means accepting spheres of legitimate intransparency, that is, the impossibility of justifying everything all the time to everyone. Shifting from the systemic responsibility of sciences and the humanities to permanent individual accountability of all researchers, making them bookkeepers of their own research, does not help to build trust – nor does the universal imperative to be transparent at all times. Both claims undermine any such trust.

9. To answer the question of how research funding organizations can support measures to rebuild societal trust, it has to be acknowledged that such organizations are not concerned with research but rather the planning of research. It must likewise be taken into account that the quality of researchers, the quality of planning and the quality of research itself are only loosely interrelated. Finally, that the planning of research is paradoxical: it involves planning research, which ultimately calls into question the previous knowledge which served as the basis for given funding decisions. In a nutshell, research planning aims at eradicating its own preconditions.

Given these premises, funding organizations can take action in four regards (10.-13.).

10. Funding organizations must acknowledge their specific functionality within a differentiated research system. The rationales behind both curiosity-driven and program-oriented research funding are equally functional and legitimate, provided that their respective organizations accurately describe their decision systems and their procedures.

11. Decision-making procedures of funding organizations must not reproduce the dysfunctions of the research system. To this end, it is essential that a discursive practice among decision-makers becomes more likely than a reliance on secondary criteria such as bibliometric information. Panel members need to be able to see beyond the boundaries of their own disciplinary background; they need to be aware of the pluralism of research perspectives and review processes.

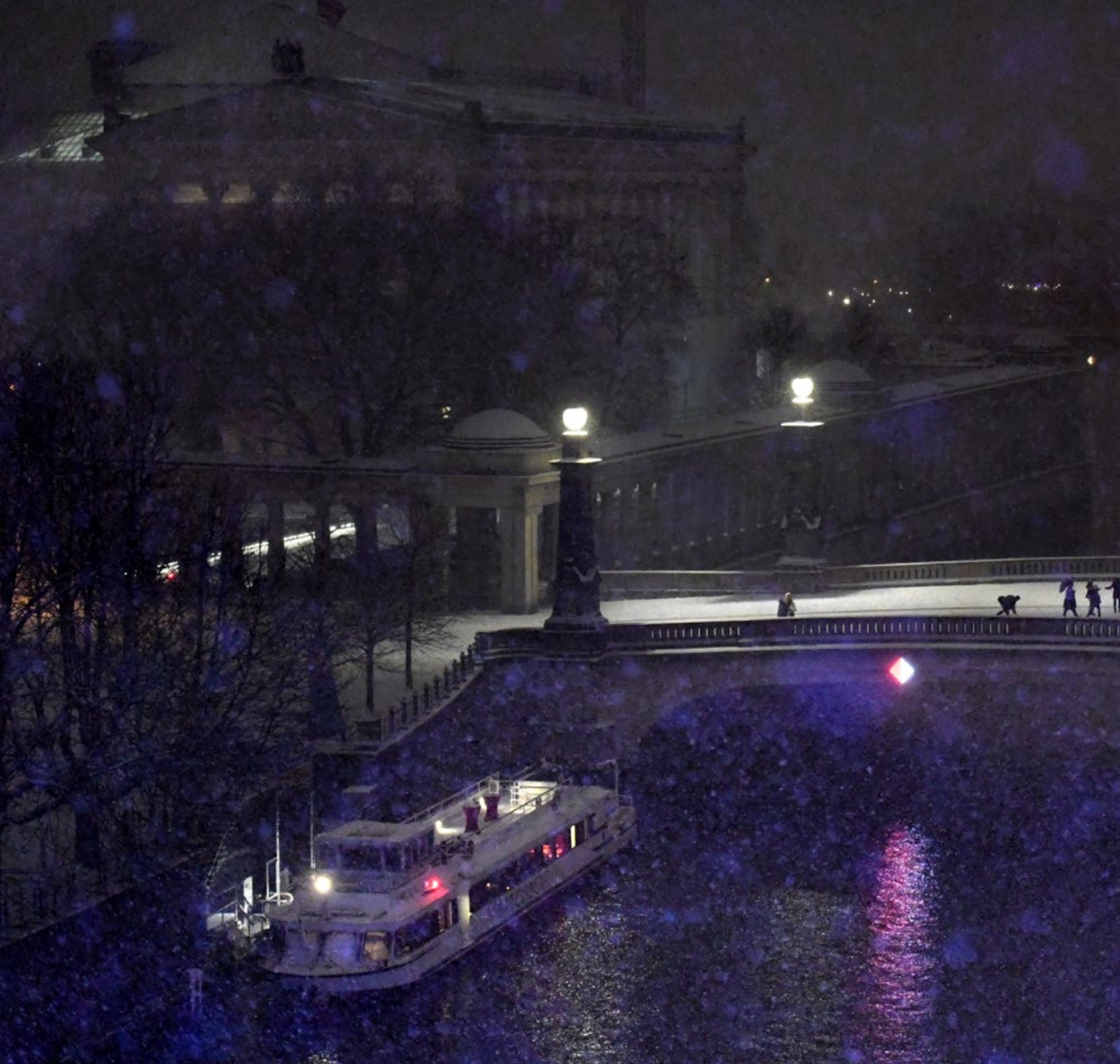
12. Research funding organizations have to ensure the functionality and trustworthiness of the research system in day-to-day research practice. Safeguarding good scientific practice is not so much a molehill for funding organizations, but a resource-rich mountain.

13. If, in the age of populism, external pressure on the research system is increasing, then we should pay even more attention to exercising modesty when it comes to promising societal impact. From researchers to research funding organizations, it is the same story

“...the key to rebuilding trust in the research system is an attitude of self-limitation and self-distancing: honesty and modesty.”

all over again: the key to rebuilding trust in the research system is an attitude of self-limitation and self-distancing: honesty and modesty. Self-criticism is appropriate for the sciences and humanities and only appropriate research will earn trust. ■





*“Effective scientific communication
with general audiences is more like
strolling through a garden than
engaging in a fist-fight.”*

Christopher Field

John Durant

Director
MIT Museum
Cambridge, USA



The Challenge of Communicating Science in the Era of ‘Fake News’

Communicating science to non-scientists has always been regarded as a challenge.

“In the era of ‘alternative facts’ and ‘fake news’, it has become necessary to re-think the business of attempting to communicate science to non-scientists.”



Traditionally, at least three elements of this challenge have been recognized: first, establishing the relevance of science to non-scientists (the problem of *interest*); second, making technically complex science comprehensible (the problem of *understanding*); and third, dealing with the incompleteness of science (the problem of *uncertainty*). All this being said, scientists were generally taken to be competent to adjudicate within their areas of expertise, and accredited journalists were generally taken to be competent in accurately representing the current consensus among scientists to non-scientists through conventional mass media (the press, books, broadcast media, etc.).

A number of recent social trends have served to undermine this traditional view of science communication. Populist politicians in the United States and a number of countries in Western Europe have fostered distrust in professional experts and professional expertise generally; lobbyists and special interest groups have challenged the scientific consensus in particular areas of research (e.g., evolutionary biology, climate science, and important aspects of public health); and pervasive social media have enabled the creation of largely isolated social networks each trading in their own ideas, agendas and values, and – most significantly – their own information sources and supposed ‘facts’. In the era of ‘alternative facts’ and ‘fake news’, it has become necessary to re-think the business of attempting to communicate science to non-scientists.

Nowhere is the need for such re-thinking clearer than in cases where science itself has become politicized. One of the most striking conclusions of random sample survey research in the U.S. in recent years is that main political party affiliation is a strong predictor of attitudes towards the scientific consensus on climate change: essentially, Republican Party members and supporters are significantly more





likely than Democratic Party members and supporters to doubt that human activities are a significant cause of climate change.¹ Scientists and science communicators who enter the public arena to engage audiences on the subject of climate change need to be aware, therefore, that significant segments of the public do not view them as neutral arbiters of expert knowledge but rather as partisan advocates in something akin to a ‘culture war’.

A key element in the politicization of science has been the deployment of sophisticated strategies for undermining scientific consensus on key issues in the public sphere. For example, the historian of science Naomi Oreskes and her co-author Eric Conway have documented the ways in which a small number of activist scientists deliberately and systematically undermined strong scientific consensus on the harmful effects of tobacco smoke and the anthropogenic causes of climate change. In each case, the activist scientists exploited the necessarily provisional character of scientific knowledge to argue that there was sufficient doubt and uncertainty to justify withholding consent from strong scientific consensus on these critically important questions.²

The traditional view of science communication has also been undermined in recent years by certain developments within science itself. I am thinking here particularly about what has been termed the ‘reproducibility crisis’ – that is, the failure of scientists to confirm their findings by repeating key observations or (more commonly) experiments. In a recent survey of more than 1,500 researchers, the leading journal *Nature* found that more than 70% of researchers had tried and failed to reproduce another scientist’s experiments, and that more than half had failed even to reproduce their own experiments.³ The reproduc-

ibility crisis has been particularly severe in certain (sub-)disciplines, such as social psychology, sparking major reviews and even a number of systematic efforts to measure reproducibility rates for research papers published in specific journals.

These trends make it harder than at any time since the Enlightenment to establish public trust in the authentic findings of science. For no longer can science communicators content themselves with simply summarizing clearly for their audiences the views of particular expert scientists on particular subjects. Now, they must pay attention also to questions of reliability, of expert disagreement, of organized skepticism, of ‘fake news’, and – above all – of the possibility of public mistrust. Science communication conducted under these circumstances should be characterized by respect for audience, respect for evidence, and transparency.

“For no longer can science communicators content themselves with simply summarizing clearly for their audiences the views of particular expert scientists on particular subjects.”

I am reminded of one of the placards that appeared in the “March for Science” that was organized in multiple cities across the United States in April 2017. The placard read:

“What do we want?
Evidence based science.
When do we want it?
After peer review.”

It seems that science communication in the era of fake news of necessity has to deal not merely with the results but also, and most fundamentally, with the values of the scientific enterprise. ■

¹ Pew Research Center, “The Partisan Divide on Political Values Grows Even Wider: Global warming and environmental regulation, personal environmentalism”, October 5 2017, accessed on 4 February 2018 at: <http://www.people-press.org/2017/10/05/7-global-warming-and-environmental-regulation-personal-environmentalism/>

² Naomi Oreskes and Eric Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*, Bloomsbury Press, New York, 2010.

³ Monya Baker, “1,500 scientists lift the lid on reproducibility: Survey sheds light on the ‘crisis’ rocking research”, *Nature*, 25 May 2016, accessed on 4 February 2018 at: <https://www.nature.com/news/1-500-scientists-lift-the-lid-on-reproducibility-1.19970>

Impressions

- 1 IAB member Helen Siu (Yale University)
- 2 Christian Müller (German Academic Exchange Service), Christiane Fellbaum (Princeton University), Harald von Kalm (German Research Foundation)
- 3 Shigeyoshi Inoue (Technical University of Munich)



Christopher Field

Director
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Meeting Audiences in Their Comfort Zone

Scientists traditionally approach public communication in much the same way they approach scientific communication.

The default model is that evidence carries the argument and that any audience is open to a careful consideration of new evidence, based on its strength, independent of their starting position or the line of thinking that brought them to it. While this model is not irrelevant to public communication, it is far from complete. Specifically, it fails to acknowledge the importance of clear language, relating to listeners through narrative, and meeting audiences in their comfort zone.

Effective communication of scientific results can be part of the process of building trust with an audience, but poorly planned or executed communication of the same material can have the opposite effect. Much of the challenge is that the precise components that build trust in a scientific audience can erode it with the general public. The most frequent stumbling blocks with a general audience concern the amount of detail, the treatment of uncertainty, and the emphasis on an impartial, usually impersonal, approach to the material. Any audience needs to be convinced, but the components of a convincing case need to be tuned to the audience. With a general audience, especially

“... establishing a personal connection plays a central role.”

when the material is controversial, establishing a personal connection plays a central role. Building a positive personal connection is a bit different for every speaker, but with important common elements. These include starting from a point of something close to agreement, using the right tone and body language, and being part of the story.



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For controversial topics like climate change, it is important to recognize that even a brilliantly crafted presentation, delivered in a confrontational way, almost never changes many minds. In fact, the result is often the opposite. The climate warrior is a well-established feature of the public iconography, but these figures typically do more to motivate the activists than to convince the deniers. The whole concept of a climate warrior is grounded in the narrative of battle. While this framing might make sense in a formal debate or a legal trial, it is a poor choice for building a shared understanding. Evidence marshalled

“Evidence marshalled to convince listeners to change their views usually feels like an attack, and most people respond to an attack with a strong defense.”



to convince listeners to change their views usually feels like an attack, and most people respond to an attack with a strong defense. A better alternative is structuring a presentation as a journey that starts from a position of shared experience or goals and builds from that foundation. For example, a mother who rejects the scientific basis of anthropogenic climate change might still be very interested in options for improving air quality for her children. An investor who specializes in hedging against financial risk could be keenly interested in approaches to pricing climate risk. Or a building manager should be quick to understand the potential in improved lighting that costs less to operate and requires almost no maintenance.

Shared values can be as important as shared experience. The motivation for action on climate change is compelling from almost every perspective, but the starting point and the distribution of emphasis across themes needs some customization. For example, religious conservatives deeply motivated by a responsibility for all of creation understand that the natural world is not ours to destroy. Small-government activists intrinsically get the idea that subsidies for fossil-fuel companies are unhelpful or that distributed power systems decrease the power and influence of giant public utilities. And small-town working people around the world understand that good jobs and stable economies come from thinking long-term and investing in people.

Starting from shared experiences and values probably will not move a room of climate deniers to vote for a carbon tax or switch immediately to an electric car. It may not convince even one individual that climate change really is caused by humans or that sea-level rise poses existential risk to many small-island nations. But a presentation does not need to sway everyone at once to be a success. Effective scientific communication with general audiences is more like strolling through a garden than engaging in a fist-fight. With a successful presentation, everyone sees things they had not expected and can look at things they already knew in a different light. As a presenter, I strive to come away from every talk with a new insight. When things go best, I also come away with new friends. ■

“Effective scientific communication with general audiences is more like strolling through a garden than engaging in a fist-fight.”



Francine Ntoumi

President

Congolesse Foundation
for Medical Research
Brazzaville, Republic of
the Congo

Public Engagement – For a Better Implementation of Health Research Findings in African Countries

Sub-Saharan Africa is the continent with the greatest burden of infectious diseases such as HIV/AIDS, malaria, tuberculosis, schistosomiasis and many others, but it is also the continent where the fewest clinical trials are conducted. This '10/90' gap has several origins: **1)** Most pharmaceutical companies are based in countries in Europe, USA, Japan, most of the diseases concerned are poverty-related such that return on investment is not guaranteed, and research and development activities are still not considered as public engagement. **2)** With the exception of countries such as Kenya, South Africa and Uganda, many African governments fail to allocate the minimum 2% of GDP to health research and development. **3)** The critical mass of scientists that could respond to the local needs in health research is not attained, and the population is not prepared to participate in relevant clinical trials, meaning clinical trials on those poverty-related diseases.

Public engagement could be considered at three main levels:

1. Stakeholders including political support providing appropriate regulatory and ethical environment. How can we (researchers) try to engage them more? As science is not considered as a priority, African researchers have to be creative in order to push stakeholders to

make decisions based on evidence from research. Immunization is a good example where science and public engagement can move forward. Over the past 15 years, through various programs, access to immunization has increased in the sub-Saharan population, although immunization coverage in children remains an important issue and one in five of African children have no access to life-saving vaccines. The reasons are multiple, but scientific evidence of protection by vaccines should motivate parents to fully cooperate. It is also clear that politicians want and need immediate results that

“... African researchers have to be creative in order to push stakeholders to make decisions based on evidence from research.”

can be quickly put to use, but researchers need to explain that science needs time and return on investment could take very long to materialize. The publication of lay memos of local research findings may encourage stakeholders to act. That is a real challenge.

2. Universities, research centers and even schools have the responsibility to produce high-quality manpower and top-level researchers and academic personnel able to address their country's public health issues. Researchers have to campaign for the development of skilled human resources in the appropriate infrastructural environment (in terms of laboratories, internet connectivity and mobility). The challenges for universities in sub-Saharan Africa are diverse: How to motivate students to engage in science in a hostile environment? There is a need to show local success stories in science and public engagement in order to attract talent.

3. Civil society, which should provide support to researchers by participating in the translation of research findings into action and eventually into impact on the population. Scientists therefore need to use appropriate communication tools. For instance, participating in TV broadcasts and radio programs could raise visibility and encourage the population to support locally conducted health research activities. It is always a very good exercise to be able to explain research activities using simple language that reduces the distance between the bench and the ground.

A striking example of the urgent necessity for researchers, governments and the public to work hand-in-hand in health research in sub-Saharan Africa is the Ebola virus outbreak three years ago in Western Africa. The lack of governmental action led to thousands of deaths. At the beginning of the crisis, it was difficult for researchers to react and implement adequate health security measures because the necessary clinical research was not on the agenda of all parties.

The Congolesse Foundation for Medical Research is an important instrument for strengthening public engagement by researchers at national and regional level in Central Africa. ■



"In order to build public trust in science and scholarship, we must step back and critically evaluate our own work, and simply tell it as it is."

Faith Osier

Cissi Askwall

Secretary General
 Vetenskap & Allmänhet
 Stockholm, Sweden



Public Engagement – A Requisite for Trust

Who do you trust?

Do you trust your spouse, your colleagues, your friends?

Do you trust scientists in general, politicians, and journalists?



I believe you trust people you know, and people you interact with, rather than those who never reach out to you or ask for your opinion. My point is: Trust in science does not work differently from trust in general.

I am the secretary general of Vetenskap & Allmänhet, VA (Public & Science), a Swedish civil society and non-profit association. VA was founded in 2002 to *promote openness, dialogue and trust between the public and researchers*. About ten years ago, the word *trust* was removed from the association's mission statement in our statutes, the reason being that openness and dialogue can lead to trust, but that is not necessarily always the case. Researchers must *gain* trust, and communication and public engagement can be the means to do so. VA is an organization developing methods as well as arguments for collaborations and interactions between science and society.

I regard myself as a representative of the public, and I used to work as a news reporter. At the University of Gothenburg where I studied to become a journalist in the late 80s, I learnt about information, communication channels and messages which were to be transferred from sender to receiver. When I started to work within research communication at the turn of the millennium, I was appointed Head of Information at the Royal Swedish Academy of Engineering Sciences. Nowadays, there are hardly any Information Officers around anymore. Instead many university employees are now called communicators – implying two-way communication. Science communication is changing these days too, gradually engaging and involving the public and different stakeholders more.





Carlos Moedas, European Commissioner for science, research and innovation, has argued that *every part of the scientific method is becoming an open, collaborative and participative process*. The world's largest research funding program, Horizon 2020, refers in many calls to RRI, Responsible Research and Innovation. RRI is a key concept for involving stakeholders and the public at large in research and innovation, in order to improve the results and make them more desirable, useful, applicable and sustainable.

Moedas has coined the *three Os* that are intended to guide the EU's research policy: *Open Science*, *Open Innovation* and *Open to the World*. Open Science is also a principle that all EU member states have agreed to implement jointly as well as nationally.

Open Science consists of several concepts:

- **Open Access** – to publications, research data and processes
- **Science communication and citizen engagement** – e.g. citizen science and public consultations
- **Policy feedback** – in order to boost evidence-based policy making
- **Altmetrics** – alternative metrics to measure the impact of research
- **Incentives and rewards** for Open Science practices

All these aspects of Open Science will help make science more accessible and understandable, thereby improving citizens' scientific literacy, which could be a prerequisite for trust. But this open approach also improves science itself as researchers gain input and new perspectives from different parts of society to inform their work.

How can researchers best involve and engage stakeholders and citizens? The recipe is simple: by knowing their target groups and tailoring the methods and messages according to their respective understanding, needs and concerns.

Decision makers, and especially politicians, are a key stakeholder group. As representatives of the people they can, to a large extent, be

“How can researchers best involve and engage stakeholders and citizens? The recipe is simple: by knowing their target groups and tailoring the methods and messages according to their respective understanding, needs and concerns.”

regarded and met as members of the public. But researchers also need to be open, honest, to the point, easy to understand, and accessible! I would also like to encourage researchers to contribute to the public debate, work together with the mass media and learn how to interact with journalists. And why not try out social media? Facebook and Twitter are interesting channels if you want to take part in public debates and to influence and interact with politicians as well as journalists.

Policy makers need to be given an overall picture of a certain research area, rather than being informed about individual studies. Researchers should therefore provide them with syntheses and summaries, and try to make more general conclusions as long as they feel comfortable doing so. But they should save their efforts until politicians' window of attention is open – usually when a question is up for debate and decision.

Trust in science and scientists is high in Sweden, but four out of ten Swedes believe that research is not taken sufficiently into account when political decisions are made. The annual VA Barometers also show that people are generally interested in getting involved in research and would like to contribute to science, but also that researchers should communicate more about their research.

I would like to encourage representatives of research performing and funding institutions to help researchers to communicate and collaborate more with societal actors. Researchers often need support to be able to engage with other parts of society. Please provide them with training, resources and advice, and do encourage them. But also ask for and evaluate these aspects of research. What gets measured and rewarded, gets done! ■

Impressions

- 1 Dale G. Medearis (Northern Virginia Regional Commission)
- 2 Faith Osier (Heidelberg University), Wolfgang Rohe (Stiftung Mercator), Christopher Field (Stanford University), John Durant (MIT Museum)
- 3 IAB Member Ulrike Hahn (Birkbeck College, University of London)

1



Faith Osier

Group Leader
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Science, Scientists and ‘Spin’

Many years ago, I took up an appointment as a junior doctor in a medical research institute and began to observe the research that was being conducted. It was intriguing to me that the researchers seemed to be asking the same question, over and over again.

“How do humans acquire immunity to malaria?”. Why couldn’t they answer the question or why did it take so long to answer it? Now that I have been researching the same topic for nearly fifteen years and I am still asking the same question (to the delight of my then supervisor!) – I have come to appreciate that it is like trying to solve a massive jigsaw puzzle. The different experiments that we conduct have the potential to place a piece of the puzzle where it correctly belongs, but many times we do not actually know how big the puzzle is in the first place. With technological advances, what once appeared to be a 100-piece jigsaw turns out to contain 100,000 pieces at a higher resolution.



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The issue I was facing as a relatively well-educated junior doctor was one of unrealistic expectations. I expected that the results would be obtained *quickly*. That the problem would be solved, and in a matter of months we would move on to tackle the next medical challenge. I lacked an appreciation of *how* research worked, how research funding was obtained and the length of time it took to develop an interventional product, such as a drug or vaccine. Managing expectations is an important consideration for building public trust in science and schol-

“Although it is vitally important to share the actual research that we do with the public, it is equally essential that we explain the process of research ...”



arship. Although it is vitally important to share the actual research that we do with the public, it is equally essential that we explain the *process* of research, from the challenges of obtaining competitive funding, to finding the right institutions and the too-often precarious nature of a scientific career.

Scientists are under continuous pressure to show their prowess, their outputs. We often remind our students to “publish or perish”. We craft our grant proposals for funding to be as progressive as possible, with the promise of achievement, clear results and exciting upcoming publications. We need to impress the reviewers, we need to impress the funders. Funders have a range of stake-holders that they in turn need to feed back to. Our universities are being ranked, we need to perform. Our promotions depend on achieving certain milestones. We not only need to publish, but to publish *well*, in high-impact journals. It is no wonder then that results are commonly embellished, or over-sold, as the scientist struggles to survive. Unfortunately for the public,

“Often it is implied that ‘a cure is at hand’ and twenty years later, the message is possibly still the same.”



expectations are unduly raised. Often it is implied that “a cure is at hand” and twenty years later, the message is possibly still the same: “...this research now shows that a cure is at hand...”. It is time to reflect on the whole culture and environment that underpins science in the 21st century.



“In order to build public trust in science and scholarship, we must step back and critically evaluate our own work, and simply tell it as it is.”



In order to build public trust in science and scholarship, we must step back and critically evaluate our own work, and simply tell it as it is. We must be objective in presenting our evidence and not be afraid to admit that the *cure is not yet at hand*, but rather that we have increased our understanding and added a piece to a complex jigsaw puzzle. In communicating, whether it be on social media or other outlets, let us find the right balance: retaining a sense of optimism whilst managing expectations. ■

Impressions

- 1 IAB member Joseph S. Francisco (University of Nebraska)
- 2 Rainer Lange (Council of Science and Humanities)
- 3 Sumathi Ramaswamy (Duke University), IAB member Helen Siu (Yale University)

1



Nili Cohen

President
Israel Academy of Sciences
Tel Aviv, Israel



Trust in Science and Scholarship – Four Hypotheses

Public engagement of scientists is a relatively new phenomenon. In the past universities were ivory towers with internal autonomy and governance, not exposed to the public eye.

Nowadays, with the massification of universities, the recognition of science and technology as building blocks of the economy, huge public investment in research, and transparency as a value, the inter-relations between public and science are more intense and more complex.

As rector of Tel-Aviv University, I felt we must be involved in community. I decided to assist a high school in Jaffa, comprised of Arabs and Jews, of lower class. We sent our professors to the school for lectures and tutorials and also opened the gates of the university to the students and their parents. I was astonished to see the excitement of all parties involved, the gratitude and how students' achievement advanced over the years. As law professor, I was an active member in a committee of experts for the codification of Israeli private law appointed by the minister of justice. We worked voluntarily for 20 years, and a bill was published.

Nowadays, as president of the Israel Academy, we are under law the scientific advisors to the Israeli government. We provide some scientific advice to the council of higher education, a body in charge of budgeting research in Israel. We addressed issues such as how to develop medical research in Israel or, in a much different context, what should be the direction of holocaust and genocide studies in Israeli universities. We gave advice to the government regarding a program to get





unemployed people who receive governmental support back to work (our advice was not implemented); we now have a committee on the issue of welfare indicators. So we are publicly engaged. And here are some points regarding science and public engagement.

1. The inherent paradox: Scientific knowledge is generally based on assumptions that require verification and on questions relating to the technique or methods of verification. Inherent in this process is the freedom to cast doubt on every assumption and to offer a conflicting view. Indeed, the history of science is replete with examples of paradigms that collapsed and were replaced by other

“How can a system founded on casting doubts and examining its basic assumptions ask for trust by those who operate outside that system?”



paradigms that eventually proved wanting. Hence the paradox: How can a system founded on casting doubts and examining its basic assumptions ask for trust by those who operate outside that system?

2. Science and technology: While knowledge can always be subject to doubt, some of its products reflected in modern technology can hardly be questioned. Here the issue of trust acquires a different dimension. There is no lack of trust in the achievements of technology, but there are serious concerns relating to its risks inherent in destructive weapons, climate change and even artificial intelligence.

It is, therefore, crucial for scientists not only to present the political and financial echelons as well as the general public with their findings and conclusions, but also to describe the doubts and the risks involved.

3. Sciences and humanities: To address these concerns and other concerns such as ethical misconduct in science, we must turn to the fields of humanities, social science and law and the question now relates to the degree of trust available to these subjects and their ability to reduce risks.



Following C. P. Snow, we used to talk in the past about the two cultures: sciences and humanities. The differences are still there, although some disciplines in the social sciences and humanities (such as psychology and archaeology) tend to adopt scientific methods. But philosophy, law and literature are based on different assumptions about human nature, and scholarship in these fields is often coupled with beliefs. The current flourishing of empirical legal studies might supply more scientifically based evidence for desired policies, but it often involves personal convictions.

4. Public engagement by researchers and trust: Relying on evidence-based argumentation, the question of whether public engagement by researchers yields more trust should be answered following thorough global surveys. Yet, as indicated above, there is more reliability in the scholarship of natural sciences.

A debate on vaccination, though emanating from different viewpoints, might be more scientifically based than debate on the relationship between judiciary and legislature, the latter being heavily laden with political views.

I believe that if neutral scientific institutes, such as academies of sciences, relate to policy issues grounded in science, this might engage more trust where political views are less dominant. But is there any field neutral of politics? I mentioned the codification project, which dealt with issues of private law, not constitutional law. This is a discipline ostensibly clear of politics. But not really. The question of what kind of contract we support – one controlled by the market or by regulation, is heavily political. And if we include in the contractual sphere the arena of family law, politics intrudes immediately, in the question of same-sex partnership. Public trust in natural science is more conspicuous, but we should be aware of the risk involved regarding the ethical limits on the pursuit of knowledge. ■



Contributors

Speakers at the 11th Forum on the Internationalization of Sciences and Humanities

Cissi Askwall

Cissi Askwall has been the secretary general of the Swedish non-profit association Vetenskap & Allmänhet, VA (Public & Science) since 2011. She has a diploma in journalism from the University of Gothenburg and has also studied political science, psychology and theology. She worked previously as a news journalist and producer at Swedish Radio, the national public service broadcaster, as well as at the national news agency TT. She was also the head of communications at VA and at the Royal Swedish Academy of Engineering Sciences. Furthermore, she was the principal secretary of a governmental investigation into how to digitalize and make Swedish cultural life more accessible, following which she was given responsibility for implementing the proposed web portal. She is a member of several international expert and advisory groups and vice president of the European Science Engagement Association, Eusea.

Katharina Boele-Woelki

Katharina Boele-Woelki is the president of Bucerius Law School, the first private law school in Germany, where she also serves as the Claussen Simon Foundation Professor of Comparative Law. Until September 2015, she was Professor of Private International Law, Comparative Law and Family Law at Utrecht University, the Netherlands, and Extraordinary Professor for Legal Research at the University of the Western Cape, South Africa. She established the Commission on European Family Law (CEFL) and the Utrecht Centre for European Research into Family Law (UCERF). She is member and board member of various professional associations and institutions, such as Deutsche Gesellschaft für Völkerrecht and the Swiss Institute of Comparative Law, and serves on editorial boards for global, European and South African law journals, book series and open access platforms. In 2014, she was elected president of the International Academy of Comparative Law. She taught at the Hague Academy for International Law and has been awarded honorary doctorates by Uppsala University, the University of Lausanne and the University of Antwerp, as well as the Anneliese Maier Research Award from the Alexander von Humboldt Foundation.

Nili Cohen

Nili Cohen, Israel Prize Laureate for legal research and president of the Israel Academy of Science and Humanities, received her LL.B. magna cum laude, LL.M. summa cum laude, and Ph. D. from Tel-Aviv University. As a student she was the co-founding editor of Tel-Aviv University Law Review. Her teaching and research interests focus on private law, comparative law, and law and literature. She is the author of *Interference with Contractual Relations, Inducing Breach of Contract* and co-author

of *Contracts A, B, C, D*. She is the recipient of the Sussman Prize in 1986 and was awarded the Zeltner Prize in 1989, the Sussman Prize for the second time in 1991, the Minkoff Prize for excellence in Law in 2002, and the Rector Prize for Excellence in Teaching (in 2003/4, 2004/5, 2014/5). She was the incumbent of the Benno Gitter Chair in Comparative Contract Law and is the director of the Beverly and Raymond Sackler Fund for Human Rights in Private Law. She served as vice-rector (1994-1997) and subsequently as rector of Tel-Aviv University (1997-2001).

Nili Cohen was awarded an honorary degree at the University of Buenos Aires in 1998. She was a member of the Committee of the Codification of Israeli Law. She is an associate member of the International Academy for Comparative Law and a member of the American Law Institute. She established the relations between TAU and Venice International University and served as a member of its Academic Council.

John Durant

John Durant trained in natural sciences (MA) and the history of science (PhD) at the University of Cambridge in the UK. He has spent his entire career working at the interface between science and technology and the wider community. He was Assistant Director of the Science Museum, London, between 1989 and 2000, where he oversaw the development of the Wellcome Wing. From 2000-2005 he was Chief Executive of At-Bristol, a new science and natural history museum in the west of England. In 2005, he was appointed as Director of the MIT Museum and Adjunct Professor in the Science, Technology & Society Program at MIT. Here, he leads the development of the MIT Museum as a place where the wider community can engage with research and innovation, past and present. In 2007, he led the creation of the Cambridge Science Festival, the first citywide festival of science and technology in the U.S. In 2008, he was a founder Fellow of the Noyce Foundation Science Center Leadership Initiative. He is currently The Mark R. Epstein (Class of 1963) Director of the MIT Museum, an Adjunct Professor in the STS Program at MIT, and a Faculty Dean at Pforzheimer House at Harvard University.

Christopher B. Field

Chris Field is the Perry L. McCarty Director of the Stanford Woods Institute for the Environment and Melvin and Joan Lane Professor for Interdisciplinary Environmental Studies. His research focuses on climate change, ranging from work on improving climate models, to prospects for renewable energy systems, to community organizations





that can minimize the risk of a tragedy of the commons. Field was the founding director of the Carnegie Institution's Department of Global Ecology, a position he held from 2002 to 2016. He was co-chair of Working Group II of the Intergovernmental Panel on Climate Change from 2008-2015, where he led the effort on the IPCC Special Report on "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation" (2012) and the Working Group II contribution to the IPCC Fifth Assessment Report (2014) on Impacts, Adaptation, and Vulnerability. His widely cited work has earned many recognitions, including election to the US National Academy of Sciences, the Max Planck Research Award, and the Roger Revelle Medal.

Francine Ntoumi

Francine Ntoumi (PhD, HDR, PvdZ, FRCPedin) is a Congolese molecular biologist who was trained in France and has worked in various countries (Gabon, Germany and Congo) as a researcher. She has held positions in international organizations in the Netherlands (Scientific officer at EDCTP) and Tanzania from 2005 to 2010, where she led the Multilateral Initiative on Malaria.

Francine Ntoumi is a member of several high profile scientific committees and international scientific networks in Africa and Europe. During her career, which has been mostly dedicated to malaria research, she has trained many African scientists of different nationalities in immunology and molecular epidemiology. Since January 2009, Prof. Francine Ntoumi has been highly involved in developing health research capacity in Central Africa through the regional network of excellence Central Africa Network on Tuberculosis, HIV/AIDS, Malaria, CANTAM, and specifically in the Republic of the Congo through the Fondation Congolaise pour la Recherche Médicale. Prof. Francine Ntoumi has received prestigious awards: the African Union Kwame Nkrumah Regional Scientific Award for Women (2012), the Georg Forster Research Award (2015), and the Christophe Mérieux Prize (2016).

Faith H. A. Osier

Faith H. A. Osier was born in Kenya in 1972 and studied medicine in Nairobi. She initially spent several years working in hospitals in Mombasa and Kilifi before moving to the United Kingdom in 2004. Here she took a Master's at the University of Liverpool and completed a doctorate in biology with the Open University. She subsequently worked as a postdoc and paediatrician in Oxford and Kilifi where she has been a Clinical Research Fellow since 2010. From 2011 to 2013, Faith Osier was also a Visiting Research Fellow at the Burnet Institute for Medical Research in Melbourne, Australia. She was awarded a Sofja Kovalevskaja Award by the Alexander von Humboldt Foundation in 2016. Since then, she has worked as group leader at the Center for Infectious Diseases, Parasitology, at Heidelberg University Hospital.

Fraser Stoddart

The academic career of Fraser Stoddart, who was born in the capital of Scotland on Victoria Day (May 24) in 1942, can be traced from Edinburgh University to Northwestern University with interludes at Queen's University in Canada, Sheffield University, the ICI Corporate Laboratory, Birmingham University and the University of California at Los Angeles.

By contributing to the introduction of the mechanical bond into molecules, he is one of the few chemists to have opened up an entirely new field of chemistry. His current research interests include the design and synthesis of artificial molecular machines that operate away-from-equilibrium. On 23 May 2013, Fraser published his 1000th scientific paper: the total count has now reached 1111. He has trained over 400 graduate and postdoctoral students of which more than 90 have subsequently embarked on successful independent academic careers. Stoddart was appointed by Her Majesty Queen Elizabeth II as a Knight Bachelor in her 2007 New Year's Honours List for services to chemistry and molecular nanotechnology. In this same year, he won the King Faisal International Prize in Science. In 2010, he was the recipient of a Royal Medal, granted by Her Majesty Queen Elizabeth II and presented by Prince Philip, Duke of Edinburgh. He was awarded the Nobel Prize in Chemistry in 2016 for his design and synthesis of molecular machines.

Peter Strohschneider

Peter Strohschneider was born in Stuttgart in 1955. He is the president of the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation), the central self-governing organization for sciences and the humanities, which promotes research in universities and other publicly funded research institutions in Germany. He studied German philology, as well as law, history, sociology and political science, and received his PhD from Ludwig-Maximilians-University (LMU) Munich in 1984. He was Professor of German Medieval and Early Modern Studies at Dresden University of Technology from 1993 until 2002. Since 2002 he has held the chair of German Medieval Studies at LMU. His research focuses lie in the fields of German medieval and pre-modern culture and literature, as well as academic research policy. He was a visiting professor at the École Pratique des Hautes Études in Paris, the Freiburg Institute for Advanced Studies and the Goethe University in Frankfurt am Main, and declined calls from the University of Tübingen and Freie Universität Berlin. From 2006 to 2011 he chaired the German Sciences and Humanities Council (Wissenschaftsrat). He is a member of numerous international committees and academies, including the Leopoldina – German National Academy of Sciences. ■



*"I fear that history will not look kindly,
when it comes to issues like
climate change, on the fact that a large
majority of scientists remained
on the sidelines. I am possibly the only
Nobel Laureate who is on Twitter.
Why should it be this way?"*

Fraser Stoddart

The International Advisory Board of the Alexander von Humboldt Foundation

The International Advisory Board of the Alexander von Humboldt Foundation is an independent, international expert group, which meets once a year to discuss strategic issues relating to the global mobility of researchers and the internationalization of research. The Board provides a forum for debate on global developments in science and academia, science policy, and science administration.



History and Mission

The International Advisory Board was established in 2007 in response to an increasing demand for expertise on issues relating to the internationalization of sciences and humanities. It is the successor to the Advisory Board of the Foundation's Transatlantic Science and Humanities Program (TSHP), which was established in 2001 with the aim of creating a binational network of experienced leaders from German and North American academia, science administration, and science policy. The International Advisory Board supports the Foundation's strategic planning. As an independent expert group, it addresses current developments in global academic markets and identifies topics of special strategic concern to the Foundation and its partners in Germany, the United States, and beyond. ■

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An Independent Expert Group

The Members of the International Advisory Board

Chair



Katharina Boele-Woelki is the president of Bucerius Law School, the first private law school in Germany, where she also serves as the Claussen Simon Foundation Professor of Comparative Law. Until September 2015, she was Professor of Private International Law, Comparative Law and Family Law at Utrecht University, the Netherlands, and Extraordinary Professor for Legal Research at the University of the Western Cape, South Africa. She established the Commission on European Family Law (CEFL) and the Utrecht Centre for European Research into Family Law (UCERF). She is member and board member of various professional associations and institutions, such as the Deutsche Gesellschaft für Völkerrecht and the Swiss Institute of Comparative Law, and serves on editorial boards for Global, European and South African law journals, book series and open access platforms. In 2014, she was elected president of the International Academy of Comparative Law. She taught at the Hague Academy for International Law and was awarded honorary doctorates from Uppsala University, the University of Lausanne and the University of Antwerp, as well as the Anneliese Maier Research Award from the Alexander von Humboldt Foundation.

Members



Yitzhak Apeloig is the former president of Technion – Israel Institute of Technology. He received his B.A., M.Sc. and Ph.D degrees in chemistry from the Hebrew University in Jerusalem and was a postdoctoral fellow at Princeton University before joining Technion in 1976, where he is currently a distinguished professor, holds the Nahum Guzik Distinguished Academic Chair and is a co-director of the Lise Meitner Minerva Center for Computational Quantum Chemistry. Yitzhak Apeloig is a world-leader in organosilicon chemistry and in the application of quantum mechanics theory to chemistry. He has published widely, was a visiting professor at universities on four continents and has presented some 200 invited lectures at international conferences, universities and in industry. He has received many awards, among them the ACS Kipping Award in Silicon Chemistry, the Israel Chemical Society Prize, the Humboldt Research Award, the JSPS Visiting Professor Award, and Technion Awards for Academic Excellence, Excellence in Research and Excellence in Teaching. He is an Honorary Foreign Member of the American Academy of Arts and Sciences, a fellow of the American Association for the Advancement of Science, and holds an honorary doctorate from TU Berlin and the Order of Merit (First Degree) of the Federal Republic of Germany.



Joseph S. Francisco is the dean of the College of Arts and Sciences and holds the Elmer H. and Ruby M. Cordes Chair in Chemistry at the University of Nebraska at Lincoln. Following undergraduate studies at the University of Texas and a PhD in Chemical Physics at the Massachusetts Institute of Technology, he spent two years at the University of Cambridge and returned to MIT as a Provost Postdoctoral Fellow. Until 2014, he was the William E. Moore Distinguished Professor of Earth and Atmospheric Sciences and Chemistry at Purdue University. Using laser spectroscopy and computational chemistry methods, his research focuses on understanding, at a molecular level, chemical processes occurring in the atmosphere. It covers the fields of atmospheric chemistry, chemical kinetics, quantum chemistry, laser photochemistry and spectroscopy. Dr. Francisco served on editorial and advisory boards for renowned journals and received prestigious awards and fellowships from organizations such as the National Science Foundation, the





Sloan and the Guggenheim Foundations, the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, and the American Chemical Society. A fellow of the American Chemical Society, the American Physical Society, the American Association for the Advancement of Science, the American Academy of Arts and Sciences, and the National Academy of Sciences, he also holds a Humboldt Research Award and serves on the Board of Directors of the American Friends of the Alexander von Humboldt Foundation.



Ulrike Hahn first qualified as a lawyer, passing both her 1st and 2nd State Law Examinations in the state of Bavaria, Germany, before taking a Masters in Cognitive Science and Natural Language at the University of Edinburgh.

This was followed by a DPhil in Experimental Psychology from Oxford University on the topic of rules and similarity in categorization. Upon completion of her doctorate, she joined the Department of Psychology at the University of Warwick as a lecturer, moving on after two years to the School of Psychology at Cardiff University where she remained for 14 years. Since 2012 she has been at the Department of Psychological Sciences at Birkbeck College, University of London, where she also serves as director of the Centre for Cognition, Computation and Modelling.

Ulrike Hahn's research interests are categorization, similarity, language and language acquisition, and, first and foremost, questions of human rationality. Her research examines human judgment, decision-making, and the rationality of everyday argument. She is presently particularly interested in the role of perceived source reliability for our beliefs, including our beliefs as parts of larger communicative social networks. Ulrike Hahn is presently a member of the Senior Editorial Board of "Topics in Cognitive Science" and an Action Editor for *Frontiers in Cognitive Science* and for *Frontiers in Social Psychology*. She also served as an Action Editor for "Psychonomic Bulletin & Review" from 2008-2012, and as a consulting editor for *Psychological Review* from 2009-2010. In 2015, she became a member of Leopoldina, the German National Academy of Sciences.

She was awarded the Cognitive Section Prize by the British Psychological Society, the Kerstin Hesselgren Professorship by the Swedish Research Council, and the Anneliese Maier Research Award by the Alexander von Humboldt Foundation.



Joachim Herz is the Thomas O. and Cinda Hicks Family Distinguished Chair in Alzheimer's Disease Research at the University of Texas Southwestern Medical Center. He studied at the University of Heidelberg, where he also completed his doctoral thesis in Pharmacology. After graduating from medical school in 1983, he practiced medicine as a surgical resident in Germany and England before joining the European Molecular Biology Laboratory (EMBL) in Heidelberg. He moved on to the laboratory of Drs. Michael Brown and Joseph Goldstein at the University of Texas Southwestern Medical Center in 1989 and joined the faculty of the Department of Molecular Genetics at UTSW in 1991, where

was named full professor in 1998 and the Thomas O. and Cinda Hicks Family Distinguished Chair in Alzheimer's Disease Research in 2002. He is an Established Investigator of the American Heart Association and a member of the American Society for Clinical Investigation. Among his numerous awards and honors are fellowships from the Boehringer Ingelheim Foundation and EMBL, being selected as a Syntex Scholar, the Lucille P. Markey Scholar Award, the Wolfgang Paul Award of the Alexander von Humboldt Foundation and the German Federal Ministry of Education and Research, the Heinrich-Wieland Prize for Excellence in Lipid Research, and a MERIT award from the National Institutes of Health.



Guinevere Kauffmann is a director at the Max Planck Institute for Astrophysics in Garching, Germany. Following her undergraduate years in South Africa, she obtained her doctorate at Cambridge University. After a postdoctoral stay as a Miller Fellow at the University of California, Berkeley, Dr Kauffmann moved to Munich, where she

Impressions

- 1 Dan Fallon (American Friends of the Alexander von Humboldt Foundation), Christopher Field (Stanford University)
- 2 Helmut Schwarz, President (2008-2017) of the Alexander von Humboldt Foundation
- 3 Henrike Hartmann (Volkswagen Foundation)

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has been a scientist at the Max Planck Institute for Astrophysics since 1995, most recently as the leader of a group studying galaxy evolution. Dr. Kauffmann is known for her pioneering work to develop theoretical models for the formation and evolution of the galaxy population as a whole. She has also played a leading role in devising analysis methods for extracting quantitative information about the physical processes driving galaxy evolution from the observational data provided by modern large-scale surveys, notably the Sloan Digital Sky Survey, but also smaller, specially designed surveys, which she and her team have carried out themselves.

Dr. Kauffmann was awarded the Heinz Maier-Leibnitz Prize and the Gottfried Wilhelm Leibniz Prize, the most prestigious prize in German research, by the German Research Foundation. She was elected to the American Academy of Arts and Sciences, the German National Academy of Sciences Leopoldina, and the US National Academy of Science. In 2010, she was awarded the Distinguished Service Cross of the Federal Republic of Germany for her services to science.



Liqiu Meng is a professor of cartography at the Technische Universität München (TUM). She served as the Senior Vice-President for International Alliances and Alumni of TUM from 2008 to 2014 and as senator of the Helmholtz Association from 2009 to 2012. Following studies of geodetic engineering in China, she completed

her doctorate and a postdoc at the University of Hannover in Germany before moving to Sweden to teach and to work as a consultant while finishing her habilitation in the field of geoinformatics. She is a member of the German National Academy of Sciences Leopoldina and the Bavarian Academy of Sciences. She serves on university councils at Aalto University in Finland and at Tongji University in China, the Senate of the German Aerospace Center DLR, and on the Boards of Trustees at the German Research Centre of Geosciences GFZ and several Max Planck Institutes.



Helmut Schwarz is professor of organic chemistry at the Technische Universität Berlin and past president (2008-2017) of the Humboldt Foundation. He has worked as visiting professor at a number of research institutions abroad and has served as vice president of the Berlin-Brandenburg Academy of Sciences and Humanities, vice president of the German Research Foundation (DFG), chairman of the Scientific Advisory Board of the German-Israeli Research Programme and vice-chairman of the Board of Directors of the Fonds der Chemischen Industrie.



Helen F. Siu is a professor of anthropology at Yale University. She received an MA in East Asian Studies and a Ph.D. in Anthropology from Stanford University and joined the faculty at Yale in 1982. She has served on numerous university committees, chaired the Council on East Asian Studies and was Director of Graduate and Undergraduate Studies for Anthropology. Since the 1970s, she has conducted fieldwork in South China, exploring rural transformations and the socialist state, and the refashioning of identities through rituals, festivals, and commerce. Lately, she explores the rural-urban divide in China, historical and contemporary Asian connections, and global cross-border dynamics.

She served on the University Grants Committee and the Research Grant's Council in Hong Kong, for which she received the Bronze Bauhinia Star. In the U.S. she has served on the Committee for Advanced Study in China and the National Screening Committee for Fulbright awards in the U.S. In 2001, she established the Hong Kong Institute for the Humanities and Social Sciences at the University of Hong Kong. It promotes inter-disciplinary, inter-regional research and cross-institutional collaborations. Siu was its honorary director from 2001 to 2011, and remains chair of the institute's executive committee.



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Ljubiša Stanković was born in Montenegro in 1960. He received a B.Sc. degree in Electric Engineering from the University of Montenegro with an award for "best student at the University", an M.Sc. degree in Communications from the University of Belgrade and a Ph.D. in Theory of Electromagnetic Waves from the University of Montenegro. As a Fulbright grantee, he spent the academic year 1984-1985 at Worcester Polytechnic Institute, USA. Since 1982, he has been on the faculty at the University of Montenegro, where he has been a full professor since 1995. In 1997-1999, he was on leave at Ruhr University Bochum, Germany, supported by the Alexander von Humboldt Foundation. At the beginning of 2001, he was at Technische Universiteit Eindhoven, The Netherlands, as a visiting professor. He was vice-president of Montenegro from 1989-90 and member of the Parliament of Yugoslavia, 1992-1996. During the period of 2003-2008, he was rector of the University of Montenegro. He was ambassador of Montenegro to the UK, Ireland and Iceland in the period 2011-2015.

His current research interests are in signal processing. He published about 350 technical papers, about 150 of them in leading journals. Professor Stanković received the highest state award of Montenegro in 1997 and 2015, for scientific achievements.

He has been a member of the National Academy of Science and Arts of Montenegro (CANU) since 1996 and is a member of the European Academy of Sciences and Arts.



Sarah Stroumsa, the Alice and Jack Ormut Professor Emerita of Arabic Studies, taught in the Department of Arabic Language and Literature and the Department of Jewish Thought at the Hebrew University, where she served as the rector of the university from 2008 to 2012. Her areas of academic focus include the history of philosophical and theological thought in Arabic in the early Islamic Middle Ages, Medieval Judaeo-Arabic literature, and intellectual history of Muslims and Jews in Islamic Spain. Among her books are *The Beginnings of the Maimonidean Controversy in the East: Yosef Ibn Shimon's Silencing Epistle*; *Freethinkers of Medieval Islam: Ibn al-Rawandi, Abu Bakr al-Razi, and Their Impact on Islamic Thought*; and *Maimonides in his World: Portrait of a Mediterranean Thinker*.



Verica Trstenjak is a professor of European law at the University of Vienna and an external scientific member of the Max Planck Institute Luxembourg for International, European and Regulatory Procedural Law. Since 2013 Professor Trstenjak has also been an interim judge (juge par intérim) of the civil service tribunal of the EU and a member of the Council of the European Law Institute (ELI). From 2004 to 2006 she served as a judge at the General Court of the European Union, and from 2006 to 2012 as an advocate general of the European Court of Justice. She has published several books, more than 250 articles, and has given lectures and keynote speeches at numerous international and European conferences. She is a member of the editorial board of several renowned legal journals, such as *European Law Review*, *Zeitschrift für Europäisches Privatrecht*, *European Journal of Commercial Contract Law*, *Ecolex*, *Italian Law Journal*, of the *International Academy of Comparative Law* and *Academia Europaea*, and a founding member of the *European Law Institute (ELI)*.



Raimo Väyrynen, professor emeritus of political science at the University of Notre Dame, USA, and the University of Helsinki, has published extensively on international peace and security, international political economy, and the theory and history of international relations. He was a visiting professor at Princeton University and the University of Minnesota as well as a Fulbright scholar at MIT and a visiting fellow at Harvard University. His most recent books include *The Waning of Major War: Theories and Debates* (2007) and *Towards Nuclear Zero* (2010). He has led the Tampere Peace Research Institute, the International Peace Research Association, the Helsinki Collegium for Advanced Studies and the Finnish Institute for International Affairs and was president of the Academy of Finland. Globally sought-after as an expert advisor, he has served on top-level boards and committees for – among others – the United Nations University, the Peace Research Institute Oslo, the Copenhagen Peace Research Institute, the European Union Research Advisory Board, the European Science Foundation, and the European Research Council. ■

Impressions

Christian Müller (German Academic Exchange Service), Jens-Peter Gaul (German Rectors' Conference)





Forum on the Internationalization of Sciences and Humanities

The International Advisory Board hosts an annual Forum on the Internationalization of Sciences and Humanities, opening its discussions to a select group of leading international experts and top management officials representing the Humboldt Foundation's partner organizations.

Each Forum provides an opportunity for eminent international experts to hold an open exchange of views in a private setting. Important minutes of the proceedings and recommendations are published for the benefit of a wider audience.

Forum topics

- 2001** The Role of the TSHP Advisory Board in the Transatlantic Dialogue
- 2002** Trends in American & German Higher Education
- 2003** The Impact of the New Developments within the European Research Area for Transatlantic Scientific Co-operations
- 2004** What Factors Impact the Internationalization of Scholarship in the Humanities and Social Sciences?
- 2005** Bi-national Programs on Shifting Grounds?
- 2006** The Advancement of Excellence
- 2007** Postdoctoral Career Paths
- 2008** Strategies to Win the Best: German Approaches in International Perspective
- 2009** Cultures of Creativity: The Challenge of Scientific Innovation in Transnational Perspective
- 2010** Crossing Boundaries: Capacity Building in Global Perspective
- 2011** The Globalization of Knowledge and the Principles of Governance in Higher Education and Research
- 2012** Networks of Trust: Will the New Social Media Change Global Science?
- 2013** Postdoctoral Career Paths 2.0: The Golden Triangle of Competitive Junior Investigators, Adequate Academic Systems, and Successful Careers
- 2014** Beyond Bibliometrics – Identifying the Best
- 2015** Identifying the Best – Theory, Methods, Practice
- 2016** Scholarly Integrity

Imprint

A supplement to duz – DEUTSCHE UNIVERSITÄTSZEITUNG,
May 25th 2018.

The duz SPECIAL is published by the DUZ Verlags- und Medienhaus GmbH.

Publisher responsible for this edition

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Concept and editing

DUZ Verlags- und Medienhaus GmbH, Berlin

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Design and typesetting

axeptDESIGN, Berlin, www.axeptdesign.de

Photos

David Ausserhofer, Berlin, www.ausserhofer.de

Proofreading

Robin Stocks, Bonn

Printing

SDL Digitaler Buchdruck; Berlin

Publisher

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Press date

May 2018

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