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XXI CENTURY BIOMEDICAL ENGINEERING IN LATIN AMERICA: TOP QUALITY OR DISAPPEAR

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Twenty First Century Biomedical Engineering (BME) setting is characterized by the intensification of networks and an ever growing interchange of information. This greatly eliminates isolated markets and it is no longer possible to ignore latest instruments. BME of Latin America (LAm) is therefore compared with the best available as the barriers of time and cost are falling. The terms of comparison of LAm BME production with the international offer are as follows:

Support is growing in importance as the paradigm of ONCE-BOUGHT-ALWAYS-OPERATIONAL is no longer applicable: in XXI Century the successful operation of an instrument is based on continuous support. In order to compete, LAm BME must include support networks with better response times than international offers.

Performance: LAm engineering must aim at top quality products in order to survive since most attenuating reasons invoked in semi-isolated economies will no longer be valid (import delays, local technical support versus foreign documentation, etc.). Compliance with international safety and quality standards is mandatory in order to be considered both in LAm and abroad.

Appropriateness must be aimed at by LAm developers who should develop only what has proven efficacy in health problems. Gadgets don't pay in the long run.

Cost of instruments in LAm are seldom competitive due to the small scale factor and to a complex combination of facts known as the "protection of foreign products". Since LAm exports Biomedical Engineers and has meager opportunities to invest, the type of Biomedical Instruments to develop are design-intensive, low-series solutions to diagnostics and treatment challenges.

If these issues are not properly addressed, XXI Century may well see Latin America only as a market for Biomedical Engineering firms of other continents.

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PROJECT SIC: A COOPERATIVE BME RESEARCH EFFORT IN A DEVELOPING COUNTRY

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SIC: *Sistemas de Instrumentación Inteligente en Cardiología* (Intelligent Instrumentation Systems in Cardiology) is a major research project in biomedical engineering jointly funded by CONICIT (Research Council of Venezuela) and IDB (Interamerican Development Bank). This effort brings together five venezuelan research institutions and BME groups with the aim of: applying modern techniques to cardiovascular disease analyses, interpretation, prediction and treatment; introducing innovations in Cardiology, particularly in diagnostic and treatment of major local health problems; coordinating BME R&D actions in a coherent manner, developing a "critical mass" of researchers and engineers, and improving undergraduate and graduate BME education; obtainning a "national" experience in the handling, transfer, operation and prescription of high technology for the health care system; and establishing the foundations for an industry of appropriate technology for Cardiology. The choice of the application field was based upon the fact that cardiovascular diseases are, by far, the first cause of death in Venezuela, as well as in many other countries around the world. One of the reasons for the high incidence of cardiovascular diseases is the spread of Chagas Miocarditis, a tropical disease produced by the infection with the *Trypanosoma Cruzi* parasite. This characteristic gives room for innovation, and for a long term impact of the BME field to the health care system. Core areas of R&D are high resolution electrocardiography, echocardiographic and angiographic image analysis, development of databases, and intensive care monitoring and alarming systems. Instrumentation development, digital signal and image analysis, pattern recognition techniques and knowledge based methodologies are the main engineering areas currently being applied. There is no doubt on the impact that this project has already made, after one year of its inception, and will certainly have in the development of the Biomedical Engineering field in Venezuela, and surely, through international cooperation in other Latin American nations.