

The Meaning of Cartographic Engineering in Brazil

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Abstract: Geodesy, Astronomy, Gravimetry, Photogrammetry, Photo-interpretation and Remote Sensing are taught in Brazil, at an under-graduation level, as techniques for Data Acquisition, aiming at the Production of Maps and/or Data Basis, under the generic title of a Course called Cartographic Engineering.

Specific education in each of those disciplines is offered by Universities or Scientific Institutions at a graduation level.

In the year 1958, was founded the Brazilian Society of Cartography (Sociedade Brasileira de Cartografia - SBC) aiming to congregate all the undergraduate and graduate professionals whose activity contributes direct or indirectly to the production of line maps or data bases.

Brazil couldn't afford to have different specific institutions to affiliate different professionals which, as a matter of fact, are individuals of the same universe: surveyors, geodesists, photogrammetrists, photointerpreters, remote sensing experts, cartographers, graphic arts technicians etc.

A definition of Cartography was emitted by the United Nations in 1949 which preconized: "Cartography is the ensemble of operations aiming at the production of maps and plans, starting from the original surveyors on the ground and ending by the final printing"

Said definition has been regarded as improper, taking into consideration that a human being could hardly or never be a cartographer, as he had to be simultaneously a land surveyor, a geode-

sist, an astronomer, a photogrammetrist, a photointerpreter, a remote sensing expert, a geomorphologist, a geologist, a geographer, a soil scientist, a forest engineer, a hidrographer, an oceanographer, a cartographic draftsman and a graphic arts technician.

We have always agreed with those that contested such definition, for the same reasons. But now we start to think whether the author of it was not having in mind to attribute all those tasks not to one only man that would be called a cartographer but to consider all the above mentioned professionals as cartographers.

Those professionals in charge of preparing the maps and plans themselves didn't agree with the definition issued by the U.N. and during a meeting of the International Cartographic Association, - held in Paris, in 1966, sponsored by the UNESCO, delegates from approximately 60 countries came to a consensus in defining Cartography as "The ensemble of scientific, artistic and technical studies and operations that come into play after the results of direct observations or the exploitation of an existing documentation, aiming at the elaboration and preparation of maps, plans and other forms of expression, as well as in its utilization".

The Rio de Janeiro State University (Universidade do Estado do Rio de Janeiro) started, in 1965, with an undergraduation course of Cartography. One year later we were informed of the recommendations of the ICA meeting including those related to the levels of cartographers and the author of this paper made a suggestion to the Rector of the University to transform de Superior Course of Cartography in a Cartographic Engineering Course.

An adaptation of the curriculum, ementas and programs was immediately made in order to conform them with the curriculum minimum recommended by Prof. Zarutskaya from U.S.S.R., in charged by ICA of preparing such curriculum.

In order to conform the "curriculum plenum" with the other engineering courses we decided to structure the course in 10 semesters and add those disciplines necessary to match the four basic semesters with all the other engineering courses.

Table no. 1 shows the "curriculum plenum" and respective duration of each discipline.

Table no. 2 is a flow chart of the disciplines showing their distribution per periods and the succession of pre-requisites.

The philosophy of this course is based on the Brazilian reality: the present impossibility of our universities to maintain specific Courses on geodetic and geophysical engineering, photogrammetric engineering or remote sensing engineering.

Cartographic engineers are then professionally formed, first of all, to prepare any kind of map (topographic, cadastral, thematic or special). But also to be able to properly solicit, from the data acquisition professionals, the elements he will need for the production of a desired map or plan, or any other kind of cartographic expression. And to know as well what kind of cartographic products he should furnish to the Graphic Arts technician to print or reproduce the map or plan he has prepared.

A deeper specialization in Geodesy, Astronomy, Photogrammetry, Photointerpretation or Remote Sensing can be obtained in graduate courses at some universities or research institutions like the Institute for Space Research - INPE.

The flow chart of the Cartographic Engineering Course shows that during the four first periods the student only improves his basic knowledges. From the 5<sup>th</sup> period on, all the professionalizing disciplines, necessary to the above mentioned formation, are offered.

One last aspect of this course is still based on the definition of Cartography issued by the ICA.

The end of that definition intends to mean that the Cartographic Engineer is the only professional duly prepared to make efficient use of a map and thoroughly exploit it. Agreeing with such statement, was included in our curriculum, as shown in the flow chart, some disciplines related to the use of maps and plans.

Our cartographic engineers are prepared to advise the civil engineers in the development of road and railroad designs, hydroelectric power plant designs, transmission line designs, city planning, mining developments etc., etc.

We agree that is not easy for a civil engineer to select the best method to produce a map, as well as to choose the most adequate scale and contour interval for a certain project. In counterpart, it would also be difficult for a cartographic engineer to give an advise on those details if he hasn't at least fundamental knowledges of those various engineering projects.

Dr. Frederick Doyle is proposing, during this Congress, that and International Union is found aiming to congregate all the present international societies known as sister societies: ISPRS, FIG, IAG, ICA and ISM.

We would say that we had the same thought in mind when we founded our Brazilian Society of Cartography.

We wouldn't say that Cartography is the best word to express our intention, but we are convinced that we were not wrong when we decided to start with one only society to gather all the professionals working for the same final goal.

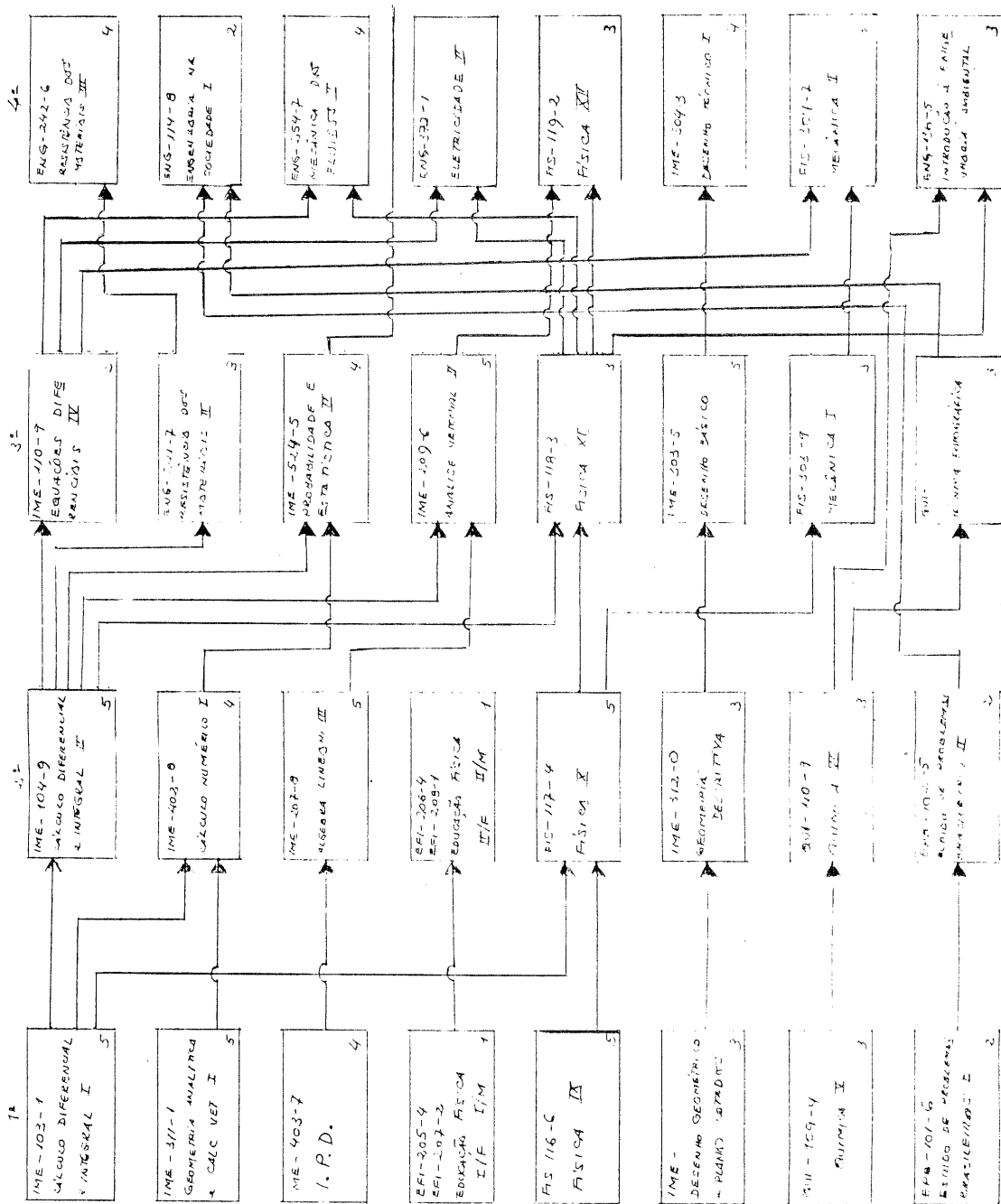
And we believe we have been prudent when we decided to start with a Cartographic Engineering Course, before we could afford to have different undergraduate specific courses in Geodesy, Photogrammetry, Remote Sensing and so on. Our main concern is with the work market for our undergraduate professionals. We are very careful in trying to form a number of engineers not larger than the offer

of employments per year.

Photogrammetry, Photointerpretation, Remote Sensing and Data Interpretation are then being presently taught, in Brazil, only in the five universities that offer, at an undergraduate level, Cartographic Engineering Courses. And we think it is enough - nowadays.

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