ELEPHANT
IN THE LAB

INTERVIEW

FAPESP: increasing the visibility of Brazilian research

Short title	An Accelerator for Science in Latin America: FAPESP
Long title	A driving force for Latin America's research infrastructure: The São Paulo Research Foundation.
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In 1997, SciELO, the biggest Open Access database in Latin America got some initial funding from the São Paulo Research Foundation FAPESP. What triggered the launch of such an infrastructure and what were the main goals back then?

Back then a few local scientists approached us with the idea to set up a repository for journals edited in Brazil. They suggested that such a service would increase the visibility for science that is being done in Brazil and is published in Brazilian journals. We found the idea worthwhile and we started SciELO. At that time, it was the first initiative linked to Open Access that was ever

launched in Brazil or even worldwide, I believe. A few years later PLOS one appeared in the United States. In 1997 only a few people were talking about the potential of Open Access, so SciELO was a pioneering initiative and it worked well: it raised the visibility, improved the journals and drew attention to Brazilian research on an international scale. Now Scielo is a network of repositories of journals from several countries, around 17 or 20. There are thoughts about building a similar infrastructure available for data. Often SciELO is being called a repository, but it is not really a repository it's common infrastructure for journals, which makes the whole publishing process more efficient and less expensive. Journals must comply to certain procedures and certain quality levels to be accepted as a part of SciELO.

How important is SciELO for disseminating research outputs in Brazil and whole Latin America currently?

SciELO increased the visibility of Brazilian journals internationally, inside the country they were already known. The challenge was and is the fact, that not many scientists outside Brazil would use Brazilian journals as a source of information and that has many reasons. Our thinking, which came from those scientists behind SciELO, was to make these journals available on the web. These journals would then progressively have more articles published in English and also with time, the internet would have tools to translate them from Portuguese to English. All those things added would facilitate the visibility of research outputs produced in Brazil. There was an interesting article, which came out in those years published in Nature, about the invisibility of science from Latin America, which discussed these points which we are discussing now. It says basically that there was some good science done here, but researchers kept communicating in Portuguese or in Spanish and the rest of the world was not really aware of that research. Later on, we managed to raise attention to SciELO in Chile, Argentina and other countries.

The Sao Paulo Region is said (e.g. in The Journal of Technology Transfer, 2019) to have the biggest research output in Latin America. What is the reason for this? What role do research infrastructures play in this context?

That's true and the reason is simple - Sao Paulo is the biggest region in this area with the biggest population of 42 million people, which is the size of Argentina or Spain. The economic output of the region is larger that the economic output of Argentina and is it's almost the same as the output of Spain. It is a region where a lot of things are happening, it's very large and heterogenous. Besides being a highly industrialized and economic power, the state has implemented a strategy for developing the science and technology system. It's been a priority for many years already and goes back to 1934 when the University of Sao Paulo was founded. Nowadays it is the best university for research in Brazil. Later, the state founded many other universities, research institutes and the foundation, where I work - the Sao Paulo research institution. The state of Sao Paulo uses 12 percent of all its fiscal revenues for higher education a research, which allowed the state to grow a sizable infrastructure for science. Furthermore, Sao Paulo is the most industrial region in South America, which means that a lot of research is done around the business sector. Around 60 percent of the research and development is done by companies. There is a system in Brazil that puts together universities, third mission oriented research institutes and industrial research labs.

The country itself is very big and heterogeneous. In some parts of the country you can do research like in Europe, in other parts it's very difficult. The Brazilian science and technology policy has had important strategies in terms of reducing disparities. The challenge is, however, that in order to reduce disparities local initiatives are necessary, even if there is some central funding and planning from the national sources. What we learned in Brazil is that when national funding substitutes the local funding, very little development happens, but when federal funds add to the local funding, development happens.

You also need a critical amount of researchers, that give a positive feedback into the system, more you're going to have more. That is something Robert Merton came up with in 1960, calling it the "Matthew effect". He took it from the Bible, where it says those who have money will have more money, those who have nothing will have nothing, so Science tends to follow this. If you look at the world, for example to California, or to Berlin, London, Science grows very fast, but if you look to Ghana, Nigeria, parts of Brazil and Bolivia, it doesn't. I'm not saying it's right but that's how it is.

In your opinion, how should research infrastructures develop?

A research infrastructure should normally be linked to the benefit of the society, because we're talking about public infrastructures. The big challenge, in this respect, is that you need to have adequate balance of values. An infrastructure should drive the advancement of knowledge which then will drive the economy as a consequence. And the clue is that both aspects are equally important.

Infrastructures today and in future can help research to be more open, digitalization facilitates communication and brings us closer to openness. In Brazil, especially in the state of Sao Paulo, the idea to have an open infrastructure has got traction in the last ten or fifteen years. A good example in this context is the National Research Space Institute of Brazil that offers openly images about Brazil, South America and Africa for anyone in the world. They have been doing this for more than a decade. Brazil uses these images also to control how the status of the forest is. There is another large research infrastructure that was built in Brazil and now getting into into the second generation - a Synchrotron Lightsource in the city of Cantinas in the state of Sao Paulo. The first one started operating in 1998 and it was open for scientists from anywhere in the world. Many scientists from Argentina, Chile, Columbia come and use this equipment to do their measurements. Now Brazil is finishing the second generation of it, which will be ready later this year. I believe, this will be the best synchrotron lightsource in the world. We hope, that researchers will come from Germany, Spain and the United States to use that infrastructure for their research. This is a good example of how research infrastructure can become more open and benefit science this way.

How do FAPESP and other Brazilian research funders support further development of research infrastructures?

The Sao Paulo Research Foundation (FAPESP) is public, so the taxpayers fund it. In Brazil some states created their own research foundations and some states did not. Sao Paulo, in this context, is an interesting case, which I haven't seen anywhere else in the world. It exists since 1962 and according to the constitution 1% of all fiscal revenues of the state belongs to the foundations.

This means it's never necessary for the foundation to negotiate a budget, it's just always one percent - around 600 thousands US-Dollars per year. The foundation funds research through receiving proposals using a peer-review system to select them. We are very much a bottom-up organisation: most of the time we offer funding to individual researchers, not to institutions, universities or research institutes. We offer researchers to fund medium to large sized equipment that will be part of the infrastructure and award it together with the grants.

This way, every year between 5 to 10 percent of our expenditures are invested in upgrading the research infrastructure of the state. For example, a large part of this is done through a program that call multi-user equipment. This is how it works: a researcher gets funding to buy large equipment and he or she must commit to making these technicalities open to other researchers in some parts of Brazil or in the world. In this case, they can charge costs, because they need to cover the costs of operating the infrastructure, but the equipment has to be available to anyone for a reasonable cost. By now, there is a large network within the state of Sao Paulo of user equipment including magnetic resonance probes, spectroscopes, microscopes, gene-sequencers and others. Researchers in Brazil or the rest of the world are free to use those; this way we are fostering a more efficient use of that infrastructure. Sometimes we also participate in worldwide initiatives to build large-scale infrastructures. For example, right now we are part of two large projects. In one we are building a large telescope in Chile, which is going to be the largest telescope in the world - the great magellan telescope - and FAPESP is contributing four percent to that. We are also working with Fermilab, which is a large neutrino research facility that was just build in North America. And then, we are working with the national government of Brazil to build this new Synchrotron Lightsource. These are examples of large infrastructures that get our funding.

What are the main challenges in setting up research infrastructures? And how do you adapt them to actual researchers demands?

In our region the main challenge are skills and capacities of researchers to use the available equipment. Research infrastructures are more than just the fact of having technicalities like gene-sequencers and so on. For example, in some some other countries universities have support-teams that help researchers in using the infrastructures. Here is Brazil this type of support for infrastructure work is mostly missing. Most of the time researchers learn how to use certain equipment themselves, so they end up being the researchers that write articles, teach and supervise the students, supervise the post-docs and people who write reports and do the accounting. This is one of the major challenges here: We have ways to fund the researcher, but the universities don't have enough resources to support them, in order to save their time from managerial tasks, so that they can focus on science. Another example: We are now trying to make it mandatory for researchers to have a data management plan. One of the challenges we have is, that their universities don't have a service that offer data management, so one of them has to organise a computer which doesn't make any sense, it's a waste of time, because in 5 years this computer will not be on the Web anymore, it has to be a institutional service–a repository.