

Surviving and Thriving in Global Software Development Teams

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Abstract

Software, by its very nature as an intellectual artifact, is being increasingly produced by global virtual teams for global markets. Configuration management systems replicate source code to widely disparate teams. Virtual work follows the sun as team members hand off work in process to colleagues on different continents. Instant messaging, VoIP, conference lines, and other collaboration tools are enabling these teams, but what individual and team skills are necessary for success in this new world? The author has learned that without certain skill sets, software developers should be afraid. Actually, they should be very afraid, as success cannot be assumed, and even near death experiences may follow, as the author's experiences illustrate.

Keywords: Virtual Teams, Global Teams, Outsourcing, Offshoring, Global Sourcing.

1 Introduction

Software Engineering graduates and professionals are in age of not just unprecedented opportunity, but also a global opportunity that exists only recently. This new frontier has great potential, particularly in mid to low cost geographies¹. McKinsey Global Institute research points to: “Demand for offshore labor by companies in the developed world will increasingly push up wage rates for some occupations in low-wage countries.” [1] Software engineering has great potential to take advantage of this drive. As McKinsey Global Institute also points out the engineering is more amendable to offshoring with 52% of work being moved globally². Diamond Cluster Research indicates this movement is accelerating.³

The flattening of the world as described so well by Thomas Friedman in his book “The World is Flat” is bringing Latin American engineering talent more and more on to the world stage. [3] Multinational companies in North America, Europe and Asia are looking broadly to engage global talent. Furthermore that talent needs to engage effectively with team members across the world. This is something in which most people here and in other countries are not well trained or equipped.

In the following sections I’ll share some keys to success with global virtual teams of which I’ve learned from over 20 years of working with global teams in over 20 countries. “Globalization has now shifted into warp drive” with global virtual teams riding on the coattails, so you’d better get ready for an interesting ride.” [3]

2 Software as a Global Product

If you think of software as a product, it is an interesting creation. It is, by its very nature, an intellectual artifact with no mass, which has high value, is a pure construction of logic, universal in its structure. It can be moved at the speed of light around the world, tossed back and forth by engineers on differing continents like an intellectual ping pong ball. It can be replicated nearly instantly and destroyed even faster. The massless and intelligent nature of software is not new, but our ability to move it globally and copy it at negligible costs is relatively recent. Until the about 1980s, the speed of putting a floppy or tape in your pocket getting on a plane and flying around the world had a higher through put rate than commonly available and affordable data lines. Today complaints arise if it takes more than a minute to move a song from continent to continent. A \$200 copy of Vista can be transferred around the world in just a few minutes more. The ability to move intellectual assets between groups globally, while considered boringly common place now has revolutionized industries and our work cultures. We now as a matter of course, synchronize software source trees between teams on multiple continents several times a day. A technical problem can be packaged and handed off to a collaborator with no more thought than playing catch in the park.

¹ The McKinsey Global Institute classifies low cost geographies as: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Czech Republic, Estonia, Hungary, India, Indonesia, Latvia, Lithuania, Malaysia, Mexico, Philippines, Poland, Romania, Russia, Slovakia, Slovenia, South Africa, Thailand, Turkey, Ukraine, Venezuela, and Vietnam. [1]

² McKinsey Quarterly 2005 states “Some occupations also are more amenable than others to remote employment. The most amenable to it are engineering, on the one hand, and finance and accounting, on the other (52 percent and 31 percent, respectively).” [1]

³ Diamond Cluster Research states: “Virtually all of the buyers of outsourcing services” in the latest study have outsourced at least some of their IT functions. This is up from 80 percent a year ago, reflecting the continued growth in the outsourcing market. Additionally, 74 percent of buyers expect their use of IT outsourcing to continue to increase in the coming year (up from 64 percent in 2004).” [5]

The mass-less nature of many products today along with the prevalence to high speed networks has enabled the rapid ascension of high value software industries in India, Philippines, Ukraine, and China, among others. Latin American countries are particularly well located to benefit greatly for North American partnerships, but they are also gaining increasing access to worldwide teams and projects. As an example, last year Mexico's Softtek⁴ was the first Latin American company to be included in Gartner's Magic Quadrant for Offshore Application Services and more recently has achieved a world-wide staffing level of over 5,000 people. Additionally, Hewlett Packard has increased its Latin America investments with numerous global development teams with members in Brazil, Costa Rica, and Puerto Rico working virtually side by side with team members in China, Russia, USA, India, France and Germany.

The economics are pressing the shift forward towards teams with members from widely scattered sites. Locally, Costa Rica's Artisoft⁵ is a clear example of software developers that can play on the world stage.

3 Nature and Challenge of Global Virtual Teams

The ease that we do move software (and other intellectual assets) globally is creating a new work paradigm of global virtual teams producing products for global markets. Tools have sprouted up to support distributed work. Configuration management systems such as ClearCase⁶, globally replicate source code to widely disparate teams. Virtual work follows the sun, as team members hand off work in process to colleagues on different continents. Collaboration tools, such as instant messaging, VoIP, virtual meeting rooms, team wikis, and conference lines are providing a communications infrastructure for these teams, but what individual and team skill are necessary for success in this new world?⁷ As amazing as the new capabilities are, spectacular project failures occur in their wake. These are frightening and eye opening to say the least. My personal observations are that the majority of projects with global virtual teams do not meet expectations. The issue is not how fast, easy or prevalent the tools are that can enable such teams, but how does one work in this global market of worldwide distributed virtual teams?

When designing and building products, I used to be concerned, and certainly my boss was concerned, with how did I work team player? Could I collaborate with peers sitting nearby to design, develop and release new products? Today, there is a new set of skills critical enough such that software developers lacking them should be afraid. Actually, they should be very afraid, as without them success is not likely and failure can be nearly a certainty, with even near death experiences following in their wake.

So, let's take a look at this. To make global virtual teams successful is hard work. Let me repeat that: Making global virtual teams successful is hard work. The reasons are basic.

Figure 1 illustrates the two basic dimensions of challenge in virtual team work both in distance and in culture. Distance brings the obvious (but often ignored) issues around different time zones and lack of personal touch or contact. Psychologists assert that much of our communication, validation, and reality checks are visual. Mehrabian's rule (Total Liking = 7% Verbal Liking + 38% Vocal Liking + 55% Facial Liking) is just one portion of the loss incurred via remote communications [6].

⁴ Softtek (www.softtek.com) is a Mexico base software product development related services company.

⁵ Artisoft, is a Costa Rica based software development services company. Contact Federico Zufaly at +506.519.1000 for further information.

⁶ Rational ClearCase MultiSite (<http://www.ibm.com/software/awdtools/clearcase/multisite/index.html>) is an IBM product for managing source trees across multiple sites.

⁷ Huettner et al point out "... most companies now take email, high-speed Internet access, and instant messaging for granted, and are beginning to devise ways to integrate wikis, blogs, RSS feeds, VoIP (Voice over Internet Protocol), and other collaboration technologies into their daily work. Not surprisingly, however, the people side of the equation has evolved much more slowly ..." [4]

Individual work deliveries are propelled by commitment to the team. Commitments historically within the team were based on relationships built on the personal connections that are most easily achieved in face-to-face situations. Today, as we compound these challenges with odd hours in global phone conference meetings either early in the morning before that cup of coffee or in late the evening after a long day, the bonding task is made all the more difficult.



Figure 1 – Challenges with global teams

Cultural differences create virtual team gaps in business styles, formation of agreements, alignment of purpose, and planning processes. The cultural gaps are not only compounded by separation of the team, but the separation can mask this gap until disaster or failure occurs. Even after a failure occurs, the teams may not even understand it was fundamentally caused by a cultural misunderstanding. Other causes are imagined and the team gets frustrated.

Virtual teams are not a new subject, nor are cross-cultural issues. While these are clearly challenges, how frequently or likely is one to be a member of a global virtual team? What's changing are the prevalence, frequency and necessity of virtual teams as multinational corporations continue to seek new markets and new talent in new lower cost geographies. Useful research studying virtual team behaviors is included in Appendix A.

However, my purpose today is to give you a few tips based on more than twenty years working on virtual teams in more than twenty countries, and how to survive and thrive in your own personal journey. Every time I think I've hit all the global challenges one could imagine, I find I am incredibly successful in unearthing another. Each new region or country convinces me that it will remain a lifetime journey for us all. I'm going to talk about eight real world factors of working together. For each I'll provide an example illustrative story and a suggestion or two on how to succeed.

- What Does "Yes" Mean?
- Virtual Team Commitment
- Infrastructure
- The Honeymoon
- Embrace Your Travels
- Success Requires Investment

- Even Managers Need Help
- The Clock – Friend or foe?

4 What Does “Yes” Mean?

Let me start with a story of a near-death experience triggered by the most innocent of questions and a lack of cultural understanding. I was setting up a small team of Hewlett-Packard and Canon engineers to work in California. The team would include three engineers from Canon Japan and one from HP Japan, complemented with a couple of US engineers. To speed up the work, we decided to form the team in a face to face for four months before working in a distributed mode. Being the lead person in California, I was fully committed to make my Japanese visitors as comfortable as possible. I arranged for a rental car and a near by apartment with nice amenities for each of the visiting team members.

My first Japanese visitor had just come in via taxi from the airport. Even after the 12 hour flight he was still quite lively and alert. He had a considerably longer and more complex name than the typical American engineer could pronounce. So, to ease his working in the US, we shortened his name to Yuki. I didn’t realize until six months later that in Americanizing his name we apparently changed the gender associated with it. He didn’t take any offense in accepting a girl’s name common n Japan. But that’s not my story.

To help Yuki settle in, I offered to take him to his apartment to let him rest after his journey. As we walked to the rental car I arranged, I asked “Do you want to drive?” After a brief pause, he relied “yes”, I handed over the keys and off we drove. As we exited the parking lot heading south towards town on a four lane road, I started to realize something was wrong. We swerved back and forth across the four lanes, charged towards an oncoming large semi truck (whose grill work I still remember) and at the last fraction of a second pulled wildly to the left, passing that oncoming truck **on the left**, swerved back across all 4 lanes over the curb before coming to a rest sitting on the sidewalk.



Figure 2: Author with Yuki, a visiting Software Engineer from HP Japan

What I didn't know at the time about Japanese culture was that answering no to a question is considered impolite and rude. As such, people in Japan do not generally ask yes / no questions. My question: "Would you like to drive?" allowed only one polite answer, "yes", regardless of the outcome. Also in Japan, people drive on the left side of the road and the driver's seat is in the right side of the car. Furthermore Yuki was a user of mass transit and had a company apartment within walking distance to work. He had not driven for years after he had initially learned to drive. After a moment to recompose ourselves, I turned to him and fortunately asked: "Do you like me to drive?". I got an immediate "yes."

So, what does "yes" mean? What does agreement really look like? The way we ask the question may not produce an honest answer. In Japan, yes/no questions should be avoided to get to the truth. This lack of understanding on this cultural difference caused continued problems in first half of our project. I would ask if the project requirements were agreed to, or whether a design was good, or if we were finished with a topic. The agreement I thought we had, didn't really exist. "Yes" did not mean agreement.

This is not unique to Japan. When working with Indian teams, agreement to a schedule is most often an agreement to try, not agreement to deliver, even with very improbable likelihood of meeting the target. An American team member is focused on the commitment for the delivery, while the Indian team members are focused on the commitment to try very hard. When the inevitable deadline comes and goes, without the milestone met, there is frustration by both sides. The Indian team members worked nights and weekends, sacrificing family life, holidays to try to do the impossible and consequently angry now that there is no appreciation for how hard they tried and the depth of their commitment. The American team is angry that the scheduled delivery date was not met, and there are significant impacts to the business as a result. Both portions of the virtual team are frustrated and angry.

The irony is that the Indian team may have given indications of the risk with statements such as "The schedule is aggressive and looks difficult". The American team agreed but didn't understand that the statement was informing them that hitting the scheduled dates was unlikely. The Indian team believed they had informed the American team of the risk and committed to try as hard as they could. The American team understood it would be hard, but believed there was a commitment to *deliver*. Both teams had it within their power to prevent the failure, but didn't understand that the lack of communication and understanding from differing cultural norms was interfering with achieving their plans.

Even in similar cultures, challenges exist. In phone conferences, we easily ask questions that may force or cause an answer to be incomplete or inaccurate. We are denied the visual clues that would indicate that more discussion is needed.

The reason one should be concerned, is that this is just a single example of cultural issues creating havoc within a project team. See Appendix B companies providing cross cultural.

So, the takeaways from this section are:

- Take extra time to probe perceived understanding, be they agreements or concerns. Asking for risk assessments where there is agreement will help assess degrees of concerns relating to a plan or schedule.
- Take time to learn your own particular culture's differences in comparison to others and recognize what changes and adaptations are necessary to succeed with teams and partners from other locations.
- Understand cultural norms with respect to agreements (and a variety of other interactions). What does agreement look and sound like in the other culture. What do commitments mean?

5 Virtual Team Commitment

A few years ago, I had the pleasure of overseeing Hewlett-Packard's relationship with Hermes SoftLabs, a software R&D supplier in Slovenia. The team started on in Ljubljana and, while it was multinational (English, Croatian, Slovenian, American, Japanese and others), the team worked very effectively. It then expanded into a second site in Maribor, a few hours away by auto. These two sites, while not that far apart, started to exhibit some "we and they" behaviors not uncommon in virtual teams. The loss of personal touch and comradeship by separating into two

locations showed up as a decreased level of commitment within the team, with team members not stretching to meet tough goals for the project. Overall productivity was still good, but we felt it could be better.

At the end of some successful product deliveries, the Hermes management decided to celebrate the success with a joint off-site celebration away from work. Over a couple days the team boated together, swam together, dined together, danced together, drank together and bonded together. On return to the office, team commitment and productivity significantly increased. The higher level of performance was sustained through the duration of my experience with the team.



Figure 3: Team Members bonding from Hermes SoftLabs

The takeaway from this section is:

- Spending fun time together as a team strengthens team bonding. Team bonding drives team member commitment. Team member commitment drives team performance. Take the time for teams to bond.
- Bonding is also not a single one time event. Periodically refresh with face to face encounters, or create activities that pull the team together, even if over the phone and across distances.
- Set a portion of meeting time to share non-critical, non-project information – the equivalent of hallway chats.

6 Infrastructure Support

A couple years ago, I got complaints from a virtual team with both US and Indian team members. The concerns were around the quality of the meetings, lack of availability or access to the team, and the competency of the Indian team.

It was during a visit that the project manager and I started to understand the root causes. There were a few surprising limitations in the infrastructure that placed the Indian team members at a disadvantage when compared to their US counterparts. The Indian team members attended the phone conference around a project managers' speaker phone. Additionally, the engineers were not equipped with portable computers that allowed them to bring their work to the meeting. Before the meeting, each team member would print several inches worth of hard copy documents pertaining to the agenda and then bring them to the meeting. Often a question was asked requiring information not printed out, the India team guessed or said "We'll get back to you on that". While both teams spoke English, the challenge of accents was exacerbated by the poor quality of the conference phone. Both these inhibitors required the Indian team to be at the office at extended hours to be able to meet with the Americans. Our solution was to equip the Indian team with portable computers, phone headsets at their desk, and network connections at home. When a

conference phone was desired, they should switch to a higher quality conference speaker phone, such as a Polycom phone⁸.

There was surprising resistance to these improvements. The \$1000 to \$2000 incremental cost per engineer of these changes was not perceived to be worth the gains. It would also provide them with a benefit not existing elsewhere in Indian organization. However the improvements prevailed as it came down to a simple choice. The India team would:

- Operate at a very low cost, provide a lower level of contribution and be perceived to be second rate, or,
- At a slightly higher, but still low cost, be able to perform at a level comparable with the other team members.

The investments were made and the performance of the team improved.

Takeaways from this section are:

- Don't accept lower levels of performance from different sites. Find out the root cause and fix it.
- Visiting team member sites can reveal fundamental issues that would not be recognized from afar.

7 The Honeymoon

My next topic is the honeymoon. We know personal relationships depend on the passion of the honeymoon to build a foundation that can carry the relationship for the long haul. Newly formed virtual teams often experience three phases that vary greatly in satisfaction by team members on both sides of the relationship. The initial phase, which I call the Honeymoon, is similar to the marital honeymoon period where all members are on their best behavior and work hard to meet the expectations of the team.

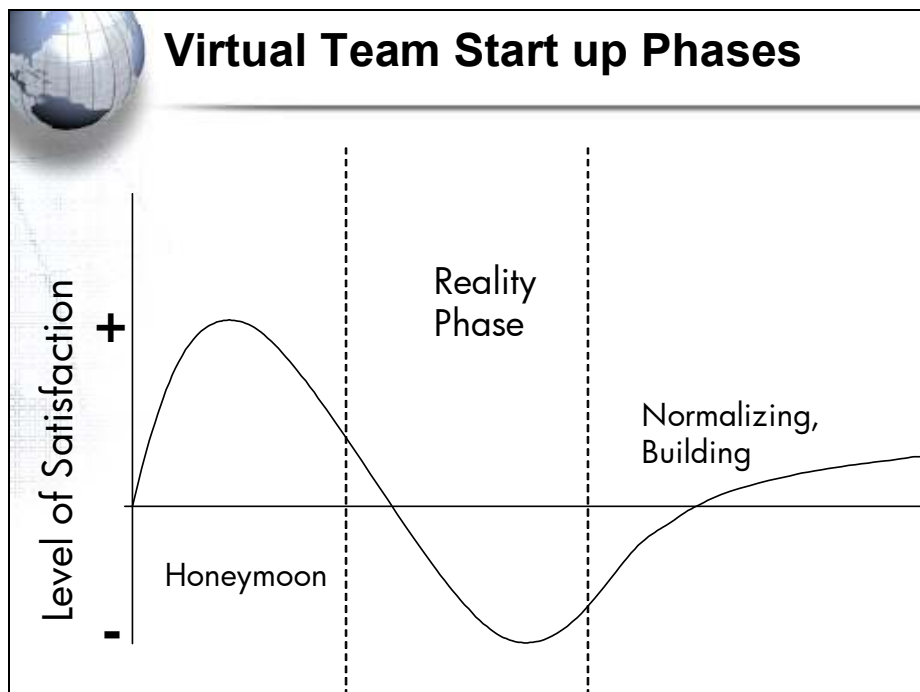


Figure 4 – Virtual Team Formation Phases

⁸ Polycom (www.polycom.com) manufactures quality conference speaker phones.

Subsequently, a second phase sets in: a “reality” phase in which the partner is discovered to be quite imperfect. In virtual teams building the personal relationships during the honeymoon are going will provide the foundation upon which to rebuild the team and push past the reality stage. The next story will include an example of a misspent honeymoon.

8 Embrace Your Travels

I had dinner one evening with a Bob, a financial controller, and his wife at a fondue restaurant in Sacramento, California. His company manufactured electronic light screens hundreds of feet high or across. The company was just acquired by a similar Belgium based company and the two companies were in the process of merging their operations. He lamented about the difficulty of communicating, getting responses from and working with the Brussels' team. Emails would go unanswered. Phone messages would not be returned. Progress was slow on joint projects. As I probed further I discovered that a few weeks after the merger, he was invited to the new headquarters in Brussels for some joint planning. He thought the visit had gone well, but he noted traveling can be tough. He'd work through the day with the Brussels' team and much of the night would be spent on the phone or in email communicating with the team back in California. He became absolutely exhausted, and had to turn down several evening dining invitations with the Brussels' team to keep on top of the work back in California. Shortly afterwards he was invited back for a special award to recognize some of the accomplishments of his local team. Unfortunately, as typically the case, the local work load was heavy and Bob didn't see the value in flying to Belgium to accept the award. He said he was honored, but couldn't attend and asked that they ship it to him.

While Bob thought the Brussels' meeting was successful with good results, and his work was appreciated, things began to unravel a few weeks later. He was not getting the responsiveness he expected from the European part of the team. Retrospectively he now recognized that he missed the opportunities to build the relationships that would be necessary to sustain success from a distance. He should have put his email and conference calls back to the US on hold and focused on building and strengthen the personal connections crucial to making progress in the future. Had he traveled to accept the award in person, he would have strengthened and refreshed those same relationships.

Take advantage of visits by team members to your location. Mike, of Hewlett-Packard, was particularly good at building those virtual team relationships. He summarized his experience as: “Relationship building needs to be more than just meeting in the office and then going back to homes/hotel. You have to socialize with them. When they visit with you find somewhere to take them. Show them the local area and the local sights, preferably by foot if possible. Make sure you know the history of the sights you are showing them, it helps. Help them to find places to visit when you cannot be there - particularly if they are with you for several weeks.” Mike's experience clearly demonstrated face to face meetings early in the relationship are better than all the phone calls, instant messaging and emails you could ever hope to have. In fact he asserted the face to face time increased the value of other communications by an order of magnitude.

So, the takeaways from these two sections are:

- Recognize that building personal relationships at the beginning of a project is a key factor to success. Achieving this without meeting face to face is more than difficult.
- When visiting a partner or team member, especially for the first few times, put other work on hold. Recognize the high priority of establishing the right personal connections and relationship. Much is achieved during the social aspects of the visit, regardless of demands elsewhere or travel weariness.

9 Success Requires Investment

A few years back, Hewlett-Packard decided to shift the work related to a very technical software product from California to India. The strategy was to utilize an experienced India R&D team to provide the support and new development for an existing product in order to release the US staff to work on another product. A solid plan was put together to train and mentor the India engineers and transition the responsibility. Half way through the transition, a business financial tightening forced the canceling of all remaining transition travel. In spite of concerns

raised, the team was constrained to complete the training and development of the India staff by phone and email. The teams adjusted their plans and did what they could to finish bring up the new team remotely.

Continually, over the couple next years, the original team was repeatedly pulled back to the prior product to help out one crisis after another. Frustration built up by both the sending and receiving teams. Attrition of key people in the lab caused yet more problems. Schedules associated with the new US product became completely unpredictable as the prior product continually impacted availability of the US staff.

10 Even Managers Need Help

A second learning from the same team and transition described above relates to the management of the new team. There are two aspects to this. First, is the receiving manager strong enough to help build a new team and pave the pathway forward? Second, and just as important, how will the new manager be trained?

The sending team considered software project management a horizontal skill that did not require training specific to the product being transferred. This was a misjudgment that severely undervalued critical product-specific skills, including the judgment necessary to correctly prioritize work, develop accurate schedules, recognize danger signals, and react appropriately to a variety of business situations. Without these skills, schedules were incomplete and inaccurate, customers escalated issues, unnecessary work was performed and performance suffered. The first manager left the team.

A few months after the initial transition, the sending team recognized the problem and started mentoring the new manager in terms of knowledge and judgment specifically related to the product, its delivery chain, and its customers. Team performance improved significantly.

Several years later, the best estimate of the total financial impact of canceling the travel and not training the manager was at least ten times the short term savings and much higher impact in opportunity costs through the continued pull back of resources.

So, the key takeaways from these two sections are::

- Recognize that in the software R&D space, it is not just the individual contributors who need the training. In any development space, the technical leadership is crucial to the success of the team. Care is needed in choosing the manager. It is also critical to provide product-specific manager and leadership training and mentoring during the transition of the work.
- Building a team to take on the technical responsibilities for software product development is dependent on solid, thorough training. Restricting that training by cutting out face-to-face training and mentoring can cost far more than the initial savings. Forrester Research has a good related paper [2].

11 The Clock – Friend or Foe

Many virtual teams are spread globally such that it's a continual challenge to find times that all members of the team can meet. If it's 9:00 in the morning in San Jose, Costa Rica, it's 8:30 in the evening in Delhi and midnight in Shanghai and 5:00PM in Paris. I once found myself on a team with weekly 5AM phone meetings. Managers need to keep an eye out for the toughest situations where staff are members of multiple teams, some meeting early in the morning and others late at night.

However, there are also frequent cases where the time zone differences can be your friend. With careful structuring of project responsibilities and roles across the virtual team, deliveries can be accelerated, while holding the cost constant. Some examples:

- Development and test – one portion of the team is discovering defects in a product and another portion of the team is fixing them. Defect notices are available in each morning for development team, which

- isolates the problem, fixes the code and rebuilds the product ready for the next test cycle. While the same number of hours is consumed, the number of days in the project can be cut down dramatically.
- Software product build systems - Software source is updated during the day and submitted for builds by the remote team through the night. The remote team is able to identify, resolve and restart any broken builds as necessary.
- Solving customer problems – tough problems which need to be worked to completion can take a follow-the-sun approach handing the problem off to the next day shift in a different geography. This avoids issues with night shifts and country holidays, higher staff turnover, security, etc.

The key to achieve these are short work cycles, infrastructure that allows work to be moved efficiently, and a design of the project organization which supports the dynamic movement of work. In the first example above, the organization must be structured and located such that the test work day is opposite the development workday. In the second example, the team supporting the product build must have the competency to fix and resolve many build problems while the development team sleeps (or be able to wake up engineers as necessary.) Additionally, as build systems generate numbers of huge files which need to be electronically shipped back to the development team, a large enough data communications pipe must be available to support movement of the work. In the third example, knowledge of the customer problem and ability to reproduce it must be captured to enable it to be shuffled between sites.

Takeaways from this last section are:

- During the creation of a virtual team and planning the responsibilities, investigate how you could structure to using time zone differences to your advantage. The type of talent and skills required at various sites may be dependent on your time zone leveraging approach.
- Be sure the infrastructure supports the capture, movement and sharing of information and work necessary for any follow-the-sun models.
- Exhibit personal flexibility in the times and methods you can communicate. Be careful of commitments to multiple virtual teams which may force meetings in early mornings and late nights.

Acknowledgements

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Appendix A

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Appendix B

Some companies that provide cross-cultural or multicultural training are:

- TMA (www.tmaworld.com)
- Wilson Learning (www.wilsonlearning.com)
- India Cultural Training, (www.IndiaCulturalTraining.com)
- The Brannen Group (www.brannengroup.com)
- Global Savvy (www.globalsavvy.com)