

Towards the sixth generation of R&D management

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Abstract

Many companies perceive research and development (R&D) as somewhat fuzzy, involving high uncertainty, with unclear rate of return, and troublesome to manage. On the other hand, companies that succeed at commercializing new technology in a rapid and precise manner achieve possibilities of attaining a greater market share, premium prices and dominant designs, leading to a much sharper competitive edge.

The perspective on managing R&D processes has changed over the years, moving from a technology-centered model to a more interaction-focused view. This paper deals with management of research and development (R&D), with focus on synthesizing five generations of R&D processes and *combining* those with related management responses as well as with examples of managerial approaches – all within a described company context. The choice of combining these three categories represents a dynamic and nuanced picture improving the understanding of R&D management contingencies.

A sixth generation of R&D has also been elaborated, one generation re-focusing the research part connecting to loosely tied multi-technology research networks. The bases for this new set of approaches are a broader multi-technology base for high-tech products and a more distributed technology-sourcing structure. The ‘Bluetooth’ case study, originating within Ericsson, has been used to exemplify the roots and ideas of the sixth generation of R&D. The Bluetooth case represents a joint cross-industrial, open intellectual property-based, effort in developing and bringing a new technology to the market by utilizing the resources from more than one thousand companies.

Properly managing R&D processes has long been a matter of debate and considered a troublesome area with no simple answers; ranging from an Achilles’ heel in some firms to the sole basis of competition for others, many of the differences have contributed to R&D management issues [Product Development Performance, Harvard Business School Press, 1991, p. 1; Developing Products in Half the Time, Van Nostrand Reinhold, New York, 1991, p. 170]. By properly managing R&D processes, companies can reach an increase in lead-time precision, increased quality of final products, and reduced development cost. Overall, companies’ competitive advantage can be strengthened as placed efforts are managed in a leaner manner and more aligned with overall business strategy. © 2003 Elsevier Ltd and IPMA. All rights reserved.

1. Five generations of R&D management

R&D has been studied for a long time within different contexts, economies, and environmental demands throughout the years. The transition from early days’ booming markets and economic growth in the 1950s to today’s highly competitive and global marketplace is reflected in the way R&D has been managed. Early success stories such as the industrial research laboratories Bell Labs, Xerox Parc and Lockheed Martin Skunkworks have been replaced by companies like the more market-focused 3M, the rapid introductions of

new product ranges from Japanese manufacturers like Toyota and Sony, and R&D collaborations like Ericsson’s network of companies around the “Bluetooth” technology and standard.

The perspective on R&D processes has been different throughout the years, since the structure and prerequisites of the economy have changed and so has the presumption of best practice. One attempt at describing the last 50 years of evolution within the R&D field is shown in Exhibit 1. Worth noticing is that these five models of R&D generations, though presented on a time scale, hold components or ideas still valid and sought for by many companies, and hence do not represent a map of where companies today are to be placed. Throughout these periods, different industries or companies have

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R&D Generations	Context	Process Characteristics
First generation	Black hole demand (1950 to mid- 1960s)	<u>R&D as ivory tower</u> , technology-push oriented, seen as an overhead cost, having little or no interaction with the rest of the company or overall strategy. Focus on scientific breakthroughs.
Second generation	Market shares battle (mid-1960s to early 1970s)	<u>R&D as business</u> , market-pull oriented, and strategy-driven from the business side, all under the umbrella of project management and the internal customer concept.
Third generation	Rationalization efforts (mid-1970s to mid-1980s)	<u>R&D as portfolio</u> , moving away from individual projects view, and with linkages to both business and corporate strategies. Risk-reward and similar methods guide the overall investments.
Fourth generation	Time-based struggle (early 1980s to mid-1990s)	<u>R&D as integrative activity</u> , learning from and with customers, moving away from a product focus to a total concept focus, where activities are conducted in parallel by cross-functional teams.
Fifth generation	Systems integration (mid-1990s onward)	<u>R&D as network</u> , focusing on collaboration within a wider system – involving competitors, suppliers, distributors, etc. The ability to control product development speed is imperative, separating R from D.

Exhibit 1: Description of five generations of R&D processes (developed and adapted from Roussel, 1991, p. 39; Rothwell, 1994; Miller and Morris, 1998, p. 19; and Chiesa, 2001, p. 12).

functioned as role models or drivers of best practice, a phenomenon that can also be recognized from research results.

During the first generation of R&D (1950 to mid-1960s), most of the new products that were produced were also sold, new industries emerged, and technology was generally seen as the remedy for all ailments [17,20]. This first generation of R&D worked under the assumption that the more R&D went in, the more products came out. In short, R&D was seen as an overhead cost [22, p. 26]. With regard to the R&D process, it was viewed as linear and as focused on pushing technology downstream towards the marketplace (e.g. [18]) – a marketplace characterized by a demand matching or sometimes exceeding the supply.

During the second generation of R&D (mid-1960s to early 1970s), the supply and demand were in a more stable relationship, competition was intensified, and more emphasis was placed on marketing efforts to increase the sales volume [20]. Within this environment, more focus was placed on the short-term demand side,

neglecting long-term research in favor of ideas from the market. Process-wise, the market-pull effect was strengthened and the process was seen somewhat oppositely as compared to the first generation of R&D – i.e. ideas originated from the market, to be refined and developed by R&D (e.g. [26]). Project management was also introduced to direct and monitor the R&D efforts, and the business side as the internal customer of R&D was highlighted [16, p. 13].

Further, the third generation of R&D can be discerned during the period of the mid-1970s to mid-1980s, when the economy was shivering with high rates of inflation and demand saturation [20]. Cost control and cost reduction became the name of the game [16, p. 15], leading R&D to eliminate wasteful efforts by reviewing and improving the way new technology was developed and monitored within the company (e.g. [1,12,19]). This strong process-focus resulted in a more linked and interaction-focused view of R&D (instead of the two extremes as before), tying the technological capabilities more closely together with the market needs. The port-

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