

"Ciência, política e sociedade. In memoriam Jean-Pierre Contzen"

Universities and national labs - A virtuous binomial

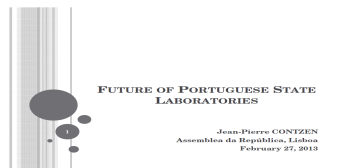
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J. P. Contzen and the state labs

In 2006 J. P. Contzen, together with Elias Fereres Pierre Papon and Manfred Popp, at the invitation of the portuguese government, made a report on the *Reform of the State Laboratories (Redesigning the Governance of the State Laboratories' System)*. It was an extensive and detailed follow-up of an international evaluation presented in 1997 and monitored in 1998 and 2001. Later, in 2013 at the National Assembly, Contzen spoke about *The Future of*

Portuguese State Laboratories. Both in the report and the National Assembly talk, the state labs situation was analysed and recommendations made. Before looking at the recommendations, I want to make a brief analysis of the **complementary role** of *universities and national or company labs*, what I call the **virtuous binomial**.



Their main role and products

- *Universities*

Main roles: Prepare future generations of agents of knowledge and advance basic science.

Modality: Free pursuit of knowledge.

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- *Research Labs*

Main roles: Develop new technology (transfer of basic science to products) and scientific services to the community (state labs).

Modality: Responsive to industry and society needs. To advise government and to follow government guidelines.

Main products: New technological products or applications and scientific services to industry, government and society in general.

The binomial in action: Some disruptive techniques of the XX century

- **The electronic revolution**

- The modern theory of semiconductors starts in 1923 with Bloch's theory of electrons on a lattice. Further developments of the theory were made by Gudden, Peierls, Kronig, Penney, Wilson, Schottky, Mott, Bethe, etc.
- However it was only in 1947 at the Bell Labs that Bardeen and Brattain invented the transistor, that really started all the electronic applications that we now depend on.

- **The internet**

- Already in 1962, Licklider at MIT dreamed about the creation of an *Intergalactic Computer Network*
- However, it was only in 1969 that, under the pressures of the cold war, ARPA (now DARPA), a research and development agency of the Ministry of Defense in the USA, created the ARPANET, a network of shared information for data security.

The binomial in action: Some disruptive techniques of the XX century

The ARPANET idea drifted slowly to non-military applications until the creation by Tim Berners-Lee at CERN (an international research lab) of the World Wide Web in 1992.

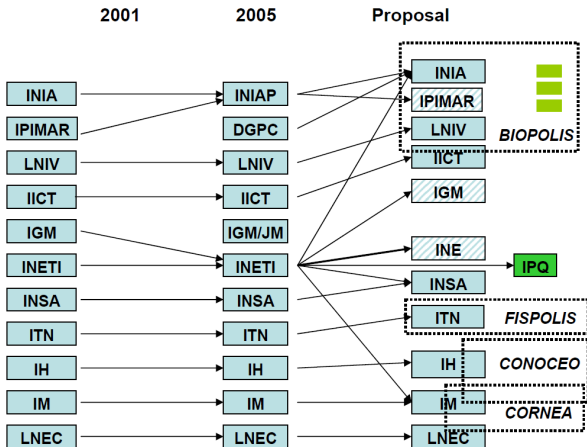
- etc, etc.
- **Nuclear Power applications** (Los Alamos, Sandia), **High Temperature Superconductivity** (IBM labs), and perhaps all disruptive techniques of the past (and future) developed at specialized research institutions.

J. P. Contzen's core recommendations (2006 and 2013)

- A new governance scheme, with more flexibility in the management of human and financial resources (both state and external income). Flexibility of definition of the staff table and assesement of researchers according to the specific mission of the laboratory (could be different from what is expected from university researchers).
- A clear guidance from their responsible ministries and a definition of a multi-annual financial planning.
- Creation of consortia centered on the global needs of industry and society (Biopolis, Fispolis, Conoceo, Cornea). Consortia are not arbitrary mergers of state labs with very different missions and specificities.
- Specific recommendations for each one of the existing labs (worth reading) and mechanisms for consortia creation.

The 2006 report summary recommendations

The Evolution of the System of State Laboratories



The situation today (2017)

● Universities

- Despite a widespread maintenance of a suzerain-vassal feudal tradition of transmission of power, the universities have made remarkable progress.
- A young generation of doctorates, most times in low-level or precarious positions, have raised the scientific level, the number of publications and modernized the content of the courses.
- So much so that, foreign companies eagerly come to some "job fairs" to hire the new well-prepared graduates.
- Conclusion: some problems, but remarkable progress.

The situation today (2017)

● State Labs

- A ageing staff, with no perspectives of renewal.
- No clear definition of purpose by government, low connection to industry and society needs, except in a few services which however are mostly performed by temporary personnel (fellows)
- Integration of some labs in universities. Others, if not fully integrated, guided by university professors with university guidelines: Career advancement based on publication record rather than on lab purpose achievement, Essential services performed by a rotating crowd of temporary fellows, rather than by specialized staff.
- Arbitrary mergers of labs with no consortium logic.

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- **Conclusion:** in Portugal one leg of the binomial is progressing (the university), the other is either extinct, disappearing or in bad shape.
- So this is the situation of the almost one-legged *virtuous binomial*, and **without binomial there is no "virtus"**.