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Int. J. Production Economics 67 (2000) 169–182

international journal of
**production
economics**

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Analysing organisational issues in concurrent new product development

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Received 4 August 1998, accepted 27 January 2000

Abstract

Organisation analysis and improvement techniques have been a field of study for many years with the result that there are a number of different methodologies ranging from purely mathematical models of analysis to heuristic models using simulation. This paper presents an overview of research carried out towards the development of a methodology and tool aimed at assisting in the reengineering of the processes and organisation deployed in Concurrent New Product Development (CNPd) (NPD within a Concurrent Engineering (CE) environment). The focus is on the analysis of the operation of multifunctional project teams throughout the NPD process lifecycle, using process modelling and analysis techniques. The methodology and tools developed identify low value adding tasks and poor value adding ability of the performers, using both quantitative as well as qualitative information. This enables the company managers to reduce lead times, remove weak functions or links, move towards a more flatter organisation, and improve performance of the process and consequently organisation. The methodology and tool were originally developed within the European BRITE-EURAM (No. BE-8037-93) project PACE – a Practical Approach to Concurrent Engineering © 2000 Elsevier Science B.V. All rights reserved.

Keywords: Concurrent engineering; Process modelling and analysis; Multifunctional teams; Organisational analysis; Business process re-engineering

1. Introduction

New Product Development (NPD), is an interdisciplinary activity requiring contributions from nearly all the functions of a firm, whether it is an upgrade/improvement of an existing product or a new concept either to the company or the market. Traditionally NPD has been viewed as an organ-

isational activity, which was the result of various functional activities performed in stages from concept development to product delivery. The sequential operation of these functional stages resulted in long development times and many quality problems due to the lack of communication and understanding of the different product design, manufacturing and above all customer requirements. To avoid these problems Concurrent Engineering is being used by many companies and has resulted in companies making new products better and faster [1–4].

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CE or Concurrent NPD (CNPD) comprises two basic thrusts: parallelism or overlapping of different but hitherto sequential activities, and early involvement of all enterprise functions that contribute to a successful product [5]. This requires changes in the organisational structure, culture and new approaches to management and control, with a focus on human resource management and process management. The overlapping of activities requires those activities to be managed in a different way. Overlapping requires that the different actors involved communicate and collaborate more vigorously than in the past situations. Multifunctional Teams are often set up to achieve this. The successful implementation and management of Multifunctional Teams hence is of paramount importance. These teams cause strains on the organisation structure and processes within the product development function, in terms of resource availability, information flow and decision making. Methods within Organisation Theory (e.g. [6]) can be used to investigate and improve the structures and processes. However extant organisation theories such as those of Thompson [7], Galbraith [8] and Mintzberg [9] allow aggregated analysis and predictions about the organisational performance of engineering teams under given circumstances. Their aggregated view of organisational behaviour prevents them from providing specific prescriptions for organisation design in a CE context [10]. There is also a lack of focus on the processes, which run through the structures. In CE in order to manage or improve the overlapping of tasks an explicit understanding of the NPD process is needed. There is hence a need for a framework in which organisational issues of CE and the NPD process can be explicitly analysed.

To improve the performance of any action or entity we need to understand how and why given situations and behaviours are generated [11]. To understand behaviour we need to measure or analyse in some way the behaviour over time, which requires that we have some model representing our current belief about the content and causal dependencies of different elements of the entity or action, and which gives insight and understanding of the way organisations work. Thus modelling together with an analysis framework provides us with an

understanding, which may be used, for improvement.

The most popular model of organisations is that organisations are fundamentally *information processing* structures (as seen in the work of March and Simon [12]; Simon [13]; Galbraith [8]. In this view, an organisation is an information processing and communication system, structured to achieve a specific set of tasks, and composed of limited information processors termed ‘actors’-individuals or undifferentiated specialist subteams [14].

Modern literature (such as [15–17]) supports this thinking. According to Levant Orman [17] the solution to the problem of organisation design is to take a prescriptive and analytical approach to re-optimisation of organisational processes and structures. An information processing/decision-making paradigm of organisations should be adopted [18–20].

2. Research questions

Engineering teams are composed of different and specialised participants working on complex design tasks with different values, interests, and capabilities. Developing an analysis methodology together with a graphical computational model representing the state of the organisation for CE (in product design/development) was difficult because of the complexity of human organisations and the requirement for detailed predictions of team behaviour and performance. In most medium sized companies developing medium complexity electromechanical products the NPD process is fairly long and complex involving many different functional expertise. From a computer based process modelling and analysis point of view, there were four basic issues that had to be addressed:

- (1) How to *model* product development activities – detailed or abstract;
- (2) How to break down or dis-aggregate the NPD process so that problems can be *analysed* in their true context;
- (3) What should be the *units of analysis* for studying organisational behaviour or performance – the team or the actors; and

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