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From experience: leading dispersed teams

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Abstract

Although management can gain great performance benefit from colocating cross-functional product development teams, colocation is becoming increasingly difficult to achieve as companies globalize and form alliances. Consequently, this article offers guidance to keep your development team functioning effectively even though it may be dispersed across town or around the world.

We aim our suggestions at the team leader, but both team members and managers will find helpful ideas and become sensitive to critical issues. For example, management often underestimates the loss in team performance as the team disperses and incorrectly assumes that communication technologies alone will largely overcome the complications of distance.

An effective team depends on open, effective communication, which in turn depends on trust among members. Thus, trust is the foundation, but it is also the very quality that is most difficult to build at a distance. For this reason and for several others that occur in the very front of the project, we suggest that if you can get your team together face-to-face at any time during the project, do it at the beginning. You can establish trust while you are planning the project together, writing the product specification, formulating working approaches, and creating communication protocols (for example, how long before an e-mail must be answered?).

Likewise, the most important maintenance activity during the middle of the project is retaining an effective level of trust, which is far easier than having to rebuild trust. In part, you accomplish this by “humanizing” the project: sharing team member biographical information, telling an occasional good-natured joke, and knowing when a colleague’s family member is in the hospital. We also cover communication technologies—which ones to select and why you need a variety of media. Although such technologies are necessary for running a dispersed team, they are not nearly as sufficient as many technology suppliers suggest.

Another complication is that differences in culture tend to grow as the team spreads over greater distances, encountering different time zones, languages, ethnic groups, and thus corresponding values. Although such differences place challenges before the team, diversity also offers advantages to those who are sensitive to the facets of culture. Consequently, we break culture down into its components and suggest ways of working with each one.

Although we tend to underestimate the complications of working at a distance today, in time, teams will learn the skills needed. In the meantime, the perceptive manager and team leader will pay special attention to building these skills.

Michael is a product development manager for Veloce Drives, a (fictitious) maker of computer storage devices. Michael’s project, to develop the company’s first product aimed at the entry-level market, is not going well. The Mechanical Development engineers, a newly acquired group located in Silicon Valley, are at loggerheads with the Control and Electronics engineers in Colorado. These two groups have discovered that they are interpreting a new interface standard differently. Whichever group loses the argument will have to redo much of its design work and stand responsible for delaying the whole project.

Corporate Purchasing, located at the other end of Silicon

Valley, has just discovered that Mechanical Development is planning to purchase critical components from a supplier that is on Veloce’s corporate blacklist. Again, more delay while they find an alternate source.

Marketing, located about a mile from Purchasing, keeps vacillating on the software features to be included on the accompanying CD-ROM, because they do not understand the entry-level market well. Thus, Software Development—in Colorado, a few miles from Control and Electronics—is reluctant to start work until they have stable definition of the product to be developed, even though software development is also on the critical path.

Within in Software Development, Harry has been identified as the most knowledgeable programmer for a small but crucial component of the project. He has made it clear to Michael that he has other projects vying for his time.

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Ursula, the European Sales Manager, based in Zurich, has continually modified the list of languages that *must* be included on the packaging. Now, after seeing a mock-up of the carton, she has finally concluded that Veloce will have to go with communication that is more symbolic and avoid language as much as possible.

Finally, Manufacturing Engineering, located at the company's plant in Penang, Malaysia, have uncovered some critical manufacturability issues, all stemming from the fact that the engineers in newly acquired Mechanical Development have never visited the factory and thus have no idea of its capabilities. A request by some of these engineers to visit Penang was turned down for budgetary reasons.

Helpful terminology We call such teams *dispersed teams*. They may be spread around a metropolitan area or across the globe.

Many people instead call these *virtual* teams. The term “virtual” is vague and has become faddish. *Virtual* means almost but not quite. Teams are all about performance [10], and dispersed teams fail to perform as well as colocated ones. By calling them virtual, one implies they are not actual teams, and this is likely to weaken performance expectations. Consequently, we avoid this term and advise setting up and running these teams to make the members' work as real as possible.

1. Dispersion has become commonplace

Regrettably, Michael's team experience is becoming increasingly common. Companies that once occupied one site are now spread around the globe to exploit low-cost manufacturing or expand their market coverage. Acquisitions result in geographically splintered development groups.

Technological solutions become the glue to alleviate the complications raised by dispersed teams. Videoconferencing, e-mail, cellular phones, pagers, voicemail, intranets, and myriad group communication software solutions are aimed at maintaining effectiveness as teams separate physically. Although these high-tech tools are necessary to overcome the difficulties of working at a distance, they are far from sufficient. Too many teams deny the thorny interpersonal, cultural and communication problems that all dispersed teams experience.

2. Improving your dispersed team

Although the situation for Veloce Drives may be difficult, Veloce can make many improvements. We will move through the project generally from its beginning to its end, treating project initiation activities first, then techniques that can be used in midstream, and finally manufacturing transition topics.

2.1. Initiating a dispersed project

The beginning of a project is undoubtedly a make-or-break situation for a dispersed team. Whether is called the fuzzy front end [12] or doing your up-front homework [3], success at the beginning of a development project is crucial to overall project success. Moreover, the dispersed teams literature agrees solidly [4,11] that this formative period is critical one for building team trust and establishing communication patterns. This is compounded by up-front activities that are naturally subjective, poorly defined, and multifaceted.

Consequently, this is the time to develop trust explicitly and employ the highest caliber communication and team-building resources available. If you can bring the team together face to face at any point in the project, this is it—whether for two hours or two weeks. If you can find a facilitator to help build team trust and high quality interaction, employ one. If you cannot meet face to face, consider a high-quality videoconference. Upfront activities cover three areas:

- Defining the project (items such as its scope, schedule, budget, resources)
- Defining the product (What will it look like; what will it do; what it will cost?)
- Establishing the team's style for getting its work done (For instance, does the team test it first or show it to prospective customers first?)

A section below covers each of these, but because the success of any of them depends on developing trust, we cover it first.

2.1.1. Build team trust

Dispersed or not, the success of everything a team does depends on developing trust. With a colocated team, trust normally develops as the team works together on team activities. When your team is dispersed, trust building needs a jump-start. Consider three options.

First, you can conduct trust-building exercises specifically, such as outdoor challenge activities like rock climbing. If these fit into your plans, take advantage of them, but it is not essential to make this an extra activity.

A popular option today is explicitly planning trust building into the other activities you must do to initiate your project, such as defining the product. During this initial phase, an expert facilitator can intersperse exercises that illustrate the need for clear communication and trust building as part of the product specification process. This involves explicitly setting up an environment in which members feel comfortable expressing themselves. They realize their contributions are taken seriously and help the team to make progress.

Third, you can *hope* for a type of “swift trust” described by Jarvenpaa and Leidner [9], which *may* develop spontaneously in teams that never actually meet physically.

Whereas normal trust depends strongly on interpersonal relationships that are nurtured explicitly, swift trust ignores interpersonal dimensions, instead relying on the perceived reputation of the team members and the willingness of the team to defer to the “experts.” Swift trust is advantageous in that it does not require explicit trust building. However, it is uncertain, because it may not develop spontaneously, and if it is not established quickly, it may never occur at all. In a dispersed team, you may be relying on what happens in the first few keystrokes of a project, and trust is likely to decay if action on the project lapses.

Few dispersed teams have heard of swift trust, but they seem to unknowingly opt for it. Then the team is faced with the likelihood of a weak foundation of trust for its project. For a project as important and complex as product development, the team leader and the project will benefit from consciously developing trusting relationships rather than overlooking the issue or betting on swift trust.

2.1.2. Define the project

Any team must understand—and agree upon—its general mission, that is, what specific objectives this project must achieve, in what timeframe, and what human and financial resources will be provided to achieve it. When the team is dispersed, this will take more effort, and it must be more explicit. There is greater potential for distrust and misunderstanding of project expectations for a dispersed team because of distance and cultural differences. For example, the urgency of a particular task, such as getting a drawing to a supplier before the weekend, which may seem quite obvious to a North American team leader, may not be nearly so compelling to a team member in Australia who is enjoying summertime in January.

Beyond just stating the schedule, goals, and resources, team members must also accept, own, and understand them. If these are not established at a face-to-face meeting, where body language can alert you to agreement or discomfort, the leader should contact each member and ask her or him to paraphrase these items, as the member understands them, to ensure understanding. Team leaders must focus on explicit agreement and be open to questions that might appear repetitive to allow for each team member to understand—and ultimately own—the project expectations.

Distance also makes it difficult to detect deviations from project expectations. It might be obvious locally that a team member is straying from the team’s goal, but this deviation is likely to last longer and thus become more serious when it is out of sight. Both the team leader and management must be checking—more so than for colocated teams—that all members remain on board and focused on project expectations.

2.1.3. Define the product

Although product definition sounds much like the project definition just covered, it is completely different. Whereas all projects have a project definition activity, only projects that develop products have a product definition

step. Here, the team decides how big the product will be, what variations of it will be offered, what features it should have, what industry standards it must incorporate, how user-friendly it must be, and indeed, just what *user friendly* means for this product.

Product definition is a critical activity that is at odds with team dispersion:

- Product definition, of necessity, occurs at the beginning of the project, which is precisely when the team has the least experience in working together, making dispersed meetings less effective.
- Product definition issues are by nature cross functional. What engineering can accomplish in a certain amount of time is likely to be less than what marketing would like to have done in even less time. Only detailed interplay between these functions can hammer out an acceptable middle ground. Although the engineering—marketing battleground may be the bloodiest one, it is not the only one; similar conflicts arise between purchasing and quality, testing and manufacturing, and regulatory and sales. This is where communication skills, trust, and respect, which are more difficult to build on a dispersed team, become vital.
- Many product definition issues are, by nature, inexact and subject to various interpretations. In such situations, the nuances of intonation and body language help to decipher what others are really saying.
- Time spent together exclusively for creating a product specification helps to bond the team around this definition of the product. Consequently, if you cannot get together physically to define the product, use a synchronous means of communication, such as videoconferencing, where all participants can participate at the same time. The sense of ownership and deep understanding of product definition issues, which comes with the opportunity to influence the definition, will move the remainder of the project along faster. Working jointly also allows team members to discover each other’s working styles and points of view. This builds the necessary trust that will be needed to work effectively in a dispersed environment.

Many techniques are available to improve product definition, including quality function deployment (QFD) [8], concept engineering [1], joint specification creation workshops [12], and personas [2]. Notice that all of these focus on the subtle, subjective, trade-off-rooted nature of product definition. This implies the need for intensive involvement of most or all of the development team to create the product definition, a situation at odds with a dispersed team.

2.1.4. Establish the team’s working approach

Team leaders generally appreciate the importance of the project and product definition issues above, so it should be

relatively easy for them to bolster management of these areas for dispersed teams. However, team leaders have far less appreciation for the importance of an agreed-to approach for how the team's work is to be accomplished. Because of the complexity of innovation and the fact that it seldom follows a straight path [5], two individuals working toward the same end can easily be using conflicting working approaches. This lack of understanding of differences in style can waste time and effort and, worse, tear teams apart.

For example, some product developers prefer to analyze a situation thoroughly before building anything (paralysis by analysis), while others naturally start building things before they have thought them through, possibly wasting resources and time in a trial-and-error mode. Engineers will argue the chicken-and-egg problem of whether the hardware or the software should be completed first to support the other one. Engineers and marketers often disagree on how much design can be started before all customer requirements are known. Because these issues are product- and organization-specific, we cannot offer solutions. However, we hope to sensitize you to their importance so that you can address them before they become disruptive.

These examples go beyond the relatively routine issues of documented standard operating procedures (SOP), signature authority, version control, and customer contact policy. The examples in the previous paragraph involve individual differences in style, philosophy, and values. They have many gray areas. This is precisely why they need special attention for a dispersed team.

Here again, working approach is a vital but subtle subject to be covered in the initial team "meeting" (in-person or virtual). This is another subject that will greatly benefit from the highest quality communication you can afford. A facilitator can draw out the issues, conflicts, and inconsistencies while developing the project schedule by probing in areas that are likely to surface differences of opinion as to how the work might be completed. Look for areas where

- Two different activities don't have a clear sequence
- Information for proceeding is likely to be cloudy
- A problem could be attacked either top-down or bottom-up
- Two activities are overlapped heavily

The point of identifying these differences is to get them out on the table for discussion and resolution before they disrupt the project and—worse—undercut team trust. This is the time to voice differences that could smolder awaiting a most inappropriate time to explode later.

If you cannot discuss the team's work process in person, then identify the likely issues and piece together solutions with the individuals involved. For example, you might be able to resolve critical differences in approach between hardware and software development by arranging a face-to-face meeting of only the principal players.

As distance increases, expect these working-approach

issues to become more critical. These are just the areas where differences in national, organizational, and functional culture (discussed later) are manifest, as they relate strongly to values that can differ greatly across cultures.

2.1.5. Establish communication protocols

In a colocated team, members naturally gravitate toward means of communicating that work for them. These so-called protocols do not happen naturally for a dispersed team, so they have to be created explicitly. In your initial contacts with the team, establish ground rules and expectations for communicating. Do this as a group to build agreement and buy-in to these ground rules. Protocols can be as simple as "All e-mail will be acknowledged as received within 24 hr." or "All phone messages shall be returned within 4 hr." You and your team decide. Include everyone, even the fringe players (such as Harry and Ursula in our case study) in these communication protocols. Everyone may not attend the initial meeting, but make sure they will abide by what your team has agreed to in terms of communication expectations.

In building your protocols, think carefully about what you expect your communication to accomplish. For example, above we stated only that e-mails would be *acknowledged* within 24 hr, because your initial concern may be: was the message received? Instead, if you are concerned about action being taken on the e-mail, then change your protocol accordingly. If you want to cover both issues, you may need two protocols.

Communication protocols should also cover how disagreements are to be handled. Creative, intelligent people disagree. Your team leadership determines how conflicts will be handled. Once protocols are established, it is less likely that team members will refuse to mention issues or bring them up until it is too late to resolve them. Emphasize that you need to know about issues early on, so you can deal with them before conflicts arise. See the section "Monitoring Communication Protocols" later in the article for more on this.

2.2. Managing your project in midstream

Now that our dispersed team is off to a good start, we look at some of the issues that arise daily in leading a dispersed team through the central portion of the schedule.

2.2.1. Maintaining trust

The vital ingredient of trust is much harder to maintain when the team is dispersed. The more barriers the team encounters—distance, organizational boundaries, cultural and political differences, and language barriers—the more difficult it is to build and maintain trust. When members feel appreciated and supported, they will speak up during meetings, share ideas, and discuss issues freely and in a collaborative manner. Without this trust and respect, meetings are not as effective, innovation suffers, and discussion can bog down in meaningless details. This is especially true in dispersed teams where team leaders do

not always know their team members well and lack the body language clues that tell them when people are restless, bored, or irritated with a subject.

At Veloce Drives internal competition (lack of trust) materialized as the us-against-them battle between the Mechanical Development engineers and the Control and Electronics engineers. These two groups lost sight of the fact that they are both working for the same organization, and the goal is to get the product out successfully, not whose interpretation of the interface is used. Any trust that existed between these groups has been damaged and will have to be rebuilt.

Trust could be rebuilt between these two groups independently of the interface interpretation issue. The most effective way of getting the engineering effort back on track is to rebuild the trust in the process of resolving the interface dispute. We suggest that the two groups meet using an independent facilitator who can reframe the effort and keep the discussion focused on win-win goals. A high-quality form of synchronous communication, such as videoconferencing, is acceptable if the two groups cannot meet face to face.

With the facilitator's help, the engineers would be encouraged to move away from "who will win?" The following questions would help to reframe the discussion:

- What is the ultimate goal? To get the product to market in a timely manner, or have one group of engineers' interface "win"?
- Which solution would be best for the company in the end?
- Which would give the team more product growth room or flexibility in the future?
- How can the workload be redistributed so that no matter which group has to redo some of its work, the load is bearable?

A faster way to resolve the immediate conflict would be for the vice president of engineering to decide, effectively dictating the solution. Although this solves the immediate problem quickly, it further entrenches the distrust issues.

In reframing discussions, you can learn from modern negotiation techniques. To change a negotiation from a win-lose, confrontational situation into a win-win collaborative, problem-solving one, avoid stating one's own position—which sets up a confrontation—and instead use the more constructive approach of stating your interest in the outcome. You can also set up a collaborative atmosphere conducive to cooperation by asking first, "What are your needs?" rather than beginning with "I want."

2.2.2. Encouraging social interaction

Social interactions in dispersed teams are usually seen as superfluous and not possible. However, the best performance comes from people who feel connected to others and thus trust them. When team members build relationships through interactions, they are enhancing the vital ingredient

of trust. In a dispersed team, interactions occur primarily through phone conversations and e-mail. When people put a face with a name or voice, they relate better to that individual. The less that one individual knows about another, the more they make assumptions about him or her to fill in the information gaps. Consequently, social interaction is not a distraction from the "real work" of the team but a necessary prerequisite to that work, especially for dispersed teams.

This important point is at odds with a prevailing view that "good" workers check their personal problems at the door, so we provide an example. Imagine that one of your team members is not performing. You could "come down hard" on them. But if you happen to know they have a child in the hospital, you might compassionately give them a little extra time to deliver their tasks, insuring their loyalty and appreciation, rather than their animosity.

Strengthen connections between team members by

- Creating a team Website having photos of team members with information about their backgrounds, education, specialties, hobbies, and family to bring members closer.
- Inquiring about family, sports, and other interests to acknowledge everyone's humanity. This social interaction takes little time, such as a sentence or two in an e-mail: "How did your soccer game go on Saturday?"
- Having a "check-in" time at the beginning of a teleconference or videoconference where you quickly go around the room and find out what has happened to people since the last meeting. Learning that someone's daughter is in the hospital, their mortgage was approved, their commute was twice as long as usual, or they just won a trip to Hawaii will help in understanding that person's behavior in the meeting.

2.2.3. Selecting technology tools

We do not believe that dispersed teams, or even dispersed meetings, are mainly about a particular communication technology, but we do believe that if you are going to be involved with a dispersed team, you will have to choose and use your technologies wisely. Contrary to what suppliers of these technologies might suggest, there is no technology that is best for all situations. Even face-to-face discussion, the ultimate by many measures, has its weaknesses. For example, people can be distracted by appearance: have you ever missed what someone was saying because you were concentrating on something caught between their teeth?

Fig. 1 organizes some technologies in a way that helps you select an appropriate one for the task at hand. We have divided them into synchronous versus asynchronous and socially oriented versus information oriented. For discussing alternatives and reaching a decision, a synchronous means is better and faster, but you might find that you get

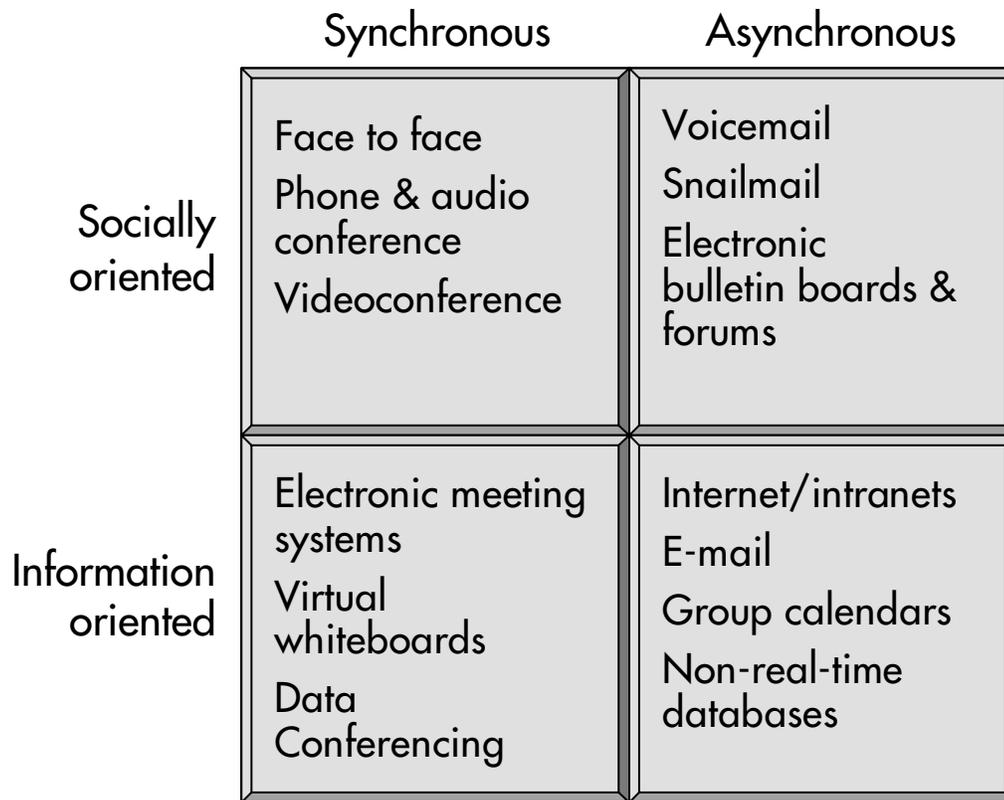


Figure 1. Select a communication technology according to the needs of your message.

better decisions by imposing the delay of asynchronous e-mail. Telephone is advantageous for conveying certain emotions, but it is a poor medium if you need a record of what was said.

The success of your meetings does not depend as much on the technology used as on the basics for any meeting:

- A clear purpose for the meeting
- Adequate notification of the meeting and clear expectations
- An outcome-based agenda
- Clear and enforced ground rules

With that said, here are our guidelines on how to use technology and some observations:

- No one technology works for everything; the best solution is using the technology that fits the task.
- Vary how you meet; always using teleconferences becomes stale.
- More of a certain quality, such as social interaction, is not necessarily better; face-to-face meetings are essential for the beginning of a project or for times of conflict. But having your teammates surrounding you when you need uninterrupted concentration to complete a task can be distracting.
- The categories in Fig. 1 are not firm; for example, e-mail could rank as more socially oriented in some cases.
- Communication technologies can be combined in

various ways; for example, virtual whiteboards go well with videoconferencing.

- Product development requires both socially oriented (for example, to evaluate the feel of a mobile phone in the hand) and information oriented (to convey the final geometry of that phone) technologies.
- Asynchronous technologies will predominate as time-zone differences grow.
- Training in the proper use of a technology is often crucial to its effectiveness. Make sure whoever facilitates the meeting knows how to use the technology and can troubleshoot it. If everyone is fussing with being hooked into the meeting, rather than actually discussing the agenda, frustration results.

2.2.4. Running dispersed meetings using technology

Two-way videoconferencing is an excellent alternative to face-to-face meetings once trust has been established. Being able to see as well as hear team members maintains trust. However, videoconferences usually take more planning and effort to be successful than project managers allow. Consider such technical issues as compatibility of equipment at all sites, cable or T-1 lines functioning properly, camera angles and focus, adequate sound levels, and so forth. Once you resolve these technical details, you will find that leading video meetings is different than leading either teleconferences or face-to-face meetings. For

example, making sure that each member is participating but not dominating is both more important and more difficult than in in-person meetings, as is displaying documents.

Teleconferencing is less challenging technically, but it requires even more skill than a videoconference to ensure that everyone contributes. Teleconferencing is challenging because this medium is less engaging than a videoconference or an in-person meeting. For instance, it is very easy to talk on the phone while working on something else.

The facilitator can control the teleconference by noting who speaks and who is quiet. Ask specific questions of people by name. “Go around the room” by verbally polling people to keep members on their toes. Keep a “seating” chart, as if they were in the room with you, and make tick marks as people speak. Then ask those who haven’t said anything, “Joe what do you think about that?” or “Judy, we haven’t heard from you yet.” These types of questions let people know you expect and value their participation.

An adjunct to a teleconference is Internet groupware (collaboration software) used as a white board or flip chart. Everyone can see the points made, and members can clarify if the scribe doesn’t record accurately. This real-time tool can be highly effective once people become familiar with the software. Groupware allows the facilitator to track people’s attention levels much more easily than a teleconference alone. More advanced versions allow attendees to write comments on the document or whiteboard. When the facilitator gives over control of the document, the cursor will either change color or the initials of the person controlling the cursor will appear underneath.

When using any of these technical media with groups having different native languages, keep in mind that those communicating in their non-native language are at an increasing disadvantage as the quality of the communication medium decreases. English is becoming the standard world language for business meetings, but for those of us in the United States it is easy to forget the extra burden this places on team members from other countries. Give non-native English speakers time to interpret the information.

2.2.5. *Monitoring communication protocols*

After you set up your team protocols initially, also monitor and revise them as you execute the project so that they keep working effectively for you. This is where your leadership of the team is tested. Holding the group to its agreements and revising them so that they remain effective is a major factor in maintaining trust.

Some of your protocols should address how to deal with conflict. Although constructive disagreement is a vital part of the creative process of product development, it also requires a certain level of trust, which is increasingly difficult to build as a team disperses. Consequently, to enjoy the benefits of constructive disagreement on a dispersed team, you will have to work harder at it than you would on a colocated team. When you are colocated, disagreement may occur and be resolved relatively naturally, but as your team

disperses, protocols establish an environment that allows you to still disagree without destroying your team in the process.

As team leader, you need to overemphasize the point of voicing concerns, how to share ideas, and when to do it. Often, the underlying problem was never mentioned when it first occurred, because members didn’t know how to bring up minor irritations and issues. As the team leader, getting agreement on how to handle disputes and establishing guidelines before issues come up is much easier than repairing trust and communication lines afterwards.

Better yet, rather than waiting and depending on members to report their conflicts, keep in touch with them proactively through virtual forms of what Bill Hewlett and David Packard institutionalized at HP called management by walking around (MBWA) [12, pp. 264–65]. Use effective questioning. For example, rather than a general, “How’s it going?” ask, “What are the main issues for you on the project right now?”

2.2.6. *Managing fringe players*

Most product development teams have a core group that is heavily devoted to the project. This usually includes some engineers and designers, who are often assigned to this one project for the bulk of their time. This core group may also include Marketing and Manufacturing Engineering. Beyond these, there are many bit-part players, often including Purchasing, Sales, Manufacturing, Finance, Regulatory and Safety, and Quality. These peripheral but often critical players present special challenges in building trust. Here are two categories.

Watchdogs Some groups, such as Legal, Purchasing, Quality, or Regulatory, are either purposely set up to police the team or the individuals involved assume this role. A policing mentality erodes trust. At Veloce, Purchasing’s role includes blacklisting suppliers. Because as much as 80% of a hardware product can be purchased components, Purchasing assumes a central role in development. Some companies recognize this and integrate Purchasing into their development teams. But Veloce Drives apparently keeps Purchasing as an independent watchdog of the company’s purse strings. As a consequence, the rest of the company views them as police to be avoided at all costs. Crucial information may be kept from Purchasing, or Legal, or whatever the “watchdog” department is. As project manager, work to make them a partner on your team rather than an adversary. This will be harder to do on a dispersed team, where it is easier for a watchdog to stand apart and harder to build trust with remote members.

Here are two ways to strengthen Purchasing’s role: The first is to collaborate with them to help meet their goals and still achieve yours. Many times the fringe players don’t have a solid understanding of your goals and needs. As project leader, you need to take the time to clarify to these fringe players your project goals and how they affect the

company's success. An alternative is to have them join your team as an integral part of the project, not just as a fringe player.

When trying to integrate a watchdog into the team, remember that trust has much to do with proximity. The most powerful way to build trust is to bring people together, so look for these opportunities for even partial colocation of your watchdogs.

Veloce has several opportunities for making Purchasing into an integral, trusted member of the team. One is to move at least a portion of Purchasing to the Mechanical Development site and perhaps colocate individual buyers with development teams. Many companies in Veloce's situation, with dispersed sites, totally surrender the power of colocated development teams, ignoring opportunities to colocate critical players who are already located nearby. A milder approach used by many companies is to relocate a buyer or two to the Mechanical Development site to support all development activities. At a minimum, Purchasing could provide a list of approved and blacklisted suppliers on the corporate Website as a resource for designers. Listing criteria for what constitutes a preferred supplier would go a long way toward helping everyone understand the criteria and why some suppliers are not used.

Important decision makers The issue with other peripheral players, such as Sales or Production, isn't that they are at cross-purposes with the team. Instead, it is more of a lack of interest. Often, product development ranks way down on their priority list, so it is difficult to get their attention. Yet, these weakly linked players sometimes need to make a critical decision to proceed, provide resources, or adjust their work to accommodate the new product. They can unknowingly create obstacles, because dispersion places these individuals out of sight and out of mind regarding the project.

Ursula, the European Sales Manager, is far less involved in Michael's project than is Marketing or Purchasing, yet her role in final approval of critical items is just as important. Thus, she could inadvertently be quite disruptive. You can do four things to keep Ursula onboard. One is to ensure that she understands that her role is crucial yet potentially threatening to the schedule. Second, work out some mutually acceptable way to keep her informed of the team's progress so that she feels comfortable acting when her decision comes up. Third, keep the channels of communication open with Ursula: know when she is traveling or on holiday, and always know how to reach her via e-mail, cellular phone, *and* fax. Then follow up to confirm that she is receiving your communications. Although the Ursulas on your team will require handholding out of proportion to the effort they put into the project, your efforts to maintain contact with these fringe players will be rewarded many fold. Lastly, you could ask Ursula to delegate the assignment to someone who does care or has the time. Obtain her agreement to the delegation early on and then employ the first three steps above with that person.

In our Veloce case, Marketing is in a similar situation. They are the last ones who want to delay the project after making an eloquent case that the very success of this project depends on achieving an aggressive launch date. Also, Marketing has a legitimate need to understand this new market. However, they simply do not realize that the whole project is being delayed by lack of action on their critical task. Again, the dispersed nature of this team hides this issue and allows action to slip.

To heighten Marketing's awareness, they must be integrated into Software Development's day-to-day activities so that the impact of their inaction will become obvious to everyone involved. A videoconference or teleconference between key Software Development and Marketing people could accentuate the effects of Marketing's inaction. Perhaps you could arrange for the marketing member of the team to stop by Software Engineering to see the (lack of) progress and thus highlight the timing issue vividly.

Another approach would achieve two objectives at once. Simply make the software engineers available to marketing for customer visits to fill in the gaps in the marketing data. On the one hand, this would make it dramatically clear to marketing that the software engineers were not writing software, as presumed. It would also educate the software engineers regarding the nature of the market and the vagueness in certain aspects of customers' desires. This could give Software Engineering new respect for the customer data they now have and help them to realize that it may never become much more definite.

Fringe players, such as Harry in our Veloce case study, also can delay the schedule and harm the overall success of the project. Enlisting Harry early, as stated above, so that he is aware that the project will be coming to him, is important. Sometimes though, these "stars" will not cooperate until management leans on them to do so. You may have to escalate your request to an appropriate level of management. Look to your sponsor to request the "star's" timely assistance in the project. Weigh the effort of keeping Harry on board against the benefits received. Perhaps you can find someone else who appreciates the opportunity that the project presents. This tactic can be more effective in the end.

2.3. *Moving into manufacturing*

We cover manufacturing-related issues here, because they appear to occur after design and development activities. However, the message of concurrent engineering is that manufacturability issues have their roots early in the design, and if they are not addressed early in the project, resolving them when the design enters manufacturing is difficult and costly. In other words, this section is placed here only for flow of the discussion, not because it should be left until this point in the project.

Veloce Drives illustrates an increasingly common situation of designing the product in a completely different environment and culture than it will be built. To develop a

product manufacturable at low cost, the design must reflect an intimate knowledge of the specific capabilities and idiosyncrasies of its manufacturing plant. When design engineers understand the capabilities of the specific equipment involved in manufacturing their new product, they can make appropriate design decisions. Otherwise, these decisions have to be corrected under fire on the factory floor. Well-informed decisions on manufacturability conserve development labor and build trust between engineering and manufacturing.

As with Veloce, however, obtaining an intimate knowledge of a facility half way around the world is not easy. Travel is expensive and communication becomes more difficult when design and manufacturing groups are in different countries and time zones. Recall that Veloce's engineers had tried to visit the factory, but their request was denied due to its cost. One way of putting the value of this travel in perspective—so that it can be approved—is to calculate your project's economics [12].

Customary good practice is for manufacturing to provide written manufacturing capability information, and dispersed groups will depend on this information even more. Colocated designers can just take a walk out to the factory floor to check out their design assumptions. Overseas designers are unable to do this, and their assumptions about the factory are increasingly likely to be wrong as the factory becomes more remote. Factories in Malaysia operate very differently than ones in Silicon Valley.

Good practice also provides for manufacturing engineers to become involved in the design early enough to influence it for manufacturability in *their* plant. Fortunately, current communication technologies facilitate involving remote manufacturing engineers in a design. One is product data management (PDM) systems, which can convey a product's characteristics over a distance. Another is digital mock-ups (DMU), which provide a three-dimensional image of a part or assembly on a computer screen. Finally, there are 3D faxes, which send a part's geometry over the Internet to be built into a plastic rapid prototype part at the receiving end.

However, the more remote the factory, the more important it is for key design engineers to actually see the factory. Visiting a factory in Malaysia is likely to make a lasting impression on a designer. The relationships developed during the visit will encourage him or her to contact the factory occasionally to check out design assumptions. These relationships will also encourage communication about "minor" changes made at a particular factory and encourage passing them back to the design engineers.

2.4. Taking advantage of cultural differences

Team culture simply acknowledges that different members of the team are likely to have differing styles and values, so they consequently behave in distinctive ways. To the extent that you understand these differences and can anticipate them, your team will operate more harmoniously. Although highly diverse teams are more challenging to work with, such teams are usually also more rewarding,

since differing values and styles provide richer solutions and complimentary skills. Consequently, culture is not something to be homogenized, even if this could be done.

The important point to know about culture is that the more dispersed the team is, the more cultural variation it is likely to have, and thus the harder the team will have to work to appreciate and deal with these variations.

There are four categories of culture:¹

- Individual—individual differences in outlook or style, as might be described by Myers-Briggs Personality Type Indicators or The DiSC® behavior preferences.
- Functional—differences in outlook that are characteristic of different departments, such as the Marketing–R&D interface topics covered in many articles in this journal [7].
- Organizational—characteristic differences between companies, for example, an IBM as opposed to a Dell.
- National—differences that correlate with nationality, for instance, the Japanese propensity for consensus building versus the American desire for individuality.

Observe that these four categories correlate with degree of dispersion. Even a colocated team has individual style differences, while a team that includes an outside, overseas supplier will experience all four kinds. Consequently, while a colocated team may only have to include some Myers-Briggs sensitivity training in its preparation, a fully dispersed team should be well versed in all four types.

Individual Styles Individual styles, or personality differences, afflict both colocated and dispersed teams. Such differences can lead to misunderstandings, which breed miscommunication, which breeds distrust.

However, personality differences can be an asset to your team. Make sure you choose a variety of styles. Your team needs conscientious, meticulous members *and* direct, seat of the pants, decision makers. The tendency is to choose associates who view the world as we do. For instance, a team made up of all analytical people will run into analysis paralysis quickly. Because the bulk of your development team is likely to be engineers or scientists, who tend to have a certain personality style, you will have to concentrate on variety in order to obtain it. The key is to respect the value in each style and use it effectively.

Try to seed your team with each of these styles:

- Direct or Action oriented—wants informed but quick solutions
- Conscientious or Analytical—wants information and facts before making decisions
- Influential or Social—wants to influence the work of and lead the team
- Steady or Stable—wants to make sure everyone feels involved and things go well

Individual style conflicts arise from not valuing another's style or having too many of one individual style

on the team. As team leader, learn as much as you can about the behavior preferences of your team members. Then when you need quick decisions, go to the Direct engineer, not the Conscientious one. But if you need the team to reach consensus, ask the Steady person to work on that.

Functional Culture Each profession trains its members differently. People tend to go into fields that fit their style. This just reinforces basic strengths that got them into certain educational programs in the first place. For instance, marketing and sales types prefer more contextual information, but engineers and scientists just want the facts, which had better be correct.

The basic solution here is to help each group gain an understanding of how the other operates by having them work together—in person if possible. Rotate people between departments at the same site before they join a dispersed team. Have engineers accompany marketers on market research calls so the engineers see the value of contextual material. Conversely, send a sales or marketing member out with an engineer on a field call to solve a particularly nasty technical problem that requires precision.

Organizational Culture Each organization, over time, develops its own set of shared assumptions and values. In general, these have worked for them in the past, so they tend to be taught to new members as they join the “family.” Although it may be difficult to articulate the differences, you can feel them clearly. For example, some organizations are more punctual than others, and some follow policies to the letter while others will do whatever is needed to please the customer.

Each culture has its strengths and limitations. By taking advantage of the diversity that a cross-organizational team affords, it can be a more powerful team than a monolithic one. All too often, a dominant partner, either the biggest partner or the customer in a customer—supplier pair, has the power to force others into their way of doing business, so they do. When agility and flexibility count, instead consider what you can adopt from your smaller, younger partners.

National Culture Duarte and Snyder summarize factors Hofstede and Hall found helpful for understanding differences in national culture [4]:

- Power Distance—Extent to which followers defer to the leader
- Uncertainty Avoidance—Degree of task structure desired
- Individualism—Collectivism—Preference to act as individuals versus a group
- Masculinity—Femininity—Relative emphasis on material versus “caring” values
- Long Term—Short Term—Balance of long-term versus more immediate gratification
- High—Low Context—Amount of context required along with the facts

We suggest that the whole team discuss and appreciate the particular differences in these factors relative to the

team composition. The factors that will be most relevant will depend on the particular nationalities involved.

Once the team appreciates these factors, they will be in better position to deal with them when they arise. Due to these very factors, people in certain cultures are reluctant to mention problems or controversial issues, especially in a group. To overcome this reluctance, provide opportunities for people from various cultures to communicate in a variety of ways. Otherwise, they will just retreat into their shells or go along passively with what others want, which destroys team energy, creativity, and trust.

2.5. Merged or acquired cultures

In our Veloce case, Mechanical Development is the only part of the organization explicitly identified as an acquiree. However, the hodge-podge nature of the firm’s locations suggests that it has grown through acquisition. Furthermore, there are several indications that Veloce has consistently ignored the difficulties and opportunities latent in these cultural differences.

Most companies that merge or acquire other operations similarly ignore the resulting organizational cracks. They grossly underestimate the time and effort needed to assimilate new people into an organization. Then they have employees later who still refer to themselves as former XYZ employees, as we experienced at one client site last year. This is a classic symptom that the acquired company’s employees still feel separate and aren’t fully integrated into the culture.

Discover the underlying differences in values, styles, or assumptions and put them on the table for discussion. Face-to-face meetings are essential. The initial expense is quickly mitigated because mutual understanding of differences prevents delays, misunderstandings, and mistakes that will only grow worse as they fester.

3. Key points

- *Genuine* communication is vital: miscommunication undercuts trust, and distrust saps energy.
- The greater the degree of your team’s dispersion (distance, time zone, national, language, etc.) the greater the challenge you face.
- Management usually underestimates the difficulty of managing a dispersed team.
- Even partial colocation can be quite beneficial; watch for opportunities to partially colocate your dispersed team.

Notes

1. These categories are adapted from Duarte and Snyder who provide a lucid description of the last three categories and some instruments for assessing

your team members relative to them. We have added the individual styles category. It is not normally classified as a cultural category, because it is not associated with a social or organizational group. However, we believe that including it provides a more complete picture of the style and values issues you will encounter as your team disperses.

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Biographical Sketches

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