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**DEVELOPING COMPLEX
COLLABORATIONS:
BASIC PRINCIPLES TO GUIDE DESIGN
AND IMPLEMENTATION**

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People have worked together since the beginnings of human time. Since then the forms of collaboration have barely changed. While a group of laborers building the pyramids of Egypt might seem to bear little resemblance to a team of machine operators working in a plant, they actually have much in common. Both groups are made up of people of similar backgrounds with clear loyalties and interests, interacting face-to-face to perform relatively well–defined tasks in pursuit of a shared goal.

But things have changed in recent years – new technologies have made the world a smaller place and altered the nature of work, competition and markets have become global, and knowledge is now the most important resource for organizations trying to make their way through an increasingly complex world. As a result, traditional forms of collaboration are no longer sufficient for competing effectively in this new, more demanding, global business environment.

To meet constantly changing conditions and demands, business has to transcend boundaries to get what it needs regardless of where it exists – geographically, organizationally and functionally. Remaining competitive in the new global economy means collaborating across time, distance, organization and culture. Organizations now have to go further to find the right pieces and rapidly pull them together to create the best fit for their purposes. They also have to be able to take these collaborations apart just as rapidly when circumstances change and start over again with different pieces. In short, they need more complex collaborations to address the challenges of a more complex world.

These new collaborative forms are not like the teams of recent years past. They can be strategic partnerships among multiple organizations with similar stakes in the

outcome of the project. Or they may involve virtual collaborations among people and teams working in different parts of the world. Value chains – relationships among different organizations to produce a product or service that is primarily identified with one primary organization – are yet another collaborative form. What makes these collaborations so complex are the number of people involved, the multiple organizational contexts within which they must function, and the potential psychological, cultural, and geographical distances that must be overcome. That is what this paper is about – *how to span these distances and transcend these boundaries to create collaborations that can address the business challenges of the new global economy.*

In this paper we will address this issue by describing the basic principles for the design of complex collaborations that emerged from our analysis of three case studies. Before that, we need to get a better understanding of what we mean by the expression, "complex collaboration," the characteristics of these collaborations, and the unique challenges they present.

THE NEW WORLD OF "COMPLEX COLLABORATION"

This is one of those situations where it's easier to define an expression by first describing its opposite, a "simple collaboration," and then to compare a complex collaboration against this base line. A simple collaboration is an ideal case – a situation that involves no barriers to overcome and where the collaborative process can flow unobstructed. The characteristics of simple collaborations and of their more complex counterparts are summarized in Figure 1.

One characteristic of a simple collaboration is a simple *task*, where the inputs are predictable and manageable and where the procedures for processing these inputs are well defined. These are "routine" tasks and are characterized by low "uncertainty" (Pava, 1993). A non routine or highly uncertain task – one in which the nature and timing of the inputs are difficult to predict and the task procedures are not predetermined but require judgement – is more complex. What is typically referred to these days as knowledge work is characterized by high task uncertainty (Mohrman, Cohen and Mohrman, 1995). New product development, new program development, process improvement, and the buying, selling and manufacturing decisions involved in global supply chains would be examples of non-routine, highly-uncertain, and therefore, more complex tasks.

The simplest kind of collaboration also involves only two *people*. With less than that, you do not have a collaboration. With the addition of more people to the collaboration, the possibility of different goals, points of view, personalities, etc. increases geometrically, as does the potential level of complexity.

In fact, *differences* of any kind make the collaborative task more complex. Two very similar people do not need to spend a great deal of time understanding each other's point of view, language, and expectations. The more diversity involved in the collaboration, the more obstacles to be overcome before the collaborators can successfully complete their task. Although everyone is now familiar with the challenges of cultural diversity, the challenges of organizational diversity may be less obvious but are just as important. People from different organizations involved in an interorganizational collaboration bring different agendas, goals, points of view, and even different cultures to the collaboration, making these collaborations far more complex and

challenging than if they were from the same organization (Park & Ungson, 1997; Saxton, 1997). Similarly, people from different functional units – engineering, manufacturing, marketing – within the same organization bring their different professional "thought worlds" (Dougherty, 1992) or culture into the collaborative mix, making this more complex than a collaboration among two like minded engineers, for example.

Face-to-face collaboration is simpler than virtual collaboration. The immediacy, almost instantaneous reciprocity, richness, and social cues of a face-to-face interaction generally make it easier for two or more people to collaborate if they are "co-located" and can, therefore, interact face-to-face when they need to. If they have to interact "virtually" via media that are less rich, more impersonal, and feature time delays between the back and forth responses that characterize successful collaborations, their task becomes more complex and difficult (Nemiro, 2003a).

All of these factors can contribute to the complexity of a collaboration. "Complexity" is a continuum, not an "either/or" situation. Therefore, the important issue is not whether a collaboration is complex or not, but how complex it is. The more complex the collaboration, the more effort required to make it work. The challenge is to overcome the difficulty and compensate for the complexity. How to do that is the focus of this chapter.

ABOUT OUR CASE STUDIES

This chapter is based on three very different case studies reflecting widely diverging purposes, forms, and circumstances. The first case features *interorganizational collaborations* among the John Deere Construction and Forestry Equipment Company

and various John Deere dealerships and two year technical colleges located throughout the United States. The purpose of the collaborations was to develop training programs for John Deere construction equipment service technicians, which were in short supply at the time the program was initiated. The case includes the overall program run by Deere -- which initiates, facilitates and supports these programs nationwide -- as well as two projects that have been conducted under the auspices of the program in different regions of the United States. This was the first case we examined so we had the opportunity to follow this case over an extended period of time. As a result we were able to observe the ebb and flow of a long term project -- from the initial uncertainties as participants from different organizations feel each other out, through the development of critical relationships and trust, to the eventual pulling back as changing economic conditions produce different priorities.

The second case shifts the focus to *cross cultural collaboration*, particularly collaboration across international boundaries. Only one company is involved in this case, the Radica Games Group, Inc., one of the leading developers and manufacturers of handheld electronic games and video game controllers in the world. This case also includes two projects, the development of the Bass Fishing Game in the mid 1990s and the more recent project to develop controllers for the video game consoles produced by Nintendo, Sony, and Microsoft. The Bass Fishing Game project involved different teams in Dallas, Hong Kong and Radica's factory in Southern China; the Controller projects involved the same sites plus a team from a company in the United Kingdom that was acquired in the late 1990s.

How they partitioned, allocated and integrated tasks among these different sites is one of the more interesting features of this case. The international nature of the case also enables us to take a close look at the challenges of collaboration across dramatically different cultures. We see how the CEO, Bob Davids, and his right hand man, S. W. Lam, an engineer from Hong Kong with a long term interest in Western management ideas, collaborated early on in the shaping of the unique culture of this multinational company. We also see Lam's critical role in the Bass Fishing Game project as a cultural and functional liaison between the teams in Dallas and Hong Kong. With the acquisition of the company from the UK several years later, Radica quickly became larger and even more dispersed and culturally diverse. The tensions and stresses associated with integrating the new site added yet another challenge, a challenge that was exacerbated by the intense time and performance pressures inherent to product development in the toy and game business.

The third case also features an interorganizational collaboration, but with a very important difference. While the first case involved multiple organizations in a project that was only indirectly related to the core business of most of the organizations involved in the case, the third case focuses on a *supply chain collaboration* where interorganizational collaboration is not just the means, but also the end. The case focuses on Solectron, one of the pioneers in the electronics manufacturing services industry (EMS), an industry that is the epitome of the increasingly global and interrorganizational nature of modern manufacturing. In their evolution over the years from contract manufacturer to "global supply chain facilitator," Solectron's role now involves the facilitation of the entire

supply chain, not just acting as one of the links in this chain. One could argue that collaboration is now the very core of their business.

Since close collaboration is intrinsic to supply chains, the interorganizational collaborations in the Solectron case are more tightly linked and critical to the success of all of the parties involved in the collaboration than they are in the John Deere case. In fact, close collaboration with customers and suppliers is a particularly important element in Solectron's new strategic direction. In this case we see how Solectron executes this strategy and supports their new emphasis, especially via the extensive use of performance metrics and information technology. The case also examines one of their most far reaching efforts to date, their close collaboration with their customer Brocade, a producer of data network storage systems. This close collaboration is especially apparent in the innovative logistics initiative, which involves a Solectron employee serving on site, in effect, as Brocade's logistics department. This initiative demonstrates the challenges, risks, and rewards that go along with the blurring of boundaries in global supply chain collaborations that seem to grow closer and more complex every day.

For each case we interviewed about 20-25 people who were either directly involved in the collaborations or were close enough to the projects to provide additional details and supplementary perspectives. The actual names of the organizations and individuals are presented in this paper with the exception of the John Deere case. The John Deere names are real, but the names of the other organizations and individuals in that case are fictitious. Before we describe the factors and principles that emerged from our analysis of these cases, we need to say a few words about how we approached that

analysis, our perspective on the kinds of factors and principles we expected to find, and the framework we used to organize and understand our findings.

ABOUT OUR PERSPECTIVE AND FRAMEWORK

We analyzed the case studies by identifying the critical success factors in each case. We grouped the factors into four broad categories that fit the kind of collaborations we examined in our case studies. The categories are:

- organizational level factors – the characteristics of the organizations and teams involved in the collaboration (e.g., culture) and of the relationship among them (e.g., shared goals, complementary capabilities).

- structure of the collaboration – The role of structure is to make complex collaborations less complex and more manageable by reducing uncertainty and increasing predictability. Simple collaborations among just a few people working for the same organization can be structured "on the fly" – spontaneously, informally, and as the need arises. As we will see in the following, complex collaborations require proactive structuring in the form of formal agreements (e.g., contracts); well-defined roles, tasks, responsibilities, and decision making processes; and the like. Structure makes it easier for the participants to get a handle on the many issues, problems and challenges they have to face to make these collaborations work.

- characteristics of key people and their relationships – personality and skills of people in critical roles and the relationships among these people.

- collaboration process – how the people involved in the collaboration work

  together (e.g., the nature and style of leadership, how they communicate, the

  norms that guided their interactions, etc.).

What we present in the next several pages is the integration of the findings, the

critical success factors, from all three cases (the full case descriptions and analyses for

each case are presented in Mankin and Cohen, 2004). These critical success factors help

define basic principles that apply to all of the cases. In effect, we move from the critical

success factors for each case to the basic principles that underlie all of our cases.

PRINCIPLES IN COLLABORATION DESIGN

What can we learn from collaborations as varied as those in our cases? That is the

purpose of this section – to pull together all of the separate findings from the three cases

to identify basic principles for the design of complex collaborations. Table 1 presents

these basic principles. All three of our cases demonstrate these principles in action,

though their specific manifestations often vary from case to case. These basic principles

can be used as a foundation for the design and implementation of complex collaborations,

regardless of the forms they take or the conditions under which they operate (see Mankin

and Cohen, 2004 for an action framework based on these principles). The Table and our

description of the principles follow the organizing framework we described in the

preceding section. The logical place to begin is with the highest level factors, those that

define the context (Fitzgerald, 2003) and entity within which the complex collaborations

unfold.

<u>Organization</u>

The basic principles at the organizational level fall into three loosely defined categories. The first category includes those principles that bring teams and organizations together – we describe them as "magnetic forces." They comprise the raison d'etre for the projects. The second category is the "glue" that helps keep them together, and the third includes the factors that propel the collaboration forward.

<u>The Magnetic Forces That Pull Them Together</u>. Of the organizational level factors, *shared goals* (Gomes-Casseres, 1993) and *complementary capabilities* (Doz, 1996) are a good starting point. In effect, they are what pull together the different organizations and teams involved in a complex collaboration; they provide the reason for them to collaborate. This is particularly easy to see in interorganizational collaborations such as those in the John Deere case. All of the organizations in that case had a stake in the success of the projects, albeit for different reasons. For John Deere, an on-going supply of well-trained service technicians helps them sell equipment; for the dealers, the revenues generated from servicing this equipment is one of their fastest growing sources of profit; for the colleges, the new programs and the students they attract is the coin of their realm. All of the organizations bring different capabilities to the mix – equipment for the students to learn on from the dealers; cachet, resources and wide spread experience from Deere; and expertise in curriculum development and instruction from the colleges. Without these shared goals and complementary capabilities, the collaborations would never have been able to get off the ground.

These factors were also critical in the Solectron and Radica cases. Shared goals and complementary capabilities are essentially a "given" in the contract manufacturing

business and are fundamental to the very nature of supply chains. They are also critical to new product development efforts, such as those conducted at Radica, involving as they do intra-organizational collaborations between marketing, design, engineering and manufacturing to develop new products.

The Glue That Keeps Them Together. The glue that keeps collaborating organizations and teams together is their *compatible cultures* (Doz, 1996; Dyer & Singh, 1998). We can see this factor in play in both Brocade's and Solectron's willingness to take risks and try new things -- for example, by placing a Solectron employee in a sensitive position on-site at Brocade. Similarly, all of the organizations involved in the John Deere programs shared a commitment to hands-on technical careers in the construction industry, and their cultures tended to reflect the traditional values of this industry.

The Radica case also illustrates this factor as well as the two dimensions that are most important to a supportive, collaborative culture. Despite the profound cultural differences between the product development team in Dallas and the engineering design team in Hong Kong, they both shared a commitment to "getting the product out the door." In the toy and game industry if new products are not on the market in time for the Christmas season, the company risks losing out on the bulk of their sales for the year. Companies that do not have strong *bias for performance* do not last long in the toy and game business.

The Radica case also illustrates the other side of this cultural coin. *Mutual respect and trust* (Inkpen and Currall, 1998; Ring and Van de Ven, 1994) played a critical role in the success of the Bass Fishing Game project. The CEO, Bob Davids, with the help of his

cultural liaison, S. W. Lam, spent several years before the project intentionally and

explicitly developing a culture of mutual trust and respect throughout the company. This

culture laid the foundation for the project by guiding the kind of behavior needed to

collaborate effectively across their considerable geographic, temporal and cultural

differences. Without this culture, and the norms and behavior through which this culture

was expressed, the company would not have been able to pull off this crucial project,

especially given the time pressures they faced and the stakes involved. This cultural

dimension was also a significant factor in the other cases, but nowhere was its role more

dramatically illustrated than in the Radica case.

      The Factors That Propel Them Forward. We now turn our attention to a number

of factors that enable collaborating organizations and teams to continue collaborating and

carry out these projects over time. One of the most important is *high level management*

support and *the access to resources* that typically accompanies that support (Nemiro,

2003b). This was one of the most frequently mentioned success factors in all three of our

cases.

      In the John Deere case, for example, high level support from the various partners

fluctuated throughout the projects as personnel, priorities and other circumstances

changed. When there was high level support from all of the partners, the projects moved

along, when there wasn't, the projects stalled. The actions of the EVP for one of the

dealerships provides an object lesson in what the expression "high level support" means

in operation, transforming this obvious cliché into a blueprint for executive action. First,

prior to his involvement in this project he already had a reputation for "walking his talk."

He talked a great deal about how important the project was and backed up his "talk" by

pressuring individual dealer stores to provide internships, tuition support, and jobs to students after they graduated from the program. One of his most important actions was to assign one of his employees almost full time to the project to serve as liaison and representative and provided her with a budget to support her role in this project.

Our last principle in this category, *prior experience with complex collaboration* (Fitzgerald, 2003, Inkpen and Currall, 1998; Khanna, 1998)*,* was only explicitly mentioned in the John Deere interviews, but it was at least implicit in the other two cases. Almost all of Solectron's customers have used contract manufacturers like Solectron for years. In addition, Solectron only collaborates closely with their 100 or so best suppliers. And, the way a company becomes a "best supplier" is to have enough previous experience with Solectron to build up the kind of track record needed to qualify for that status.

This factor was also an issue at Radica on the Controller projects after their acquisition of the company in the UK. Because of their history of collaboration on the Bass fishing Game project, the Dallas and Hong Kong teams had little difficulty working together on the Controller projects. On the other hand, the UK designers from the newly acquired company did have some initial difficulty communicating with the Hong Kong engineers, and vice-versa. The employees at the two sites had never worked together before, so they were unfamiliar with each other's language habits and cultural norms and sensitivities. Over time, as they became more familiar with each others culture and language constraints, they learned how to avoid many of their earlier communication problems and worked together more effectively from there-on-in. It seems clear from the Radica case, and is at least suggested by the other two cases, that previous experience

may develop collaboration skills and possibly even help build a culture of relationships

that can lay the groundwork for future collaborations across multiple boundaries.

Structure

The structural principles also fall into three categories, though the categories do

not seem to reflect as clear a logic as the categories in the previous section. The first

category deals with formal roles for the entities involved in the collaborations --

individuals, teams and organizations -- the responsibilities that go along with these roles,

and the relationships among the roles. The second category focuses on governance and

authority structures – i.e., how projects are managed and decisions made. The third

category has to do with how these roles and structures are supported, primarily via

information and information technology.

Formal Roles, Tasks, Expectations, and Understandings. This principle manifests

itself in very different ways in each of our cases. In the Solectron case it was in the form

of formal contracts with their suppliers and customers. At first glance this might appear

too obvious to even mention. In a business where pennies per part can add up very

quickly and delays in delivery schedules can shut down production, a formal contract

specifying costs, delivery date and penalties for failure to perform would almost seem to

be a given. According to one of our interviewees, however, a VP in the materials

organization, the wide spread use of formal contracts is a relatively recent development in

the electronic manufacturing services industry. Personal relationships and "handshake"

deals used to be the norm in this industry. In recent years, though, relationships between

Solectron and their suppliers have become "more than just a couple of beers and hot

dogs," but now have to be "based on good business principles." Not surprisingly, these good business principles include formal contracts.

Formal contracts were not as relevant in the John Deere and Radica cases, since nothing was being bought or sold among the participants. However, the basic principle still applies though the forms it takes vary from case to case. In the John Deere case, for example, there was some initial uncertainty about participants' roles, responsibilities, and boundaries which slowed down both projects in their early stages. More formal documentation of these roles and other, related issues such as decision making processes -- in the form of a *charter*, for example (Dowling, 2003; Justice and Jamieson, 1999) -- would have helped. In the Radica case, each team was given a well-defined goal, tasks were identified and allocated based on these goals, and then the tasks were integrated via shared understandings about what to communicate, when, and by which means. These task designs served the same purpose as formal contracts specifying roles, responsibilities and expectations.

While the issues that need to be formalized depend on the nature of the collaboration – e.g., products, prices, and delivery dates for supply chain collaborations vs. roles and responsibilities for joint interorganizational projects -- all complex collaborations require *formally-defined liaison roles*. In all three of our cases, people in these roles were responsible for integrating the teams, organizations and cultures involved in the collaborations. Without them, the projects would have failed. Too often, in an attempt to save money and resources, roles such as these are left to chance and good intentions, to be filled by whoever has the inclination and the time. But there is rarely time left over from other responsibilities, especially when these other responsibilities are

important enough to be formal job requirements. Informal roles like this are rarely fulfilled, or at least fulfilled well.

Therefore, liaison roles need to be created proactively and intentionally. Designating a formal liaison role with distinct responsibilities increases the likelihood that these responsibilities will actually be carried out. Creating this role is a design issue, a structural intervention that formalizes the role to make sure that it is not overlooked and that it receives the support, recognition and attention it deserves. Since liaison roles are so inextricably linked with the qualities of the people who fill those roles and the relationships among them, we will address this issue again in the section on "people and their interrelationships."

Special Governance and Authority Structures. This principle is most clearly seen in the John Deere case. For each project, there was an advisory team to oversee the project and a separate implementation team (with some overlapping members) to carry it out. Special governance structures were not needed in the Solectron case, however, since the nature of their business is interorganizational collaboration and they have ongoing structures and processes in place, both formal and informal, to deal with their supply chain relationships. At Radica, the CEO acted, in effect, as the "special governance structure" for the Bass Fishing Game project by participating closely in the project from beginning to end. This informal approach worked well at the time because the organization was small, but a more formal structure was created when Radica grew larger and more complex, after their acquisition of the UK unit.

Our findings suggest a number of criteria that can be used to design these governance structures. First, the structures need to ensure that *all of the entities*

(organizations and teams) involved in the project are represented in the governance structure. Second, since interorganizational collaborations frequently involve organizations and/or people that have not previously worked together, *simplicity and clarity* is critical, especially if there are more than two organizations involved in the collaboration. In other words, the structure should be as simple as possible to minimize confusion, especially in the early stages of the project when the different parties are trying to figure out who everyone is, the roles they play, and the organizations they represent. The rule of thumb is to create the simplest structure that will enable the work to get done while providing adequate representation for all of the critical parties involved in the collaboration.

The overlapping advisory groups and implementation teams used in the two John Deere projects are good examples of this tradeoff among simplicity, representation, and an efficient way to get work done. The advisory group provided for broad representation and access to a wide range of perspectives, experience and expertise to guide the projects. The implementation team made it possible for a smaller group of individuals, representing the organizations with the greatest stakes in the project, to dedicate time necessary for carrying out the day-to-day tasks.

A third rule of thumb suggested by our cases is to create a *clear decision authority*, especially if the work is "high intensity" – i.e., critical to the success of the organizations, requires close collaboration, and is performed under significant time pressures. At Radica, the CEO was the clear decision authority in the Bass Fishing Game project. After the company acquired the UK unit, the new CEO could no longer be as closely involved, so the lines of authority became murky, at least for a while. This is one

of the reasons it took so long to resolve the differences which slowed down the Controller projects in the early stages. As this last example illustrates, it is important to create this authority early on, before conflicts emerge. During the heat of battle is not the best time to make decisions about how best to make decisions. A clear decision authority was not as necessary for the John Deere projects, since they were under less time pressure and the projects were not as critical. Therefore, these collaborations functioned more informally and democratically. This suggests a general conclusion; the more critical the project and the greater the time pressures, the closer the collaborators need to work together and the greater the need for explicit and unambiguous decision-making processes, structures and authority.

Information, Performance Metrics, and Information Technology and Systems. In his ground-breaking book on organization design, Jay Galbraith argued that "the greater the task uncertainty, the greater the amount of information that must be processed among decision makers during task execution in order to achieve a given level of performance" (1973, p 4). As we argued in the introduction to this paper, increased task uncertainty makes collaborations more complex. Therefore, more complex collaborations require more information – and more information technology -- to manage the uncertainty and make these projects more manageable.

We can see the importance of this factor by comparing the John Deere case with Solectron. The latter is more complex – more organizations (suppliers and customers), different kinds of relationships (with suppliers vs customers), more dispersed sites, greater time pressures, and outcomes that are more critical to the companies involved. Therefore, the use of performance metrics and other information is much greater. The

conclusion that we can draw from this is that the more complex the collaboration, the more information and information technology are needed to support the collaborative relationships and processes. We see a similar relationship when we compare the two projects at Radica. The earlier, simpler Bass Fishing Game project was able to make do with fax machines and telephones, while the Controller projects needed technology that was far more complex, so they added email and 3-D design systems to the mix.

We may be able to extrapolate from this conclusion about information to an even broader conclusion about structure in general. The totality of findings for this category supports one of the basic assumptions and premises upon which this paper is based, that complex collaborations require significant amounts of structure to make the complexity more manageable; the more complex the collaboration, the more structure may be required. We saw this clearly as we moved from the John Deere case to Radica and then to Solectron. New layers of complexity were added with each case as tasks, roles, and relationships became more formal, less ad hoc, and more highly articulated and developed.

People and Their Interrelationships

The principles in this category are few, straightforward and very basic. They are so closely related and universal that they comprise a foundation which may very well underlie all collaboration, complex or otherwise. This may be where all successful collaborations begin, with good relationships among competent people in the right roles.

Liaison Roles and Collaborating Pairs. This is one of the most compelling and consistent findings that emerged from our analyses of all three cases. As we mentioned

earlier, liaison roles are actually structural issues since they are concerned with how tasks and roles are structured and designed, but the connection between the roles and the people who fill these roles is so close that it is easier to discuss these two issues together.

Liaison roles are actually a kind of "integrating role," which Jay Galbraith describes as an effective means to achieve "lateral coordination" across "functional specialization, business diversification, and global dispersion" (1994, p 87). According to Galbraith,

> …these differences make it more difficult to integrate all subtasks into the completion of the whole task. The different specialities, countries, and businesses all have their own interests, constituencies, and ways of thinking. It is the task of the integrator to span these differences and achieve coordinated outcomes. Thus, the integrating role is to obtain better coordination, as well as more coordination. (p 87)

Liaison roles played a critical part in the success of the collaborations in all of our cases. Lam single handedly played that role for the Bass Fishing Game project at Radica, linking the Hong Kong and Dallas teams, as well as crossing the cultural and functional boundaries separating both locations. In most of the other instances throughout the three cases, the lateral integration was accomplished by "collaborative pairs" -- i.e., designated individuals at each site responsible for working closely on common tasks with their counterpart(s) in similar roles at the other sites. For example, the relationship between the heads of the US and UK divisions at Radica helped to resolve some of the initial tensions between these two units following the acquisition of the latter. These collaborative pairings are also critical at the operational level. In the John Deere case, it was the strong

task-based relationship between two mid-level people serving in liaison roles that enabled one of the projects to get off the ground and helped sustain the project through its difficult initial months. Similar relationships among key liaisons at both the managerial and operational level were critical to the success of the Solectron-Brocade collaborations.

Although collaborating pairs were the norm in most cases and instances, Lam's example suggests another possible means for fulfilling this function – i.e., the single liaison person who effectively integrates separate organizations or teams by him or herself. We suspect that Lam was able to fulfill the liaison role by himself because the units he spanned already had close ties, and he had significant experience and relationships in both. We found another example of a single liaison person spanning two sites in the Solectron case. The person was also Asian, linked sites in Asia and North America, had spent time at both sites, and was fluent in both English and the language of the Asian site (Malay, in the latter case). In addition, like the Radica case the organizational separation was relatively small since both sites were part of Solectron. Aside from these two examples, the linking function happened via collaborating pairs, probably because the "organizational separation" was too great and no one had similar experience at all of the sites where tasks had to be integrated.

All of this suggests a corollary to the basic principle of liaison people and collaborating pairs. Collaborations across different organizations almost always require separate liaison people to represent each of the organizations involved in the collaboration – collaborating pairs or even integrating teams of liaison people when more than two organizations are involved. On the other hand, complex collaborations within a single organization can get by with one person serving as the link between the separate

plants, teams or units if the sites have close ties and if the liaison person is able to

effectively represent each site via his or her experience, cultural background, and

language skills.

In conclusion, we are struck by how often these collaborating pairs appeared in

our cases and how important a role they seemed to play in their success. These pairings

are the axes around which the complex collaborations revolve. The question then is how

to ensure that these collaborative pairings work effectively. Part of the answer, as we

have already noted, is to create these roles, explicitly and proactively. Another part of the

answer is to put the right people in these roles. By "right" we mean people who can

transcend differences to work on shared tasks with their counterparts on other teams and

in other organizations. The special challenges of lateral integration require people with

special qualities to fill these critical liaison roles. What are these special qualities? What

is it about the liaison people we found that enabled them to fill these critically important

liaison roles so effectively?

Lateral Skills. We explored these questions by identifying key people who

functioned effectively in these roles, and asking them and others who worked closely

with them to speculate on the traits and behaviors underlying their success. From this we

have been able to put together the beginnings of a profile which describes the "lateral

skills" we consider to be indispensable for anyone serving in these critically important

and challenging roles.

First and foremost, the necessary but not sufficient foundation for this quality is

good interpersonal skills. But it is much more than that. It doesn't take very much in the

way of interpersonal skill to get along with and work effectively with someone who is

very similar and who has the same basic values, interests and background. But working

effectively with someone who is very different requires skills that go well beyond the

ordinary. It requires the kind of skill that enables, for example, a businessman from Los

Angeles and a Hong Kong engineer several years his junior to collaborate on the

transformation of an entire organization and its culture, as happened at Radica during the

years preceding the projects in our case.

Perhaps one way to understand the difference between what are merely good

interpersonal skills and what we mean by the more important lateral skills is to imagine a

person who might be best described as a "congenial racist." This is a person who is

personable and gets along well with people who are similar in background and outlook

and whose roots are in the same culture. On the other hand, this person has difficulty

relating to anyone who has different experiences or points of view, or comes from a

different cultural background. It takes a person with good lateral skills to work with

someone who is very different. This a far more valuable set of skills -- particularly in

today's multicultural, cross-functional, and interorganizational workplace – and one that

is much more difficult to find.

To get a better handle on what we mean by "lateral skills" we go back to a

definition we offered in our earlier book, "Teams and Technology" (Mankin, Cohen and

Bikson, 1996). In that book we describe lateral skills as the ability "to work effectively

with people of different functional backgrounds, work experiences, knowledge bases and

skills" (p 97). What this means in terms of the preceding discussion is that people in

collaborative pairs who possess strong lateral skills can transcend their differences to find

a common ground. This common ground enables them to work together on mutual tasks

to fulfill their shared goals. Our interviews, observations and previous work on this issue suggest that empathy plays an especially central role in lateral skills. By "empathy" we mean the ability to put oneself in another's place, to be open to the opinions, concerns, perspectives and interests of others who are quite different. It also means the ability to transcend cultural boundaries, to respect and appreciate differences, especially differences associated with national, ethnic and functional cultures.

One of our examples from the Solectron case enables us to add some additional wrinkles to our emerging profile of good lateral skills. Everyone we interviewed about the Brocade-Solectron collaborations pointed to one person in particular as one of the most important reasons for the success of the logistics initiative. This person, Glenn, was the Solectron employee chosen to be the logistics liaison person on site at Brocade and was one half of the collaborating pair that was the critical operational axis for this initiative.

Our interviewees were also very consistent in their descriptions of those qualities they thought made Glenn so effective in this role. They described him as being open to working with others, especially customers, and sensitive to their needs and concerns. "He wants to help," one interviewee noted, "he wants to understand others' issues and concerns so that he can serve them better." According to his boss at Solectron, "Glenn does a really good job of listening. He really hears what you have to say." Glenn is clearly empathic in the way we describe above, but he is also more than that. He views the people he works with as his customers and does his best to serve them well. He is able to put himself in the customer's place. Because he can internalize their needs and

make them his own, he understands their needs and can serve them better. This is empathy in the "service" of customer service.

Glenn's example also suggests another dimension. In his role as Solectron's logistics liaison to Brocade he had access to confidential information about other EMSs -- Solectron competitors -- that Brocade also used. Therefore, he had to be very careful about how he handled the boundaries of his role. His care and sensitivity did not go unnoticed by his Brocade collaborators. Many of them used descriptors such as "integrity" and "inspires trust" to describe this dimension of his personality and behavior in this all important role. It is easy to see how this character trait could affect an individual's performance in a liaison role, especially in an interorganizational collaboration where confidentiality and other boundary issues can be so important.

The Collaborative Process

Consideration of the collaborative process logically follows a discussion of the people who are the participants in this process. How they interact, the means they use to collaborate, and their attitudes and state-of-mind as they execute their tasks – these are the remaining principles to be addressed in the design and implementation of complex collaborations.

Leadership. This is one of the first basic principles underlying the collaborative process. How could it be otherwise? Leadership is necessary for focused and sustained action for almost all work-related activity, complex collaborations included, and is necessary for getting the collaborative process started. Beyond the obvious statement that leadership of some sort is important, what is most significant is the particular style, form

and approach that seems most appropriate for the conditions and nature of the collaboration.

In all of our cases, leadership was *generally facilitative and shared, but also adaptable to different circumstances and stages*. That said, there were also some very important differences between the leadership of the John Deere projects, on the one hand, and the Radica and Solectron cases, on the other. As we noted earlier in this paper, the John Deere projects were "lower intensity" than the others – i.e., the projects did not have the same sense of urgency as the projects in the other cases, and they were not as critical to the success of the organizations involved in the projects. Therefore, leadership was generally facilitative and shared throughout the projects. On the other hand, the need to get "the product out of the door" in the Radica and Solectron projects required an approach that could quickly get more directive when necessary. This was especially apparent in the Bass Fishing Game project in the Radica case where the CEO would step in and make decisions about the design of the game when the members of the project team couldn't agree or were reluctant to make the decision themselves.

Communication. Communication *among participants as well as between participants and others not directly involved in the collaboration* was also critical to the success of all of the cases. The participants in our cases communicated frequently with each other by whatever means they had at their disposal. They also communicated frequently with external stakeholders, particularly in the interorganizational collaborations – i.e., the John Deere and Solectron cases -- where the project participants communicated regularly with their managers in their "home" organizations, as well as with others who provided critical support and were most impacted by the projects.

Our cases demonstrate that *face-to-face interaction* is still one of the most important means of communication, not just for sharing information and working together on shared tasks but also for building and maintaining relationships. Over the last decade the idea of virtual collaboration has spread throughout the business world, promoted as the cure for skyrocketing travel costs, as the means for linking distant sites and collaborators, and so on. Every day, more and more business leaders, consultants, and writers are buying into the seductive vision of individuals interacting with each other via the internet or videoconferencing technology rather than face-to-face (FTF).

Unfortunately, this fevered interest has tended to distort our perception of how work is actually changing in this era of global enterprise. Recent research and the experiences of many people on virtual teams offer a very different picture of the relative roles of virtual and FTF interaction in complex collaboration. Maznevski and Athanassiou, writing in the recent book, Virtual Teams That Work (Gibson & Cohen, 2003), succinctly capture the new conventional wisdom "[F]or a virtual team, the single greatest challenge is building relationships….[and] it is easier," they continue, "to build strong ties in face-to-face relationships" (p 210). The reality of virtual collaboration is that there is no substitute for FTF interaction.

Our findings are consistent with this emerging consensus. Face-to-face interaction was an important factor in all of our cases. This was even true in the Radica projects where the different teams involved in the projects were so widely dispersed – in Dallas, Hong Kong, southern China, and in the Controller projects, the UK. The design of the tasks in both the Bass Fishing Game project and the Controller projects allowed for intensive FTF interaction where it was most needed -- e.g., among the product designers

in Dallas and among the engineers in Hong Kong. However, even in this case, Lam, the CEO and others traveled when they had to, and several other people felt that they could have worked more effectively with their collaborators at other sites if they were able to travel more often.

Face-to-face interaction is particularly important in building relationships, especially the collaborating pairs described in the previous section. The importance of this issue is succinctly described by the head of Radica's North America division, who played a major role in resolving the conflict that slowed down the Controller projects following the acquisition of the company from the UK. "Solutions work out much better if you have a personal relationship with the person you are dealing with," she notes in reference to her relationship with her UK counterpart. "If you have the opportunity to spend some time with that person, then it's easier to work out issues via email or phone." With respect to some of the initial difficulties between the two divisions, she concludes that "we would have solved it much faster if we could have gotten all of the key people together in the same room and had these meetings beforehand." She sums this up well in her final words on the subject, "before I had an issue, I had a relationship," a relationship, we would add, that was built on a foundation of face-to-face interaction.

Of course, the problem is that FTF interaction is often not possible or far too expensive, especially in situations where collaborators are separated by great distances. In those situations the only choice is to make virtual collaboration work. What that means is learning when and how to use the media that are available – fax, phone, email and the world-wide web – and when and how to supplement these media with FTF interaction via meetings, co-location, and the like. In addition, many of the factors we have already

described (e.g., structuring tasks) and will soon describe (e.g., communication norms) can help make virtual collaboration work.

Attitudes, Expectations and Norms. Complex collaborative processes require well-defined and explicit attitudes, norms, and expectations to guide these processes, especially those underpinning the prerequisite culture of *mutual respect and trust* (Fitzgerald, 2003, p. 86; Hood, Logsdon, and Thompson, 1993). This was especially important at Radica where the cultural and geographic differences were so great. That is why the CEO and Lam worked so diligently for so many years to create this culture and the norms that go along with it. Without this foundation, they never would have been able to transcend the formidable boundaries of time, distance, and culture so that this very complex collaboration could succeed.

Norms that guide communications with other collaborators are also important. These norms include how often to communicate, by what means, and the need to acknowledge receipt of phone and email communications and provide a timely response. Also important are norms that call for sensitivity and judgment in all communications, particularly in email communications where the possibility of misinterpretations and unintended slights is so great (Nemiro, 2003a).

When these communications span geographic and cultural distances, the challenges and potential consequences are even greater. International collaborations, for example, require that special attention be paid to *cultural sensitivity*, especially when email is the medium for communication. In addition, expectations about daily communications and responses might need to be established if the international

collaborations cross significant distances and time zones, the work days of widely

separated sites do not overlap, and significant time pressures are involved.

The Radica Bass Fishing Game project is very instructive here. At the end of

every work day the product design team in Dallas would fax drawings to the engineering

team in Hong Kong. Because of the 13 hour time difference, the drawings would be

waiting when the engineers in Hong Kong arrived for work each morning. They would

then work on the engineering designs and fax their responses back to the Dallas team by

the end of the work day in Hong Kong -- pointing out, for example, that the game

features the Dallas team was asking for would raise the manufacturing costs above the

targeted price point for the game. This process would go back and forth until the issues

were resolved, much like passing a baton back and forth in a never ending two person

relay race. These communication norms, coupled with the culture of mutual respect and

trust that the CEO and Lam had worked so hard to develop, enabled this *24 hour design

process* to proceed unaccompanied by the rancor and tension that one might expect in

situations marked by such intense time pressures and profound cultural differences.

Learning Processes. Once the collaboration is well underway, formal or informal

learning processes can be used to monitor progress and explore how to improve the

effectiveness of the collaborative process. All of the organizations involved in our cases

either used some form of learning process or intended to do so in the near future. One of

the best examples is the annual meetings jointly sponsored by Solectron and Brocade to

address high level strategic issues in the increasingly close collaboration between the two

companies. These meetings are usually attended by 5-7 VPs and other senior level

managers from the two companies, as well as by some of the key operational level people

involved in the collaboration. The agenda typically includes such items as an overview of the activities and developments of the past year, what the two companies have learned from the initiatives, the areas that need improvement, and what they should focus on for the next year.

The John Deere case demonstrates that these learning processes can lead to significant mid-course corrections. The slow economy during the early years of the decade led many of the organizations involved in the various programs to rethink their priorities. The programs continue but with more modest goals. This example illustrates that complex collaborations functioning in equally complex and dynamic times need to have *goals and plans that are adaptable to changing conditions*. This means reasonable goals, flexible plans, and a willingness on the part of the participants and their managers to change goals and plans when necessary. The Solectron-Brocade collaborations illustrate a corollary to this principle, the *utility of "early wins"* -- modest but meaningful goals that can be achieved quickly. The logistics initiative was intentionally designed to produce "early wins" that would quickly build support for the initiative at Brocade and confidence and trust in Glenn.

Fun and Playfulness. Our last basic principle is perhaps the most difficult to get a handle on, at least in terms of how to make it happen. This was only occasionally mentioned in our interviews, but it was clear from the tone of the interviews that many people derived a great deal of intrinsic satisfaction from their participation in the projects, especially when things were going well. If this is an important principle, the logical question, then, is how to make this an actionable principle, how to make the collaborative experience pleasurable? In other words, how to make these projects fun?

Our cases suggest an answer to this question, not because of what was done but what was apparently not done, or at least was not perceived to be important enough to be mentioned by our interviewees – i.e., specific team building activities, experiences, or even social events designed for the explicit purpose of having fun, rather than doing work. We have no doubts that there were some experiences of this sort in all of the projects, but they did not seem to play an important enough role for any one to cite them as a major factor in the success of their efforts. Since extrinsic sources of fun – parties, games, clowns, humor consultants – did not play a significant role in the projects, we can only conclude that the fun came from the intrinsic pleasures of doing a difficult job well. The other factors described here are what made it possible for the participants to have fun -- to be challenged by the demands of a complex project, to meet these challenges by performing their tasks effectively, and to derive great satisfaction from the success of their efforts. In other words, fun is not the cause of their success, it is a byproduct of their successful efforts. Therefore, by focusing on the other factors, the fun will likely follow.

CONCLUSION: TOWARD AN ACTION FRAMEWORK FOR THE DESIGN OF COMPLEX COLLABORATIONS

In this paper we have identified a number of basic principles for the design of complex collaborations. These principles apply in all three of our cases, and possibly to all forms and under all conditions. However, some circumstances can accentuate the importance of particular principles or make different aspects more salient. For example,

* A performance-oriented culture, clear decision authority, and a more directive leadership approach are especially important in "high intensity" projects.

∗   International collaborations require that more attention be paid to developing communication norms that emphasize cultural sensitivity.

∗   Shared goals, complementary capabilities, and information sharing are more likely to be critical issues in collaborations among multiple organizations.

∗   The more complex the collaboration, the greater the need for information, information technology, and performance metrics – in fact the greater the need for structure in general.

All of these principles, plus the limited caveats and qualifications listed above, may be too complex for many managers and others who face the challenges of real world collaboration. Therefore, in these last few paragraphs we offer a "meta-principle" which underlies and integrates the basic principles we have described in the last several pages. For the most part, the basic principles are essentially specific manifestations of this overarching meta-principle. The meta-principle is much easier to keep in mind, and it may be all that is needed in many situations and projects. It is our hope that once the meta-principle is internalized and deeply grasped, the specific action steps to be taken will easily follow. They will flow naturally from the convergence between the logic of the principle and the particular conditions of each project.

There are two threads that weave through the principles and help tie together what might otherwise look like a disconnected series of items in a long laundry list. One thread conveys the "soft side" of complex collaboration, i.e., the people, their relationships and how they work together. This is the foundation of all collaborations, complex or otherwise. This is where collaboration begins and the Petri dish within which it breeds and grows. The second thread involves the structuring elements that support the

collaboration – i.e., the infrastructure that helps focus action, informs decisions, buffers distraction, and improves efficiency. In and of itself, this structure is not the essence of collaboration. However, as we mentioned earlier, it does reduce uncertainty and confusion, increase predictability, and can make complex collaborations less complex and more manageable. Structure provides a safe harbor of predictability and stability within which creative collaborations can develop and thrive.

These two threads weave throughout our principles. They are of course related and inseparable. Structure supports collaborative relationships, and these relationships produce structure. Both threads are needed to stitch the fabric of complex collaborations together; without both, the "garments" will fall apart. These are the fundamental truths that underlie our principles and our perspective on how to make complex collaborations work. The two threads represent the yin and yang of our meta-principle – the interdependence of structure and relationships. The synergy between the two can be summarized in four broad steps:

1. Collaborations start with relationships between the right people in critical liaison roles. Therefore, the first step is to explicitly and intentionally *create these liaison roles* and formalize these roles by defining specific responsibilities and requirements.

2. The next step is to *put the right people in these roles* – i.e., those with well-developed lateral skills.

3. After that, it is important to *enable collaborative relationships to form among the people in these roles*, by intention to initiate specific projects or by "enabled serendipity" -- creating conditions that enable these

relationships to form spontaneously around common interests which may

evolve in time into joint projects.

4. Then the next steps are to use these relationships as the axes for launching

a formal, more extensive effort by having the people in these relationships

collaboratively *design the structure (e.g., charters, governance and*

authority structures, performance metrics, etc.) that will help them focus

on their collaborations and tasks.

To state it as simply as possible, our meta-principle is to start with relationships

among key people, then use the relationships to create the structure they need to do their

work. By internalizing this meta-principle and using it as a mind set, plus referring to the

specific principles for details as needed, managers and others should be able to design

any complex collaboration, regardless of form, type or circumstances.

Our working metaphor for the application of the basic principles is jazz. Neither

the tightly orchestrated compositions of Stan Kenton – intricate, predictable, and smooth

flowing – nor the free improvisations of Ornette Coleman – unpredictable, chaotic, and

for many, very unsettling. Instead, the "jazz" of our framework is the music of Charley

Parker and John Coltrane (before his cosmic period) which were characterized by

improvisations on clearly stated themes. Like their music, the principles are meant to

suggest approaches and inspire ideas, not to constrict action into narrowly defined boxes.

In keeping with this metaphor, we encourage the "musicians" who read this paper

to follow their own muses and improvise their own melodies, coming back to the themes

from time to time and keeping the score and the principles which underlie it squarely in

mind. Like any good jazz musician, readers can improvise on the principles to create

harmonious collaborations that transcend boundaries to produce deeply fulfilling

performances.

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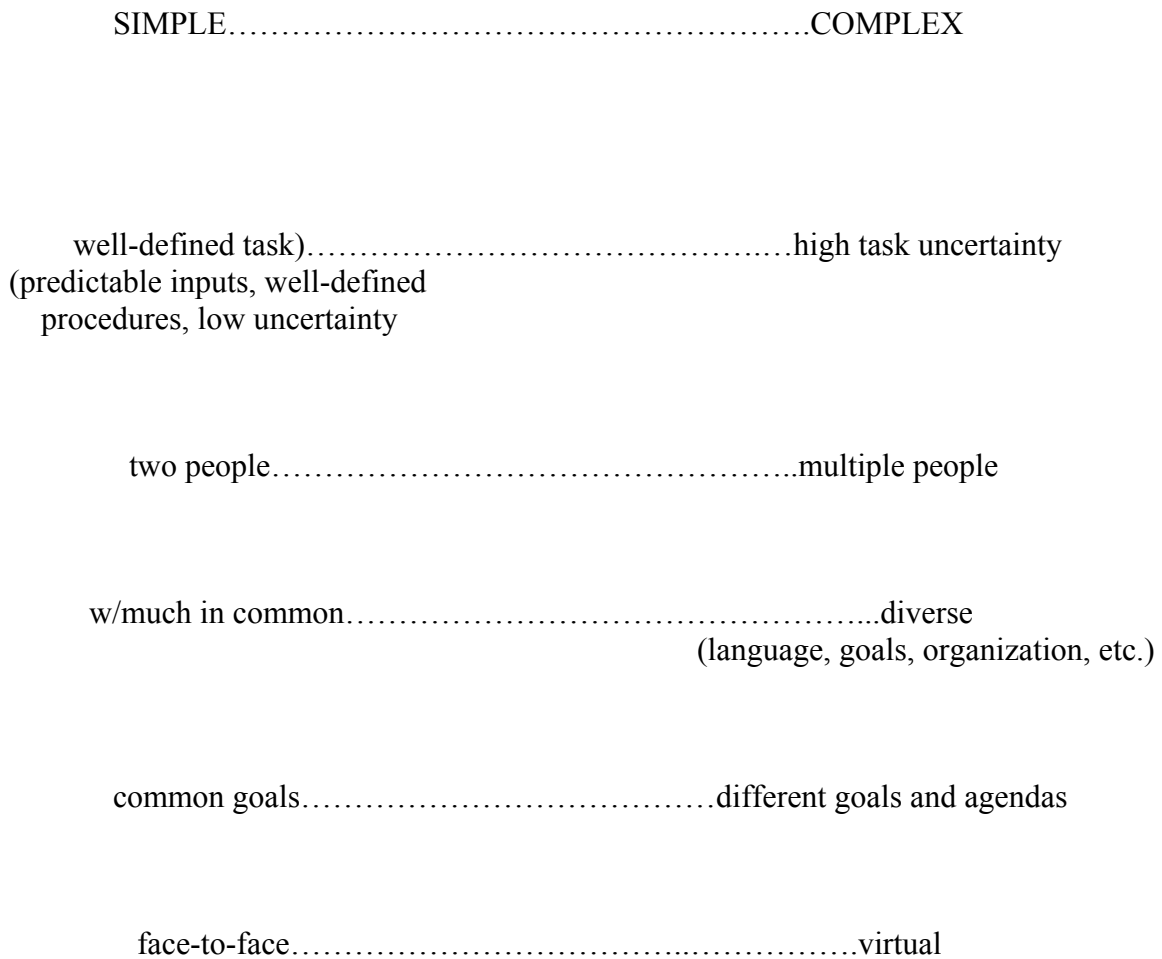
FIGURE 1

SIMPLE VS COMPLEX COLLABORATIONS

SIMPLE………………………………………….COMPLEX

well-defined task)…………………………….….high task uncertainty
(predictable inputs, well-defined
   procedures, low uncertainty

two people…………………………………………..multiple people

w/much in common………………………………...diverse
                                                                  (language, goals, organization, etc.)

common goals………………………………different goals and agendas

face-to-face………………………………..………….virtual

TABLE 1

BASIC PRINCIPLES IN THE DESIGN OF COMPLEX COLLABORATIONS

	BASIC PRINCIPLES
ORGANIZATION	o shared goals o complementary capabilities o compatible cultures 　∗ bias for performance 　∗ mutual respect and trust o high level management support o access to resources o prior experience

| STRUCTURE | o   formal roles, tasks, expectations and understandings
　∗   charter
　∗   formerly-defined liaison roles
o   special governance structures
　∗   all entities represented
　∗   clarity and simplicity
　∗   clear decision authority
o information, performance metrics, and information systems |

| PEOPLE AND RELATIONSHIPS | o liaison roles and collaborating pairs
o lateral skills |

| COLLABORATIVE PROCESS | o facilitative but adaptable leadership
o frequent communications among participants and with external stakeholders via multiple means
　∗   face-to-face interactions and relationship building
o attitudes, expectations, and norms
　∗   mutual respect and trust
　∗   communication norms (cultural sensitivity, 24 hour design)
o formal and informal learning processes
　∗   adaptable goals and plans
　∗   utility of early wins
o fun and playfulness |