The Logic of Failure:
Implications for Record-Keeping by Organizations
Owen Ambur, February 23, 2003

In *The Logic of Failure: Recognizing and Avoiding Error in Complex Situations*, Dietrich Dorner says, "It appears that, very early on, human beings developed a tendency to deal with problems on an ad hoc basis" since the tasks facing our prehistoric ancestors were "problems of the moment and usually had no significance beyond themselves." (p. 5)

The implication is that ***human beings are not naturally "wired" to create and use records***, which document occurrences in the past and help us recognize patterns that may portend problems in the future. Instead, we are tuned to react to the stimuli thrust upon us at each instant. On the other hand, the fact we are no longer in the prehistoric phase of the life cycle of humankind attests to the power of records to enable us to alter the future course of history, for better or worse, including its impact upon ourselves and the organizations in which we participate. Power is accompanied by responsibility. In human systems affecting multiple people, responsibility *should* be accompanied by *accountability*, and accountability requires records having the attributes outlined in ISO 15489.[1]

The failure of organizations to build records management capabilities into their business and decision-making systems is the root cause of the waste, fraud, and abuse generated by those systems – particularly by those who have attained positions of power within the organizational hierarchies, as well as other "insiders" who have special expertise and authority to manipulate those systems. For those folks, the lack of sound record-keeping systems is an opportunity for self-gratification, aggrandizement, and personal profit. Unfortunately, for the rest of us, it is the root cause of failure to uphold the common interests of the larger community.

If you read beyond these opening paragraphs, the implication is that you are motivated to use this record to advance the state of your own knowledge and perhaps help overcome the logic of failure in human systems. Barring evidence to the contrary, the assumption is that your desire is to do good rather than harm to yourself and others. Hopefully, you will also be motivated to do whatever you can within your own sphere of influence to insist that the organizations in which you are involve use electronic records management systems that meet the underlying requirements, as outlined in ISO 15489 and specified in U.S. Department of Defense standard 5015.2.[2]

Dorner begins to build the basis for his thesis by citing claims that we "... have a strong tendency to visualize when we form hypotheses about the world and events that take place within it" and "our minds therefore have great difficulty grasping problems that cannot be visualized." (p. 6)

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[1] ISO 15489 is available at http://www.naidonline.org/links/ISO_15489-1.pdf

[2] Additional information on ISO 15489 and DoD Std. 5015.2 can be found, respectively, at http://www.naa.gov.au/recordkeeping/rkpubs/advices/advice58.html and http://jitc.fhu.disa.mil/recmgt/

On the other hand, he asserts:

> Real improvement can be achieved ... if we understand the demands that problem solving places on us and the errors that we are prone to make ... Our brains are not fundamentally flawed; we have simply developed bad habits. When we fail to solve a problem, we fail because we tend to make a small mistake here, a small mistake there, and these mistakes add up. (p. 7)

Contributing to the sum of failure, Dorner notes: "... ***real-world decision-making processes are rarely well documented, and it is hard, if not impossible, to reconstruct them. Reports on real processes ... are often unintentionally distorted or even intentionally falsified***." (p. 9, emphasis added) In short, individuals and organizations generally do not create and maintain adequate records. Often they even take steps to "cover their tracks" by altering and/or destroying records.

Furthermore, Dorner asserts: "***Failure does not strike like a bolt from the blue; it develops gradually according to its own logic***." Thus, he suggests we can learn to deal with it, particularly since "***People court failure in predictable ways***." (p. 10, emphases added) Some of the ways in which we do so include:

- acting without prior analysis of situations,
- failing to anticipate side effects and long-term repercussions,
- assuming the absence of immediately obvious negative effects means that correct measures have been taken,
- being blinded to emerging needs and situational changes by over-involvement in ongoing projects, and
- being prone to cynical reactions. (p. 18)

Dorner says the first obvious difference exposed by his research is that good decision-makers make *more* decisions than the poor decision-makers. (p. 21) In other words, they are more sensitive to subtle changes and act upon them more aggressively.[3] As Dorner characterizes the behavior of subjects in his research: "… good participants acted 'more complexly.' Their decisions took different aspects of the entire system into account, not just one aspect." (p. 22)

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[3] In *Sources of Power: How People Make Decisions*, Gary Klein addresses the differences between the way experts versus novices make decisions in naturalistic situations. Briefly, he says the difference is that experts have a greater base of experience upon which to notice patterns, as well as the omission of elements that normally would be present in a decision scenario. Contrary to popular belief and training dictum, he says people do *not* routinely compare options and select the best one. Instead, they visualize implementation of the first option that occurs to them and, if it seems likely to succeed, they act upon it.

More specifically, he says:

> The ***good participants differed from the bad ones … in how often they tested their hypotheses. The bad participants failed to do this. For them, to propose a hypothesis was to understand reality; testing that hypothesis was unnecessary. Instead of generating hypotheses, they generated "truths"***… the good participants asked more *why* questions (as opposed to *what* questions). They were more interested in the causal links behind events … The bad participants, by contrast, tended to take events at face value and to regard them as unconnected ... good participants dug deeper in their analyses than bad ones did … Bad participants tended to leap from one subject to another, no doubt because they encountered so many difficulties in trying to solve a given problem that they dropped it and moved on." (p. 24, emphasis added)

The clear implication is that ***poor decision-makers don't need records. Indeed, they don't want them – because documenting reality in reliable records risks recognition of contradictions with the "truth" as they "know" it.***

Poor decision-makers simply don't have the time or inclination to deal with the facts. Moreover, having to reconcile what actually happened yesterday with the whimsical flow of disconnected events of today is a needless complication they have no desire to incur. As Dorner puts it: "… characteristic of the behavior of bad participants is a high degree of 'ad hocism.' Even when they do not initiate the change of subjects themselves, bad participants are all too ready to be distracted." (p. 25)

Paradoxically, even though good decision-makers make more decisions, Dorner observes "… ***the innovation indices of the good participants are generally lower and the stability indices higher than those of the bad participants" because "the good participants focused their energies on the right fields of endeavor … and … continued to focus on those fields over time***." (p. 25, emphasis added)

The implication is that good decision-makers are creating a record of which they can be proud and, thus, have no need to "run away from it" by jumping from one ad hoc strategy to another. In addition, the fact that the good performers rated lower on "innovation" calls to mind Albert Einstein's famous quotation: "Genius is 1 percent inspiration and 99 percent perspiration." It is not so important that we come up with *a lot* of *new* ideas as it is that we doggedly pursue *good* ideas.

Yet another notable notion is the admonition to "think globally while acting locally" – in other words, to take effective action within one's own sphere of influence while keeping in mind the broader perspective of how the cumulative effects of our actions, individually and collectively, impact ourselves and others. However, due to the natural and inescapable limitations on our all-too-human minds, that admonition is doomed to become little more than rhetoric unless it is enabled by records having the characteristics outlined in ISO 15489.

With further reference to his research subjects, Dorner notes: "The good and bad participants also

differed in their degree of self-organization during sessions. While the good participants often reflected on their own behavior, commented critically on it, and made efforts to modify it, the bad participants merely recapitulated their behavior. The good participants also structured their behavior to a greater degree." (p. 26) In other words, the poor decision-makers condemned themselves to relive their failures of the past by avoiding the need to reflect upon their own behavior, as a contributory factor to the results being generated. The implication for organizations is that they should implement systems and procedures that encourage, if not require, their employees to reflect upon and accept accountability for their actions and inaction.

A closely related implication is that poor decision-making is *enabled* by the *lack* of structured processes facilitating reflective thought. Consistent with that dynamic, as Dorner notes, it is not surprising that when:

> Confronted with stubborn problems, bad participants were frequently inclined to shift responsibility or blame onto someone else's shoulder... If, the moment something goes wrong, we no longer hold ourselves responsible but push the blame onto others, we guarantee that we remain ignorant of the real reasons for poor decisions, namely, inadequate plans and failure to anticipate the consequences. (p. 27)

The implication is that poor decision-making is enabled by the lack of records sufficiently salient to encourage, if not enforce, accountability and reflective thought.

A corollary is that poor decision-makers are threatened by and, thus, can be expected to resist the use of systems that structure the decision-making process while at the same time creating records to facilitate reflection and accountability. At the very least, such individuals are unable or unwilling to put forth the effort to create such records and manage them effectively so that they can be efficiently used as a basis for reflection.

On the other hand, just because some people make relatively poor decisions doesn't mean they are complete idiots or even unnaturally foolish. Indeed, Dorner says the results of his experiments show "… there is no significant correlation between scores on IQ tests and performance in … any ... complicated problem-solving experiment." However, "It seems likely that the capacity to tolerate uncertainty has something to do with how [the] participants behaved." (p. 27)

Conversely, it seems likely that the capacity to create and use records effectively increases control over and, thus, reduces uncertainty about the course of future events. Why should the future hold any particular fear or uncomfortable uncertainty for people who routinely experience success in creating records of which they can be proud? Those who are accustomed to success view problems as opportunities. They derive pleasure from reducing complexities to actionable steps toward resolution and results.

Of course, in this age of uncertainty, including constant and ill-defined threats of terrorist activity, it is all-too-apparent that many things are far beyond our individual spans of control. However, it is also apparent that it is in our collective interests to do the best we can to specify

the parameters of the threats, based upon the best and most complete records we can obtain and/or generate. Unlike anxiety, fear is not irrational – if it is based upon reasonable estimations of the probabilities of the occurrence of events. In order to resolve anxiety, it is necessary to reduce it to fear, the validity of which can be assessed, preferably based upon records having the attributes outlined in ISO 15489.

A corollary to Dorner's findings is that IQ tests present an unrealistic view of true intellect – unless "intelligence" is defined to *exclude* the ability to efficiently access and effectively apply the records that constitute the collective knowledge and wisdom of humankind throughout our history. Donald Norman says, "It is things that make us smart."[4] If we accept that proposition, it seems stupid to exclude from intelligence assessments the ability to use the very things that make us smart, i.e., records and the technologies by which we can more efficiently and effectively apply and use the knowledge they encapsulate.

Be that as it may, Dorner suggests: "… when someone is reluctant to reflect on his actions, it is hard not to see in such behavior a refusal to recognize one's impotence and helplessness and a tendency to seek refuge in certainty and security." (p. 28) Conversely, even the confidence that comes with experience and expertise may not insulate us from the failure to reflect upon the consequences of our actions. Addressing the Chernobyl disaster as a case in point, Dorner notes:

> … tendency to "oversteer" is characteristic of human interaction with dynamic systems. We let ourselves be guided not by development within the system, that is, by time *differentials* between sequential stages, but by the *situation* at each stage. We regulate the *situation* and not the *process*, with the result that the inherent behavior of the system and our attempts at steering it combine to carry it beyond the desired mark. (p. 30)

Indeed, Dorner suggests that even though the veteran expert operators "may well have known 'theoretically' about the danger of reactor instability, they could not conceive of the danger in a concrete way." Moreover, with respect to their mistaken actions that led to catastrophe, he posits:

> Another likely reason for this violation of the safety rules was that operators had frequently violated them before… as ***learning theory tells us, breaking safety rules is usually reinforced, which is to say, it pays off.*** Its immediate consequence is only that the violator is rid of the encumbrance the rules impose and can act more freely. (p. 31, emphasis added)

In short, rules are commonly violated with impunity because it is possible to do so without being "caught". Violations routinely occur with impunity for at least two reasons: First, the necessary records are not created and made readily accessible and, second, because the margin of safety built into the rules means that violations may not result in failures that become self-evident.

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4 My paper addressing the records management implications of the points made by Norman is at http://ambur.net/smart.htm

Thus, as we gain expertise in any particular discipline, we also learn to violate the rules of the domain. In most cases, we are rewarded for taking such risks. A corresponding result is that the rules themselves are made more restrictive than necessary, to account for the fact they will be routinely violated. In turn, rules may come to be viewed as stupid and/or excessively bureaucratic intrusions on personal freedom.

In other words, the lack of records documenting the offending behavior *enables* such behavior, while at the same time encouraging the establishment of overly restrictive rules. To short-circuit those dynamics and improve not just compliance but, more importantly, system performance, H.J. Harrington asserts with respect to the requirements for quality management systems:

> ... there is one absolute necessity. The Document Control system *absolutely must* be developed and functioning before any other procedure is implemented... [Otherwise] the integrity of the system will suffer, and individuals may lose confidence in the system...[5]

The true stupidity is to design systems that fail to create, maintain, and make readily available the appropriate records – regardless of the particular rules that are supposed to be applied in the business process in question. In turn, it is lazy to craft rules that cannot be enforced because the record-keeping requirements have not been sufficiently specified, much less implemented. Such laxity rises to stupidity if the rules themselves come to be viewed with disdain because they are widely understood to be excessively restrictive.

Of course, it is also true that many rules imposed from the top-down are indeed stupid as well as unenforceable, serving largely to pump up the ego of the folks on top who are feeling the oats of their lofty, legitimized positions of power in organizational hierarchies.[6] In that regard, Charles Fords' assertion is noteworthy: The most important lesson to be learned about the dynamics of deceit is how we use lies to others to deceive ourselves.[7] The story of the emperor's clothes of golden thread also comes to mind.[8] Woe to each and every one of us as we are blinded to reality by the hubris of our own sense of power to retrofit reality as we see fit within our own spheres of influence, however small they might be.

Among the factors Dorner cites as contributing to the faulty logic of each of us, as imperial decision-makers in our own personal and bureaucratic domains, are the following:

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[5] See http://ambur.net/RMmetrics.htm

[6] For discussion of the higher-order illegitimacy of so-called legitimate sources of social power in the cyber age, see http://ambur.net/French&Raven.htm

[7] For additional discussion of the dynamics of deceit and the concomitant implications for record-keeping by organizations, see http://ambur.net/Lies.htm

[8] The tale of the emperor's new clothes and similar stories from other cultures are recounted on D.L. Ashliman's site at http://www.pitt.edu/~dash/type1620.html

- The tendency of a group of experts to reinforce one another's conviction that they are doing everything right, the tendency to let pressure to conform suppress self-criticism within the group … what Irvin Janis identified as ... "groupthink" … (pp. 33-34)

- We must often make do with tentative solutions because time pressure forces us to act before we can gather complete information or outline a comprehensive plan. (p. 40)

- Planners and decision makers may have no direct access, or indeed no access at all, to information about the situation they must address. (p. 40)

Implications include the fact that groupthink lends itself well to the establishment of highly successful self-fulfilling prophesies – so long as the members of the group are sufficiently well insulated from conflicting elements of realty. Toward that end and with respect to the psychology of deceit, Ford notes the likely "emergence of self-appointed mind-guards – members who protect the group from adverse information that might destroy the shared complacency about the decision."[9]

Needless to say, those dynamics are supported in turn by organizational cultures and systems that downplay, if not ignore, the importance of records. Such cultures tend to value tacit and even implicit knowledge more highly than that which is made explicit in records. What matters most in such cultures is what we *think* and "feel" rather than what we truly *know*, based upon reliable evidence. With respect to what we think (assume) we know, Dorner insightfully avers:

> An individual's reality model can be right or wrong, complete or incomplete. ***As a rule it will be both incomplete and wrong,*** and one would do well to keep that probability in mind... ***People are most inclined to insist they are right when they are wrong and when they are beset by uncertainty***... People desire security… And this desire prevents them from fully accepting the possibility that their assumptions may be wrong or incomplete... … ***the ability to make allowances for incomplete and incorrect information and hypotheses is an important requirement for dealing with complex situations***. This ability does not appear to come naturally, however. One must therefore learn to cultivate it. (p. 42, emphases added)

One definition of the term "document" is "data in context." Without context, data is meaningless. Information technologists are highly prone to talk about and focus on "data" rather than documents, as if *substance* is not only unimportant but also somehow *disconnected* from the *technology* processes of interest to them.

Another way of stating the point is that many information technology decision-makers prefer to "toy with technology" rather than to address the information requirements underlying the

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9 See http://ambur.net/Lies.htm

business processes the technology is supposed to be supporting. That dynamic is consistent with Norman's observation that experiential cognition tends to be favored over reflective cognition, because the latter requires effort while the former occurs naturally. Everyone enjoys being entertained but having to think can be stressful.[10] The results of such techno-focused groupthink are predictable. The failure to create and maintain business records in a business-quality manner leads inevitably not only to confusion and ineffective decision-making but also to waste, fraud, and abuse.

Indeed, information systems that focus on "data" rather than documents *enable* waste, fraud, and abuse – because the "data" is subject to manipulation not just by outside "hackers" but even more so by insiders who have the most to gain or lose. Even if we assume those in the positions of power will be honest and forthright in all of their dealings (which Ford implies will *never* occur), Dorner points out:

> Formless collections of data about random aspects of a situation merely add to the situation's impenetrability and are no aid to decision making. ***We need a cohesive picture that lets us determine what is important and what unimportant, what belongs together and what does not*** – in short, that tells us what our information *means.* This kind of "structural knowledge" will allow us to find order in apparent chaos. (pp. 44-45)

The obvious implication is that disembodied "data" must be embedded within the context of documents having the attributes of a "record," as outlined in ISO 15489. Moreover, the relatively unstructured documents that currently contain the vast bulk of business information should be given somewhat more structure, without going overboard and breaching the point of diminishing returns. Equally importantly, important elements of context that are not contained within the "text" of the documents themselves should be captured in *metadata* that is embedded in or reliably linked to documents, thereby comprising a complete record of all of the relevant aspects of the business transaction or knowledge to be shared.[11]

While there is nothing wrong with being entertained and enjoyment is certainly a worthy goal, hopefully, most of us desire more from life than that. Dorner characterizes our desires as "beacons for our actions; they tell us which way to go. When formalized as goals, they play an important role in problem solving."(p. 49) In that respect, he says it is important to distinguish between positive versus negative goals, as follows:

> With a negative goal what it is I actually *want* is less clearly defined than with a positive goal. Negative goals … are therefore often defined in quite vague, general terms: things have to change "somehow"... A general goal … is defined by a single criterion or by a

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[10] See http://ambur.net/smart.htm

[11] The requirements for specifying the semantics (meaning) of metadata are specified in ISO 11179. Extensible Markup Language (XML) provides a standard syntax for structuring information, and myriad communities of interest are working to specify vocabularies of XML metadata elements comprising the meanings commonly conveyed in their business processes.

> few. A specific goal is defined by many criteria; it can be described and conceptualized very precisely. (p. 50)

A specific, positive goal is actionable and leads to results that can effectively measured and documented in records. Indeed, that's why there is a natural tendency to avoid establishing such goals, since individuals and organizations can be held accountable for them. For example, to put the issue colloquially, people would rather talk about the weather than do anything about it. It is more fun to talk about things for which we clearly cannot be held accountable, and it is safer for our egos to avoid entanglement in goals that are specified in measurable objectives for which we are responsible.

In addition to distinguishing between positive and negative goals, Dorner also highlights the difference between general goals and those that are unclear: "Unclear goals ... lack a criterion by which we can decide with certainty whether the goal has been achieved." (p. 50) In fact, goals may be so unclear as to be "implicit" – in the sense that we may not even be consciously aware that we are pursuing them. On the other hand, he suggests:

> the fact that most people's actions are driven by an excessive (or exclusive) preoccupation with explicit goals accounts for a great deal of bad planning and counterproductive behavior. People concern themselves with the problems they have, not the ones they don't have (yet). Consequently, they tend to overlook the possibility that solving a problem in area A may create one in area B. (p. 52)

To offset such risks, Dorner says:

> In setting goals, we must understand these characteristics and know how to manage them. We can often replace one type of goal with another of a different type. For example, an unclear goal can sometimes be clarified into several clear goals. Or an implicit goal can be made explicit... When possible, we should try to convert negative goals into positive goals. (p. 53)

While it may also seem logical to convert general goals into specifics ones, Dorner cautions not to do so prematurely, because "if particular actions are not informed by an overall conception, behavior will respond only to the demands of the moment." To avoid that result, he suggests:

> One way out of this dilemma is to set intermediate goals according to the criterion of maximum "efficiency diversity." ***A situation is characterized by high efficiency diversity if it offers many different possibilities ("diversity") for actions that have a high probability of success ("efficiency"***) ... We can pursue situations of efficiency diversity even when we cannot specify our final goal. (pp. 53-54, emphasis added)

The concept of *efficiency diversity* is particularly pertinent to the development of information management systems in the early stages of their life cycles, before it is known which design may be most efficient and effective. A colloquial expression of this concept is to "let a thousand flowers bloom." In the realm of information technology it is reflected in the architectural design

of widely *distributed systems* that are *loosely coupled* by virtue of compliance with the applicable, minimum standards for interoperability. In turn, to avoid stifling creativity as well as to encourage "buy-in," a premium is placed upon *voluntary* participation in developing and implementing the standards – so long as *interoperability* is the general goal (common vision) toward which everyone is aiming.

Dorner says, "If we want to dispel the unclarity inherent in … complex concepts, we must 'deconstruct' them. We have to take them apart and isolate what we mean *in detail*." (p. 54) Tongue in cheek, he notes, "By labeling a bundle of problems with a single conceptual label, we make dealing with that problem easier – provided we're not interested in solving it ... A simple label can't make the complex nature of a problem go away, but it can so obscure complexity that we lose sight of it. And that, of course, we find a great relief." (p. 55) Deconstructing complex problems takes time and effort. It is easier just to give them a label and "write them off"as if we understand them, particularly when we feel pressed for time. With respect to time pressures, Dorner notes:

> Conflicts between importance and urgency often arise... Becoming conscious of such conflicts is usually all we need to do to resolve them. When we are pressed for time, however, we can lose sight of the importance and urgency of the individual problems … and … revert to "muddling through," focusing on urgent but often unimportant problems and ignoring the truly important ones. (p. 56)

For information technologists, this problem commonly manifests itself in a focus on the technology itself – almost to the exclusion of the business information (records) to be acquired, maintained, and used in decision-making processes, much less to provide accountability for results achieved.

Information technology decision-makers may not even be aware of the disconnect between what they prefer to do (i.e., enjoy doing) versus what the organization needs from them. In that sense their goals are implicit, and Dorner observes: "***…implicit goals. … are dangerous because they go unnoticed at the early stages of a planning process***. They emerge only after we have pursued other goals with which the implicit goals are negatively linked. (p. 57, emphasis added) "Implicit" means unacknowledged as well as undocumented. By definition, documenting goals means making them explicit but that alone is not sufficient. The utility principle of marketing holds that a product or service is valueless unless it is delivered at the time, place, and in the form needed by the consumer.[12] Accordingly, records must be readily available to decision-makers and other stakeholders precisely when, where, and in the form needed to render informed

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[12] In the second edition of their textbook entitled *Marketing*, Zikmund and d'Amico identify five types of utilities that comprise *economic utility*: form utility, place utility, time utility, possession utility, and information utility. Possession utility is created by "conclusion of the sale and transfer of ownership" and information utility results from "promotion to communicate what consumers want to know." (p. 9) It is noteworthy but beyond the scope of this paper to consider how much advertising and promotion fails to tell consumers what they need to know in order to make informed decisions.

judgments. If many of our goals are implicit and thus hidden, perhaps even from ourselves, it next to impossible for them to have economic utility in the decision-making process, except by chance.[13] In addition to our tendency to have hidden goals, failure is also abetted by hapless if not also willful ignorance of future risks. As Dorner puts it: "When we are working on a given problem, we focus on that problem alone and not on problems that don't exist yet. So ***the mistake is less not knowing than not wanting to know***." (p. 58, emphasis added) Needless to say, it is easier to avoid awareness of problems likely to occur in the future if the antecedents leading up to them are undocumented and thus concealed from view. Likewise, prospects for plausible deniability are retroactively enhanced by the lack of records removing reasonable doubt of responsibility.

Dorner suggests we can avoid that pitfall, "Simply by keeping in mind, whenever we undertake the solution of a problem, the features of the current situation that we want to *retain.*" However, he says that is not as simple as it seems because:

> ... ***advocates of progress often have too low an opinion of what already exists... in other words, we don't pay enough attention to what we want to leave unchanged*** … an analysis of what should be retained gives us our only opportunity to make implicit goals explicit and to prevent the solution of each problem from generating new problems … (p. 58, emphasis added)

In particular, we don't take effective action to ensure the records created in our business processes are protected from misuse and alteration, not only by "outsiders" but particularly by "insiders," who may have the most to gain or lose by manipulating our comprehension of the past. The inevitable result is that our records commonly lack the critical attribute of *reliability*, as outlined in ISO 15489.[14]

Information technologists are particularly prone to this error because, by nature, they are looking to advance the state of the technology and therefore tend to downplay the importance of the information. The relatively short life cycle of rapidly evolving technology exacerbates the short-sightedness of technologists to comprehend the importance of longer-term records.

In that respect, Dorner suggests: "A goal that remains unclear, one that is not broken down into concrete partial goals, runs the risk of taking on a life of its own. Without concrete goals, there

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[13] One of the enduring principles of Total Quality Management (TQM) is that the product or service cannot be right if the *process* by which it is produced is not right, except by chance. While we should always keep in mind the intended outcomes, we must focus on the requirements of the process in order to achieve the desired outcomes. High-level decision makers are prone to issuing orders and refusing to be troubled with the details. That tendency is a prescription not only for failure but also for scapegoating of those unfortunate enough to be stuck with responsibility without the necessary authority.

[14] As set forth in ISO 15489, the four attributes of a record are *authenticity, reliability, integrity,* and *usability*.

are no criteria that can be used to judge whether progress is in fact being made." (p. 61) Such is the case with many of the technology investments made by organizations. The record-keeping requirements associated with those systems are not explicitly specified. The technology takes on a life of its own and becomes an end unto itself, rather than merely a means toward more meaningful results in the higher-order interest of the organization as a whole. As Dorner further explains:

> The various phenomena that follow on inadequate definition of too general or unclear a goal develop with a peculiar logic. Inadequate analysis leads first of all to uncertainty. "For some reason" we don't know what we ought to be doing, and so we go out in search of problems. Once we find some, we must then decide which ones we will attack first. If we have no criteria based on the specification of our goals to help us set priorities, we will choose the most obvious problems – or the ones that we already know how to solve. Not only do we then almost inevitably end up concentrating on the wrong problems but we neglect long-term considerations, especially when partial or interim goals capture our attention and displace primary goals. Realizing we are attacking the wrong problems only makes us more uncertain. (p. 63)

On the other hand, Dorner notes that such:

> …repair-service behavior is not totally irrational. It is surely preferable to correct obvious ills than to do nothing at all… Charles Lindblom even recommends this kind of "muddling through" for many situations… Karl Popper argues for pragmatic politics driven not by lofty ideals but by the exigencies of the situation, … (p. 63)

On this matter, Dorner concludes: "What is important … is a proper assessment of the situation. If we can formulate goals in concrete terms, we should; if we can't, then muddling through is better than inaction." (p. 64)

In that sense, his advice captures the essence of the distinction between Total Quality Management (TQM) versus reengineering. Reengineering focuses on radical change in terms of the strategic vision affecting the entire organization, whereas TQM focuses on tactical enhancements (continuous improvement) in each and every component of the value chain in the day-to-day business processes.

Reengineering is revolutionary, whereas TQM is evolutionary. TQM can help to hit the target, but that is of little value if the target is wrong. Conversely, reengineering can help correct the target but that is of little value if the processes in the value chain are poorly conceived and managed. Evolution is natural, continuous, and inevitable, while revolution is exceptional, occasional, and highly uncertain. Revolution is about destroying that which currently exists, whereas evolution is about building upon it.

With respect to potential conflicts among the targets for which we are aiming, Dorner reiterates, "It is especially difficult to reconcile conflicting goals when one of them is implicit and when we are therefore unaware of it." (p. 65) Moreover, he notes:

> Unrecognized contradictory relations between partial goals lead to actions that inevitably replace one problem with another. A vicious circle is commonly the result... The same thing happens when current problems are so urgent that we will do anything to be rid of them. This, too, can produce a vicious circle in which we flip-flop between two problematic situations... When people recognize that they are caught in vicious circles of this kind, they find different ways to deal with them. One of these is "goal inversion'." They give up one goal or even pursue the exact opposite of the original goal. (pp. 66-67)

By definition, vicious circles are "revolutionary," whereas virtuous circles are evolutionary. Virtuous circles are enabled by good record-keeping systems and practices. Vicious circles, including goal inversion, are abetted not only by the lack of records making such dynamics explicit but also by the turnover of decision-makers as they climb the corporate ladder or move on to "other opportunities" in other organizations. Such turnover and lack of records (corporate memory) enables organizations to continue climbing the treadmill without solving real problems and making measurable progress toward desirable outcomes.

Such a regime serves well the interests of the top-level cadre of managers and decision-makers whose lack of interest and skill in creating a record of which the organization can be proud is the very thing that increases the need for their services, and thus the value of the "intangibles" they contribute to the organization. Indeed, the price (compensation) top-level corporate officials have been able to command has grown so large that it is not necessary for them to fail for very long in order to become very wealthy. After all, who but they could perform the "magic" that defies not only recordation but even the comprehension of lesser beings.[15]

If that sounds illogical, it certainly is. As Dorner explains, "Still ***another means of coping when we find ourselves pursuing or having achieved contradictory goals is 'conceptual integration,' or plainly put, doublespeak.***" (p. 67-68, emphasis added) Needless to say, doublespeak is aided by the lack of records rendering the contradictions readily apparent, thereby enabling the emperors to parade proudly and unchallenged. Conceptual integration befits those without clothes, as well as those who consort with them.

Dorner observes, "Another and perhaps even more alarming form of resolving goal conflicts is by way of 'conspiracy theories'." (p. 68) Conspiracy theories are fostered not only by the lack of records whereby the facts of the alleged conspiracy can be assessed but also by the lack of documentation of the theory. That enables the theorists not only to mold the features of the conspiracy to conform to the whims of their own thoughts but also to evolve the theory itself.

In short, conspiracy theorists are free to see and hear whatever they wish, and that is a powerful incentive. As Dorner notes: "… self-protection … need to preserve a sense of our own

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[15] In *The End of Marketing as We Know It*, Sergio Zyman decries this dynamic in the marketing industry. His observation is equally applicable to other disciplines, particularly toplevel management of organizations: "... since we guarded our information so carefully, nobody else knew enough about what we did to know if it was valuable. They just had to take our word for it. Trust us, we said, and they didn't have any other choice." (p. 8)

competence … plays a key role … It is difficult for us to admit to ourselves that, despite the best of intentions, we have failed. Such failure suggests that our understanding of prevailing conditions is inadequate." (p. 69)

Paradoxically, our desire to preserve our egos leads us to fail to create, maintain, and apply records that could improve our understanding of "prevailing conditions" and, thus, reduce the risk of failure in complex situations. In that respect, Dorner notes we often end up treating the symptoms rather than the causes of problems, because we have inadequately defined the goal. He suggests one reason we fail to define goals appropriately is due to "… an insufficient assessment of reality … a reality model that is too crude, too imprecise, or lacking altogether ..." (p. 72) Indeed, he observes that the systemic nature of situations is commonly ignored.[16]

Dorner defines a "system" as "a network of many variables in causal relationships to one another." (p. 73) He suggests it is "wise when correcting a deficiency to consider it within the context of its system" and "considering the system ... means recognizing the different ways the variables can affect one another ..." Among the categories into which he groups such interrelationships are *feedback* (positive and negative), *buffering*, and *critical versus indicator variables*.

He opines, "Negative feedback … means that an increase in one variable produces a decrease in another and vice versa. This kind of feedback tends to perpetuate the status quo." (p. 74) Further, he notes:

> A system incorporating many variables regulated by negative feedback is a *well-buffered system*. It can absorb a great many disturbances without becoming unstable. But in natural systems, the capacities of buffers are usually limited. A feedback system consumes materials or energy, and if either one is exhausted, the system may collapse. (p. 75)

Large bureaucratic organizations are well-buffered systems. The intricacies of their structures are well-suited to negative feedback, and they are reflective of general goals that are widely shared. Thus, bureaucracies are well-positioned to continue consuming resources even though they may be poorly structured to address the objectives underlying the generalized goals.

One indication of the problem is the difficulty such organizations encounter specifying their objectives in measurable terms. So long as the goals remain poorly specified, it is difficult to quarrel with them and/or to hold anyone accountable. The result is that the organization survives for as long as the larger political, social, and economic systems can support it, but it

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[16] In *The Fifth Discipline: The Art and Practice of the Learning Organization*, Peter Senge says: "systems thinking is the fifth discipline. It is the discipline that integrates the other disciplines, fusing them into a coherent body of theory and practice." (p. 12) He defines "discipline" as "a body of theory and technique that must be studied and mastered to be put into practice." (p. 10) The other four disciplines he identifies are *personal mastery, mental models, building shared vision,* and *team learning*.

accomplishes relatively little beyond ensuring its own persistence.

Dorner notes "*critical variables* ... are those that interact mutually with a large number of other variables in the system... if we alter them, we exert major influence on the status of the entire system."

By contrast, "*Indicator variables* are those that depend on many other variables in the system but that themselves exert very little influence on the system. They provide important clues that help us assess the overall status of a system." (p. 75) Currently, in most large organizations, at best, records are used as indicator variables. However, superior performance requires that they become much more "critical" – particularly in complex situations where the risks associated with failure are great.

As Dorner points out, "For reflection … it is essential to understand the relationships between broad and narrow concepts, between the abstract and the concrete. (p. 77) With respect to his research subjects, he asks and responds: "Why do our participants tend to see a bundle of many independent minisystems instead of one overarching system? One reason they deal with partial problems in isolation is their preoccupation with ... immediate goals ..." (p. 87)
In addition, he says:

> Another reason is informational overload... There just doesn't seem to be time enough to worry about problems that are not immediately pressing... To deal with a system as if it were a bundle of unrelated individual systems is, on the one hand, the method that saves the most cognitive energy. On the other hand, it is the method that guarantees neglect of side effects and repercussions and therefore guarantees failure. (p. 88)

Moreover, he observes:

> The fact that reductive hypotheses provide simplistic explanations for what goes on in the world accounts not only for their popularity but also for their persistence. Once we know what the glue is that really holds the world together, we are reluctant to abandon that knowledge … (p. 91)

As the saying goes, "If it ain't broke, why fix it?" If we have already achieved perfect understanding and performance, there is no need for continuous improvement. We are free not only of the burden of change but also the uncertainty associated with it. As Dorner points out:

> ***One excellent way to maintain a hypothesis indefinitely is to ignore information that does not conform to it...*** We are infatuated with the hypotheses we propose because we assume they give us power over things. We therefore avoid exposing them to the harsh light of real experience, and we prefer to gather only information that supports our hypotheses. (p. 92, emphasis added)

In that respect, it has been dictum in the discipline of records management that someone must "declare" a record to be a record in order for it to become one. Such a policy is highly conducive

to the dynamic Dorner highlights. All that is required is to conveniently fail to "declare" records containing evidence contrary to the common knowledge of the group (groupthink).

On the other hand, it is also true, as Dorner writes: "…formation of abstract concepts by means of generalization is an essential mental activity. We could not begin to cope with the multitude of different phenomena we encounter if we did not put them together in categories." (p. 93) "The ability to identify common characteristics in only a few examples of a certain type of thing and then to formulate an abstract concept on that basis is very useful … without this ability we would be overwhelmed by the variety of phenomena we encounter." (p. 94)

Nevertheless, Dorner cautions: "Essential as it is to put aside 'unimportant' features and to stress 'important' ones in formulating classes, the dangers of this intellectual operation are great. A necessary generalization can easily evolve into an overgeneralization." (p. 94) In that respect, he says:

> The more we know, the more clearly we realize what we don't know [and that] probably ... explains why organizations tend to institutionalize the separation of their information-gathering and decision-making branches... The point of this separation may well be to provide decision makers with only the bare outlines of all the available information so that they will not be hobbled by excessive detail when they are obliged to render decisions. (p. 99)

At some point, Dorner suggests that any of us may become frustrated in the belief we can never gain enough information to make a rational choice, in which case:

> We may resign ourselves to total inaction or we may give in to irrationality and base our actions on intuition...[17] We may resort to "horizontal flight," pulling back into a small, cozy corner of reality where we feel at home … Or we may resort to "vertical flight," kicking ourselves free of recalcitrant reality altogether and constructing a more cooperative image of that reality. ***Operating solely within our own minds, we no longer have to deal with reality but only with what we happen to think about it.*** (p. 104, emphasis added)

In what amounts to a requirements statement for records, Dorner observes:

> We rarely have trouble dealing with configurations in space. If we're not entirely sure of what we're looking at, we can take another look and resolve our uncertainty... That is not true of configurations in time. ***A time configuration is available for examination only***

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17 Klein argues that rationality is virtually never used in *naturalistic decision making*. Instead of rationally weighing alternatives, his research shows that people visualize the likelihood of success of the first alternative that occurs to them. Thus, he suggests what is required is to enhance the intuition of experts to recognize patterns, including the lack of events that would normally be present.

in retrospect. (p. 107, emphasis added)

In records management parlance a logically related "series" is a set of records compiled over a sequence of time. ***Records capture snapshots of events in time and render them in space so that we can revisit them to reduce uncertainty***. Expounding further on this point, Dorner points out:

> In contrast to the rich set of spatial concepts we can use to understand patterns in space, we seem to rely on only a few mechanisms of prognostication to gain insight into the future. The primary such mechanism is *extrapolation from the moment*. … those aspects of the present that anger, worry, or delight us the most will play a key role in our predictions of the future... Two factors come together in extrapolation from the moment: first, limited focus on a notable feature of the present … second, extension of the perceived trend in a more or less linear and "monotone" fashion (that is, without allowing for any change in direction). Fixation on the characteristics of the moment brings with it the danger that too much significance is ascribed to present circumstances. (pp. 109-110)

Such short-sightedness is abetted by the lack of records and contributes to what Dorner calls "magical hypotheses," which probably result from overgeneralizations. (p. 134). In addition to magical hypotheses, which are relatively simple and uneducated guesses of the moment, Dorner observed in his experiments a second class of hypotheses that attempt to take time delays into account. Of those he says:

> These sequential hypotheses arise from the "conditionalizing" of simple hypotheses... This kind of "progressive conditionalizing" lets us maintain hypotheses indefinitely, and the resulting structure of hypotheses becomes, of course, ever more complex and ungainly. But this, too, has its advantages. If, for example, a certain sequence of steps does not produce the desired effect that strict adherence to the rules should produce, the complexity of the rules allows us to blame the failure on a mistake we must have made at some point in the ritual. In this way we can continue to believe that our ritual is altogether adequate for solving the problem. All we have to do is execute the ritual correctly. At this point, our actions are almost completely divorced from external conditions. We no longer pay any attention to what is happening in the outside world. All that matters is the ritual. (pp. 135-136)

Moreover, he notes, "… in situations where feedback is not frequent and where the intervals between action and feedback are longer, we can expect ritualizations to wax luxuriant." (p. 136) Thus, rituals are aided by the lack of records providing feedback that highlight the unproductivity of the routine. Indeed, he suggests this dynamic is even more powerful in natural settings because the participants in his experiment:

> ... were working under relatively good conditions. They received running reports ... and could intervene at will. In the real world, systems rarely have such short lag times and rarely provide us with complete information on their behavior over time. This means that the tendencies we observed ... will be much more pronounced in real situations. In the

> real world, people tend even more to overgeneralize from local experience, to ritualize, and to believe that no rationally comprehensible principle is at work … (p. 137)

With respect to this point, Klein's solution would be to ensure that experts are available with sufficient experience and training to make good generalizations, and that is certainly appropriate in many instances. In many other cases, Norman would note that precise behavior is not required in order to achieve adequate, albeit perhaps less than optimal results.

On the other hand, Dawes would point out that failure to consider enough alternatives with sufficient specificity is the cause of irrational behavior, the consequences of which may be severe for many people. The risk is particularly acute in systems that are not "well buffered," such as organizations where those at the top of the hierarchies are free to impose their wills upon others, unchecked by countervailing forces and unaccountable due to the lack of records tying their actions to the consequences.

With respect to buffering and the severity of consequences, Dorner observes:

> In the fields of ecology, biology, and economics, we find systems that are well buffered. They can absorb a lot of abuse. But at some point, too much is too much... 'Catastrophes' seem to hit suddenly, but in reality the way has been prepared for them. Unperceived forces gradually eat away at the supports necessary for favorable development until the system is finally unable to resist any longer and collapses. (pp. 137-138)

The failure to perceive forces eating away at necessary supports is enabled by our native inability to deal with changes over time and supported by the lack of records making such changes explicit.

Based upon research results, Dorner holds out hope that human beings can learn how to deal with time configurations, but he notes the subjects were working under nearly optimum conditions, had only one task to perform, and thus were not distracted from it by other tasks. (p. 143) He cites an example of one participant who learned from his mistakes and altered his behavior quite abruptly. (p. 151) Overall, however, Dorner concludes the native ability of most people to deal with relatively simple time-dependent systems is minimal. (p. 152) On the other hand, he suggests nothing complicated or superhuman is needed to deal with such systems:

> All it requires is keeping a few utterly simple rules in mind: Try to understand the internal dynamics of the process. ***Make notes on those dynamics so that you can take past events into account and not be at the mercy of the present moment***. Try to anticipate what will happen. (p. 152, emphasis added)

In other words, we must *record* the dynamics by capturing time-series snapshots (records) of the process as it transpires and use those records to foster understanding of how it might extend into the future, taking into account additional contingencies.

With respect to anticipating and taking action to affect the future, Dorner distinguishes between two types of planning – forward planning and "reverse" planning – of which he says:

> We plan the way we will actually act – forward. Reverse planning is thus in this sense "unnatural" because we can't act in reverse... But even if we can't act in reverse, we can plan in reverse. We can quite easily consider what conditions would have to prevail just prior to the desired goal in order for us to achieve that goal by means of a specific action. (p. 155)

Although it may be easy to determine the conditions that would be necessary just prior to the desired end state, Dorner points out:

> For reverse planning it is crucial to have a clear goal in mind... ***The fact that goals are often unclear may well explain why people show little spontaneous enthusiasm for reverse planning.*** But even when people do have clear goals and could use reverse planning effectively, they rarely do. (p. 156, emphasis added)

The lack of clear goals may also account in part for the apparent lack of enthusiasm for creating records, the existence of which might make explicit the absence of clarity in goals that are implicit. In turn, the failure to create records enables decision-makers to continue pursuing goals that are unclear, against which success can be claimed regardless of the outcomes achieved.

When goals are unclear, Dorner suggests the efficiency-diversity method is appropriate, i.e., to pursue many paths with high probabilities for success. He argues, "... only if we are completely uncertain about the structure of the problem sector, and thus about the best path to our goal, should we resort to hill climbing, perhaps interspersed with trial and error to counteract the inflexibility of this approach." (p. 158) By "hill climbing," he means taking "only those actions that promise a step toward our goal." (p. 157)

However, as he acknowledges, hill climbing may take us to the top of the wrong peak. Similarly, he points out that *free experimentation* (trial and error) is a fairly primitive method and "poses problems because we often do not realize we are captives of our old ideas and are by no means considering all of the other available possibilities." (p. 159)

Given those limitations, Dorner suggests: "Another way of expanding a problem sector is *culling unsuccessful strategies*. … identify the features that previously unsuccessful approaches to a problem have in common, and then we develop new approaches that do not have these features." Needless to say, that approach requires not only that the strategies themselves are well documented but also the actions taken and the results achieved – which runs counter to the natural inclination of people to avoid creating and using current and complete records.

Among the various approaches to clarifying goals, Dorner posits: "Perhaps the most important method for expanding a problem sector is *thinking by analogy*." (pp. 159-160) In a similar vein, Klein says:

> In trying to understand how people solve ill-defined problems, one strategy is to try to reach the goal while simultaneously trying to define the goal, using failures to define the goal more clearly. There is a second strategy: to find an analogy that suggests the features of the goal. (p. 201)

Again, however, this strategy assumes we have a clear and complete understanding of the features of the analogous goal, which may be unlikely unless it is fully and accurately documented. In short, planning by analogy relies upon record-keeping by someone else. In any event, regardless of the planning strategy employed, Dorner says scope is important:

> The difficulty of finding the correct scale for planning accounts for many failures. The more uncertain we are, the greater our tendency to overplan, for example. In a situation we find threatening to begin with, we try to foresee all possibilities and make allowances for every conceivable mishap. This approach can have ruinous consequences. (p. 163)

Moreover, as Dorner notes:

> Looking closely at a problem often increases our insecurity, and a retreat into a minuscule but detailed planning process can help us feel we are applying the full force of our rational powers to the uncertainty of the situation while letting us put off the evil day of action – after all, we have to plan carefully before we act. (p. 164)

That is particularly true if we can fail with impunity to take action, since lack of action creates no records establishing our accountability. It is far more difficult for others to hold us responsible for inaction than for actions that create evidence of our culpability. In addition, overplanning protects our egos from the risk of self-realization of failure, as Dorner observes:

> ***Because planning only involves imagining our actions, we are essentially free from the irksome conditions of reality, and nothing prevents us from simply ignoring the conditions necessary to carry out an operation. Since we human beings tend to think in the abstract anyway, ignoring those conditions comes quite easily.*** (p. 166, emphasis added)

In short, not only does the act of documenting our plans force us to think more concretely about realistic courses of action but it also exposes our plans to scrutiny by others. However, if our plans are complex and broad enough in scope that no one, including we ourselves, can truly understand them in terms of actionable steps, we are able to reach the state of nirvana where we are free to live in our imaginations without being held accountable in reality.

On the other hand, thinking concretely may force us to resort to overly simplistic notions. Dorner quotes biocyberneticist Ludwig von Bertalanffy, "Oversimplifications, progressively corrected in subsequent development, are the most potent or indeed the only means toward conceptual mastery of nature." In that respect, Dorner observes: "Experts see things in much more differentiated form … and for that very reason they may overlook other perspectives." (pp. 168-169)

Dorner suggests that experts may be deconditioned to alternatives as their actions become automatic. Accordingly, he argues "experience does not always make us smart. Experience can also make us dumb..." if the result is "methodism – the unthinking application of a sequence of actions ..." (p. 170) He notes:

> ***Methodism is likely to flourish in those situations that provide feedback on the consequences of our actions only rarely or only after a long time. In particular, if our plans apply to a field in which we rarely act, our planning gradually degenerates into the application of a ritual.*** (p. 172, emphasis added)

Rituals may be essential to the cohesion of large bureaucracies and societies as a whole but, at the same time, they may be pernicious to the long-term health and well-being of individuals and organizations – which in turn can threaten the stability of the broader social order. The desire for stability in the larger society must be counterbalanced by the more specialized interests of individuals and organizations.

In that respect, Dorner introduces two relevant concepts – *elaboration* and *conditionality*. Elaboration is the specificity with which a goal as well as the measures for achieving it are described. Conditionality is the extent to which the planner determines which conditions have already been met versus those which still need to be created in order to achieve the goal. (p. 173)

Societies, nations, and large bureaucratic organizations are goals unto themselves to the degree that they already exist, and thus the conditions for their creation have already been met. However, they may be sorely lacking in elaboration of the goals and means by which they are serving the needs and interests of their stakeholders. Moreover, their ability to continue to exist may be dependent upon the degree to which they can avoid creating and exposing records documenting the goals and methods that are implicit in their actions.

Lord Acton said: "Power tends to corrupt and absolute power corrupts absolutely. Great men are almost always bad men."[18] However, part of the explanation for the truth of that statement is implied in the thought that "character is what you do when no one is looking."[19]

Those in positions of power are often able to wield it without exposing their actions to the scrutiny of their "subjects". In that sense, absolute corruption may not be a function either of unique character flaws in our leaders or of power itself so much as it is in the power to hide and distort the record of one's actions. Indeed, it is a fairly well accepted notion that leaders must be free to act secretively in the best interest of their followers.
It seems likely the power to act without creating and exposing the record of one's actions is the

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[18] Lord Acton's authorship of this thought is documented at http://phrases.shu.ac.uk/meanings/22900.html

[19] This statement has been widely used, e.g., by the Boy Scouts of America and former Oklahoma Congressman J.C. Watts. See, for example: http://www.quapawbsa.org/parent/ and http://www.geocities.com/Athens/Forum/6330/2001/a010513.html

root cause not only of absolute corruption but also lesser variations of it. At least one might wonder why anyone of good character might feel the need to hide his or her actions from others who might care to have a "look" at them.

One might also assume a connection between good character and good decision-making, and in that respect Dorner observes:

> … good problem solvers favored expressions that take circumstances and exceptions into account, that stress main points but don't ignore subordinate ones, and that suggest possibilities. … the bad problem solvers used "absolute" concepts that do not admit of other possibilities or circumstances. (p. 175)

Perhaps there is a connection between absolute power and absolute concepts that tends to blind leaders to other alternatives. Perhaps such a connection might be strengthened by the insecurity of the leader's position in the organizational hierarchy. In that respect, Dorner suggests:

> ***The person whose insecurity motivates him to ignore conditions will probably know or at least suspect it. And he will consequently tend to avoid translating his plans into action because that would make their inadequacies apparent.*** (p. 176, emphasis added)

Needless to say, such a person is also incentivized to avoid creating or maintaining records documenting his insecurities. Dorner says: "In fact, ***people look for and find ways to avoid confronting the negative consequences of their actions***. One of these ways is 'ballistic behavior'." (pp. 177-178, emphasis added) Ballistic behavior is that which, once launched, will lead inevitably to results that are beyond further control of the actor. Of such behavior, Dorner says:

> It is clear that as a general principle behavior should not be ballistic. ***Because our grasp of reality can only be partial, we have to be able to adjust the course of out actions after we have launched them; analyzing the consequences of our behavior is crucial for making these ex post facto adjustments.*** (p. 178, emphasis added)

In organizational settings, being able to make *ex post facto* adjustments requires not only clear records of the interim results being achieved but also of the actions that caused them. However, Dorner observes a powerful dynamic working against the requirement for records:

> ***If we never look at the consequences of our behavior, we can always maintain the illusion of our competence.*** If we make a decision to correct a deficiency and then never check on the consequences of that decision, we can believe that the deficiency has been corrected. We can turn to new problems. ***Ballistic behavior has the great advantage of relieving us of all accountability.*** The less clear a situation is, the more likely we are to prop up our illusion of competence with ballistic behavior. ***Such behavior reduces our sense of confusion and increases our faith in our own capabilities.*** (p. 179, emphases added)

Continuing on that theme, Dorner notes: "... activity may foster an illusion of competence. By intervening ... a person demonstrates his competence, his ability to take the situation in hand ... Conversely, someone who feels obliged to demonstrate to himself or to others a competence he believes he does not possess may well yield to resignation." With respect to the ethical implications, Dorner suggests that crises and loss of confidence cause people to act more ballistically and aggressively in the belief that "ends justify means," paying less attention to moral standards. (pp. 181-182)

Finally, Dorner says, "... we can protect and maintain our competence by an 'immunizing marginal conditionalizing' of our measures." By that, he means we absolve our actions from responsibility for adverse results by assuming exceptions to generally prevailing rules. In other words, we reason that our action would normally have achieved the desired results except for "... certain limited conditions that are unfortunately prevailing just at this moment ..."[20] (p. 182)

Moreover, he notes: "***If feedback on the consequences of our actions comes rarely and is of a kind that can be easily ignored, immunizing marginal conditionalizing is a marvelous method for dispelling all doubts about our competence***." (p. 183, emphasis added) Needless to say, the conditions for such rationalization are facilitated by the lack of clear and explicit records. However, if there is any doubt about which is more important – records or our sense of self – the implication of his observations is clear with respect to which will prevail, at least among those who are action-oriented:

> ***Preserving a positive view of one's competence contributes significantly to shaping the direction and course of our thought processes. When we are asked to act, we do so only if we feel at least minimally competent to do what is asked of us.*** We need to feel that our actions will ultimately be successful. Without some expectation of success, we are unlikely to act at all and will rather resign ourselves to letting fate take its course. ***We often redirect our thinking from our actual goals to the goal of preserving a sense of our competence. This act of self-protection is essential to maintaining a minimum capacity to act.*** (p. 188, emphases added)

Thus, as Dorner observes, it is not surprising:

> Many shortcuts and omissions in thinking that we may attribute to an effort to economize can also be interpreted as self-protection. If we develop a reductive hypothesis and see everything as dependent on a central variable, we not only make things easier, we also derive the reassuring feeling that we have things under control. Without this simplification, we might find ourselves afloat on a sea of data and interrelationships that are far from easy to analyze, and being at sea is not a pleasant feeling. Forming simple hypotheses and limited the search for information shortens the thought process and allows

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20 This observation calls to mind the wry assertion: "Just because you're paranoid doesn't mean they're not really out to get you." In short, as long as the record is unclear, we are free to believe whatever we wish. No one can tell us otherwise.

a feeling of competence. (p. 188)

On the other hand, besides oversimplification, he reiterates that over-planning is another defense mechanism:

> Our tendency to pursue planning, information-gathering, and structuring processes that go on interminably can also reflect a need for self-protection. If excessive planning and information gathering keep us from making contact with reality, reality will have no opportunity to tell us that our measures aren't working or are all wrong. (p. 188)

Dorner also points out that methodism may be motivated by self-protection:

> Rather than think about the specific demands on a specific situation … and rather than discover that the schemes for action we have ready to hand are not applicable, we prefer to assume that the new problem is of an old, familiar type that we have solved frequently in the past. This assumption makes us feel secure – we see that we can cope with the situation. Then if we actually have to do what we've planned, we can avoid confronting any errors – or the simple fact that our action had no effect at all – by acting ballistically. We will simply refuse to look at the consequences of our actions. (pp. 188-189)

Additionally, he notes: "Another proven means of protecting our sense of competence is to solve only those problems we know we can solve. If we solve the problems we can and avoid the ones we cannot, we reinforce our sense of competence." (p. 189)

In an observation that highlights the importance of mental aids, what Norman calls "cognitive artifacts," and what might commonly be called "records," Dorner sums up his observations on the causes of failure:

> ***The slowness of our thinking and the small amount of information we can process at any one time, our tendency to protect our sense of our competence, the limited inflow capacity of our memory, and our tendency to focus only on immediately pressing problems – these are the simple causes of the mistakes we make dealing with complex systems***. (p. 190, emphasis added)

While it may be impossible and even undesirable to change human nature, as Norman has asserted, it is things (cognitive artifacts) that make us smart. In that respect, records and records management systems can help us overcome the limits of our mental capacities, including our tendency to focus on the impulses of the instant. Indeed, Dorner observes that personal intelligence, even genius, is not sufficient. Instead, he notes: "… the ability to deal with problems in *the most appropriate way* is the hallmark of wisdom rather than of genius." (p. 193)

Toward the objective of increasing wisdom, Dorner suggests, "Thinking about our own thinking – without any kind of instruction – can make us better problem solvers." However, "***In more complicated situations ... unstructured reflection on our own thinking may be disruptive, make us uncertain, and so produce negative results. … instruction, too, can fail to achieve its***

purpose when the situation is complex. (p. 195, emphasis added)

In other words, no amount of personal reflection or expert assistance to cram additional information into our heads may be sufficient to offset the lack of records appropriately capturing the essential elements of the problem and helping to structure our thinking about it.
Indeed, with respect to training, Dorner says his experiments have shown that it may give trainees a false sense of competence that is not reflective of their actual performance. Regarding that result, he asks and posits:

> Why did the participants who had been "treated" with certain procedures think this essentially useless training had been somewhat helpful? The training gave them what I would call "verbal intelligence"… Equipped with lots of shiny new concepts, they were able to talk about their thinking, their actions, and the problems they were facing. This gain in eloquence left no mark at all on their performance, however. Other investigators report a similar gap between verbal intelligence and performance intelligence and distinguish between "explicit" and "implicit" knowledge. The ability to talk about something does not necessarily reflect an ability to deal with it in reality. (p. 196)

Talk is indeed cheap. Effective action is far more difficult, and it is not surprising that people may prefer to have their performance judged on what they say rather than the actual record of their actions.[21] Likewise, in addition to avoiding judgment by others, it is not surprising that we may be uncomfortable reflecting upon our own performance, particularly if it is thrust "in our face" in the form of cold and unfeeling evidence of our actions and inactions.

While computers are certainly unfeeling and may be perceived as cold, Dorner asserts they can provide opportunities for reflection. (p. 196) In a related line of reasoning, Norman notes: "Prior to the computer ... records might be scattered all over the world, and to research any given question would take years, enormous energy, and vast sums of money." (p. 182) Now, he asserts, "It is easy to keep a record of individual actions…" (p. 183) Such electronic, computerbased records can indeed provide a ready source for reflection – provided we have the wisdom and courage to use them for that purpose.

Aside from the potential to use computers to create and reflect upon records of reality, Dorner highlights their utility for planning and simulation: "A planning decision-making scenario simulated on a computer may be less complex than one in the real world, but it has the great advantage of letting us run our experiments on fast-forward and so of bringing us face to face with our mistakes." (p.197)

He suggests such simulations can be used as training exercises, from which: "We can learn that it is essential to state goals clearly." He says, "We all know we should do that, but we rarely encounter the necessity." Moreover, he notes, "We can learn how to adapt information gathering to the needs of the task at hand, neither going into excessive detail nor stopping too short." (p.

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[21] Among those in positions of power, parents are particularly prone to the notion that their charges should "do as I say and not as I do."

197)

Ultimately, Dorner suggests, "There is only one thing that does in fact matter, and that is the development of our common sense." (p. 198) Yet, in contradiction to that assertion, he reiterates:

> Temporal configurations … often seem beyond common sense. … we do not give adequate attention to the characteristics of processes that unroll over time. ***What we did yesterday is lost in the obscurity of the past, and what we ought to do tomorrow is in utter darkness. We human beings are creatures of the present.*** (p. 198, emphasis added)

Thus, it is important to bear in mind not only Norman's assertion that "it is things that make us smart" but also Schacter's seven sins of memory.[22] It has been said that common sense is not common at all, and to suggest that it might be sufficient for dealing with complex, time-sensitive problems seems to defy reality, if not also common sense.

Be that as it may, Dorner concludes with an important observation and an earnest recommendation relative to play acting to prepare ourselves to deal more effectively with reality:

> Mistakes are essential to cognition. But when we are dealing with complex systems, it is hard to pinpoint our errors... As a result, ***mistakes made in handling demanding situations tend to teach us little of value***... Make-believe has always been an important way to prepare ourselves for the real thing. We should use this method in a focused manner. We now have far better tools for this purpose than we have ever had before. We should take advantage of them (p. 199, emphasis added)

No doubt, highly realistic simulations are a cost-effective means of training experts to deal with complex technology and circumstances. Indeed, realistic simulations and the technology supporting them are the very kind of "things" (cognitive artifacts) that Norman says make us smart. In that sense, simulations are implementations of the abstractions of reality that are captured in records.

Ultimately, however, simulations are no substitute for technology that delivers the information we need to learn and make well-informed decisions, in real business processes, in real time. Avoidance of failure in complex situations requires that we design systems that take advantage of our natural perceptual talents by bringing to our attention precisely the records we need at the exact moments when we can most effectively apply the lessons they convey.

Anything less amounts to an organizational failure, the seriousness of which is merely a matter of degree. In large measure, the logic of failure is the self-defeating logic of the protection of our fragile egos. The irony is that such short-sighted, ego-protective behavior leads to the failure to

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[22] For a discussion of Daniel Schacter's seven sins of memory, see http://ambur.net/MemorySins.htm

compile, analyze, and use records and thus contributes to our impotence to determine our own fate.

In the final analysis, to extent that failure in complex systems may be avoidable, the failure to use records effectively to learn from the past condemns us to suffer realities that we have enjoined ourselves from facing until the instant they are thrust upon us. That may be consistent with the nature of our being, but it we have it within our power to do better than that. The question is whether we have the will and wisdom to do so.