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# MEASURING AND MANAGING PERFORMANCE IN ORGANIZATIONS

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**ROBERT D. AUSTIN**

foreword by Tom DeMarco & Timothy Lister



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*To Christopher and Warren*

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uate education in the known universe, and is like the most fun you can have while drinking directly from a firehose. I am enormously grateful that these two places exist and for the influence they had on me.

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# Contents

**Foreword** *xiii*

**Preface** *xv*

**One: An Introduction to Measurement Issues** 1

**Two: A Closer Look at Measurement Dysfunction** 10

**Three: The Intended Uses of Measurement in Organizations** 21

Motivational Measurement 22

Informational Measurement 25

Segregating Information By Intended Use 29

**Four: How Economists Approach the Measurement Problem** 32

Balancing Cost and Benefit Associated with Agent Effort 34

The Effort Mix Problem 37

**Five: Constructing a Model of Measurement and Dysfunction** 42

The Importance of the Customer 44

What the Customer Wants 45

Extra Effort versus Incentive Distortion 47

**Six: Bringing Internal Motivation into the Model** 52

The Observability of Effort 54

Model Assumptions 55

**Seven: Three Ways of Supervising the Agent** 58

No Supervision 58

Full Supervision 60

Partial Supervision 62

**Eight: Designing Incentive Systems** 66

A Better Model of Organizational Incentives 68

**Nine: A Summary of the Model** 74

The Model Setup 74

Three Ways of Supervising the Agent 76

The Principal's Solution 79

**Ten: Measurement and Internal Motivation 81**

Internal versus External Motivation 81

Delegatory Management 87

The Conflict Between Measurement-Based and Delegatory  
Management 89

**Eleven: Comparing Delegatory and Measurement-Based Management 92**

**Twelve: When Neither Management Method Seems Recommended 102**

Measurement versus Delegation in Real Organizations 108

**Thirteen: Purely Informational Measurement 114**

**Fourteen: How Dysfunction Arises and Persists 124**

The Earnest Explanation of Dysfunction: A Systematic  
Error by the Principal 126

Misguided Reflexes, Folly, and the Mystique of Quantity 127

The Difficulty of the Principal's Inference Problem 133

**Fifteen: The Cynical Explanation of Dysfunction 137**

Delegation Costs, Inevitable Dysfunction, and  
Non-Attributional Cultures 140

**Sixteen: Interviews with Software Measurement Experts 147**

Interview Results 149

**Seventeen: The Measurement Disease 159**

The Malcolm Baldrige Quality Award 159

ISO 9000 Certification 160

Software Capability Evaluation 162

Similarities Between Methods 163

The Nature of the Measurement Problem 167

**Eighteen: Societal Implications and Extensions 171**

Probabilistic Measurement 172

Firm Integration Theories 174

The Difficulty of Explaining Cooperation Under  
Assumptions of Pure Self-Interest 178

**Nineteen: A Difficult But Solvable Problem 180**

**Appendix: Interview Methods and Questions 183**

**Glossary 191**

**Bibliography 195**

**Author Index 209**

**Subject Index 211**

# Foreword

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One of the insights that comes early in a reading of Rob Austin's book, *Measuring and Managing Performance in Organizations*, is that measurement is a potentially dangerous business. When you measure any indicator of performance, you incur a risk of worsening that performance. This is what Rob calls *dysfunction*.

In order to see why this happens, you need to remember that measurement is almost always part of an effort to achieve some goal. You can't always measure all aspects of progress against the goal, so you settle for some surrogate parameter, one that seems to represent the goal closely and is simple enough to measure. So, for example, if the goal is long-term profitability, you may seek to achieve that goal by measuring and tracking productivity. What you're doing, in the abstract, is this:

measure <parameter> in the hopes of improving <goal>

When dysfunction occurs, the values of <parameter> go up comfortingly, but the values of <goal> get worse.

You probably understood long ago that dysfunction was a possibility, but thought—as we did—that it was nothing more than a rare, freakish anomaly. But as Rob pursues the subject with persuasive thoroughness, it gradually begins to dawn on you that dysfunction is not an exception to the rule; it is the rule: Anything you measure is likely to exhibit at least some dysfunction. When you try to measure performance, particularly the per-

formance of knowledge workers, you're positively *courting* dysfunction.

Our first real understanding of dysfunction came from reading Rob's Ph.D. thesis. The thesis arrived at our offices over the transom (Tom had been interviewed for Rob's research project a year before, but did not even remember that when the thesis arrived), along with a pile of other hopeful contenders for our attention—brochures, monographs, phone and credit card bills, and a few book manuscripts. We dutifully looked through the first few pages, and then read the rest avidly. Recorded below, in abbreviated form, is the sequence of reactions that each of us had:

*Why does this guy want me to read this thing? . . .*

*I see what he's getting at, but what does this have to do with me? . . .*

*Oh, I think I'm starting to see. . . .*

*Oh, oh. . . .*

*But surely this can't apply to the measurement that I'm doing. . . .*

*Gulp, it does. . . .*

We called Rob for permission to make a few copies and sent them out, first to our fellow Guild members, and then to several influential members of the measurement community. As calls and email messages came back, we found that others were having the same response: "At first, I wondered why you wanted me to spend time on this huge pile of paper; by about page 30, I began to understand. . . ."

When you realize that dysfunction will probably accompany almost any kind of measurement, you're inclined to ask questions like, Why and when is it likely to occur? What are the underlying causes? What are the indicators that it is happening? and, most of all, What can I do about it? Satisfying answers to these and other allied questions were provided by Rob's thesis, but by no other source that we knew of. That made us believe that the work needed to be made available in some more accessible form. We began to encourage and cajole Rob to develop his work into a book. *Measuring and Managing Performance in Organizations* is the admirable result. We believe this is a book that needs to be on the desk of just about anyone who manages anything.

June 1996

Tom DeMarco  
Camden, Maine  
Timothy Lister  
New York, New York

# Preface

---

**F**ew management tools appear as simple and obviously useful as measurement. You establish numeric goals, take actions, and measure how the actions affect progress toward goals. Based on what the measures reveal, you adjust your actions. You continue in this way. Simple. You analyze measurements to determine what works and what doesn't. Despite organizational complexity, you learn confidently, your managerial decisions backed up by hard data. Obviously useful. Right?

Look more closely, however, and this clear picture begins to blur. Soon you find examples of measurement disaster. Look again and you discover startling disagreement among recognized experts about the value of organizational measurement. First, you encounter an expert who claims that measurement is indispensable, a nearly absolute good, almost a miracle cure. Next, you find an expert who concludes that measurement is inescapably harmful, a danger to the survival of the Western world, a seductive trap. Keep looking and you also see that, far from sorting out their differences, disagreeing experts seem to be largely ignoring each other. Your warm feelings of confidence in organizational measurement give way to cold misgivings.

This book is my attempt to sort it all out, to determine which organizational factors allow measurement to work successfully, and which force measurement programs to fail or do damage. Be

forewarned, however: This is not a cookbook. You will not find quick-and-easy answers here. Measurement in organizations is not a quick-and-easy subject, and, as I will show, the idea that measurement is quick-and-easy causes quite a bit of trouble for people who try to implement measurement systems. What you will find in this book, I hope, is a way to deeper understanding of organizational measurement and a framework that will be useful as you consider measurement opportunities in your own organization. I hope that you find these things here, because the foremost goal of this book is to help managers and designers of real systems of measurement.

This book is different from some other books you might have read on measurement or related subjects. Perhaps the most important difference is in its emphasis on the behavioral aspects of measurement situations. There are no technical descriptions of specific measurements here and no details of measurement analysis or graphing techniques. Instead, the focus is on people and how they react when they are part of organizational systems that are being measured.

Another difference between this book and some others is its attention to measurement systems that don't work very well. Some books on measurement so strongly advocate its use that they look almost exclusively at success stories. They profess to tell you how to get it right, but they supply little or no detail about the consequences or likelihood of getting it wrong. Partly, this is because stories of management failures are harder to find than accounts of successes, for obvious reasons: People like to claim credit for successes and forget failures. But you can learn a lot from failure. So, I've worked to find examples of failure and devoted a significant portion of this book to examining the examples in search of a common pattern of failure. Understanding the pattern of failure can help us avoid it.

Yet another way that this book is different is in some of the tools it uses to explore issues surrounding measurement. Some tools used in this book are borrowed from economics, and if you are not an economist you may not have seen them before. I use them because they add value to the discussion by drawing attention to aspects of measurement situations (especially costs) that get left out of many analyses. As these tools are introduced, I

explain them, provide advice on how to interpret them, and try to point out their implicit limitations.

### Three Central Questions

Three questions are at the heart of this book:

1. How should measurement be used to improve the efficiency and effectiveness of organizations?
2. Why do real organizations often use measurement inappropriately, thereby causing measurement programs to fail or do harm?
3. What are the practical implications of the answers to the first two questions?

To answer these questions, I've taken three approaches.

First, I've conducted an extensive review of written materials related to measurement and performance management in fields ranging from economics to management theory to statistics to theater. By drawing on so many fields, we can make use of the special insights available in each. The many references to other source materials in this book, and its extensive bibliography, should assist any reader in search of more information on the subject.<sup>1</sup>

Second, I've constructed a model similar to models used by some economists. The model is a way of capturing the pattern of dysfunction, a mechanism that allows us to vary aspects of a measurement situation and see what happens. As such, it is a way to determine which situations make success possible and which situations make failure inevitable. Answers to central questions are derived primarily from the model.

Third, I've conducted interviews with eight people who are recognized experts in the use of measurement to manage a particular organizational activity: computer software development. The

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<sup>1</sup> Where I've embedded references in the text, I list the foremost authorities first and then revert to chronological order.

content of expert interviews adds richness to this book's recommendations and explanations. The interviews also provide a check on assertions about the current state of thinking about measurement; the check is especially important at points where allegedly common ways of thinking are shown to contain flaws or contradictions. In addition, the interviews permit discovery of expert beliefs that are consistent with the model's explanations of measurement failure—alarming, the seeds of failure seem present in the advice of some experts.

My use of the word "expert" in this book is deliberate, but the word should be interpreted in a specific sense. I call these eight people experts because they are recognized repositories of state-of-the-art knowledge about software measurement—not because they agree with me (some of them don't). The fact that some experts' answers contain elements consistent with what I call a dysfunctional pattern does not mean that they are not experts, or that they cannot add value to a discussion of organizational measurement. So, throughout this book, I use quotes from all of the interviews to help me make points. I see no necessary contradiction or double standard in using the opinions of experts with whom I disagree on some points to make points on which we agree.

Who are these experts? Those who agreed to be identified are

- David N. Card, Software Productivity Solutions
- Tom DeMarco, Atlantic Systems Guild
- Capers Jones, Software Productivity Research
- John D. Musa, AT&T Bell Laboratories
- Daniel J. Paulish, Siemens Corporate Research
- Lawrence H. Putnam, Quantitative Software Management
- E.O. Tilford, Sr., Fissure

One expert wished to remain anonymous and is labeled Expert X when cited or discussed in this book. Names of experts are used throughout except in Chapter Sixteen, where expert answers to specific questions are analyzed and directly compared. Names are omitted in that chapter to prevent the appearance of ranking of experts, which is *not* one of the aims of this book.

Students of software measurement will recognize most, if not all, of these names. People who are less familiar with these experts may wish to know that this group, on average, has produced extensive book, periodical, and conference proceedings publications specifically on the subject of software measurement. Their experience in the software field ranges from fifteen to thirty years, and all have spent much of their careers working on measurement or related issues. These experts are a subset of all such experts in the world, but they are a relatively large subset in this new field. I estimate that there are no more than twenty other experts in the world who would be regarded by most practitioners as being on a par with these.

## **A Strategy for Reading This Book**

Readers of this book will no doubt share an interest in organizational measurement as a management tool. But their deeper motivations may vary. Some will be interested because they need information they can use to improve the performance in their own organization; such readers may be rushing to satisfy specific needs for solutions that work right now. Other readers will be attracted by a general desire for understanding of organizational phenomena; these readers may be less hurried and may value more leisurely exposition and more detailed explanations. Where a reader falls on the spectrum between specific and general interest will influence what he or she gets out of each of the chapters of this book. I encourage you to think about where you fit on this spectrum, and, depending on what you decide, to vary your approach to reading this book. I have advice on how to vary your approach, but first I need to explain how the book is arranged.

This book is organized into nineteen chapters. Chapters One through Three introduce measurement issues, especially issues that surround measurement failure. Chapters Four through Nine

directly address the first of the big questions highlighted above by constructing the model that is central to this book's treatment of measurement in organizations. Chapters Ten through Thirteen address alternative forms of management and some practical conclusions of the model about management styles and the organization of work. Chapters Fourteen through Sixteen turn to the second big question by extending the model to consider why measurement dysfunction arises and persists. Chapters Seventeen and Eighteen explore broader implications of the previous chapters' conclusions. And, finally, in Chapter Nineteen, an epilogue provides some summary thoughts on the book as a whole.

My advice on how to read this book is quite simple. For deepest understanding, read all of the chapters in detail. For a quicker tour with a more practical focus, skim Chapters Four through Eight (which present the details of the model used in this book), and carefully read Chapter Nine (a recap of Chapters Four through Eight). If you are especially pressed for time, read Chapters One through Three ("An Introduction to Measurement Issues," "A Closer Look at Measurement Dysfunction," and "The Intended Uses of Measurement in Organizations"), Chapter Seventeen ("The Measurement Disease"), and the concluding chapter. I suggest this last, very brief route through the book, in part, because I think it will suffice to hook you—to bring you back to the book at a later date, when you have more time available for reading.

## **What This Book Is Not About**

This book does not deal with all important measurement-related issues. As I noted earlier, there is little here on the technical aspects of measuring, analyzing, or graphing specific measurements. Perhaps the most significant topic not addressed here, however, has to do with a moral dimension of the measurement problem. Aside from considerations of efficiency, feasibility, and cost, there are situations in which measurement is not appropriate for ethical reasons. Philosophical questions concerning privacy, fairness, and the like could be addressed in a book on measurement in organizations. But treating these issues adequately would require many more pages. My decision to exclude the

bulk of moral issues from this book reflects my desire to treat capably a manageable slice of the measurement subject; it is not an indicator of how important I believe ethical issues to be.

To people who are interested in the moral aspects of measurement in organizations, I am pleased to report that by the end of this book I have established a case for the importance of ethical behavior purely on efficiency grounds. I show that ethical behavior should be practiced in many organizational contexts not because such behavior makes the world a better place (although that is also a fine reason) but because ethical behavior makes things work better. If there is a single message that comes from this book, it is that trust, honesty, and good intention are more efficient in many social contexts than verification, guile, and self-interest. To some, this conclusion may not seem profound. In my view, questions of the appropriate mixture of selfish individualism and selfless cooperation in a civilized society and its institutions are both profound and of the greatest practical importance.

*June 1996*  
*London, England*

R.D.A.

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**MEASURING AND MANAGING**

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**ORGANIZATIONS**

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# Chapter Three:

## The Intended Uses of Measurement in Organizations

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**B**ecause dysfunction is defined with respect to organizational intentions, any study of it must pay careful heed to exactly what is intended by measurement system architects. Intended uses of measurement can be partitioned into two categories:

- *Motivational measurements* are explicitly intended to affect the people who are being measured, to provoke greater expenditure of effort in pursuit of organizational goals.
- *Informational measurements* are valued primarily for the logistical, status, and research information they convey, which provides insights and allows better short-term management and long-term improvement of organizational processes.

The distinction between the two categories is sharpened by the observation that motivational measurement is, by definition, intended to cause reactions in the people being measured, while informational measurement should be careful *not* to change the actions of the people being measured. Informational measurement must be careful not to affect behavior, because the information conveyed by measures is likely to be most representative of

actual events when people being measured behave as if the measurement system did not exist (Roethlisberger and Dickson, 1939).

Whether measurement is intended to motivate or to provide information, or both, turns out to be very important. In some situations, the two categories of measurement become incompatible. Attempts to force compatibility cause dysfunction. Figuring out what makes measurement work as intended and what makes it fail or cause serious problems begins with a close look at the two categories of measurement.

## **Motivational Measurement**

The motivational use of measurement is familiar to most people in its most overt forms, such as sales bonuses, incentive pay, merit pay, pay-for-performance, or any other attempt to reward strong performance monetarily as determined by an established measurement system. Systems that associate less tangible rewards, such as increased probability of promotion, with measured strong performance, operate on the same principle. Under these systems, people who produce measured outcomes in desirable ranges are rewarded; people who fail to perform according to measurements may be punished (for example, dismissed).

The recent trend is toward more explicit links between measured performance and reward. A 1988 report on executive compensation in financial institutions (Peat Marwick, 1988) revealed that 87 percent of the banks, thrifts, insurance companies, and diversified financial firms surveyed had incentive plans for their executives, compared with 82 percent in 1987. Fully 98 percent of banks used incentive plans. A more recent report by Hewitt Associates, a compensation consulting firm, showed that the number of U.S. companies offering variable pay to all salaried employees increased from 47 percent in 1988 to 68 percent in 1993 (Tully, 1993). Companies now pay more in incentive compensation than in salary increases. In 1993, bonuses and other incentive payments averaged 5.9 percent of base salary, compared with 3.9 percent five years earlier. By comparison, the average raise in 1993 was just 4.3 percent.

Viewed theoretically, motivational measurement is a means of encouraging compliance with prescribed plans of action. An organization establishes relationships with other organizations and with individuals to obtain resources and capabilities needed to execute its plans. These other organizations and individuals do not usually have an inherent interest in the successful execution of the first organization's plan, but they take an interest in exchange for help in meeting some of their own needs or to avoid a worsening of their condition that might be brought about by the first organization. In this way, a group composed of organizations and individuals is bound together by a network of *contracts*, commonly understood formal or informal agreements that specify what is to be done (or not done) or to be provided by each member of the group.<sup>1</sup> Through creation of the network of contracts, the goals of the group's founder are extended to the group as a whole. The contractual arrangements that bind them together can then be said to be *functional*, if they tend to produce results consistent with expressed goals, or *dysfunctional*, if they tend to produce results inconsistent with those goals.

Economists have traditionally regarded the contractual relationships that bind such groups together as simple exchanges. Terms of the agreement are specified initially; when both sides have met their terms, the contract is complete. Contracts may be entered into repeatedly; their specifications may be contingent on outcomes determined by nature (for example, "If it rains more than ten days in April, construction shall be completed by the end of May; otherwise, by May 15"); or they may extend over long periods of time. In each of these cases, functioning of the contract as a prespecified exchange is similar in principle to and little different from any other transaction in which goods are exchanged or purchased. However, as organizational theorists (see, for example, March and Simon, 1958; Pfeffer, 1990) and institutional economists (see Coase, 1937; Alchian and Demsetz, 1972; Williamson, 1975) have pointed out, some arrangements between

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<sup>1</sup> In a slight departure from the usual use of the word "contract," this includes agreements in which one party does not enter freely, as, for example, when a government imposes a requirement on a business firm without consideration (for example, monetary payment).

cooperating parties pose challenges to the notion of a contract as a simple exchange.

The *employment contract*, for example, seems at odds with economists' idealizations. Chester Barnard's (1938) *inducements and contributions* framework, widely cited in explanations of the employment relationship, does have an economic flavor. Barnard argues that inducements given to each employee must exceed what the employee is asked to contribute or else cooperation will cease. The framework is clearly based on the notion of exchange but, in a departure from the usual economic portrayal of exchange, this transaction is not clearly defined or prespecified. The employee agrees not to specific terms, but rather to act in a general way on the employer's behalf, within the "zone of acceptance"<sup>2</sup> of the employee (March and Simon, 1958), in exchange for payment. Contract terms are not fully specified because neither employee nor employer knows in advance what will be required in pursuit of the employer's goal; the employee is expected to exercise discretion. In performing the job, the employee gains job-specific knowledge that the employer does not possess. The ambiguity of contract terms and the private job-knowledge of the employee make it hard for the employer to determine whether the employee is fulfilling his or her part of the contract. Therefore, the possibility of employee opportunism arises. The exchange between employee and employer becomes complicated as terms are ambiguous and verification of contract performance is difficult.

Contracts involved in cooperative work, whether formal employment contracts or another sort, often have verification of performance difficulties. Concerns that the opportunism of one member might undermine achievement of the group goal are common and legitimate. There is a need for the group's leader or leaders to exert influence over group members in a way that causes them to adhere to the spirit of their respective contracts;

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<sup>2</sup> Barnard's actual phrase was "zone of indifference," which is not quite right. Employees have preferences even within their zone of *acceptance*. Preferences within the zone play an important part in explanations of some organizational phenomena (for example, dysfunction). Perhaps this is why James March and Herbert Simon prefer the word *acceptance*.

that is, there is a need for *control* of the group action. Motivational measurements and their associated incentive plans are a response to the need for control. By measuring a group member's performance and explicitly associating rewards with favorable measurements, the group member's incentives are, in theory, brought into alignment with those of the group's leader. The member works harder and in the way desired by the leader. Recall that previously described instances of dysfunction occurred when measurements were faulty, in that the alignment of interests produced was imperfect. Imperfect alignment may result in more effort being expended by employees but in the wrong way. Both the amount of effort expended and how the effort is allocated across task activities are important determinants of the eventual value of the work. In the Blau example, nothing of value can come of employment-agent activities if prospective employers are never contacted, regardless of how earnestly agents devote effort to interviewing prospective employees.

## Informational Measurement

Informational measurement can take two different forms. The first, which might be called *process refinement measurement*, provides information that reveals the detailed structure of organizational processes. Detailed accounts of the internal workings of processes are useful in designing improved processes, thereby making the organization function more efficiently. Frederick Taylor (1916) pioneered this use of measurement. He proposed using organizational quasi-experiments to determine the laws and parameters governing production processes ("Every little trifle—there is nothing too small—becomes the subject of an experiment. . . ." p. 75). In an often cited example, he showed that more total weight could be loaded if a man did not lift his maximum load each time; lifting the maximum load each time reduced the overall rate at which he could lift, thereby reducing the total amount that could be lifted in a day. After Taylor's experiment, loaders of coal and iron ore were given strict orders concerning how much to lift in each shovel, and the result was more efficient loading. In a similar vein, Campbell (1979) proposed designing

government social programs as quasi-experiments with built-in measurements.<sup>3</sup>

The second form of informational measurement, *coordination measurement*, has a purely logistical purpose. Coordination measurement provides information that allows short-term (sometimes real-time) management of organizational flows and schedules. For example, it benefits a print shop to measure its current stores and usage rates of various kinds of paper so that shortages or burdensome inventories can be avoided. Likewise, knowing how far ahead or behind schedule a software project is running can help managers avoid bringing resources to bear too early or too late. In rudimentary form, coordination measurement generates simple warnings or red flags, such as the light that flickers on a car dashboard indicating dangerously low oil levels.<sup>4</sup>

The informational use of measurement in its conceptually pure form is not intended to have motivating effects on workers. Its purpose, rather, is to learn about whatever is being studied or managed. A physicist reading from a voltmeter during a lab experiment is using measurement purely informationally. In such contexts of conceptual purity, measurement has been described as “the assignment of numerals to objects according to rules” (Stevens, 1946, p. 677), “assigning numbers to represent qualities” (Campbell, 1957, p. 267), and, more elaborately, “the establishment of empirical rules of correspondence between a set of empirical objects (A) and a set of numerals (N)” (Grove *et al.*, 1977, p. 220). An often repeated assertion by Lord Kelvin espouses the virtues of purely informational measurement:

When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowl-

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<sup>3</sup> Most experts interviewed for this study recommended such quasi-experimental uses of measurement. David Card described an informational research program in place in his organization that he believes has led to better understanding of processes involved in software production.

<sup>4</sup> Most experts interviewed for this study cited logistical coordination as a legitimate use of measurement.

edge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the stage of science (as quoted in Humphrey, 1989, pp. 3–4).

Proponents of organizational measurement take the claims expressed by Lord Kelvin deeply to heart. Some aspire to a science of organizational measurement; others place great practical store in the power of quantification to reveal aspects of the organizational world. Many posit analogies between measurement in physical and organizational systems. One frequent analogy casts the manager in the role of an airplane pilot guided by organizational measures that are like cockpit instruments. Kaplan and Norton (1992) use this analogy in their paper advocating multiple criteria measurement systems:

Think of [the organizational measurement system] as the dials and indicators in an airplane cockpit. For the complex task of navigating and flying an airplane, pilots need detailed information about many aspects of the flight. They need information about fuel, air speed, altitude, bearing, destination, and other indicators that summarize the current and predicted environment (p. 72).

Several experts interviewed for this book repeated versions of this analogy. Capers Jones also made comparisons to medical diagnosis, stating that just as doctors seeking to explain a patient's ills measure blood pressure and pulse, so should managers seek out organizational ailments by checking flows, rates, and trends. Jones carried the comparison to the point of characterizing some measurement advice as "measurement malpractice."

Outside of the theoretical realm, however, it is nearly impossible to achieve the purity of informational measurement inherent in these analogies. Unlike mechanisms and organisms, organizations have subcomponents that realize they are being measured. Russell Ackoff (1971) draws a careful distinction between organisms and organizations (concisely paraphrased here by Mason and Swanson):

. . . both are purposeful systems in the sense that each can change its goals. The difference is that organisms are comprised of organs that only serve the purpose of the system, whereas organizations are comprised of purposeful subsystems with their own goals (see Mason and Swanson, p. 135).

Organizational subsystems are composed of people, most of whom maintain among their goals the desire to look good in the eyes of those responsible for evaluating and allocating rewards to the subordinate subsystems. The desire to be viewed favorably provides an incentive for people being measured to tailor, supplement, repackage, and censor information that flows upward. Eric Flamholtz (1979) reacts to the extension of purist definitions of measurement into organizational contexts by protesting that

In the context of organizations, the role of measurement is *not* merely a technical role of representation; it has social and psychological dimensions as well. The function of accounting measurement systems, for example, is not merely to represent the properties of “wealth” (measured in terms of “assets”) and “income”; but rather to fulfill a complex set of functions. . . . Accounting measurements are *simultaneously* intended to facilitate the functions of accountability (stewardship), performance evaluation, and motivation, as well as provide information for decision making (Flamholtz, 1979. See also Mason and Swanson, p. 255).

Mechanistic and organic analogies are flawed because they are too simplistic. Kaplan and Norton’s cockpit analogy would be more accurate if it included a multitude of tiny gremlins controlling wing flaps, fuel flow, and so on of a plane being buffeted by winds and generally struggling against nature, but with the gremlins always controlling information flow back to the cockpit instruments, for fear that the pilot might find gremlin replacements. It would not be surprising if airplanes guided this way occasionally flew into mountainsides when they seemed to be progressing smoothly toward their destinations.

## Segregating Information By Intended Use

In the last few words of his above protest, Flamholtz (1979) notes that measurements are intended to provide a basis for decision making. This is true of all measurement categories. Motivational measurement is used to decide whom to reward and whom to punish, thereby providing impetus for workers. Refinement of process measurement is used to decide which processes to redesign and how to redesign them. Coordination measurement is used to decide when to acquire new resources and how to allocate them.

It is important to notice that the distinctions between the categories of measurement reside entirely in distinctions between the categories of the decisions for which they are intended to provide information. Nothing about a piece of information makes it inherently motivational or informational. Rather, it is the way in which the information is used that determines the measurement category. Measuring the progress of a software project and comparing the measurements against planned progress generates information that is probably of interest to someone. But knowing the nature of the information and how it is generated does not permit categorization of the measurement. Something more must be known about the way in which the information will be used. If the reason for measuring is to decide who among project managers should receive the largest salary increase, then the measurement is motivational. If the reason for measuring is to decide how to improve development processes, then the measurement is process refinement. And if the reason for measuring is to decide when more resources should be added to the project, then the measurement is coordination.

Because the category of measurement is not inherent in the information provided by the measurement, information is difficult to segregate by intended use. Difficulty in segregating information yields a consequent difficulty in dictating how measurement information will be used. Information on whether a project is behind schedule can be used either motivationally or informationally, regardless of what was intended when the measurement system was put in place. The designers of a measurement system are usually powerless to guarantee that measurement informa-

tion will be used in accord with their intentions, if not from the moment of the installation then certainly by the time the system has been in place for a while.

People working on activities that are being measured understand that dictating the uses of measurement is difficult and choose their behaviors accordingly. Unless trust between workers and managers is greater than usual in organizations, claims that measurement will only be used in a particular way are not credible. Regardless of official declarations, workers may believe it is in their interest to assume that available information will be used for performance evaluation and begin preparing for that possibility. In preparing for motivational measurement, people being measured will glean information from the design of the measurement system. Ridgway (1956) points out that

Even where performance measures are instituted purely for purposes of information, they are probably interpreted as definitions of the important aspects of that job or activity and hence have important implications for the motivation of behavior (p. 247).

People in organizations have a justifiable interest in understanding what is important to those who make decisions about rewards and punishments. And measurement systems—even those that are supposed to be purely informational—provide some of this understanding.

As has been shown in the examples, dysfunction is a possible result of the difficulty in segregating uses of information. Dysfunction occurs when the validity of information delivered by a system of measurement is compromised by the unintended reactions of those being measured. Unintended reactions become possible whenever measures are imperfect. Recall the hypothetical farm-produce regulation example at the end of Chapter Two; produce ratings were not intended to be evaluative, but, rather, to provide a common language for use by buyers and sellers in talking about fruits and vegetables over telephone lines. The intention of the regulation is coordination, to allow buyers to make purchases based on independently verified grade rather than

based on expensive trips to inspect produce being considered for purchase. The dysfunction arises in such a case because motivational uses of the measurement information are not precluded by the design of the measurement system. The price of some grades is higher, and buyers and farmers react to that fact, regardless of the system designers' intentions.

Note that many measurement systems are expressly intended to serve both motivational and informational purposes. It is common to hear motivational phrases like "improved accountability" intermingled with informational phrases like "better understanding of processes" in justifications of organizational measurement systems. As will be shown, even some experts have these dual expectations of their measurement systems. When systems are expected to perform motivationally *and* informationally, situational characteristics that affect the quality of measures become critical. For many such systems, the phenomena being measured seem far too complex to permit perfect measurement, which in turn seems to imply dire consequences for the systems' prospects of avoiding dysfunction. Unless the latitude to subvert measures can be eliminated (that is, unless measures can be made perfect)—a special case—or some means can be established for preventing certain kinds of information use (for example, if it could be made unthinkable within an organization's culture to use measurement to evaluate people), dysfunction seems destined to accompany organizational measurement. The sense of inevitability in Campbell's (1979) law of corruption of measurement indicators seems justified:

The more any quantitative social indicator is used for social decision-making, the more subject it will be to corruption pressures and the more apt it will be to distort and corrupt the social processes it is intended to monitor (p. 85).

# Author Index

- Ackoff, R., 27–28, 131, 195  
Alchian, A., 23, 96–97, 175–76, 179, 195  
Anderson, E., 95, 195  
Argyris, C., 84, 195–96  
Aristotle, 18–19, 132, 196  
Arrow, K., 17, 178, 196  
Barnard, C., 24, 38, 83, 87, 196  
Basili, V., 112, 196  
Beach, C., 12, 196  
Blau, P., 6, 8, 10–12, 13, 16–17, 25, 37, 39, 53, 74–75, 127, 196  
Boehm, B., 112, 197  
Bollinger, T., 166, 197  
Brennan, E., 14, 197  
Brody, D., 97, 197  
Brooks, F., 103, 111, 197  
Campbell, D., 14, 15, 17, 25–26, 31, 197  
Campbell, N., 26, 28, 197  
Card, D., *see* Subject Index  
Caswell, D., 40–41, 112, 200  
Caulkins, J., 72, 119, 144, 203  
Chambers, R., 38, 197  
Chandler, A., 128, 197  
Chew, W., 3, 6, 7, 39, 197  
Clausing, D., 57, 201  
Coase, R., 23, 175–76, 198  
Crosby, P., 162, 164, 198  
Cummings, L., 16, 198, 202, 203  
Curtis, B., 71–72, 104, 111, 167, 198, 202  
Dawes, R., 72, 84, 87, 127, 132, 140–41, 144, 178, 198–99  
DeCharms, R., 90, 199  
Deci, E., 83, 89–90, 141, 199, 207  
DeMarco, T., *see* Subject Index  
Deming, W., 5, 98, 110–11, 145, 167, 199  
Demsetz, H., 23, 96–97, 175–76, 195  
Devin, L., 113, 199  
Dickson, W., 22, 84, 205  
Drucker, P., 17, 109, 199  
Dukore, B., 19, 196  
Dunham, R., 16, 198, 202, 203  
Eccles, R., 3, 7–8, 39, 69, 71, 72, 199  
Festinger, L., 90, 200  
Fisher, L., 14, 200  
Flamholtz, E., 28, 29, 197, 200, 201  
Fouhy, K., 164–65, 200  
Frank, R., 173, 200  
Frey, B., 89, 90–91, 200  
Friedman, M., 124–25, 200  
Garvin, D., 2, 159, 164, 166, 200  
Gasko, H., 161, 200  
Grady, R., 40–41, 112, 200  
Grossman, S., 176–77, 201  
Grove, H., 26, 201

- Hannaway, J., 14, 201  
 Hart, O., 175, 176–77, 201  
 Hauser, J., 57, 201  
 Hirsh, F., 89, 201  
 Hobbes, T., 171, 201  
 Holmström, B., 32, 37–39, 40, 53,  
     86, 201  
 Hopwood, A., 8, 202  
 Humphrey, W., 27, 71–72, 105, 167,  
     202  
 Ishikawa, K., 18, 40, 70, 73, 105,  
     108–9, 202  
 Jones, C., *see* Subject Index  
 Kadane, J., 125, 202  
 Kaplan, A., 131, 202  
 Kaplan, R., 3, 27, 28, 39–40, 202  
 Kelvin, Lord, 26–27, 202  
 Kerr, S., 16, 202  
 Kohn, A., 90, 202  
 Krugman, P., 174, 203  
 Larkey, P., 72, 119, 125, 144, 202, 203  
 Latham, G., 4, 203  
 Leavitt, B., 86, 103, 203  
 Lee, C., 97, 203  
 Lehman, M., 104, 203  
 Lewis, R., 40, 68, 203  
 Liker, J., 87, 204  
 Likert, R., 84, 86, 99, 138, 204  
 Locke, E., 4, 203  
 McFayden, T., 161, 204  
 McGowan, C., 166, 197  
 McGraw, K., 89, 204  
 McGregor, D., 17, 70, 84, 204  
 March, J., 23, 24, 83, 86, 98–99,  
     116–17, 138–39, 203, 204  
 Marquardt, D., 161, 204  
 Mason, R., 1–2, 27–28, 132, 197, 204  
 Merton, R., 18, 204  
 Milgrom, P., 37–39, 40, 53, 201  
 Musa, J., *see* Subject Index  
 Norton, D., 3, 27, 28, 39–40, 202  
 Orbell, J., 144, 198  
 Osterweil, L., 104, 205  
 Ouchi, W., 17, 38, 84, 85, 98, 106,  
     117, 140, 142–44, 178, 205  
 Paulish, D., *see* Subject Index  
 Peat Marwick Main, 22, 205  
 Pfeffer, J., 23, 205  
 Porter, M., 15, 205  
 Putnam, L., *see* Subject Index  
 Pyburn, P., 8, 69, 199  
 Ridgway, V., 5–6, 7, 8, 17, 30, 70, 205  
 Roethlisberger, F., 22, 84, 205  
 Rohlen, T., 99, 118, 144, 205  
 Ross, S., 32, 86, 205  
 Ryan, R., 89, 90, 141, 199  
 Schmittlein, D., 95, 195  
 Semler, R., 86, 206  
 Simon, H., 23, 24, 83, 84, 98–99,  
     116–17, 206  
 Singer, M., 131–32, 206  
 Skolnick, J., 13–14, 171, 206  
 Software Engineering Institute (SEI),  
     162, 206 (*see also* Subject Index)  
 Stake, R., 14, 206  
 Staw, B., 127, 129, 206  
 Stevens, S., 26, 207  
 Swanson, E., 1–2, 27–28, 132, 197, 204  
 Taylor, F., 25, 108, 207  
 Thompson, J., 83, 207  
 Tilford, E., *see* Subject Index  
 Tuchman, B., 129, 207  
 Tully, S., 22, 117, 207  
 U.S. General Accounting Office  
     (GAO), 166, 207  
 Vroom, V., 83, 207  
 Walsh, T., 161, 204  
 Weiss, D., 112, 196  
 White, L., 13, 207  
 Williamson, O., 23, 87, 95–96, 128,  
     176, 177, 178–79, 195, 201, 203,  
     207  
 Woodward, S., 179, 195

# Subject Index

- A-12 attack plane example, 12, 44, 196
- Aerostyling example, 56
- Agency theory, 8, 9, 32ff., 191
- Agent, 33ff., 44, 45, 48–51, 52ff., 58–65, 66ff., 74ff., 87–89, 92ff., 103, 108–9, 114–17, 126, 128, 131, 133, 137ff., 142, 164, 166–69, 173ff., 191, 205  
(*see also* Disutility; Effort; Self-interest; Utility)
- best-mix path of, 56, 69
- choice path of, 64–65, 78–79
- delegatory management and, 87–89, 93–95, 103
- dysfunction and, 73, 140
- effort capacity, 48, 133–34
- incentives, 66–73, 78–79, 131, 164
- informational measurement and, 114–17
- opportunism, 168–69, 174, 178
- payment, 33–39, 45, 66–67, 69, 75–78
- role of, 33, 44, 74–75, 191
- supervision of, 58–65, 76–79, 92–94, 115–16, 126, 128, 194
- system exploitation, 138–40
- Behavioral science, 8–9, 38, 87, 125
- Best-mix path, 49–51, 53, 56, 75–76, 92–94
- of agent vs. customer, 56
- choice path vs., 64–65, 135
- delegation and, 94, 108–9
- distortion and, 50–51, 78
- full supervision and, 61, 69, 92–94
- partial supervision and, 63, 93–94
- principal and, 66, 135
- unsupervised behavior and, 59–61, 88–89
- Blau employment agency example, 6ff., 11–12, 17, 25, 37, 39, 44–46, 53, 61, 62, 64, 68, 74ff., 127
- Capability Maturity Model (CMM), 162
- Card, D., 26, 70, 112, 118, 122
- Choice path, 64–65, 78–79, 134–35

- Cockpit analogy, 27–28, 122, 173
- Consultants, 158, 160, 163, 164–65, 174
- Contracts, 23–25, 52, 98, 179  
 employment, 24, 203  
 forcing, 34, 52, 53, 61  
 social, 171–72
- Control, 25, 38, 81, 112–13, 127, 128, 129–31, 135  
 internal motivation and, 38, 81  
 physical systems of, 129–31
- Cost-benefit model analysis, 34ff., 54, 66–67, 173
- Criminal justice system example, 13–14, 171ff.
- Critical dimensions, 39–40, 60–62, 68–70, 94, 115, 126, 128, 164, 191, 194  
 cost of measuring, 68, 100
- Culture, 98, 181–82  
 non-attributional, 140–46
- Customer, 44ff., 73, 74ff., 87, 88, 93–94, 108–9, 126, 138, 163–64, 167–70, 192  
 (*see also* Customer value)  
 as arbiter of value, 167  
 preferences for effort allocation, 45–51, 52–53, 56–57, 75, 108  
 principal compared with, 44–45, 167–69
- Customer value, 45ff., 53, 65, 66, 75ff., 88, 93–94, 108–9, 163–64, 167–69  
 agent utility and, 55–56  
 delegation and, 94  
 full supervision and, 61, 126, 134  
 importance of, 44–45  
 incentive system and, 58–59
- Customization, 105–6, 128
- Delegatory management, 87–91, 92–101, 103, 106ff., 112, 123, 135–36, 138, 140ff., 155–56, 177, 192, 193
- converting situation for, 103, 106–8
- costs, 89, 92ff., 102ff., 140ff.
- customer value and, 94
- dysfunction and, 88
- informational measurement and, 123
- Japanese firms and, 142ff.
- leadership and, 107, 140
- measurement-based vs., 89–91, 92–101, 108–13, 135–36, 142ff.
- not recommended, 102–13
- of software development, 155–56
- subtlety of, 107–8, 109
- DeMarco, T., 5, 66, 70–71, 89–90, 105, 110–12, 113, 118–19, 122–23, 128–29, 141, 167, 199
- Deming Award, 165
- Deming's Fourteen Points, 111
- Department of Defense example, 12, 15, 44, 102, 163
- Distortion, *see* Incentive distortion
- Disutility, 34, 52, 59, 63, 67, 87–89, 192  
 from cost of delegation, 89  
 forcing contract and, 52
- Dysfunction, 5ff., 10ff., 21ff., 30–31, 37ff., 42–51, 59ff., 69, 73, 88, 94, 108, 111–12, 124–36, 137–46, 147ff., 157–58, 163, 166–67, 171ff., 180, 185, 189, 192
- Baldrige Award and, 166
- consultants and, 158, 164–65, 174
- cynical explanation of, 126, 137–46, 174
- delegatory management and, 88, 94
- distortion and, 47–48
- earnest explanation of, 125–27, 137, 139, 189
- expert interviews about, 147–53, 157–58

- incentive systems and, 59,  
63–65, 138
- inevitable, 140–46
- management evaluation methods  
and, 163, 166–67
- measurement and, 42–51
- measurement-based manage-  
ment and, 88
- partial supervision and, 64, 69,  
73, 94
- prevented by full supervision,  
61–62, 69, 94
- software development and,  
111–12, 147
- targets of performance and, 94,  
108
- Economic Theory of Agency**, 8,  
32–41
- Economist, The*, 3, 12, 85, 86, 107,  
165, 195, 198, 199, 205, 208
- Effort**, 18, 33ff., 45ff., 52ff., 58ff.,  
66–69, 73, 75–79, 81, 87–89,  
92–96, 108–9, 133–34, 173,  
176, 191, 192–93, 194
- capacity, 48–49, 93, 133–34
- cost of, 33–36, 66–67, 76–78, 89,  
95–96
- customer preferences and,  
45–51, 75
- delegation and, 92–94, 108–9
- forcing contract and, 52
- fully supervised, 60–62, 65, 108
- incentive distortion and, 47–51,  
59, 65, 78
- incentive systems and, 50–51
- internal motivation and, 81
- mix problem, 37–41, 45, 55
- observability of, 35–36, 52–55,  
68, 97, 172–73, 176
- partially supervised, 62–65, 69
- revenue and, 35–36
- unsupervised, 58–60, 61, 64,  
88–89, 92, 194
- Employee**, 4, 24, 98–99, 108–9, 191  
(*see also* Organizational identifi-  
cation)
- accountability, 4, 108
- lifetime employment of, 87, 89,  
99, 107, 142
- performance reviews, 53
- trust, 107, 109
- Environmental covariates**, 97
- Expert interviews**, 147–58, 183–90
- Expert X**, 4, 70, 114
- External motivation**, 81ff., 172, 181
- debasement effect of, 89–90
- internal vs., 81–87
- Full supervision**, 58, 60–62, 68ff., 77,  
80, 92ff., 108, 139, 164, 193
- control vs., 128
- cost of, 70, 72, 95–97, 100, 104, 164
- critical dimensions and, 61–62,  
68, 115–16
- distinguished from partial,  
126–27, 133–34
- distortion prevented, 65, 69
- experts' views of, 152
- incentives and, 152
- internal motivation and, 90
- partial mistaken for, 73, 79,  
126–27, 132
- probabilistic measurement and,  
173
- Harvard Business Review (HBR)*,  
2–3, 198, 199, 200, 201, 202,  
203, 205, 206
- Holmström and Milgrom (H-M)**  
model, 37–41, 42–44, 54
- Human Relations School (HRS)**,  
84, 86, 142
- Incentive distortion**, 17, 47–51,  
53–54, 59, 108–9, 177
- best-mix path and, 60, 61, 78, 93

delegatory management without, 88, 109  
 extra effort vs., 47–51  
 full supervision and, 69  
 partial supervision and, 65, 108

**Incentives**

dysfunction and, 59, 63–65, 79  
 electronics factory example, 143–44  
 experts' views of, 152–54  
 internal motivation and, 38, 141  
 law and, 172, 174  
 organizational model of, 68–73  
 salary increases vs., 22  
 systems of, 35, 50–51, 54, 55, 58–59, 63–65, 66–73, 79, 108, 143–44  
 targets, 61

**Inducements and contributions framework**, 24, 83

**Internal motivation**, 38, 52–57, 81–91, 92, 123, 172ff., 181  
 consultants and, 174  
 delegatory management and, 123  
 external vs., 81–87, 89–90  
 incentives and, 38, 108, 141  
 laws and, 172  
 measurement, 81–91, 181  
 model of, 52–57  
 no supervision and, 58

**International Standards**

Organization (ISO) 9000 Certification, 110, 159, 160–62, 164–65, 200, 204

**Job redesign**, 70, 103ff., 128, 132–33, 135, 137

**Jones, C.**, 27, 70

**Loose-cannon problem**, 119–20, 146

**Malcolm Baldrige Quality Award**, 110, 159–60, 164–66, 200

**Management-By-Objectives (MBO)**, 109–12, 134

**Management**

methods of evaluation, 159–70  
 self-assessment tool, 121–23

**Measurement**

(*see also* Critical dimensions; Dysfunction; Measurement-based management; Motivational measurement)

aggregation, 118–19, 121  
 analogy to physical control systems, 62, 129–31  
 coordination, 26, 29, 185  
 corruption of, 2, 31, 55, 131  
 cost of, 5, 34–35, 66–71, 92ff., 104, 108, 133, 155–57, 164  
 culture, 181–82  
 informational, 21–22, 25ff., 81, 114–23, 151–52, 184–86, 193  
 internal motivation and, 81–91, 173  
 of key area criteria, 40–41  
 lines of code (LOC) example, 112, 117  
 management evaluation methods and, 159–70  
 model of, 42–51  
 optimal investment in, 92, 94  
 probabilistic, 35, 36, 55, 172–74  
 problem, 180–82  
 process refinement, 25–26, 29, 120–21, 128, 185  
 of quality, 18, 67, 72–73  
 redesign for, 103ff., 128, 132, 135, 137  
 reward and, 22  
 as self-assessment tool, 121–23  
 stockholder view of, 2, 15, 139  
 of true output, 18, 38–39, 44, 116  
 of true quality, 18  
 uses of, 2, 21–31

- Measurement-based management, 71, 81, 87ff., 92–101, 102–13, 127, 133, 135–36, 192, 193  
 converting for, 103ff.  
 delegatory vs., 87–88, 92–101, 108–12, 135–36  
 dysfunction and, 88, 146, 163  
 evaluation methods as, 163–64  
 inappropriate practices, 109–11  
 software and, 147
- Metrics, 154, 156–58, 187, 188
- Model  
 assumptions of, 42–44, 55–57, 124–25, 133  
 of organizational incentives, 68–73  
 societal implications of, 171–79  
 summary of, 74–80
- Motivation, *see* External motivation; Internal motivation
- Motivational measurement, 5, 21ff., 29–31, 32ff., 47, 51, 68–69, 114ff., 123, 151–52, 173, 184–86, 187, 189, 190, 193  
 aggregation and, 118  
 experts' views of, 151–52  
 informational vs., 29–31, 114–16, 123, 151–52, 186  
 prevention of, 190  
 probabilistic measurement and, 173
- Musa, J., 118–19
- Naive continuous improvement, 133
- No supervision, 58–60, 62, 67, 68–69, 77, 80, 88, 92, 94, 95, 104, 194  
 delegatory management and, 88, 94, 95  
 measurement cost and, 67, 104
- Organization, 97ff., 106ff., 140  
 firm integration, 174–78  
 incentives model, 68–73  
 intimacy, 106–7, 109  
 measurement in, 2, 21–31  
 public vs. private, 98, 100, 140
- Organizational identification, 38, 84, 87, 89, 95, 97, 140ff., 158, 172, 178, 181  
 consultants' lack of, 158  
 delegatory management and, 89, 95, 97  
 group identity, 142, 144, 172, 178  
 internal motivation and, 38, 84, 181
- Partial supervision, 58, 62–65, 67ff., 72–73, 77, 79, 80, 92ff., 100, 104, 108, 126ff., 133–34, 185, 194  
 dysfunction and, 94, 127  
 measurement costs and, 67, 68, 104  
 mistaken for full, 73, 79, 126–27, 133–34  
 performance targets and, 69, 134, 185
- Paulish, D., 4, 119
- Payment, *see* Agent payment
- Performance, 4ff., 54–55, 97 (*see also* Agent effort; Effort)
- Pluralization of consumption, 103, 203
- Principal, 32–38, 44–45, 48, 52ff., 60ff., 66ff., 74ff., 89, 92–95, 98, 102–4, 115–17, 125–29, 132–36, 137–39, 167–69, 191, 194, 196, 205  
 as agent, 137, 167  
 agent payment by, 33–39  
 cost situations, 76ff.  
 as customer, 44–45, 167–69  
 customer preferences and, 56–57

- cynical explanation of behavior, 137–46
- earnest explanation of behavior, 125, 126–27, 137
- exploitation of system, 138ff.
- forcing contract and, 52–53, 61
- inference problem, 127, 133–36
- management method of choice, 92–95, 103
- mistakes partial supervision for full, 73, 79, 127
- motivational measurement and, 68ff.
- standardization reflex, 127–28, 132–33, 137
- supervision mode of choice, 67, 70, 79–80
- target-setting, 61–63, 65, 67, 69, 73, 116
- Produce standards example, 13, 19–20, 30–31, 44
- Putnam, L., 69, 112
- Quality Function Deployment (QFD), 56–57
- Quantity, mystique of, 127, 131–33
- Red pen example, 120, 141
- Repetitiveness of task, 95, 102, 103, 105, 106
- Ross-Holmström (R-H) model, 32–33, 35–37, 43–44, 52, 54, 86
- Same-value lines, 47–49, 53, 64, 66, 135
- Schwab, C., example, 1, 2, 5
- Self-interest, 83, 84, 126, 138, 140, 141, 178–79
- Semco example, 85–86, 87
- Software Capability Evaluation (SCE), 110, 159, 162–63, 165–67
- Software development, 55–56, 73, 102, 103–6, 111–12, 131, 132–33, 135, 141, 147, 151–52, 155–58, 171–72, 180
- delegatory management and, 102, 155–56
- dysfunction and, 111–12, 147
- factory analogy, 105–6, 108
- job redesign and, 132–33, 135
- measurement comprehensiveness, 151–52
- metrics, 154, 156–58
- standardization, 103, 104, 132–33
- Software Engineering Institute (SEI), 149, 159, 183  
(see also Author Index)
- Software Productivity Consortium, 129ff., 206
- Soviet industry example, 5, 14, 196
- Specification, 103–5, 108, 128
- Standardization, 103, 104–5, 108, 127–28  
reflex, 127–28, 132–33, 137
- Subdivision, 104–5, 108, 128
- Supervision, 58–65, 76–79  
(see also Agent supervision; Full supervision; No supervision; Partial supervision)
- Theory X and Theory Y management methods, 84, 86
- Tilford, E., 70, 72, 110, 112, 114–15, 118, 119–20, 141, 167
- Trans World Airlines (TWA) example, 1–2, 10
- U.S.S. *Omaha* example, 12, 13
- Utility, 34, 55, 59, 63, 87–89, 92, 93, 133, 192, 194
- Weimar Republic census example, 119, 141
- Word processor example, 169–70