

What Does It Mean to Manage?

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Most experienced engineers observe that their status and compensation are significantly less than that of managers and executives, who are treated as if they were making more valuable contributions to the organization. Engineers often describe managers as being over paid because they are not doing “real” work. Yet, when given the invitation to join the elite ranks of managers, executives, and directors, some delight in the prospects of more power and money, while other dread the thought of having the responsibility of navigating through a world of conflict and confusion.

While the expertise of an audio or broadcast engineer is relatively clear, the skill of managing looks both mysterious and trivial. What does it mean to manage? Are engineering skills transferable to managing? Should a new manager automatically be given training and mentoring? Let us take a fresh look at the concept of management.

Four Steps

The word managing is nothing more than a semantic alias for decision making. Anyone who makes a decision, and that includes all of us, is functioning as a manager. When you choose employment in a particular company, you are managing your career. When shop for groceries, you are managing your life style. We manage ourselves, peers, bosses, subordinates, spouses, children, pets, etc. This simple conclusion immediately leads us to the question: what does it mean to make a decision, or at least to make a good decision?

Decision making involves four distinct sequential activities: (1) collecting the relevant data, (2) enumerating the choices and their properties, (3) applying a value system to sort the choices, and (4) executing a plan to get to achieve the desired outcome. All four steps are critical to making a good decision, and we will examine each phase of the process.

Step 1. Data collection is the art of gathering relevant information, which especially includes constraints and limitations. Perhaps there are budget, time, and resource limits; perhaps a critical piece of test equipment is out for repair; or perhaps the needed expert is on vacation. A transmitter is intermittent, and the relevant data is the frequency of occurrence, properties of the failure, inventory of spare parts, cost of a replacement, and so on.

I have one colleague who has the proclivity to collect data forever, and I have another colleague who never bothers with any data collection. What is optimum? Collecting data is recursive because a decision maker must decide how to collect data; he must decide what data is relevant; and he must decide when there is enough data to go to the next step. Data collection consumes time and resources.

Step 2. With enough data, one can begin to look at the implications, which are nothing more than a catalog of choices and their if-then relationships. If I replace the transmitter with a new model, then we are covered by a factory warranty. But we may experience the unreliability of using a new product that has had very little run-time in the market. If we replace the failed part, we may have solved the problem, but the failure may have been caused by another factor and the repair may fail again. If I assign George to the task of designing a new studio, he will be unavailable evaluate the transmitter.

Building a comprehensive set of if-then relationships creates a tree with each leaf being a possible outcome, and each branch being an if-then choice. A decision maker creates a tree structure of choices and outcomes. If we install the routing system, then we are at risk of a studio being off line for some period, and that will force us to rent facilities at a neighboring studio. If we hire two new engineers, that will deplete our equipment budget. If we terminate a support group, their tasks will be distributed to others who may be overloaded, and they will have to discard tasks that they would otherwise do.

Like data collection, building decision trees is expensive. How many levels of if-then should be explored? How many choices should we consider? Brain storming often results in discovering hidden choices. Pruning the tree makes this job simpler but one needs a criterion for the pruning, and the quality of the result depends on having sufficient data with a reasonable level of confidence in its accuracy. A useful branch that was prematurely pruned, even for good reasons, may remove a great solution. Aggressive pruning can result in no possible solutions, the so called null set.

Step 3. Assuming that we have identified several choices, what value system should be used to make a decision? Are we trying to optimize cost, and we should therefore select the cheapest solution? Do I want to best return on investment? These are the publically acceptable values. However, there are numerous private values, mostly involving career advancement. Which choice is likely to raise the probability of a salary increase, or which choice has the least risk to my reputation, or which choice has the lowest stress level? We even get such simple criterion as which choice is least likely to collide with my vacation? If our staff is overloaded, the criterion may be to shift the work to another department regardless of their work load.

The Individual vs. the Organization

Individual values and organizational goals sometimes collide because individuals operate with their own enlightened self-interest, which rarely matches the goals of the organization. In fact, one could say that the goals of the organization are nothing more than the goals of those who have more control. The CEO may be trying to optimize the likelihood of reaching a level of profitability for the quarter in order to trigger a bonus. The engineer may try to engage in an activity that results in a conference paper because he wants to look for new employment.

Nominally, values systems are a given: each individual simply prefers one outcome over the others. When we drill down, however, clarity becomes cloudy. Who has really

considered if a choice that raises income is best when it also creates hostility among colleagues? Do you really value having a new car and dreading going to work each day? For most of us, the answer is no. Economists routinely get this wrong.

Step 4. Having selected the optimum choice, how do assign tasks, define milestones, and control activities that will get us to the selected goal? To use an analogy, we have selected the resort where we want to take a vacation (end point), but we have to design a way to get there (travel plans). Instructions have to be given to the individual contributors so that the various tasks can be synchronized. And again, we find the process recursive. The step of executing the specifics in a plan, which is typically assigned to individual contributors, also involves the four steps: data collection, cataloging choices, applying a value system, and executing the appropriate tasks.

Task assignment is nominally the responsibility of those with a managerial title, but the staff can easily skew such assignment by their willingness to take on a task. When the value system of the individual contributor is inconsistent with that of the decision maker, the process deviates from the plan. A repair engineer who loves to fix equipment may avoid the obvious conclusion that the defective equipment should simply be replaced with a new one. Or conversely, the engineer who is incompetent at fixing the equipment may recommend replacing it.

The Circle Back

Decision making becomes even more complex when we consider that at each step there will be surprises and changes. As the process advances, new data will appear, a viable choice will be blocked, value systems will get resorted, and a routine task suddenly becomes very complex. In a remodeling, one suddenly discovered that the wall to be removed actually contained structures that held the roof up. Perhaps, a political shift changes the criterion in the midst of executing a previous plan, such as a proposal for a leveraged buyout. A new set of decisions must be made but starting from a point in the middle of a previous process. The biggest obstacle to reaching a decision often results from there are contradictions within the data, choices, and value system: like searching for a number less than 5 and greater than 10. You could look forever and never come to closure.

Having identified the four major steps in all decision making, it becomes readily apparent that different skills and temperament is required for each. I have never met anyone who is equally good at all steps. Ideally, decision making should be in group where all the skills are present. The most egregious example is that of an engineering manager who does not understand the technology but who is trying to manage engineers with a different value system. Hence, Dilbert was born.

At this point in the discussion, we can readily see why an organization might provide unbelievably high rewards for a CEO that was really good at decision making. But on the other hand, one can also see why optimizing decisions is extremely difficult, and few

individuals actually possess the skill to do it well. In most decision making, we see a manifestation of one fundamental problem: how to reconcile disparate values systems.

Those who are promoted to the role of manager, mostly as career advancement, rarely receive training in the skill of decision making. Yet the art of decision making is so valuable that it should be part of our basic education, not just in a professional context but as part of our life skills.