

# SCIENCE IN THE AGE OF AUSTERITY

Whenever these days you talk to scientists about their funding situation, the situation is bleak. In the US whichever way you look at the issue, funding cuts are on the horizon. Japan had a national debt exceeding its gross domestic product already before the earthquake, with science budget cuts implemented already then. It's even worse now. Most European countries are also reducing science funding. And that's not just Portugal or Greece. The UK, the Netherlands, Italy, Ireland all are cutting back research. And what I hear from science policy makers in Germany, their relatively comfortable funding situation will not last forever either.

All in all, the situation is rather depressive, despite the fact that along with many others I strongly believe a strong scientific effort is one of the best long-term investments a country can make. Not investing in science and technology to me means a negative spiral for wealth and prosperity. But sometimes, whether you like it or not, a healthy science funding just isn't possible. Adding to that depression is then that these deep funding cuts are not followed up with structural reforms to make sure academic research can survive those challenging circumstances.

It's certainly time now to ask: *how do you conduct science in such an environment?*

There is a broader range of solutions adopted by different countries. A possibility is simply to cut back across the board, which is an option for smaller budget cuts. But that's too simplistic and only hurts the research infrastructure indiscriminately. The question is rather how to use the available money most effectively.

Some countries therefore focus on individuals. In Japan, where the research structure generally is based on large groups with a strong hierarchy, there is the FIRST programme. In 2010, 30 researchers were awarded up to \$50 Million *each* for four years. It's a huge pay-out to the country's research elite, and it will be interesting to see what they achieve with this funding. But what it means is that you invest a lot of money in only 30 research fields.

Indeed, focussing only on a smaller number of research areas is not uncommon.

This could be specific topics such as energy or health, or a focus on applied research that benefits industry. In the UK, there is a lot of talk about the need to show an 'impact' in research projects, whatever is really meant by that. Richard Jones has an informative blog post on this debate in the UK. And even worse, entire research areas can be neglected. Again the UK sets a bad example, by shutting down funding in nanotechnology. To quote Richard Jones again in his blog post 'Why has the UK given up on nanotechnology?': "Currently, the UK has

no actual on-going nanotechnology program.” Cutting back a technologically relevant area like this one is sheer madness to me, and surely there must be better ways than cutting the proverbial branch on which you’re sitting on.



The Perimeter Institute in Waterloo, Canada as a model for a successful research institute. Photo by 'Red Hippos' via flickr

More generally though, funding agencies seem to mostly rely on variations of one of the two models, or a combination of both. But as I tried to argue, neither of them does seem very smart. They might work well in the short-term, but could lead to a real problem later on. You can't only focus on the big shots at the top. It is equally important to support promising young researchers with new ideas. In Japan, those 30 high-flyers in the FIRST programme also have to support young talent. But in my view, truly innovative ideas can only come from independent talent. And with respect to limiting research areas, the issue is of course that long-term benefits are notoriously difficult to predict. I don't think Einstein had any idea that his theory of relativity, which initially was also scientifically contested, would one day be important to the running of GPS devices.

But I do think there are alternatives that could be discussed. One way might be to reduce redundancies in research. An idea to provide funding in a larger number of key areas that would avoid duplication is to create dedicated research centers where several investigators can work in parallel on complementary topics. There are several great examples for this already – both within universities and as independent institutes. And these needn't be industry-related research such as that conducted by the Fraunhofer Society in Germany. For more fundamental research, there's also the Perimeter Institute for Theoretical Physics in Canada as a successful model for fundamental research. In my view this trend to create such institutions, whether at universities or outside of them, will increase with time. In the UK, the science minister has indicated similar plans, but I don't see much having come out of this so far.

Obviously, it won't be possible to offer any realistic solution to the problem in a blog post. But to me the present approaches to manage shrinking research budgets is inadequate. If we do less research we need to do it right. And using this crisis to think about our research infrastructure needn't be a bad thing. It should be seen as an opportunity to reform the academic research system in a more comprehensive and fundamental way than the academic community and the politicians normally dare to think about.

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