

IT Relationship Management: Four Early Warning Signs of Breakdown

by Michael Mah and Douglas Stone



Introduction

Ed Yourdon

Lawyers and courtrooms are probably the last things your average IT manager would think about during a typical systems development project. There are exceptions, of course — managers involved in negotiating a contract with a customer for the development of a system generally get to see some of the language describing the legal ramifications of a project failure. But in the atmosphere of optimism and goodwill that typically accompanies a project launch, the “divorce clause” portion of the contract is often overlooked.

Unfortunately, it’s becoming more and more common to see IT projects end in expensive lawsuits. Indeed, some of the larger contract development firms are likely to spend more money on litigation than they do on coding. And the consequences are greater than just a large figure for legal expenses in the corporate P&L statement: inevitably, software-related litigation means that high-level IT executives, mid-level project managers, and lower-level technical specialists are dragged into the courtroom to explain their role in the dispute. Nobody wants a lawsuit, but if it’s a likely occurrence, then the project manager should plan for it.

An important perspective on software litigation is provided by Michael Mah and Douglas Stone. They suggest that instead of thinking about IT projects solely as “transactions” in which certain deliverables are created by the project team and delivered to the customer, we should also think of such projects in terms of *relationships* between two parties who often have different cultures, different interests and priorities, and different patterns of problem solving and communication. All of this can lead to conflict and disputes, and as Messrs. Mah and Stone remind us, “When disputes are handled

poorly, parties revert to seeking justice and judgment, often through arbitration or litigation.” Thus, while Mah and Stone would almost certainly agree with traditional advice for avoiding litigation — that is, “Do good work, and keep reasonable records” — their article focuses instead on managing critical relationships and dealing with the early warning signs of potential relationship breakdown. It’s worth noting, by the way, that these skills are *not* the sort of thing that most IT project managers are trained in.

Having worked as an expert witness myself, I can tell you from personal experience that all of the advice in this month’s issue is valuable. Vast sums of money, not to mention emotional anguish and unfulfilled expectations, could have been avoided in these cases if both parties had paid careful attention to the kind of advice that Mah and Stone have offered here. I can only hope that you take the advice seriously, and that it helps you avoid an unpleasant lawsuit at the end of *your* next project.

Ciao,

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by Michael Mah and Douglas Stone

In today's e-economy, time is bending all the rules. Corporations across all industries face strategic inflection points, those described by Intel Chairman Andy Grove as "the time in the life of a business when its fundamentals are about to change."

A growing number of organizations are facing the challenge of change through outsourcing and partnering to enable themselves to focus on their core competency and accelerate time to market. A common view of outsourcing is that it is a transaction or series of transactions. While that may be true to an extent, it also involves the creation of a set of intra- and inter-industry relationships.

And whenever new relationships are created, conflict almost always results. Corporate cultures may intersect or conflict, some interests are likely to be divergent, and patterns of problem solving and communication are often different at best. Time pressures amplify these problems. A conflict that can be managed and resolved given enough time might explode when harsh deadlines are imposed.

Among the companies that succeed in today's modern economy will be those that manage their strategic relationships the best. While core competencies will differ

from organization to organization, relationship management must be a core competency for *every* organization. The costs of failure in this domain are high. Conflict consumes energy, saps creativity, and destroys teamwork. When disputes are handled poorly, parties revert to seeking justice and judgment, often through arbitration or litigation. Conflict escalates, and, all too often, everyone loses — except perhaps the lawyers.

This article is about managing critical relationships and successfully recognizing and dealing with the early warning signs of potential relationship breakdowns.

SOFTWARE AND I.T. HAVE NEVER BEEN EASY

Consider the following:

- **Demand for technology is insatiable.** Studies show that backlogs for IT projects in about 75% of corporations today run six months to two years [3].
- **IT productivity and staffing can't keep up.** Shortages of IT professionals combined with limits in process improvement can't keep up with demand. Hence the backlogs.
- **Overruns continue.** High demand creates conditions ripe for overpromising. Projects are late, often because of the wishful thinking that marked the initial deadline.
- **Outsourcing is booming.** Estimated at about \$100 billion worldwide in 1999, outsourcing is expected to grow 50% in three years. Companies are doing partnering deals at an incredible pace [2].
- **Litigation is on the rise:** Disputes are epidemic. A Cutter Technology Council Business Technology Trends and Impacts "mega trend" estimates

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that some companies will spend more on litigation than software coding on many IT projects. (Or maybe it's just that lawyers charge a lot more for their time than programmers.) [1]

FOUR EARLY WARNING SIGNS

Outsourcing and partnering are here to stay. And so is conflict. The only question is, is litigation? That depends entirely on the choices of the parties as to how they manage their relationship. Below are four early warning signs that indicate that you could be at risk.

Warning Sign #1: Shotgun Weddings

We begin with a dynamic that establishes structural flaws in a relationship at its very onset. You would never marry someone (we hope) with a predetermined deadline, rushing the deal after a few dates. Yet companies do exactly that when they get it into their heads to sign a deal "by the end of the month," believing they will fix the contract exhibits after the wedding.

There are many reasons why this happens. In some cases, outsourcing is a euphemism for downsizing or cutting costs, which some consider an "old economy" model of outsourcing, compared to the "new economy" view of outsourcing as "partnering for speed." In a cost-cutting scenario, we have to be very careful about balanced scorecards and service levels involving IT productivity. It would be foolish to expect no negative impacts on time to market in a downsizing environment. Both parties need to make their expectations clear; the vendor must resist the temptation to overpromise, and the client must avoid indulging unrealistic hopes.

In other scenarios, outsourcing is a euphemism for staff augmentation to

accelerate time to market. A client hires a supplier to address the applications backlog by bringing in skilled staff to build the clients' projects.

When conflicts happen here, it often is rooted in the ambiguity within the initial contract because of a rush to sign the deal. Later on when things sour, it usually involves clients who accuse suppliers of breach for delivering less than promised functionality late, over budget, and/or with unacceptable reliability. Suppliers often accuse clients of having changed the scope beyond the initial contract and claim that the requirements were either ambiguous or late.

The truth is that both sides contributed to the problem. They engaged in a contract where a firm price and a firm delivery date were agreed to for a project that was not firm in its definition. Neither side had an effective handle on metrics, management, or requirements practices.

In sum, the time pressures from shotgun weddings cause a lack of thought, making for a sloppy deal. This in turn lays the groundwork for false expectations from which accusations of breach emerge. Assuming that the shotgun wedding has already occurred, the question is what to do about the consequence (aside from not repeating another shotgun wedding on the next deal!).

What You Can Do Now

In the staff transition situation, both sides need to have real conversations about balanced scorecards and service levels that reflect reality. It is dangerous to your relationship to hope for "Internet speed" results in an environment of staff reduction. If the parties do not discuss this adequately, there will be a tendency to deploy systems too soon and with poor reliability in order

to make the service levels. This sets up tension, and someone will feel exploited. The fact is that both parties contributed to the problem because of a rushed contract with structural problems around expectations.

Part of the solution also will involve making the client understand how an outsourcer makes money. An outsourcer, after a staff transition, has the same costs of that staff, and it has to do the same work and make a fair profit, while producing the same level of output (one hopes). The only way this can occur is through the use of more productive software processes, which does not always occur immediately. However, this can be accelerated if the partners tackle process improvement as a joint interest. In this way, both the client *and* the supplier stand to gain.

On projects for hire, both parties have to jointly solve the problem of scope, early on and throughout the project, to manage the promises and the expectations. This is about negotiation that is multiphased. It needs to be part of the ongoing dialogue on promises and expectations. Yet most organizations aren't formally trained in integrative bargaining, and they need to be.

If there are already disputes about scope, what was not discussed during the promise phase has to be discussed as soon as possible. Differences over "what happened" will arise. Rather than slip into blame about how you got into this situation, both of you will need to constructively negotiate an outcome based on a mapping of individual interests — both the client's and the supplier's.

This mapping requires two things. First, there must be a joint proficiency in the subject of metrics, benchmarking, and project

estimation. The structural issues around project scope, cost, schedule, and reliability, and how they relate to contractual terms and service levels, have to be adequately resolved. Second, both sides should develop skills in negotiation. In cases where a dispute is already involved, mediators can facilitate negotiation with the goal of solving the problems by satisfying both joint and individual interests to the maximum extent possible.

In the relationship, if one loses, both lose. If you want the partnership to succeed, you have to create a win-win situation. This happens through dialog in which expectations are expressed and feelings of being exploited are not allowed to go underground, only to reemerge later with a vengeance.

This leads us to talk about ambiguity around project scope because of poor metrics frameworks.

Warning Sign #2: A Poor or Inadequate Metrics Framework

It may not surprise you, but many of those thick contracts that outline the "transaction" between clients and suppliers are woefully lacking in the subject of metrics. This is especially disastrous when applications development is involved. Many contracts that we are asked to review often do not have even basic IT project measures, such as the Carnegie Mellon SEI Minimum Data Set, defined in their exhibits. These metrics are vital for project estimation, service levels, and productivity benchmarking.

There are also contracts and agreements that spell out measures for software IT projects but get them plain wrong. In these instances, newly developed or enhanced software is erroneously treated as a manufactured object. Productivity goals for software development are described

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in factory terms, such as cost per function point, or number of function points produced per person-month of effort. This is a disaster waiting to happen.

Another surefire sign of potential conflict is when the volume of functionality (the size) designed and built by the supplier or developer is quantified in a way that doesn't fit the bill. In one recent example, a CIO of a major corporation swore that she would not sign any outsourcing deal that used function points as the size measure. She felt that the function point metric didn't fit her organization's world and that the metric could be manipulated, resulting in disputes over what was produced.

That, unfortunately, can happen, but it's not always the case. Any size metric can be misused, not just function points. In some cases, such as e-commerce applications or object-oriented client-server applications, function points might simply be an inappropriate fit. On legacy mainframe Cobol applications, they probably are a good size metric. But forcing a one-size-fits-all metric (with any metric) is bound to create conflict and ambiguity in any IT relationship.

When you combine inadequate size metrics with viewing software as a "manufactured object" and not an outcome of an R&D process, you're dead. The factory productivity paradigm takes over, and all behaviors seek to maximize rates of output because of structural flaws in the IT client/supplier relationship. You might have a situation where a supplier is encouraged to build a lot of bad software fast because reliability is not in the balanced scorecard.

Creativity is also squeezed out of the picture. Yet when you hired a software developer or IT services provider, you hired that organization to create innovative

and creative solutions to your problems. Bad metrics programs promote the wrong behavior and lead you to disagreements that cannot be discussed adequately because of inbred structural flaws.

What You Can Do Now

Both the client and the supplier need to jointly develop a reliable, mutually agreeable measurement framework with the help of metrics subject matter experts (SMEs). Sometimes these metrics SMEs are already within your organization. Other times you might need to hire a neutral third party who understands IT measurement to come in and train both sides of the team.

Addressing these structural issues will help steer conversations so you stop arguing about the wrong things in your balanced scorecard. You might still argue about the right things, but at least getting the topic on the right track will give you some hope of discussing what's important.

If you want to quantify IT efficiency, don't just talk about the cost. Look at two other critical aspects — the length of the schedule and the reliability of the system when it is placed into service. In some cases, the productivity paradigm needs to be thrown out. Software development is R&D. It is not a manufacturing activity.

You might decide that getting IT solutions that grow your business is so important that you don't care if you pay more than the industry average, because your supplier moved *fast*. Or you may decide that a system that is five times more reliable than your competitor's allows you to grow your business incredibly, and you don't care that it needed an extra month to get the bugs out. You still measure cost and schedule, but you tailor the service levels and

balanced scorecards with a better understanding of R&D processes.

On disputes regarding project scope, get away from the one-size-fits-all notion of software functional size. Force fitting any one size metric will lead to questions on the integrity of that metric. Speak to delivered functionality in the vocabulary that makes sense to both organizations. If you are fluent in talking about software in units such as code, modules, programs, or objects, it's not mandatory to force everyone into function points unless adding this metric helps the situation.

The point is, when both you and your business partner jointly agree on what measures matter, you can work toward mutual interests and avoid implementing the wrong metrics and flawed service levels.

Warning Sign #3: Treating Outsourcing Strictly as a Transaction

At a recent outsourcing conference, one speaker from a major *Fortune* 50 corporation espoused the view that, when it all came down to it, outsourcing was in its very essence "just a business transaction — you sell, I buy." Many in the crowd agreed.

Yet when we examine deals that have soured, a powerful theme that emerges is how the "relationship" failed. Relationship management was cited as *the* area where the parties experienced a breakdown.

Here's the catch. Outsourcing deals *are* business transactions. *But they are not only business transactions* — they are also relationships. When organizations treat them as only one or the other, they run into trouble.

If you imagine that an outsourcing deal is about friendship and teamwork, and not at the heart about business, you're setting yourself up for a fall. You may give away too

much on a particular issue in order to preserve the relationship, when a hard-headed business decision is called for.

It is equally dangerous, however, to treat outsourcing deals as if they are *only* deals, without involving the important aspects of long-term and human relationships. It is simply true, for example, that people who feel valued perform more effectively. Relationships marked by clear and frequent communication are more durable and less prone to conflict.

What You Can Do Now

Parties have to address the fact that divergent interests exist in any partnership, and they have to be consciously managed within the context of the relationship. Both entities have needs to be met. Some can be satisfied as joint interests, while other needs are unique to one party's own specific interest.

It will be important to try to create joint teams that develop a shared identity, one that minimizes the polarizations that can occur within "us versus them" frames. This shared identity is constructed at the same time that you work to resolve the structural deficiencies of poor metrics frameworks. Creating a sense of common cause can be difficult if you have defective or nonexistent metrics.

If you're finding, as one major chemical company executive recently described, that "our supplier is making 75 out of 85 service levels, but we're really unhappy, and things don't feel right," then something is deeply wrong. It might be time to reopen negotiations to get to the underlying flaws. If a client is feeling exploited, it's only a matter of time before things come to a head, and at that point it will be difficult to construct a sense of common purpose.

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On the supplier side, falling short of aggressive production goals can result in complicated emotional dilemmas around competence. In the dynamic and fast-moving high-tech economy, things do keep changing, including project scope and requirements. These directly drive factory-like production metrics downward. Suppliers who are fearful of being perceived as less than competent are in a box. Showing fear is unacceptable in a corporate environment, so something called a “cover-up emotion” takes center stage. Oftentimes that is anger.

If anger becomes the predominant emotion in your communications, that is a serious indication of fears around performance. This calls for a two-pronged solution — one focused on the structural problems that are setting the dynamics into motion in the first place, and another focused on some kind of communications training to help with those difficult conversations. Why? Because people trained in science and technology might need new skills in human interaction and solving interpersonal and intercompany conflicts, subjects that were not covered in degreed engineering programs.

It is better to tackle these issues sooner rather than later, because in most business agreements, there are inadequate means of resolving disputes — which leads us to the next early warning sign.

Warning Sign #4: Contractual Dispute Resolution Clauses That Emphasize Conflict Escalation

There are three different words in dispute resolution. Mediation. Arbitration. Litigation.

Here are short definitions for each:

- Mediation: problem solving
- Arbitration: judgment
- Litigation: war

When you look at dispute resolution mechanisms in business agreements, you often don't see processes for managing conflicts. What you find are ways to escalate them.

Good dispute resolution clauses do involve “escalation,” in the sense of sending a dispute that can't be resolved at one level “upstairs.” But too often, kicking the problem upstairs also means kicking the conflict into high gear. The boilerplate language used in some “early dispute resolution” clauses doesn't address the all-important question of how to deescalate tension. In the absence of some conflict management procedures and practices, the executives brought in to manage the conflict rely on the only tools they know: arbitration and litigation.

What You Can Do Now

Organizations on both sides of the deal need to reexamine common practices for managing conflict. Some changes can be written into the contract, while other changes require adopting new assumptions about the working relationship.

Key players on both teams need to gain a clear understanding of what causes conflict, what kinds of communication tend to sustain and deepen conflict, and what methods can manage conflict most effectively. In addition, innovative partnerships set up mediation processes within newly designed governance structures. They incorporate deliberate intervention protocols that focus on facilitated negotiation.

Of course, the best way to manage conflict is to avoid it at the outset. Structures should be created that foster clear, dependable communication on a day-to-day basis, before conflict arises. Now we've come full circle with the three previous early warning signs: if you take time *before*

signing the deal to make the expectations clear, develop a mutually agreeable metrics framework that promotes the right service levels, and work to create a partnership in which individual and joint interests are maximized, then you are less likely to require dispute resolution procedures. Still, having reliable dispute resolution frameworks can actually encourage more productive behavior and lessen the risk of disputes escalating into intractable conflict.

Shotgun weddings often are the cause of inadequate dispute resolution frameworks. Oftentimes, in an effort to finish the deal, negotiators simply cut and paste boilerplate dispute resolution language into the appropriate section of the contract as an afterthought. This is dangerous. Resorting to these clauses is becoming more and more common. And sadly, the rapid rise in IT-related litigation is testimony to the failure of these frameworks. They simply don't work.

We suggest a new paradigm of dispute resolution that focuses on joint problem solving of both the substantive/structural aspects *and* the relationship aspects of the partnership in a new way. This involves actively solving the problems with the contractual, metrics, and relationship management infrastructures. There are ways to use these early warning signs as beacons by which to steer your ship. You can target the areas directly using a number of intervention tactics and lower your risk of being sapped by your conflicts and dragging your partner (or being dragged *by* your partner) into court.

SOME GLIMMERS OF HOPE

The presence of the warning signs in and of themselves doesn't necessarily spell gloom and doom. That being said, if by chance you recognize two or more of them in your

partnership, then there could be a potential risk of conflict. The warning signs are not insurmountable by any means. Conversations need to happen to further structure the partnership in more effective ways.

Then again, you could choose to ignore the warning signs and hope that they will just go away. They will not. Ignorance is not bliss. If you ignore these warning signs, you run the risk that bitterness and resentment will build up. They will surface during interactions between the parties, because people will have a hard time suppressing the tension and discomfort they feel.

When this happens, it's natural for them to want to "vent." Most of the time it will be with peers and colleagues on "their side." A buildup will occur. Camps of opinion begin to form. Polarization starts to take shape on larger and larger scales. Here is where the warning signs play themselves into posing real risks. When things get really bad, someone dares to mention getting justice. And here begins the slide toward litigation.

Things to look out for: when tensions rise, things *feel* plain wrong. There are hushed talks in the hallways. Certain things become undiscussable in front of certain people. Secrets start proliferating in the organization.

Trust your intuition. If this breakdown in trust continues, you have to get moving right away. You need to find solutions to the tensions we describe above, one conversation at a time. It might be wise to enlist the help of a facilitator to talk about the issues in a constructive manner and to negotiate new terms. Your goal is to create a whole new frame on negotiation, one that is more in line with integrative win-win bargaining instead of a win-lose adversarial posture.

That requires a different kind of skill, which can be acquired through inhouse training.

Effective conflict management strategies are about facilitated problem solving. They can be taught. You can bring these skills to bear so that these dilemmas can be transformed into real opportunities.

The good news is that recognizing the early warning signs is really a gift in disguise, if you take the right course of action. The early warning signs give you “entry points” to shape how you interact to get the most benefit out of your relationship; they give you chances to manage the relationship in new ways. Heeding their existence early on enables you to grow an even better strategic partnership than the one you had before. If you do, and other organizations don’t, guess who has the edge?

The choice is up to you.

REFERENCES

1. DeMarco, Tom, and Tim Lister. “Both Sides Always Lose: The Litigation of Software-Intensive Contracts.” *Cutter IT Journal*, Vol. 11, No. 4, (April 1998).
2. Murphy, Cynthia, Samantha Kerr, and Lisa Maio Ross. *US and Worldwide Outsourcing Markets and Trends, 1998-2003* (Report #W19322). International Data Corp., July 1999.
3. Pickering, Chris. *Survey of Advanced Technology — 1998*. Cutter Information Corp., 1998. (Available at www.cutter.com/itgroup/reports/sat98.html.)

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