

Science in Transition

STATUS REPORT – June 2014



Science in Transition status report

Debate, progress and recommendations

Huub Dijkstra

Netherlands Scientific Council for
Government Policy & University of
Amsterdam

Frank Huisman

University Medical Center Utrecht &
Utrecht University Descartes Centre

Frank Miedema

University Medical Center Utrecht

Wijnand Mijnhardt

Utrecht University Descartes Centre

www.scienceintransition.nl

Contents

Contents	2
Summary	3
Introduction	4
What has Science in Transition done?.....	6
What issues has Science in Transition placed on the agenda?	9
Criticism and reactions to Science in Transition	12
Related discussions in the Netherlands	18
Developments in the Netherlands.....	21
Related discussions and developments abroad	26
Science in Transition recommendations.....	30
What next for Science in Transition?.....	40

Summary

Science in Transition has contributed to a fundamental debate about science and it appears that some issues that were formerly only discussed in private are now being debated in public. With the recognition that there are flaws in the system comes a call for changes to the system. International developments indicate that not only is this the right time for change but, moreover, that change is inevitable. The current system of science is in a state of flux, the requirements imposed on it are changing and the Netherlands cannot afford to lag behind.

Science in Transition has designated seven related concerns about current science: the image of science; trust in science; quality; fraud and deceit; communication; education; and democracy and policy. This analysis has received a lot of criticism, not only in terms of content but also about the tone of voice of Science in Transition. On further consideration it appeared that many critics at least identified with parts of the problem analysis.

After three-quarters of a year of debate, Science in Transition has undertaken a mid-term review and makes a number of recommendations. The most significant themes are analysis of quality, democratisation of the research agenda and the quality of university education.

The bibliometric assessment of quality has to be replaced by alternative analyses, requiring pilots and experiments for each domain. Furthermore, scientists will have to involve their societal stakeholders in formulating the research agenda and must also define and seek out their public. Universities will have to reward educational efforts better and it must be possible to develop a career based on that.

While these changes have already been instigated in part, changing the system will take years. Science in Transition will continue its work, monitor developments and continue fuelling the debate.

Introduction

Science in Transition has instigated a fundamental debate in the Netherlands *about* science. Following a very well-attended two-day conference in November 2013, a position paper extensively commented on, numerous talks, debates and lectures, and a range of reactions in the media it is now time to undertake a mid-term review of three-quarters of a year of Science in Transition.

What is it all about? The most important aim of Science in Transition is to make an integrated diagnosis of the state of science in relation to other domains such as economics, society and politics. Science is a system – an open, dynamic system that is related to many domains. All too often, aspects that do not proceed as they should, such as pressure on education, far too many meaningless publications or fraud, are only dealt with as incidents. In the meantime the structural backgrounds and causes fail to be considered. Science in Transition aims to broaden the picture and reveal the relationship between the various issues.

Facilitating public debate

It appears that, as a result of Science in Transition, some issues that were formerly only discussed in private are now being debated in public. The discussion about failures in the system has shown that the current state of play is not a given; the current system *is* capable of change. Excesses or wastage were regarded as being unavoidable by-products of an otherwise well-organised, self-correcting system. But there is now a dawning realisation that the system is not working all that well. A consensus is developing that the scientific system is not delivering on what it has promised to society.

It is, therefore, time for change. The fundamental principle in the current discussion seems to be that the way in which science is configured – for what do we reward

scientists, what are the results of science – should be more dependent on societal choices. Science must not remain an inward-looking system and societal stakeholders should be given a greater role in analysing science and helping to set the research agenda. A system change of this nature requires time and dedication of everyone involved. Changing reward parameters goes hand-in-hand with fear that there will be a period of uncertainty in respect of career prospects and job security. In order to anticipate that effect, change must be instigated by all institutional players simultaneously. This is a change that will require many years.

At the same time, universities and UMCs have sufficient freedom in terms of finances and policy to initiate change and we make a number of recommendations with regard to that. We also address the criticism that has been received and re-formulate our views on the solution.

In the Netherlands and abroad

In this status report, Science in Transition also touches briefly on the discussions that are taking place in the Netherlands and abroad about the configuration of the scientific system. It is evident from these that Science in Transition's message is not unique or unusual and that similar problem analyses are being and will be undertaken in a range of countries and domains. The European Research Council is also deliberating on its role in the international science system.

International discussions show that not only is this the right time for change but, moreover, that change is inevitable. The current system of science is in a state of flux, the requirements imposed on it are changing and the Netherlands cannot afford to lag behind.

What has Science in Transition done?

In November 2013, after four workshops had been organised, Science in Transition launched a national debate about the state of science by organising a two-day conference in Amsterdam. In addition to internationally renowned scientists such as Jerry Ravetz, Mark Brown and Sheila Jasanoff, Dutch scientists and the directors of scientific organisations also expressed their thoughts at the conference about the Science in Transition problem analysis. In addition, it was of major importance that parties outside of the scientific field voice their concerns. To that end, representatives from NGOs such as Greenpeace and from the business community, including Philips (CSO Henk van Houten) and Triodos Bank (Peter Blom), were invited. André Knottnerus (WRR Chairman), Jos Engelen (NWO Chairman), Hans Clevers (KNAW President), Karl Dittrich (VSNU) and others responded publicly to the position paper in a panel discussion.

Discussion and debate

Following on from the conference the four initiators of Science in Transition have held a great many discussions in a variety of formats in recent months, including with the boards of KNAW, De Jonge Akademie, NWO and VSNU and with rectors, deans, executive board chairmen and administrators at more than 10 universities and university medical centres. A meeting with the Rectors Association, the informal discussion body for all rectors, is on the agenda.

In addition to the more personal, small-scale meetings, the four initiators have held dozens of debates throughout the Netherlands about the ideas of Science in Transition, including a university-wide debate in Maastricht, a debate at the University College Roosevelt in Middelburg, a debate within the University of Utrecht Faculty of

Humanities, a debate at the University of Leiden Bèta Campus, a debate during lectures of general interest at the Erasmus University Rotterdam, a debate at the University of Groningen, a symposium at the Erasmus MC in Rotterdam, a debate during the KNAW Department Days for Literature and Physics, and at a VSNU debate about the future of the Humanities. Science in Transition has not just been discussed at universities; the initiators have also debated with science journalists and scientific information officials. (A more detailed list can be found at <http://www.scienceintransition.nl/agenda-overzicht-archief>). The initiators have also held discussions with postgraduates and doctoral candidates, for example during the annual national postgraduate PCDI retreat.

Reactions from scientists and politicians

However, the debate also continued without the presence of the initiators. Debates or talks have taken place at practically all universities and all UMCs during the last three-quarters of a year. All university departments have been involved in this, from students to groups of postgraduates and from (senior) university lecturers to boards of deans. Various professors from various universities have reacted to Science in Transition in lectures and various rectors have made reference to Science in Transition in foundation day speeches.

Political interest has come from the Ministry of Economic Affairs and the Ministry of Education, Cultural Affairs and Science. Minister Bussemaker from the Ministry of Education, Cultural Affairs and Science responded to the discussion in, amongst other things, her blog, on the TV programme *Buitenhof* and during the series of debates on Trust in Science. The initiators have also held face-to-face discussions with the Minister. Furthermore, Science in Transition has provided the input for the Interdepartmental Policy Study (IPS) into Scientific Research. In Science in Transition the Ministry of

Economic Affairs saw an argument in favour of more explicit collaboration between universities, colleges and the business community.

What issues has Science in Transition placed on the agenda?

Below is a brief recap of the seven key points that Science in Transition brought up for discussion in the position paper in October 2013.

The image of science

In the media, directors and scientists as well as science journalists still predominantly propagate the image of scientists as altruistic seekers of the truth who present hard, irrefutable facts. The classic overrating of more fundamental and scientific research is a fixed element of this. This is not in keeping with reality, where scientists have a personal interest in matters and where conflicting visions of reality exists at the leading edge of science. It is not just our image that is outdated; our framework of standards about what is good science and the standards with which a good science practitioner must comply is also no longer current.

Trust in science

The idealised image of science means that trust in science is placed under pressure when it becomes evident how science "really" works. When science becomes involved with policy and scientific advice is requested in order to be able to make policy decisions, scientists appear to disagree completely with each other or other interests and considerations of an economic or political nature play a role. That was apparent during the controversy surrounding the HPV vaccine and is also apparent in the current discussion about the pros and cons of fracking.

Quality

The bibliometric assessment of research has resulted in us using quantity as a measure of quality. Counting the number of publications has become more important than actually reading them. The outcome of this is an enormous production of articles, with a compelling preference for magazines that have a high bibliometric score. Scientific publications were once intended for communication with colleagues; however, they have degenerated into the universal currency that is used for decisions that determine a scientific career. Furthermore, research and scientific publications should ultimately create added value for society, but that aspect remains grossly undervalued in the research analysis.

Fraud and deceit

Fraudulent scientists are regarded as dishonest individuals, as a result of which preventing fraud focuses on raising the level of individual integrity. That ignores the system in which a scientist operates and on which they are dependent. It disregards the underlying cause that makes a scientist careless or fraudulent. The checks and balances, the self-correcting capacity of science, is no longer able to deal with the scale and the dynamics of the current publication culture and the peer review system is failing as a result.

Communication

Communication about science by knowledge institutions is often a public relations instrument and contributes to the fallacious image of infallible science. It is mostly about completed success stories about inquisitive scientists who help us understand the world through clever experiments. It provides far too little insight into the practice of science and the type of truth claims that are developed within that.

Democracy and policy

Because the majority of science has become a capital-intensive industry in which research is undertaken using taxpayers' money it would seem obvious for citizens to have an influence on the research agenda. Legitimising on the basis of output – are the results satisfactory? – is not therefore sufficient, also because it cannot be trusted blindly. Science has developed itself as a self-referential system in which recognition is obtained from other scientists and it is specifically the rules of the game of that reward system that mean that we have lost sight of the social issues. In a society that is facing more and more international and complex issues, from energy security, affordable public healthcare and climate change to food safety and food security, it is high time for a dialogue between science, politics and society. That dialogue must not be undertaken by scientists alone. The humanities and the social sciences can also play an important role in this. But how do we involve all parties – each with their own responsibilities – in that dialogue?

Education

Educating students is a core task of universities, but that task has been pushed into a tight corner because of the enormous increase in student numbers. Furthermore, evaluating university science staff primarily on their research performance has resulted in an undervaluation of education, responsibility for which is often given to temporary staff while successful scientists hardly contribute.

Criticism and reactions to Science in Transition

An almost universal criticism of Science in Transition and the position paper concerns the tone of voice and the warning function that this is said to have. Whether the analysis of Science in Transition is correct or not, it would not be a good idea to “air one’s dirty linen in public”. This would (further?) undermine the public’s trust in science.

Furthermore, it would give politicians ammunition to justify making cuts or to link science funding more stringently to collaboration with the business community or economic valorisation. Some people also blame Science in Transition for throwing a spanner in the works of existing long-term initiatives or causing things to speed up when a more relaxed pace was required. People are frightened of losing control of the dialogue and the change process.

Many of the participants in the system feel that they are being called to account, are irritated and sometimes even offended because they work very hard day in and day out for the benefit of science. The analyses of Science in Transition and others make it clear that those initial reactions by researchers and directors are fully understandable.

However, despite the hard work undertaken by individual scientists, at a macro level things are going wrong as a result of which, unfortunately, much of that hard work is not having the intended effect on science and on society. For many scientists it seems that producing articles has become the primary aim, whilst that no longer serves science and the societal stakeholders.

Publication culture

It is a broadly shared observation that publications appear to have become more important to scientists yet are of lesser importance for science, although it is clear that the culture differs in each discipline. The publication pressure is experienced most in the sciences and social sciences – some people even talk of hyper-competition – but the

dynamics are different in the humanities. Various institutions are attempting to address the publication pressure by placing greater emphasis on the quality rather than the quantity of scientific results, e.g. during job evaluations with professors. However, a broadly supported approach to this is still lacking.

The term perverse incentive has become widely accepted in discussions about failures in the system, but the term is also often misinterpreted. The point is not that scientists are tempted into interpreting results in such a way that they stand to achieve personal financial gain but that they can experience pressure to present favourable results in order to thus increase the chance of new research subsidies and to progress in their careers.

Slow science

Science in Transition was asked whether “it wants to go back to the days when the universities were not driven by results in education and research at all”. That is not what Science in Transition wants, although in the current debate that nostalgia can indeed be heard in, for example, the term “slow science” and the call for total autonomy for university researchers.

On the contrary, Science in Transition wants progress, but only if it is based on realism instead of romanticism. The administrative and societal reaction to the university world of 1968 and thereabouts was good but has gone too far in the wave of new public management that also has other public institutions in its grip. Completely new interactions are needed between science and society in the 21st century, and they are already being created.

International context

Apart from the fact that several parties play a role in the national system for evaluating and managing science and the fact that they will have to act in unison in order to achieve improvements, people also refer to the fact that scientists form part of an international community. If the Netherlands was to unilaterally adopt new evaluation criteria, that would have harmful consequences for the international career prospects of scientists. While true, that criticism fails to take into account the international developments in the areas of relevance, reproducibility and alternatives for the bibliometric assessment of quality. Furthermore, part of the argument advanced by Science in Transition falls within the in-house policy scope of knowledge institutions and, as a result, the international context is less relevant.

Quality of education

There also appears to be consensus about the quality of university education: it is under pressure. Output financing, increasing student numbers and evaluating lecturers on the basis of research performance form a cocktail that cannot be beneficial for quality. Admitting fewer students has, of course, been proposed here and there but formalising such a policy will meet with instant financial repercussions and calls of elitism. This problem has been identified and various universities do have initiatives that are aimed at offering career prospects to education specialists, but these are not structural solutions.

Democratising the research agenda

Science in Transition has received a wide range of reactions to the argument it puts forward for democratising the research agenda, i.e. the involvement of societal stakeholders in formulating research priorities. Many scientists regard this as striking at the roots of science because the public is, in principle, not equipped for helping to

decide on the direction of science. It would result in “populism” and mean an end to fundamental research, while the “yield” from science, however that is expressed, would often be very difficult to predict and may be long in waiting.

Many scientists now recognise that research financing using public resources involves an obligation to account for that research. However, many scientists believe that the formulation of research priorities is still, primarily, a task of... scientists. And the researchers who do endorse the principle see major practical problems. How do you involve citizens in formulating research questions? The limited experience that has been gained in that respect shows that it is not a path that can be taken for granted.

Societal relevance

Science in Transition argues in favour of greater societal relevance in scientific research, but that is not an argument against fundamental research nor is it an argument in favour of pure economic valorisation. If science tries to answer major social questions, fundamental research will always play a role in that. And economic valorisation, academic knowledge or products that can be commercialised, is important, but that is only one form of valorisation. Science in Transition is arguing for greater emphasis to be placed on valorisation in the broadest sense of the word – call it “societal valorisation” if you will. It is highly justifiable to regard well-educated students who can think and work independently as the most important form of valorisation of the universities.

Change

Despite what some people think or suggest, Science in Transition is not striving for radical change. What it is striving for is gradual change by means of debate and experimentation. In other words, by introducing changes in small steps, ensuring that all participants in the system act in unison on the basis of discussions about problems and then proceed to experiment with innovations. Acting in unison is vital when analysing

the quality of young researchers and research teams who are dependent on a reliable and predictable system. There has to be agreement about this with research institutions and those parties that finance research.

Image

Science in Transition believes that the public must be presented with a more realistic image of scientists. These are not just altruistic seekers of the truth but normal people with ordinary motives. Furthermore, science does not provide any guarantees and there is continuous debate at the leading edge of science between researchers with different visions, sometimes driven by ideological or economic motives. The criticism on this is divided into two camps.

One camp of the faultfinders blames Science in Transition for caricaturising public opinion about scientists. They contend that the public at large have known for a long time that scientists are just people, and that they are able to put scientific opinions into perspective.

Another camp of critics specifically fears that too realistic a picture of science will damage its image. It can lead to cheap cynicism: all scientific opinions are “just an opinion”. And what is the public to do with the knowledge that science doesn’t know it either?

What now?

The most commonly asked question by sympathisers: what is the alternative to the current system? A great many researchers, at all hierarchical levels, can identify with the Science in Transition problem analysis. However, a great many researchers also say that they are incapable of change, even though they would very much like to. For an individual researcher or even an individual university it is, essentially, impossible to

withdraw from the system. This means that the system as a whole has to change and that requires a political stimulus.

Related discussions in the Netherlands

In the Netherlands, Science in Transition has contributed to the discussion about science in a wide range of domains, from medicine to humanities and social sciences. In its weekly *Rumoer* column in the science supplement, the *NRC Handelsblad* wrote about the problems in science, often referring to the Science in Transition problem analysis, for example about career prospects for young researchers, the publication pressure, the quality of education and the numerous temporary employment contracts at universities. Researchers and opinion makers such as René Boomkens, Ewald Engelen, Chris Lorenz and Ad Verbrugge (and many others besides) have been providing analysis of the science system for a long time already. They express many of the same concerns that Science in Transition has identified. The H.Nu platform (platform-hnu.nl) focuses on many of the same themes as Science in Transition, but is oriented more specifically on the organisation of the university.

Debate in the medical world

In the medical world, Science in Transition has given a boost to the discussion about publication pressure and the effects of the current bibliometric system. For example, an editorial article in the Netherlands Heart Journal included a plea for greater clinical relevance of (cardiologic) scientific research, but at the same time established that good standards for this were still lacking.

Joost Drenth has put forward a proposition about the quality of medical PhDs. He is deputy chief editor of the Dutch Medical Journal and professor of stomach, liver and bowel diseases at the Radboud UMC. He suggested in a lecture that doctors should be able to qualify on the basis of one very good peer-reviewed article and that the other chapters of their thesis should be deposited in an open access repository.

Fewer articles and more relevant research is also the idea of Peter Kapitein from the Inspire2Live (Alpe d'Huzes) foundation, which raises money for cancer research. He entirely supports the plea by Science in Transition for collaboration between patients and researchers. His foundation has been working on the basis of that philosophy for many years already.

In social science people also feel the mismatch between the publication of scientific findings in international magazines and the "consumers" of the results in the Netherlands. In an article in *NRC Handelsblad* on 5 April 2014 Jean Tillie stated that social science is being threatened by excessively short articles about invalid measurements in English-language magazines that no one reads. High time to stop, he argues.

National debates

Partly in response to the debate in Dutch scientific circles, the WRR and the Rathenau Institute jointly organised a series of debates about Trust in Science. State Secretary Sander Dekker and Minister Jet Bussemaker attended these debates. During one of the debates the VSNU stated, as related by Chairman Karl Dittrich, that there is too much emphasis in the current science system on publications. "We missed the mark, the clock has to be reset."

At the end of the series of debates the Rathenau Institute concluded: "Indicators such as publications, the creation of rankings and citation indexes should be up for discussion. At the same time greater value must be given to socially relevant research– which means scientists should be talking with and listening to society."

The University Night

The University Night – a night full of lectures and debate made possible in part by *NRC Handelsblad* and the VU University Amsterdam – was dominated by system failures in science (“What’s wrong and how does it have to be improved?”). The “Why does the university exist?” book was also presented during the University Night. The book consists of a series of essays about developments and problems at universities and touches on the Science in Transition problem analysis. The initiators also contributed to the essay collection.

Developments in the Netherlands

A very visible change in the way in which scientists view themselves is evident from the new Standard Evaluation Protocol, which stipulates how universities have to be evaluated every six years. In the new version, quantity of research has been removed as a stand-alone criterion, while societal relevance has become more important. The new protocol was presented to Minister Bussemaker of the Ministry of Education, Cultural Affairs and Science in March. This is an important step towards substantive assessment of research performance, but its implementation over the coming years will have to show how this change has actually affected research assessment.

UMC Utrecht

In the recent research evaluation University Medical Center (UMC) Utrecht anticipated the new SEP. During the assessment of six major research programmes UMC Utrecht involved representatives from patient organisations, the businesses community and health charities. UMC Utrecht is working on a new strategy in which societal relevance of scientific research and the involvement of societal stakeholders play a major role. The stakeholders will be involved in scientific research at an earlier stage.

Utrecht University

In early summer Utrecht University will be publishing an integrated plan of approach in order to be able to address the various problems within the existing policy frameworks. For a large university this means that one has to take into account the differences in publication culture between the faculties and the fact that deans can determine their own policy as they consider appropriate.

As a result of a symposium about Science in Transition the Erasmus MC in Rotterdam is also drawing up a policy plan about high publication pressure and the limited career prospects for young researchers.

CWTS: new indicators

The Leiden CWTS is leading the development of alternatives for bibliometric assessment. The CWTS is studying the effect of impact factors amongst the UMCs. The project involves charting the emergence and development of performance indicators and procedures for research evaluation. It also involves the identification and analysis of the consequences of quantitative performance measurements on biomedical knowledge production. Finally, the CWTS aims to identify the possibilities of strengthening the positive consequences of quantitative research valuations and to minimise the unfavourable consequences.

ZonMW: system failures

Medical research financier ZonMw is also working on a “system failures” project with a problem analysis that largely corresponds with that of Science in Transition. ZonMw is also already offering a grant to encourage researchers to publish properly conducted research with a negative or neutral outcome in which testing has been carried out on animals. In addition, it is also possible to apply for a grant from NWO for open access publications of these results.

Societal stakeholders

The charity funds are now taking action themselves to investigate how they can help set the research agenda. The Netherlands Heart Foundation is asking patients, scientists, care providers, volunteers and supporters to help set priorities for the financing of

research into cardiovascular diseases. The Foundation aims to use this approach to parcel out 50 million euros over the next five years.

Not only citizens think that Dutch science has to change – the business community agrees. A range of chief technology officers from major Dutch companies such as Unilever, DSM and FrieslandCampina sent an open letter to Minister Bussemaker in which they called for changes to science. They are arguing for a strong collaboration between academics and the business community and less emphasis on the volume of scientific publications.

A textbook about scientific journalism, which will be published this year, has picked up on Science in Transition's observation that the media often present scientists as bringers of truth. According to the authors, scientists are not given sufficient opportunity in the media for discussing fundamental uncertainties.

WRR report “The Netherlands’ earning capacity”

In its “The Netherlands’ earning capacity” report, the WRR argues that greater attention has to be paid to the earning capacity of the Netherlands. The WRR sees three different social roles for science. Science can result in specific products; it can contribute towards solving all manner of problems; and it has an identifying function that provides input for policymakers. To allow science to fulfil these three roles in the best possible way science policy has to focus on optimising knowledge circulation. The institutional structure has to contribute towards this; however, the institutional structure of science and knowledge currently offers insufficient possibilities for that according to the WRR.

Future Vision for Science

A longer running project is the Future Vision for Science, instigated by the Minister for Education, Cultural Affairs and Science, which is currently being prepared and which will be presented after the summer. That vision is expected to encourage a number of important on-going changes that are also being encouraged by Science in Transition: less emphasis on quantity and more emphasis on quality of research and publications; more emphasis on education; broadening valorisation to include actual societal impact; greater attention to integrity and due care; changing the system of graduation and improved support for graduates to secure jobs outside of the university.

IPS “Scientific Research” report

What has already been published is the report of the Interdepartmental Policy Study (IPS) into “Scientific Research”. Important observations and conclusions contained in this report correspond with the Science in Transition analysis, but there are also differences, in particular with regard to the structural changes. The IPS strongly regards science as a stand-alone system and does not fully incorporate changing social and business requirements and expectations.

As far as the IPS is concerned the internal structure of financing should remain unchanged. Where it would seem obvious to restore the relationship between the first and the second funding flows for the benefit of the first funding flow, any proposals for this are lacking.

The IPS has identified that funding based on the number of PhD studies forms a perverse financial incentive and proposes that this be changed. Strangely enough, the IPS is of the opinion that this financial incentive does not have an impact on funding based on the number of graduates. According to Science in Transition that has precisely the same impact and increasing numbers of students lead to high work pressure, a reduction in standards in the curriculum and inflation of academic degrees.

Advisory Council for Science and Technology Policy advice “Stand Out From The Crowd”

In its recent “Stand Out From The Crowd” report the Advisory Council for Science and Technology Policy argues strongly in favour of selecting programmes that are not only scientifically excellent but which also answer questions raised in society. Explicit reference is not just made to economic problems but also to social issues. The AWT also makes it clear that all science – life sciences, natural sciences as well as the liberal arts and social sciences – is necessary to address the complex problems with which society is grappling. The AWT argues for university profiling and for making the initial flow of funds dependent on the success of that profiling. That specifically paves the way for short-cyclic management and can create new perverse incentives.

Profiling should make a university stand out from the crowd in a number of areas, where dovetailing with society is a guiding principle. That profiling will pay off in the near future in all kinds of national and international committees in which funds for research and innovation will be distributed. Even large universities can implement complete and varied strategic programmes without having to be afraid of narrowing down too much.

VSNU and Rathenau Institute: Future Strategy for Dutch Universities

In February 2013 the VSNU universities association and the Rathenau Institute launched the Future Strategy for Dutch Universities project. They aim to formulate a long-term vision on the position of the university, on the scientific knowledge function and on the relationships with stakeholders. Four scenarios outline what the University of the Future will look like. It raises questions about the core tasks of the university. Does the education task have to be expanded? Does university research have to be primarily fundamental or does it in fact need to be much broader?

Related discussions and developments abroad

Internationally, the Science in Transition problem analysis is not regarded as unusual or unique. In various countries the discussion has already been underway for a long time, and more fiercely than in the Netherlands. Bibliometric assessment of research performance is up for discussion and questions are being asked openly about the relevance of much of the research. Disassociation from impact factors is a trend, but good indicators for societal relevance are still being developed. The call for greater relevance of scientific research is universal.

Bibliometrics

In 2012, in response to the overrating of bibliometric parameters, scientists and scientific magazines drew up the *San Francisco Declaration On Research Assessment*. In the statement, which has since been signed by more than 10,000 individual scientists and more than 400 organisations, they are campaigning against the use of bibliometric indicators in talent policy.

Various American universities and research financiers have now adopted the rule that researchers who apply for a job or who submit a grant request may only list five published articles on their CVs. The British Research Excellence Framework, in which scientists have to write narratives about the results of their research, is also a response to the bibliometric assessment.

In the PNAS magazine prominent researchers and university administrators have denounced the system flaws in (American) biomedical science. Apart from a major focus on bibliometrics and research relevance that is lagging behind, they also mention the increase in temporary personnel as a problem in the current system. Amongst other things, they believe that science must not rest on the shoulders of the work that is undertaken by PhD candidates. The number of PhD candidates must be reduced and the

percentage of permanent staff must be increased. A review of research financing must also be undertaken.

Reproducibility

In the international science community the derailment of the scientific system has already been on the agenda for a long time and solutions are currently being explored. The reason for action being taken is mainly down to poor reproducibility and disappointing usefulness of many scientific publications. A small group of prominent researchers, including John Ioannidis, Doug Altman and Paul Glasziou, have been leading this research for almost 10 years with many quoted (!) publications that only now seem to start having some real impact. In October 2013 the British weekly magazine *The Economist* devoted itself to this in a cover article entitled "How Science Goes Wrong". The article focused on the lack of reproducibility in much of the research undertaken.

At the beginning of 2014 the medical scientific journal *The Lancet* published a series of five articles about "waste" in biomedical research. A considerable amount of biomedical research does not respond to clinical issues, is badly designed and analysed, is poorly accessible following publication and is described in publications in such a way that it cannot be used clinically. One of the authors, Oxford University's Professor Doug Altman, spoke at a Science in Transition symposium held at UMC Utrecht in January. His summary: "If you take the literature at face value, you will be misled".

In response to this problem the American research funder NIH outlines an action plan in *Nature* for increasing the reproducibility of pre-clinical research. NIH aims to encourage researchers to conduct methodologically well-substantiated experiments and to make raw data available. To tackle the same problem, John Ioannidis has set up the Meta-

Research Innovation Centre (METRICS) for tracking down poorly designed research. Journalist Ben Goldacre and the BMJ magazine have set up the AllTrials.net campaign in order to counteract bias in the literature and have all clinical trials registered and published.

An even more drastic approach is the re-running of key experiments in order to examine whether they are indeed reproducible. Organised by Science Exchange and others, the Reproducibility Initiative seeks to re-run experiments in the life sciences sector. In psychology, 13 important experiments were re-run last year as part of the “Many Labs” Replication Project.

Relevance

In the medical world the call for relevant research is getting increasingly louder. The medical-science magazine *New England Journal of Medicine* believes that university hospitals have to reflect on their future. They have to be rewarded for improving patient care and not just for scientific performance. University hospitals have to organise a “discovery-to-care continuum” (Sept 2013).

The same magazine contains a plea for more “implementation science” in medicine (1 May 2014). Just like research into HIV and Aids in the 1980s, patient issues must be the guiding factor when setting up scientific research. “Key discoveries remain confined to publications in journals and books underutilized by the people most in need of them.”

Another tangible example of disappointment in the scientific system is the Nutrition Science Initiative (established in 2012). The NUSI argues for new, solution-oriented research into obesity. The USD 830 million that the NIH currently spends every year has not resulted in any practical nutrition advice.

This discussion is also raging in brain research. In the magazine Drug Discovery Today (May 2014) Alzheimer researchers state that research using laboratory animals has not resulted in the promised breakthrough and that it is time for a new strategy. Research using laboratory animals is the basis for Alzheimer research, while the translation into human patients is often disappointing.

Science in Transition recommendations

Science in Transition is changing fast. The position paper published in October 2013 was explicitly a problem analysis and not a manifesto with solutions. It had to stir a debate in order to achieve broadly supported insights into the problems associated with the current configuration of the science system. The next step is to think about solutions.

After eight months of debating and thinking we are now drawing a number of conclusions and formulating a number of recommendations. However, the list below is not exhaustive and is therefore far from complete. More than anything, recommendations are guiding principles and are not definitive. However, they do indicate the route or routes towards potential solutions and offer substance for discussion.

Evaluating quality

Universities, knowledge institutions and NWO must abandon the quantitative assessment of research and researchers and evaluate results on the basis of substance. The new SEP is a major step in the right direction. Criticism of the bibliometric assessment of quality is now almost generally accepted but alternative assessment methods are still far from being crystallised. This is a job for scientists themselves, working in close collaboration with NWO and KNAW and also with CWTS, of course. Societal stakeholders have to be involved in assessing scientific quality. Here too, best practices from the Netherlands and abroad have to be identified and various pilot projects will have to be developed. Scientists will be asked to define who or what their public is, for whom their work is significant and on whom it can have an impact both now and in the future.

Examples: Have research groups or research programmes prepare case studies for periodic evaluations in order to prove their societal impact. Exchange available indicators for societal impact for each domain and elaborate on these through dialogue between the Board of Governors and the deans. Involve societal stakeholders, the “consumers” of the research, in these evaluations. The British Research Excellence Framework can serve as inspiration. This approach is already being advocated in KNAW’s Standard Evaluation Protocol (SEP), but the actual implementation will require the necessary attention.

Democratising

How can the dialogue between science, politics and society best be shaped in a society faced with more and more international and complex issues? Examples of such issues are energy security, climate change, food safety & food security, safety and privacy. How are all parties, each with their own responsibilities, to be involved in that?

It is inexpedient to continue doing away with such questions with arguments such as “you shouldn’t vote on the truth”, “the public isn’t interested in real research” and “not everyone can talk about everything”. That fails to take into account current affairs and developments in society. The problem is that the way in which the scientific research agenda is currently created is far too obscure. Scientists themselves have ways of testing the relevance of the research agenda internationally via articles, magazines and congresses. However, does this approach mean they are following the social agenda effectively? This issue is now out in the open and the societal stakeholders will not wait until “the university” or any other institute comes up with a solution. Science is too important to be left to scientists.

Two possible solutions have presented themselves. Firstly, involve stakeholders more in setting the research agenda and let them indicate priorities. The power of this group

should not be underestimated. It is no longer down to the university establishment to agree to this, if that was indeed ever the case. In medical science, and in environment, climate and energy, powerful lobbying organisations are setting the example by mobilising an enormous number of people and volume of capital and are thus playing a part in setting the current scientific agenda.

Super-rich philanthropists are also setting up international research programmes with the help of their hired researchers. They take no notice of the existing structures because they are dissatisfied with the content and pace of existing research programmes. Some lobby groups act like venture capitalists in order to start developing drugs for their patients. The criticism of the new external financiers corresponds largely with that of Science in Transition.

The second possible solution is to allow scientists to determine and seek out their own public, or to create their public if none exists. One way of reducing the gap is to let scientists seek out the consumers of their results or their own public. Scientists will have to seek contact with government departments, the business community, patient organisations, neighbourhood associations, and so on. This would strengthen the bond between science and society and increase the relevance of scientific research. This does not mean that there has to be less fundamental research. Even if social issues form the basic principle of research, fundamental research will still continue to be necessary.

Universities and UMCs can formulate research agendas together with their regional and national stakeholders – preferably by way of a national agreement mechanism via VSNU and NFU, which can perhaps be managed by KNAW. The Top sectors are too restricted for this and are not properly linked up with the research field. Societal themes must act as the starting point, for example the Netherlands Science Agenda with 49 questions (KNAW, 2012) and the European Commission's Horizon 2020 programme.

Education

The quality of university education is under pressure because of increased student numbers and limited lecturer hours and financing. In various disciplines, educational efforts are also structurally undervalued compared to research results. To start with, universities must therefore offer career opportunities by providing quality education, while educational efforts must be part of the job evaluation process.

In order to improve the quality of university education the aim should be to have fewer rather than more students. Give universities the opportunity to directly set a local *numerus clausus* for a course (Dynamising Committee, 2006). Universities have to be encouraged to deliver good students and not to have as many students as possible graduate.

Courses must also respond to societal needs better. Some of the graduates proceed further in the academic world, but the majority will find a job outside of the academic field. Universities must prepare them better for this and lecturers must search more explicitly for a match between their students and future employers.

Talent policy

The Innovational Research Incentives Scheme (the Veni, Vidi, Vici programme) has reached the stage of reform. The allocation percentage has become so low that the award of an individual grant is no longer the quality mark it once was – a great many excellent applications are also rejected. It has also had the effect that universities have *de facto* outsourced their personnel policy to NWO (and to the European Commission, via the ERC grants). Researchers are only able to develop a career if they have received an individual grant from NWO.

In addition, NWO individual grants should be awarded on the basis of proposal quality and not on the basis of the researcher's CV. Formally that is of course already the case,

but in practice the applicant's CV and list of publications play a major role in the assessment (also see the Rathenau report "Talent Central", 2013).

Universities' career policy can be given a much more substantive form, for example by linking it to the university profile, also in the field of education. Career policy should contribute to the diversity that is required for the various types of research that fit into a programme with academic and societal impact. Currently, career policy is to a large extent dependent on the evaluation given by parties that are external to the research (financiers, reviewers) and that stands in the way of a substantive discussions between administrators and researchers.

In order to guarantee a more secure embedding in society NWO must also involve societal stakeholders in formulating research themes. The business community and societal organisations must be given a voice in NWO boards (also see the Dynamising Committee, 2006). NWO could finance research on a more thematic basis, for example the long-term financing of major consortia that aim to resolve complex societal problems via a continuum of fundamental and applied research. Societal impact must play an explicit role in the establishment and evaluation of such consortia. Science financing must shift from short-cycle and risk-avoiding to multidisciplinary, long-term, high-risk research into complex problems. A number of these recommendations can also be found in the IPS report "Scientific Research".

PhD students, young researchers and temporary workers

Taking one's PhD should be regarded as being the completion of an academic education and not the start of a research career. In practice it appears that a PhD project is preparation for a job at the university, while only one-fifth of the PhD graduates ultimately get a permanent job. The number of PhD students has increased considerably in the last 10 years, to 4,000 per year, but this is not matched by the number of jobs at

the university. PhD students currently have a central role in knowledge production and that has to change. Why not stop allocating the PhD reimbursement, the approximate 500 million euros that universities currently receive for all finished PhDs, and add it instead to the direct university funding? It would add considerably to the direct funding as a whole.

Universities will then be less dependent on PhD students for their financing and for their "production". They should also offer clearer career paths for young researchers and there must also be a call to halt the number of scientists on a temporary contract. Since 1995 that percentage has nearly doubled, to almost 41 percent, and this excludes the PhD students. Making academic labour flexible causes a great deal of unrest and uncertainty, especially among young academics.

Direct university funding

Larger direct university funding from the government provides greater opportunity for universities to strengthen their own profile, both in education and in research. A mutual sharing of tasks and harmonisation could be agreed within the VSNU and that would be possible if the output financing was scrapped and universities did not compete with each other but rather strived to create clear profiles. The current system too often has the consequence that universities work very hard at acquiring more students but if its "competitor" has managed to acquire more students the reward for all of that effort is less money. This discourages the scientific personnel that have recruited the extra students but who are subsequently unable to serve them properly.

Fraud, lack of due attention and integrity

The Netherlands Code of Conduct for Science is outdated and no longer in line with current scientific practice: it is based on the framework of standards of the classic scientific sociology linked to individual ethics. What is lacking is a picture of scientific practice as a dynamic institutional system in which various participants (researchers, reviewers, magazines, administrators and financiers) each recognise their specific responsibilities and interests and what interactions and efforts result from that. Who can be held responsible for what? Who is the one to contact for a specific problem? What are the fora in which conflicts will be fought out or in which they can be settled? Such a roadmap for the science profession is what the seeking researcher needs in the 21st century.

Greater recognition for peer review

Researchers must be formally given the time to review scientific articles and/or participate in research financier evaluation committees. For example: allow input on committees and peer review to have a positive contribution when evaluating researchers. Personal input from researchers in the interests of science – that is impact and it reinforces the check and balances of science. Deans and department chairs can include this type of impact in their evaluation and annual assessments.

Open Access

Open Access is worth striving for because the results of publicly funded scientific research must also be accessible by the public. The earnings model of the publishing houses, which is partly based on unpaid peer review by scientists, who then have to pay to gain access to their own results, is justifiably under pressure.

However, open access does not currently address the more fundamental points of Science in Transition. Open access magazines, for example, also have impact factors

(albeit much lower than those of large commercial magazines). It also means that if all scientific publications were to appear in open access magazines but we continue to place just as much importance on impact factors as we currently do, and the open access magazines again play the impact factor, the perverse incentives to publish extensively in high-impact magazines will continue to exist.

The transition to open access will proceed with difficulty for as long as the evaluation committees continue to attach specific importance to impact factors rather than content. Because the impact factors of open access magazine are currently fairly low on average, a young scientist will not quickly, because of career considerations, have a tendency to publish in such a magazine.

From the point of view of quality and reproducibility of scientific results there are two more pressing aspects that will have to change in publishing behaviour. By default, scientists should have to make their raw data available to every scientific publication. That simplifies and speeds up quality control enormously. Furthermore, it must also be easier for scientists to be able to publish negative findings. Science in Transition is also arguing in favour of experiments with post-publication peer review and different forms of altmetrics.

Science for policy

The Netherlands has a rich and high-quality knowledge infrastructure. In addition to universities, TNO and KNAW, this includes a range of planning agencies and advisory councils such as the WRR and AWT. A scientific system that is too inward-looking threatens to lose touch with political and policy issues. In order to restore this not much good is to be expected from a Chief Scientific Officer or other way of concentrating the knowledge infrastructure. Instead of that greater pressure on knowledge circulation is required: encouraging the movement of people and ideas and information between policy, advisory bodies and science in order to combine up-to-date knowledge with skill

in the area of policy and advice. The career policy of both government departments and knowledge institutions, certainly including that of universities, should be configured much more towards this. At this moment the emphasis on process management amongst government departments and on hyper-specialisation in science too often stands in the way of exchange.

Scientific literacy in education

With regard to the outdated images of science universities have a world to gain, starting with education at Bachelor's and Master's level and even at PhD student level. The philosophy and history of science should form part of the curriculum in order that students can acquire knowledge about the background to their domain and the type of knowledge claims that can be made within that domain. Attention to integrity and due care should not be covered in a separate "ethics of science" course but should be included in conjunction with modern socio-scientific analyses.

Communication

Communication about science – once intended to inform the public in a democratic knowledge society about science – has become too much of a public relations instrument. Communication departments at knowledge institutions must disseminate a realistic image of scientists. Journalists and scientific journalists should be more critical of scientific claims and should pay more attention to discussions behind the scenes in science.

From administrators in the scientific world, ranging from KNAW and NWO to the Boards of Governors, a more assertive role should indeed be expected in communication with the public about what science can and cannot do. Expectations are sky-high but are they all really justified? Rendering account as to the uncertainty that is linked to research, the

debate between researchers and the interests that are sometimes involved can create long-term trust.

System change

The change, considered desirable by many people, is impeded because various participants are pointing the finger at each other. Universities do want to evaluate research and researchers on the basis of quality and societal impact but only want to do so if all of universities and NOW participate and proceed in the same manner. A PhD student at a university where societal impact is more important than excessive publishing will, in principle, also be able to find a job at other universities. It could have an effect on mobility if universities were to profile themselves effectively.

In any event, those same researchers do want to have the confidence that a NWO committee evaluating a research application will actually also look at the societal impact and not just at the length of the list of publications.

Changes to this type of system are linked to temporary loss of stability. Universities fear loss of income and will not therefore readily have a tendency to enter into such a transition.

International

Considering these developments it would certainly be appropriate for NWO and the universities to take action within an EU context so that these issues can also be raised in Europe.

What next for Science in Transition?

Science in Transition is not yet finished. Science is on the move and a fundamental discussion is taking place but it is far from clear how the changes will be shaped and a lot of choices still have to be made with regard to that.

Science in Transition will continue as an initiative of concerned scientists. We will continue to crank up the discussion and keep encouraging administrators and policymakers to achieve change. We will monitor and evaluate choices and policy changes critically. We will remain the voice of scientists and will remain open to collaboration. We have already had a great many discussions and debates, but are looking forward to accepting new invitations.

We will continue to contribute to the debate in a variety of ways. We will continue to collect suggestions for changes to the scientific system and to bring those suggestions to the attention of administrators and policymakers. Together with knowledge institutions we aim to organise meetings in which ideas for solutions will be exchanged. We hope to create dialogue with university staff *and* with groups of stakeholders, interest groups and the public. We hope that it will give impetus for experiments relating to the evaluation and management of science and focused on improving quality and achieving greater impact of scientific research.

On 3 December 2014 we are organising a second Science in Transition symposium at KNAW in Amsterdam.