

How to Motivate and Manage Engineers

By HAROLD E. O'KELLEY

Participative management has been one of the decade's buzz words among management theorists. A related concept I call "participative engineering" may have more immediate significance for the future health of high technology companies.

The central problem the concept addresses is the motivation and management of the most creative and talented research and development personnel — engineers, scientists and program designers.

Research and development people enjoy and seem to need the satisfaction of seeing and having a hand in the end product. The purely scientific types, whose satisfaction is derived from dealing with theoretical concepts, tend to be a small minority in the computer manufacturing business and, I suspect, in other high technology industries. On the whole, technicians are craftsmen rather than abstract thinkers.

Since these craftsmen are typically supervised by professional managers, there is a motivational gap between the two groups that commonly results in the mismanagement of the technical personnel, including the brainy scientific and engineering superstars. One form of the mistake is to force these scientists and technicians into the standard company mold in such matters as hours of work, dress and recognition. The results are a high turnover rate, decreased productivity and associated problems.

The converse of this tight-ship policy is equally ineffective — a laissez faire style that leaves the creative types to their own devices with few if any boundaries. This, in effect, is the abdication of management and results in the technician's alienation from the company to which he then has few ties beyond a signature on a paycheck.

What I call participative engineering has two principal elements. First, it calls for a breaking down of the walls that traditionally separate research and development people from the non-technical aspects of the company. Second, it incorporates the "two-track" method of corporate advancement for technical personnel, which has been experimented with in various forms by high technology companies over the past decade.

As for the work itself, the creative craftsman's contribution is self-evidently crucial to industries which depend on a developing technology. But it is equally vital that these technical people — scientists, engineers, computer program designers — feel that they are making a contribution. For the craftsman, pride in his work and his product is paramount. Our company therefore involves him in all aspects of the product that he has helped create.

After completion of the product design, he participates in the manufacturing process by contributing to production line design. He is involved in marketing through relationships with major customers and in field service by taking a hand in the training of the customer service engineers who will work on the new product. He is involved in marketing communications, by assisting in the creation of the sales literature which will support the marketing of his product, and even in such far-flung areas as financing and investor relations.

In all of these activities, he not only has the satisfaction of being involved with his product from start to finish, but also receives important recognition both inside and outside the company.

For example, the star speaker at a recent news conference in New York where we introduced a major new product was not myself — the chief executive officer of the company — or any of our other senior executives, but rather a young, long-haired, bespectacled engineer, clad in blue jeans and a well-worn corduroy jacket, who had played a large role in the product's development. Because it was partly his brain-child, he could see its implications clearly and could speak of them with a fire and natural enthusiasm that the rest of us could not match. The media loved it and so did he.

The principal research wizard and chief technical officer at my company has a salary that is second only to my own at Datapoint, and he is effectively involved in all aspects of the company. He even helps with financing.

Full involvement is not the only motivating factor. Money is as important to engineers and other technical people as it is to almost any employee, but there is a difference. To a hotshot salesman, for example, the money itself is likely to be a much stronger motivator. But the technical person has money needs of two kinds:

- He wants to feel that he is being paid what he is worth.
- He doesn't want to worry about money, just as long as it's there.

Technical people need to be comfort-

Technicians tend to be makers, craftsmen, rather than abstract thinkers. They need to see and have a hand in the end product.

able. With that prerequisite taken care of, they are much more concerned with their work environment and the projects they are working on. This is why we find it important not to push creative technical superstars into a mold. Management must place an emphasis on providing them with what they need to do the job: modern facilities, laboratories, testing equipment and all the tools of their trade.

Since the craftsman places a high value on his independence and often rebels at rules that relate to clothing, work hours and the like, such requirements should be discarded. The result may be that not everyone is at work at 8:30 in the morning but this doesn't seem to create productivity problems. The problem, in fact, is the other way around: technical people tend to work too much rather than too little because they like what they are doing.

As do other employees, the craftsman wants advancement and recognition. In nearly every major industry, the employee must become a manager to reach the top rewards. What this often does is turn good engineers or scientists into bad managers. The precise qualities that make for an outstanding craftsman usually produce an ineffective manager in today's management climate.

The technician tends to be oriented

toward things (the product), in contrast to the manager's orientation toward people (the producers). The technician is more likely to be a perfectionist, while the manager will have a higher tolerance level for frustration and a greater ability to delegate. Although the craftsman is seldom suited to a top management position, his contributions in research and development are the life's blood of a high technology company.

A perfect example was a man who was a section head under my supervision many years ago in a 300-member engineering department at another high technology company. The man was an expert in electromagnetics and microwaves and one of the important senior technical minds in the company,

but he couldn't manage his people. He was disorganized, couldn't delegate and was never satisfied with work unless he did it himself. Not surprisingly, he was also becoming disenchanted with his position.

He and I jointly agreed on two steps. First, I involved him more at the conceptual level, particularly in the planning process where he was less involved with managing people. And second, we together undertook a campaign to get him elected a fellow of the principal professional society in his field. He joined outside technical societies, wrote and delivered papers and took an active role in local and regional activities of the society. The result was an enhancement both of his own professional reputation and that of the company. He became happier at his work and became far more valuable to the company as a technician than as a manager.

The institution of a two-track system, not unique to our company but still far from the norm, enables the outstanding non-manager to reach top rewards, both in salary and in recognition. As his role in product development becomes more and more significant, he has the alternative of choosing to be either a manager or an individual contributor.

At some point he has to decide which

track he wants to pursue, although the decision is not irrevocable. Management works with him to reach that decision. It provides an evaluative program that helps indicate to him where his best talents seem to lie. And where applicable it provides outside counseling to help him make this decision.

Each track offers equivalent opportunities, both in terms of money and status within the company. It is possible, and in fact happens, that an individual contributor makes more money and has higher company status than the manager who is his boss.

In some companies, although not in ours, the individual contributors receive distinctive titles drawn from academia, such as Fellow of the Company or the division. We simply use the more functional term, individual contributor. I don't feel that the difference is terribly important.

What is extremely important is that it be recognized within a company that the two functions — individual contributor and manager — are different, that both are vital, and that becoming a manager does not convey superiority either in money or status.

The individual-contributor track carries with it some danger of a separation and an alienation of the technicians from the company. In the light of this danger, total company involvement becomes even more significant.

This full-scale involvement with the product also has direct implications for the inner workings of the research and development department itself. It militates against narrow specialization and demands "total technology" people with multi-disciplinary skills. Traditionally, computer hardware people work on the research and development of hardware, software people work on software and somehow it all comes together in one product at the end. It's the Persian rug theory; there are people who handle blue threads and there are people who handle red threads. The problem is that each is so close to his own specialty that he doesn't see the whole design.

Our method sets aside a few people who are totally involved with all parts of the project from the very beginning to the very end. The benefits of having an overview and full comprehension of the totality plus the psychic satisfaction of being immersed in the full project more than offset any loss of specialization.

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