# Multidisciplinary Systems Concepts Applied to R&D Projects Promoted by Brazilian Electricity Regulatory Agency (*ANEEL*)

**João Adalberto Pereira**[1], **Osíris Canciglieri Júnior**[2]

**Abstract** This article addresses the concepts of multidisciplinary projects focusing on the technological innovation recommended by the *R&D Program* of the *Agência Nacional de Energia Elétrica*[3] - *ANEEL*, under which are subject all the Brazilian electrical utilities through the federal law 9.991/2000. The *R&D Program* provides the directions for the electrical energy research and development offering the criteria for the elaboration of the proposals of researches projects. Until recently the product development processes were not part of the electrical utility routine, what it becomes clear that it was necessary more knowledge about the whole research and development process what has showed the lack of the adequate methodological methods. This work presents the main points of a new approach as well as the study of the product development tools applied in the elaboration of the projects proposals. Therefore it is expected that this new approach brings a better R&D projects quality and consequently a significant reduction of the time, development and reengineering costs.

**Keywords** Concurrent Engineering, Product Development, Multidisciplinary Projects.

## 1 Introduction

The Federal Law nº 9.991, enacted on July 24, 2000, disposes about the mandatory investment in R&D (*Research and Development*) by the utilities, permittees and authorized companies of the Brazilian electrical energy sector, determining that they must apply 1% of the NOI (*Net Operating Income*) in R&D

[1] João Adalberto Pereira (✉)
Companhia Paranaense de Energia, Emiliano Perneta, 390, 80420-080, Curitiba, PR, Brazil
e-mail: joao.adalberto@copel.com

[2] Osiris Canciglieri Júnior (✉)
Pontifícia Universidade Católica do Paraná, Imaculada Conceição 1155, 80215-901 Curitiba, PR, Brazil
e-mail: osiris.canciglieri@pucpr.br

[3] Brazilian Electricity Regulatory Agency

J. Stjepandić et al. (eds.), *Concurrent Engineering Approaches for Sustainable Product Development in a Multi-Disciplinary Environment*,
DOI: 10.1007/978-1-4471-4426-7_4, 

projects and energy efficiency [16]. *ANEEL* is the government agency that regulates the *R&D Program* of the electrical energy sector since 1999 and provides the *Research and Development Program Manual* [1] with the criteria for elaboration of the project proposals. As result of this *R&D Program* it is expected the increment in the qualification and technological development of the electrical utilities; generation of new processes and products or the enhancing of its characteristics; generation of new knowledge and innovative application of the existing knowledge as well as products that are consolidated and available in a commercial scale for the satisfaction of the electricity sector needs.

Project proposals must be framed according to the *ANEEL* innovation chain for the R&D projects as illustrated in Figure 1. This frame includes designs of *Basic Research* (BR), *Applied Research* (AR), *Experimental Development* (ED) and product design improvement pertaining to categories *Head Production Series* (HS), *Pioneer Production Lot* (PL) and *Market Product Insertion* (MI).

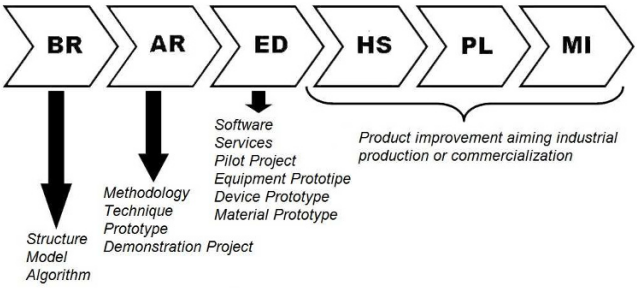


**Fig. 1** Innovation Chain for the R&D projects by *ANEEL* [1]

The majority of the product development processes, until recently, were not part of the electrical utilities routine. The adoption of the R&D program triggered the need for expertise knowledge in order to understand the whole process of research and development and, as a result, a lack of adequate methodological models was identified. So that, this work proposes a scheme to be considered since the early stages of elaboration of the new R&D projects based on techniques and methods well established in the *Product Development Process*. Moreover, it is intended that this work can be applied to others similar scenarios besides the Brazilian electrical sector.

## 2 Methodological Approaches

The research strategy used in this work was a case study with qualitative approach and it had as unit of analysis the process of the R&D adopted by *Companhia*