



# the unwritten

## **Part 2 of 3:** *Relating Chiefly to Engineering Managers*

### **TIMELESS ADVICE FOR ENGINEERS**

*The Unwritten Laws of Engineering* by W. J. King was first published in 1944 as three articles in *Mechanical Engineering* magazine. It has been in print as a book ever since, becoming a classic of engineering literature. Recent editions, including a trade version, *The Unwritten Laws of Business*, have revisions and additions by James G. Skakoon. *Mechanical Engineering* magazine is excerpting laws from the book, presented in three articles just as in 1944, with comments from contemporary authorities.

The first installment in the series, "What the Beginner Needs to Learn at Once," was published in September. Yet to come is "Professional and Personal Considerations."

**e**very business era has a preferred management philosophy promoted by a prominent management guru, from Frederick Taylor to Peter Drucker to Tom Peters to Jim Collins. *The Unwritten Laws of Engineering* has no such backing. Neither is it a complete managerial philosophy.

Although prominent business executives have endorsed many of these managerial laws for all managers, not just for engineering, the endurance of the laws is perhaps their strongest endorsement—and they seem to work. W.J. King's words tell it best:

The following is a partial list of basic commandments, readily subscribed to by all managers but practiced only by the really good ones.

# laws of engineering

By W. J. King and  
James G. Skakoon

## { INDIVIDUAL BEHAVIOR AND TECHNIQUE }

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*Do not try to do it all yourself.*

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This is one of those elementary propositions that everyone endorses, yet many carelessly violate. It's bad business: bad for you, bad for the project, and bad for your employees. You must delegate responsibility even if you could cover all of the ground yourself. It isn't wise to have so much depend upon one person, and it's unfair to your subordinates. Executives should have their business organized so that they could be away on business or vacation at any time and still have everything move along smoothly.

A common justification for hogging the whole job is that subordinates are too young or inexperienced. It is part of your job to develop your subordinates, which includes developing initiative, resourcefulness, and judgment. The best way to do this is to load them up with all the responsibility they can carry without danger of serious embarrassment to any person or group. Self-respecting engineers resent being babied to where they cannot act on a most trivial detail without approval from their manager.

On the other hand, it must be granted that details are not always trivial, and that it may sometimes require a meeting of an executive committee to change the length of a screw in a critically important mass-produced assembly. It is a matter of making sure not only that technical items are handled by engineers of appropriate competence and experience, but also that all considerations have been made.

Dorothy Kangas, a business process improvement specialist for The Nielsen Co., has seen first-hand the harm from a controlling manager. The manager "demanded that all communication go through him, and every document needed to have his signature," Kangas said. "After a period of time, it was clear he couldn't keep up with the pace of the project." He didn't trust his own team, according to Kangas, and they, in turn, quickly lost confidence in him and became resentful. The project fell behind in large part because of this controlling management style.

Kangas also said that managers need to use all available resources to plan and execute a project, whether they are in one's own department, elsewhere in the company, or even outside the company. And using

resources appropriately also counts, Kangas said: "As a manager, recognizing the strengths and weaknesses of each team member as it relates to the project's activities will alleviate much of the angst and stress when deadlines draw near."

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*Every manager must know what goes on in his or her domain.*

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There is a similar law for beginners: *One of the first things you owe your supervisor is to keep him or her informed of all significant developments.* Be aware, however, that you cannot always depend on others—not subordinates, colleagues, nor your own manager—to keep you informed; you are responsible to keep yourself informed.

This applies primarily to major or significant developments and does not mean that you should attempt to keep up with every minor detail of activities assigned to subordinates. It becomes a vice when carried to the extent of impeding operations. Nevertheless, the more information managers have, the more effectively they can manage their business.

Every manager has his or her own methods that work. "Some will create highly structured, detailed reporting requirements, and some may manage by walking around with a clipboard and a pen," Kangas said.

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*Cultivate the habit of "boiling matters down" to their simplest terms.*

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The faculty for reducing apparently complicated situations to their basic, essential elements is a form of wisdom that must usually be derived from experience. But there seems to be marked differences between otherwise comparable individuals in this respect. Some people seem eternally disposed to "muddy the water," or can "never see the forest for the trees."

Perhaps one cannot correct this innate tendency simply by taking thought, but it appears to be largely a habit—a habit of withdrawing mentally to a suitable vantage point to survey a mass of facts in their proper perspective, or a habit of becoming immersed and lost in a sea of detail. Make it a practice to integrate, condense, summarize, and simplify your facts rather than to expand, ramify, complicate, and disintegrate them.

Many meetings, for example, get nowhere after protracted wrangling until somebody finally says, "Well,

it all boils down simply to this...,” or “Can’t we agree, however, that the basic point at issue is just this...,” or, “After all, the essential fact remains that...”

The mental discipline to instinctively impel one to the heart of the matter is one of the most valuable qualities of a good executive.

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*Cultivate the habit of making brisk, clean-cut decisions.*

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This is, of course, a difficult and important part of a manager’s job. Some have a terrific struggle deciding even minor issues, mainly because they never get over being afraid of making mistakes. Normally, facility comes with practice, but it can be hastened by observing a few simple principles:

(1) Decisions will be easier and more frequently correct if you have the essential facts at hand. However, almost any manager can make decisions knowing all of the facts, whereas a good manager will make the same decisions without all the facts. So you might ask yourself: “Am I likely to lose more by giving a snap judgment or by waiting for more information?”

(2) You do not have to be right every time; nobody is.

(3) The very fact that a decision is difficult usually means that the advantages and drawbacks of the alternatives are pretty well balanced. It is likely better, in that case, to decide the matter now than to arrive at the best decision later. So take a position and see it through.

(4) It is futile to try to keep everybody happy. Give everyone a fair hearing, but after all have had their say, dispose of the matter decisively even if someone’s toes are stepped on. Otherwise, everyone will be dissatisfied, and many may accuse you of straddling the issues.

The following questions are helpful in choosing a course of action when the factors are indecisive:

- Does it expedite and forward the undertaking, or does it only produce procrastination and delay?
- Is it fair and square and aboveboard?
- Is it in line with established custom, precedence, or policy? A good reason is generally required for a departure.
- Is it in line with a previous decision or understanding? Even a good reason for a change might not offset the unfortunate impression of instability.
- Can we accept the risk? How does the penalty compare with the gain for each of the choices?
- Are there suitable future alternatives or corrective actions if a decision turns out to be misguided?

Gary Klein, an author and a senior scientist at MacroCognition LLC, has observed indecision in leaders and managers. “They are afraid of making decisions, and so they hope that the situation will magically become clear,” Klein said. “And sometimes that happens, which rewards their procrastination. More often, it doesn’t happen, and they have missed windows of opportunity while chewing up time and energy.”

Klein is an experimental psychologist who has written extensively on human cognition, intuition, and decision making, including his latest book, *Streetlights and Shadows: Searching for the Keys to Adaptive Decision Making*. According to Klein, excessive rumination often signifies a leader’s fear of making a mistake. But this fear drains decision makers, as well as their colleagues and subordinates, and prevents them all from working on other high priority issues.

On the opposite side, never mistake the true meaning of, “Don’t be afraid to make mistakes.” Decisions that result in catastrophic consequences such as huge financial losses or personal injury will not be overlooked, and may be criminal. Those who coerce you into making decisions, despite whatever aphorisms they employ, will not accept a catastrophic result. Make clear-cut, swift decisions, but only if a mistake won’t create wreckage for you and your organization.

**{ MANAGING DESIGN AND DEVELOPMENT PROJECTS }**

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*Learn project management skills and techniques, then apply them to the activities that you manage.*

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Your organization probably has, or certainly should have, standard procedures for its major engineering efforts such as developing new products or processes. You will also need to apply techniques commonly used for managing projects. Some of these include resource planning, calendar scheduling, and progress tracking. Simply stated, to manage projects properly you must plan your work, then work your plan.

The following formula for carrying out any engineering project seems to be more or less standard in the best engineering circles:

- Define your objectives.
- Plan the job by outlining the steps to be accomplished.
- Define the required resources, including people, money, and facilities.
- Prepare a definite schedule.
- Follow up; check on the progress of the work.
- Revise your schedule as required.
- Watch for bottlenecks, log-jams, and missing links; hit lagging items hard by applying additional time, money, and people.
- Drive to a finish on time.

Engineers can be disinclined toward project management, as Kangas confirms. “Many engineers look at the PM function as an ‘administrative’ function,” Kangas said. “And for the most part, indeed, it is.” But Kangas cited the example of a symphony orchestra: “Without a conductor, they may be hard pressed to start together, end at the same time, and create the flow of music that one would expect from world-class musicians.” A con-

ductor isn't an expert musician on every instrument, if any, just as a project manager isn't an expert in every engineering discipline. But conductors—and project managers—still coordinate everyone's playing.

Kangas also warns of a common pitfall in project management: scope. "Sometimes knowing the scope... clearly what is included and excluded, can be highly important," Kangas said. She added that one of the processes covered by the Project Management Institute in its publication, *A Guide to the Project Management Body of Knowledge*, to which she contributed, is scope management. "What I find most disturbing is when PMs use the excuse that 'the scope changed.'" Generally, Kangas said, an inaccurate scope results more from poor estimating, poor resource planning, or poor product definition at the start of a project than from any uncontrollable influence from outside the project team.

### { ON ORGANIZATIONAL STRUCTURES }

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*Make sure that everyone, managers and subordinates, has been assigned definite positions and responsibilities within the organization.*

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It is extremely detrimental to morale and efficiency when employees do not know what their jobs are or what they are responsible for. If positions are unclear, interminable bickering, confusion, and bad feelings are a likely result. Do not keep tentative organizational changes hanging over people; effect them as soon as they become reasonably clear. Changing them later is better than leaving people in poorly or erroneously defined positions.

"Make sure each employee has a job description, and that it's accurate and up to date," recommends Sharon Armstrong, a human resources consultant and trainer who has written several books for HR professionals, including *The Essential HR Handbook: A Quick and Handy Resource for Any Manager or HR Professional*.

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*Make sure that all activities and all individuals are supervised by someone competent in the subject matter involved.*

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In an engineering organization, at least ideally, every novice engineer working in a technological area will be supervised by a veteran seasoned in the same area. Neophytes can get themselves, their departments, their employers, and their supervisors into embarrassingly difficult spots if left on their own.

As a manager, you should offer your subordinates complete competence when overseeing their technical activities. If you are uncomfortable with or incapable of this responsibility, you'd better do something about it. A particularly good method to use, outside of

directly learning what you need to know, is to complement yourself with other experienced people under your supervision, people who can properly judge what you cannot.

Although having an accomplished veteran directly supervising every novice might be desirable, it isn't always possible. "In the real world, not all departments are set up like that," Armstrong said. So, according to Armstrong, there are other ways to accomplish the necessary supervision of beginners. "Sometimes that is a supervisor, sometimes someone in another department...but the basic premise still remains that there should be someone that any worker can go to for guidance, for input, for direction." One possibility is a matrix organizational structure, which, according to Armstrong, is alive and well. "Two or more intersecting lines of authority can run through the same individual. Matrix management considerably leverages knowledge and skills, opening opportunities for employees to branch out from their usual offices and disciplines."

### { WHAT ALL MANAGERS OWE THEIR EMPLOYEES }

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*Never misrepresent a subordinate's performance during performance appraisals.*

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The most serious responsibility of managers is to review the performance of their subordinates. As a manager, you have the distinct obligation to do this as accurately as possible. Not only would misrepresentation be unfair to your subordinates, but it also would not be the least bit helpful to anyone involved.

Along the same line, it is your inalienable responsibility to talk things over with employees if—and as soon as—you become sincerely dissatisfied with their work, or you recognize deficiencies that are working against them. This won't be easy, and it requires much tact to avoid discouraging or offending an employee. But if you ultimately must fire a subordinate, you may have two pointed questions to answer: "Why has it taken you five years to discover my incompetence?" and "Why haven't you given me a fair chance to correct these shortcomings?" Remember that when you fire someone for incompetence, it means not only that the employee has failed, but also that you have failed.

Armstrong, whose latest book is titled *The Essential Performance Review Handbook*, warns about misrepresenting an employee's performance: "It can be very bad. There are legal issues around that." According to Armstrong, a manager needs to be honest with the employee to avoid creating the case for an employee of not having been helped—as he or she should have been—before being let go, if it comes to that. "There should never be surprises," Armstrong said.

Armstrong confirmed that this unwritten law is good advice, but emphasized the caveat about ongoing communication. According to Armstrong, managers must give coaching and counseling throughout the performance review cycle, not just during the performance review itself. “You should give positive reinforcement when you see employees doing the right thing and gently redirect them when that is appropriate,” she said. “It’s the manager’s duty to help each employee be successful and to grow professionally.”

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*Make it unquestionably clear what is expected of employees.*

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Number one on the list of required communication between supervisor and subordinate is the explicit understanding of expectations on the job. All too often, managers avoid direct discussions and rely on implicit instructions, generalized goals, or corporate policies. It is not enough for you simply to hope for certain behavior or performance from your subordinates; more often than not you will be disappointed. Successful managers clearly set down goals and expectations with their subordinates, then follow up with monitoring and support.

Armstrong said that expectations and goals go together, but that “goals ratchet it up a bit, so it’s kind of expectations on steroids. It’s really having a clear idea at the start of any cycle exactly what you want the employee to do, and how you’re both going to know at the end that it’s been done.” Armstrong is a fan of “SMART” goals, those that are Specific, Measurable, Attainable, Relevant, and Time-based, especially when these goals are defined with an employee’s input. “If managers can get accustomed to helping their employees write SMART goals—and they should come from both sides of the desk—then there will be ownership on the part of the employee,” Armstrong said. “It will be realistic for the employee if they’re part of the writing of it as well, rather than having it trickle down to them, and then not feeling connected to it.”

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*You owe it to your subordinates to keep them properly informed.*

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In the catalog of raw deals, next to responsibility without authority, comes responsibility without information. It is unfair to ask engineers to acquit themselves creditably when they are held responsible for a project without having adequate knowledge of its history, present status, or future plans. An excellent practice is to hold occasional meetings to acquaint employees with major policies and developments in the business of the department and the company.

An important part of the job of developing engineers is to furnish them with ample background knowledge and, as a rule, this involves a certain amount of travel. You will find it worthwhile to take or send a young

engineer on a trip for what he or she can get out of the experience, regardless of how little he or she contributes directly. Likewise, when outsiders visit, it is good business, as well as good manners, to invite junior engineers to participate, even if their direct contribution is small.

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*Never miss a chance to commend or reward subordinates for a job well done.*

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Remember that your job is not just to criticize your people and intimidate them into getting their work done. A first-rate manager is a leader as well as a critic. The better part of your job is, therefore, to help, advise, encourage, and stimulate your subordinates. Along the same line, never miss a chance to build up the prestige of your subordinates in the eyes of others.

On the other hand, this is not to suggest perpetual lenience. By all means get tough when the occasion justifies it. An occasional sharp censure, when it is well deserved, will usually help to keep employees on their toes. But if that’s all they get, they are apt to go a bit sour on the job.

Theodore Ryan, a Ph.D. psychologist who provided advice on selecting a mentor for the first *Unwritten Laws* excerpt, warned not to overlook your top performers when commending, advising, and encouraging subordinates, as managers too often do. “It’s the subperformers and marginal performers who get most of the feedback. Often, the best performers get rewarded by *not* getting as much positive feedback and as much developmental feedback,” Ryan said. Ryan believes that putting extra time into the best performers can be among the most successful tools for recruiting, motivating, and retaining employees.

Ryan encourages expanding the ideas of commendation, reward, and critique into a team framework. According to Ryan, it should become part of a company’s “best practices” for team projects. So at a project’s start, critical points, and end, the team should ask, “How did it go? What went really well? What didn’t? How can we approach this differently?” Ryan said that the ideal is “when all of us expect that we [commend, reward, and critique each other], so we all, individually and collectively, can get better. That really helps a team.”

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*Always accept full responsibility for your group and the individuals in it.*

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Never pass the buck, or blame any of your employees, even when they may have let you down badly. You are supposed to have full control, and you are credited with the success as well as the failure of your group.

**{ To Be Continued }**