

## Chapter 27

# Scientific Computing in the Context of a Successful Agricultural Research Enterprise

**Geraldo da Silva e Souza**

*Brazilian Agricultural Research Corporation - Secretariat for Strategic Planning, Brasília, Brazil*

**Eliseu Roberto de Andrade Alves**

*Brazilian Agricultural Research Corporation - Secretariat for Strategic Planning, Brasília, Brazil*

### ABSTRACT

*Embrapa (Brazilian Agricultural Research Corporation), a governmental agricultural research institution from Brazil, is a case of successful organizational innovation that has as main characteristics: a public corporation model of organization; scale of operation at national level; spatial decentralization; specialized research units; enhanced training and remuneration of human resources and a vision of an agriculture based on science and technology. Moreover, from the beginning the organization has always been result oriented. Among the structural and political issues that led this enterprise to reach a well succeeded position, the authors argue that the strong application of scientific computing is the underlying reason that enabled high quality results achieved in research, development, and innovation. All of these reasons are presented in the next sections.*

### THE SUPPORT OF THE FEDERAL GOVERNMENT

This support has been critical to the survival of Embrapa. In the early years, it took the form of the federal government having understood the importance of technology for the development of agriculture. Once the results proved Embrapa

could be profitable as an option for the government, the battle for budget support remained, but it takes place in an environment where the corporation is one of the priorities of government, both in the sphere of executive and the National Congress.

In the first twelve years of its existence, Embrapa was a promise: of bold and modern design, but still a promise. During those twelve years, huge investments were made in the training of human resources and infrastructure - about six billion

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dollars in 2008 value. The federal government paid for this investment based on the promise that Embrapa could be for the modernization Brazilian agriculture. Without the support from the federal government, Embrapa would not have been possible.

But Embrapa's management has always been aware of the risk that the lack of achievements represented. For this, it led the research centers in a portfolio of research with short-term goals and to the conclusion of research already in progress. Moreover, it also gave special attention to the dissemination of existing results. And the media had a key role in creating the image Embrapa has. It is clear that the media not only operates on top of achievements, but also upon a consistent promise, provided it is not for long. In the early years of life of the corporation, the media bore the promise consistently, even in light of few existing results. This support was crucial to create a favorable image in society and in government. So, it has to be registered how important the development of competence to relate with the press, was for the success of the Embrapa. This relationship helped the government to justify the investment, over a period of lean achievements.

In a period of many macroeconomic imbalances and non-orthodox policies to deal with then, it is surprising that Embrapa's budget support did not falter, which only shows the decisive support the federal government gave to it. At the stage where Embrapa was only a promise, the expenditures of Embrapa evolved linearly until 1982. This was essential to consolidate its image. From 1982 onwards, the corporation was no longer a promise, and its success will explain the government's continued investments.

## **SCALE AND DECENTRALIZATION**

Many wished that Embrapa would be small and only coordinated a research program run by the existing institutes and universities. This option

was rejected because it was soon realized that, in a country of continental dimensions, the success of Embrapa depend on its size and an accumulated critical mass of researchers, diverse for talent, and branched throughout the national territory. It was understood that Embrapa needed to have the scale as large as Brazil and that it needed to have its own research network, so it could be direct responsible for the results, allowing it to be well known and evaluated on its own merits. This model would also allow for it to seek cooperation with universities, research institutes, private sector and overseas in a position of equals. Being large, diverse and decentralized, Embrapa would have conditions to represent the federal government in an area as important as agriculture and receive priority, both in the allocation of resources and with regard to institutional development.

It was very important for Embrapa to have a presence throughout the national territory. This presence helped to attract sympathy of the state governments and the National Congress. Embrapa has a marked presence in the Federal District, where are located its Headquarters and: Embrapa Technological Information, Embrapa Cerrados, Embrapa Vegetables, Embrapa Genetic Resources & Biotechnology, Embrapa Agroenergy, Embrapa Technology Transfer. The units in the Federal District are an important window of Embrapa. Being in the proximity of power, they have had important role in helping establish and solidify the image of the corporation near the central power and the international market.

## **A CONCENTRATE ORGANIZATION MODEL FOR THE RESEARCH UNITS**

Embrapa research units are distributed throughout the national territory and are specialized in products, natural resources or themes. For example, farmers know that the unit responsible for maize research is the Embrapa Maize & Sorghum, located in Sete Lagoas, Minas Gerais. Maize producers

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