

A FAILURE

I

R&M Machinery had for years provided XYZ with sophisticated equipment and reliable repair service. XYZ returned a failed piece of equipment. A meeting was held which included Archie Hunter, a representative from XYZ; Norm Nash, R&M's returned goods area representative, and, Walt Winters, an R&M engineer intimately acquainted with the kind of equipment XYZ had returned.

Norm Nash represented R&M's "official position": the piece of equipment is all right. However, during the course of the meeting it becomes apparent to Walt Winters that the problem has to be R&M's. He suspects that the equipment was not properly tested out by R&M, and that it failed because of an internal problem.

Should Walt say anything about this in the presence of the customer, or should he wait until after the meeting to discuss this with Norm Nash?

II

Walt keeps silent during the meeting. After the meeting he talks with Norm about his diagnosis. He suggests they tell XYZ that the problem is R&M's fault, and that R&M will replace the defective equipment. Norm replies, "I don't think it's wise to acknowledge that it's our fault. There's no need to hang out our wash and lessen XYZ's confidence in the quality of our work. A 'good will' gesture to replace the equipment should suffice."

R&M management decides to tell XYZ that they will adjust to the customer's needs "because you have been such a good customer all these years." Although R&M replaces the equipment at its own expense, it does not tell XYZ the real nature of the problem.

Discuss R&M resolution of the problem. Should R&M's way of handling the problem be of any concern to Walt Winters at this point, or is it basically a "management problem"?

III

Many engineers eventually move into management positions. If Walt Winters moves into management, what lessons, if any, might he take with him from the above situation?

[Prepared with James Jaksa.]

COMMENTARIES

Kenneth L. Carper

The fundamental moral concept of honesty is at stake in this case study. Norm Nash, representing the position of management, has made the decision to deny the possibility of a defective product. This decision has been made on the basis of public image and ignores the technical opinion given by Walt Winters, one of the firm's engineers.

Winter's silence is probably appropriate in the first meeting with the client. His position is one of technical support, not public relations. Also, his suspicions are not yet confirmed, and a preliminary contradiction of Nash's statement is unwarranted. Winters is correct in raising his objections directly with Nash following the

meeting with the client.

Norm Nash's reaction is unfortunate. Walt Winters should be distressed by this reaction. His first move should be to disassemble the equipment to confirm his diagnosis, if possible. If the evidence supports his hypothesis, he should then press Nash vigorously to deal honestly with the client.

While this one experience with one executive may not be indicative of the attitudes of all management executives in the corporation, Winter should observe corporate management decisions carefully for other moral deficiencies. The expression that this is merely a "management problem" of little concern to technical staff can lead to serious consequences. If management decisions routinely overrule factual technical information, placing public relations over honesty, the stage has been set for potential moral disaster. There are many examples from all engineering disciplines. One well-documented case is the Morton Thiokol treatment of the events leading up to the Challenger Space Shuttle accident (Boisjoly 1987).

One puzzling question comes to mind: What is the cost of honesty here? The relationship between R&M and XYZ is firmly established, based on years of reliable service. An honest admission of equipment failure will not damage such a relationship. Confidence is built, not destroyed, by honesty and integrity. This client is left with unanswered questions: Is this an equipment deficiency? Is it an installation problem? Has the breakdown occurred due to operator error or improper maintenance? These unanswered questions may lead to suspicions. Unanswered questions are far more likely to undermine client confidence than an honest admission of potential manufacturing defects. And Nash has already agreed to replace the equipment at no cost to the customer. What possible economic cost could honesty demand beyond this?

It is precisely the lack of economic cost that makes this case so disturbing. The lessons for Winters, potentially a future manager, are clear: If honesty can be compromised in such a trivial instance, why should one insist on integrity when the costs are high? Honesty is not always this inexpensive. Sometimes it costs a great deal. When the stakes are high, surely it will be easier to dismiss moral commitments.

The image of infallibility cultivated by managers like Nash, and their unwillingness to admit fault leads to unrealistic expectations by clients. When failures do occur, society is unprepared for the consequences.

The concept of risk is not at all well understood by the public (Martin and Schinzinger 1989). Instead of providing assistance in understanding this concept, many engineers and managers like Nash have encouraged unrealistic expectations by their attitudes. The public has become more intolerant of failure and more suspicious of the technical experts who are unable to deliver the promised risk-free society.

In fact, the very foundation of engineering design is based in trial-and-error experience. The state-of-the-art cannot be advanced without failure (Petroski 1985). The implication of a condition where failure does not occur is that technology is not advancing. When products do not fail once in a while, one must conclude that they are inefficient and overdesigned.

Technical professionals and product manufacturers have a clear ethical responsibility to communicate honestly about failures, thus contributing to the safety and reliability of products and the advancement of engineering design practice (Carper 1989, 1986, Gnaedinger 1987). Admittedly, this communication has been greatly hindered by the expanding litigiousness of contemporary American society.

Finally, some additional questions ought to be considered. It has been noted that the cost of honesty is very small

in this case. What if the anticipated cost were higher? What if XYZ were a new prestigious client, with no established business relationship? An honest admission of fallibility might destroy the relationship in its infancy, with implications for many employees of R&M. What if the equipment failure had resulted in great economic losses to XYZ, as products and other equipment may have been damaged by the failure? What if serious injuries, or even deaths, were caused by failure of this equipment? Should the actions of Nash and Winters be any different?

Do these more serious consequences and potential costs create an intrinsically different moral situation, or is the situation merely made more complex by the legal implications? Does the fear of litigation dictate the appropriate moral response?

Unfortunately, the example provided by Norm Nash gives Walt Winters very little to encourage principled moral reasoning.

Suggested Readings:

1. Boisjoly, R. M. 1987. "Ethical Decisions: Morton Thiokol and the Space Shuttle Challenger Disaster," presented at the Winter Annual Meeting, American Society of Mechanical Engineers, Boston, MA, December 1318.
2. Carper, Kenneth L., ed. 1989. Forensic Engineering, Elsevier Science Publishers, New York, NY, pp. 131, 347348.
3. Carper, Kenneth L., ed. 1986. Forensic Engineering: Learning from Failures, American Society of Civil Engineers, New York, NY.
4. Gnaedinger, John P. 1987. "Case Histories: Learning from Our Mistakes," Journal of Performance of Constructed Facilities, American Society of Civil Engineers, New York, NY, Vol.1, No. 1, pp. 3547.
5. Martin, Mike W. and R. Schinzinger 1989. Ethics in Engineering (2nd edition), McGrawHill, Inc., New York, NY, pp. 106142.
6. Petroski, Henry 1985. To Engineer is Human, St. Martin's Press, New York, NY.

Michael Davis

Part of being a good professional is making distinctions. This is a case that calls for distinguishing between lying, deceiving, and merely failing-to-reveal. Lying is much more likely to be morally wrong, all things considered, than is deceiving; and deceiving, more likely to be morally wrong than just failing to reveal.

To lie is to state as true what you do not believe, intending that the person to whom you are speaking (or otherwise signaling) will believe what you say. To deceive is to try, by whatever means, to get someone to believe what you do not believe. To fail to reveal is to do nothing when you could provide information that would change what another believes. Lying is a kind of deception; deception, in part a failing to reveal.

We have a general moral obligation not to lie. Excusable lying is rare; justified lying, rarer still. We also have a general moral obligation not to deceive, but both excusable and justifiable deception is more common. The reason for this difference is that too much lying would make communication impossible, while too much (non-

lying) deception would simply make us more wary where we could not get assurance in words. Even in war, this distinction is important. For example, while feigning retreat to trick an enemy out of its fortifications is morally permissible, using a flag of truce to do the same is not. The flag of truce preserves the possibility of communication between enemies. War would be crueler if a flag of truce meant nothing. The cruelty would, on balance, benefit no one. Not everything is fair even in war.

In contrast, failing to reveal is not necessarily morally wrong even where lying or deceiving would be. We have no general moral obligation to tell all or to correct the misconceptions of others. Indeed, failing to reveal is morally wrong (all else equal) only when we have undertaken to reveal what we do not reveal (for example, by contracting to warn) or when the harm to be prevented is great relative to the cost of revealing the information (for example, where a word would keep someone from walking off a cliff).

So, keeping silent is not deceptive just because XYZ might benefit from hearing what Winters is thinking. How much one should open one's thinking to others is a matter of judgment, taste, and convention. Some customers want "only the facts" while others want to participate in the fact finding as well. Some engineers like the give-and-take of thinking together. Others don't want to talk until they know. We recognize much latitude in such matters. "Privacy" is the word we most often use to invoke this recognition. Winters is under no moral (or professional) obligation to express his "suspicions".

Acknowledging fault under the circumstances is, however, another matter. While ordinary people are not obliged "to hang out their wash," engineers are. According to the NSPE's Code III.1.a., engineers "shall admit and accept their own errors when proven wrong." So, if the mistake were Winters', he could not keep silent. He would have to tell XYZ at the first opportunity.

Of course, the mistake in question is not Winters' (or Nash's) but someone else's at R&M. So, Winters is under no obligation to speak up. No one's health, safety, or welfare is at stake; and, so long as no one asks him what happened, nothing in his relationship to XYZ could reasonably lead its representatives to misinterpret his silence. The same would be true of Nash if, as is likely, he too is an engineer.

The letter to XYZ explaining the credit adjustment presents a different problem. If (as suggested) the adjustment was made because R&M made a mistake, the letter, as written, states as true what is in fact false. R&M (apparently) wants XYZ to believe what R&M knows not to be true, that the credit was given (primarily) for one reason when it was in fact given (primarily) for another. The letter seems to include a lie.

That lie cannot be justified (or even excused) on grounds of business necessity. XYZ may well see through it, reducing its trust in R&M. Even if XYZ does not see through it, the lie probably will not benefit R&M. In the short run, the lie saves the people responsible from public embarrassment, but R&M is unlikely to get any business because of that. In the long run, customers are likely to realize that R&M routinely covers up its mistakes. Its lies will become useless. Indeed, they will probably become worse than useless. They will reduce communication between R&M and its customers. R&M may lose its customers' help in tracking down and correcting problems. Why help if all you ever hear from R&M is that it's not their fault but they'll reimburse you anyway? So few R&M customers are likely to find such defensiveness attractive that the practice of not "hanging out the wash" seems certain to hurt R&M in the long run. And, in business, the long run is seldom more than a decade.

Winters might want to think about the problem from another angle: what should a faithful agent or trustee of R&M do when R&M's longterm interests are at stake? Nash may be thinking about R&M, or he may be

thinking about his own cousin down in Quality Control. The manager who eventually wrote to XYZ may know the whole story or only what Nash told him. Nash (for whatever reason) may not have told his superiors everything. People are not necessarily more open with superiors than with customers. Like water, information does not flow upward without help. The lying letter may have been the work of ignorance, not cunning.

So, though Winters may think of himself as trespassing on management's prerogatives, he probably should check with superiors to see how official "the official position" really is. I would not be surprised if he found that, while Nash honestly thought he was doing what his superiors wanted, they wanted no such thing. Instead, they had not really thought the matter through yet and now, hearing a different opinion, have begun to rethink a practice that had grown up without anyone noticing.

If this turns out to be so, Winters will have learned at least two lessons he should take with him into management. The first is that he should not emphasize the distinction between management concerns and engineering concerns. The most likely effect of such emphasis is to bottle up in engineering information a manager would like to have. The second lesson Winters might take with him is how easy it is for a large organization unintentionally to put its agents in a situation where they believe the organizations wants them to do things it in fact does not want them to do.

I have so far been assuming that R&M Machinery is not an engineering firm, that is, a firm with engineering in its title or owned primarily by engineers. An engineering firm, like an individual engineer, would have a positive obligation to admit its errors (just as individual engineers do) and an obligation to make sure its employees understand that.

Joseph Ellin

I

In the course of a meeting with the customer XYZ, R&M engineer Walt Winters understands that failure of a part was the fault of R&M, probably due to insufficient testing. Should he blurt out this insight then and there? No, one should not talk about internal company problems in the presence of the customer. Call a recess, or wait. Walt's insight is confidential to R&M, and might embarrass them and cost them money and customer confidence. Wantonly damaging your own company is not appropriate behavior.

At the same time, what is left on the table is that R&M, through Norm, has asserted that the equipment is fine; which it isn't. Perhaps Walt should have called a recess in order to persuade Norm to abandon this position, if not expressly, at least implicitly. The engineer has the responsibility to see that management does not repeat errors, even if they might not confess to having made them.

II

Walt says nothing, and R&M people work out a solution with XYZ without admitting any fault. The solution presumably satisfies the customer, so it's not clear why R&M should have to go further. Nor is there any indication that XYZ is harmed in some way by R&M's failure to confess error. XYZ is free to draw their own conclusions about what went wrong; if they want R&M to tell them, then can make further inquiries. Nothing is to be gained at this point by Walt going further than management wishes to go. Candor is fine, but at times serves no purpose and can be counter-productive.

III

The lesson Walt might learn is that honesty is one thing, discretion another. Here R&M used discretion in not revealing something they weren't asked about. No harm is done, the client is satisfied, and presumably R&M was prepared to be more candid if asked.

Can Walt learn anything from negotiator Norm's stonewalling by stating R&M's 'official position' that R&M wasn't at fault? Apparently Norm believes in playing 'hardball,' and Walt doesn't. But the case doesn't give enough information about this. Does 'hardball' lead into an adversary relationship which is ultimately detrimental to both parties? Is hardball necessary to avoid legal problems, or to get a better position should there be a legal dispute? Was it really necessary for Norm to go out on a limb and adopt an 'official position' which turned out to be mistaken, and which potentially could have been embarrassing for R&M to retract? In a sense, R&M is lucky that XYZ hasn't pushed matters further. They are also lucky that the failure was not of such a nature to cause XYZ serious problems, or R&M might have had the obligation to confess their error voluntarily. Walt might learn something about this from this case, but evidently there were no further consequences so maybe he didn't.

Carl Hilgarth

I

XYZ returned a failed piece of equipment to R&M Machinery, the manufacturer. At a meeting with Archie Hunter, the XYZ representative following the return of the failed piece of equipment, Norm Nash represented R&M's "official position": the piece of equipment is all right. It was during this meeting that Walt Winters, an R&M engineer who was intimately acquainted with the kind of equipment XYZ returned, suspected that it was not properly tested out by R&M and that it failed because of an internal problem.

Without data to substantiate his suspicions and since he is not R&M's "official" representative at the meeting, Walt could not conjecture in the presence of the customer. But, he can suggest to both Norm and Archie that since there are two positions regarding the returned equipment, that Norm arrange for engineering to examine it and schedule a followup meeting to present and discuss the findings. Archie will probably agree to this. Hopefully Norm's "official position" has enough leeway for him agree, too. After the meeting Walt should discuss his suspicions with Norm and arrange to examine the equipment.

II

After the meeting, Walt talks to Norm about his diagnosis suggesting R&M tell XYZ that the problem is R&M's and that they will replace the equipment. Norm replies that he doesn't think it wise to acknowledge the failure is R&M's fault, hang out our wash (that our failure to properly test out the equipment resulted in an internal failure), and lessen XYZ's confidence in the quality of our work when "a 'good will' gesture to replace the equipment at our own expense should suffice." This is strange logic as it implies there was something wrong with the equipment R&M originally supplied.

Subsequently, R&M management decides to adjust the problem by replacing the equipment because XYZ "have been such a good customer all these years" but not tell them the real nature of the problem. Again, the implication is that there was something wrong with the equipment R&M originally supplied.

Is R&M's fear of losing its reputation for quality and reliability the root cause of Norm's "official position" in

representing management regardless of any factfinding to protect our reputation at all costs? Or is it the converse. In either case, why didn't management ask for engineering's analysis? Don't they want to know what, if anything, is wrong with the equipment? Don't they realize that engineering can analyze equipment failures and improve quality and reliability? Don't they recognize the value of longstanding business relationships and the years invested in establishing them? Aren't they aware of or concerned about what Norm Nash is saying or doing on their behalf? And by whose authority does he represent the company's "official position"? Are they aware this failure could be repeated in the replacement equipment provided to XYZ? What will Norm Nash's "official position" be then? What will XYZ think about R&M? And, what will R&M's equipment replacement policy be when a company who hasn't been such a good customer all these years encounters a problem with equipment of its manufacture?

Since R&M's business and reputation is based on supplying sophisticated equipment and reliable repair service, its management should be concerned enough about any product failure. This concern should be demonstrated by the returned goods area representative who should use engineering to examine any returned equipment and report on its condition. Since R&M's policy seems to be to replace defective equipment in any event, there is nothing to lose and everything to gain by being "straight up" with XYZ and other customers in telling them the nature of an equipment problem. R&M also benefits by being able to improve their equipment designs.

This episode should concern Walt because if the resolution of this problem is not handled as a coverup, it comes very close. If you have a good supplier relationship as R&M does with XYZ, why jeopardize it. You can acknowledge the failure, and that the failure resulted from not testing the machine properly. Engineers learn from failures. Maybe the failure occurred because R&M did not fully understand a some aspect of the equipment's use at XYZ.

Also in deciding to replace the equipment because XYZ has been a such a good customer all these years borders on hypocrisy. To XYZ, R&M is a supplier. And, XYZ can go elsewhere with its business. In representing R&M's "official position", Norm creates a problem that makes an honest resolution difficult.

III

What was really an engineering problem at R&M became a management problem because of the "official position" taken by Norm and management's decision to see it Norm's way. They have placed the firm's reputation with XYZ at risk. The lessons for Walt as he moves into management are:

- o The integrity of business and customer relationships must be preserved through honest communications.
- o Prepare a position description that includes the typical duties, responsibilities, and qualifications of the returned goods area representative.
- o Institute a policy of having all equipment returned because of a failure, unsatisfactory performance, or any other reason examined by a team comprising the returned goods area representative and the engineer most knowledgeable about the equipment.
- o After examining returned equipment, meet with the customer to review the findings and present the proposed remedy based on the findings. Thus a failure that is an engineering problem should be handled and acknowledged as such.

If XYZ has been such a good customer, then R&M must be a good and honest supplier. In this case, by agreeing to replace the equipment, R&M did not use good judgement or honestly solve the problem.

Ted Lockhart

I

For Walt not to say anything at all would suggest that he agreed with Norm's views. However, to disagree openly with Norm in the meeting would undoubtedly embarrass Norm, who might perceive Walt's actions as disloyal both to him and to R&M. A compromise course of action would be for Walt to ask for a short recess in the meeting so that he could confer with Norm and inform him of the change in Walt's views about the failed equipment. Such a request would probably catch Norm by surprise and place him in the position of having to choose between defending a false position or reversing his views about the source of the equipment problem. However, this seems a less undesirable state of affairs than to be contradicted by Walt directly during the meeting. For Walt not to say anything at all until after the meeting would constitute his participating in the promulgation of false information and would not be adequately justified by any ethical considerations, such as loyalty to employers. Therefore, the most reasonable course of action for Walt is to ask for a brief recess in order to confer with Norm.

II

The course of action that Norm is recommending may produce the best overall consequences if the equipment failure is highly unlikely to reoccur in the future and if R&M's openly accepting fault would cause XYZ to purchase inferior equipment from R&M's competitors in the future. Perhaps Norm believes that this is what would probably occur. However, if XYZ is firmly convinced that the equipment failure is R&M's fault, then for R&M to continue to refuse to acknowledge this fact may well antagonize XYZ, even with R&M's 'good will' gesture. From the information given, it is difficult to say how XYZ would react to R&M's taking the negotiating position that Norm is recommending, but it is probably safe to assume that neither Walt nor Norm would be very certain what XYZ's reaction would be. What is certain is that the course of action that Norm is recommending is deceptive and dishonest. In the absence of ethical considerations adequately supporting Norm's recommended course of action, Walt's view that R&M should be open and honest about the equipment failure in its discussions with XYZ is the reasonable position.

The problem is, of course, a "management problem" in the sense that R&M management must decide what to do. However, since Walt is being asked to go along with and support Norm's judgment it is also his problem, and for Walt automatically to defer to Norm in this matter without considering the ethical ramifications of such a deferral would be for Walt to fail to act autonomously.

III

Engineers who move into management should realize that engineers' dissenting from management's views on technical matters as well as on business matters is not uncommon and that for management to expect and to insist that engineers not take any position on any issue that is incompatible with management's position on that issue violates engineers' autonomy and conflicts with engineers' obligations to be objective and truthful. Engineering managers must recognize that engineers' dissenting from other engineers' views and from management's decisions is not unusual and that it is unreasonable to expect blind obedience from them.

Engineers can reasonably be expected to be judicious in choosing the ways in which they express their dissent, but they should not be expected to express it only when and how management chooses.