First Movement: Coordination

*When I said start your attack, I meant the music!*

In his path-breaking essay “The Nature of the Firm” (1937), Nobel Prize winning economist Ronald Coase asked a very fundamental question: If ordinary market exchange among individual buyers and sellers can in theory efficiently coordinate the allocation of economic resources through the price system, why do we need organizations (Coase, 1988)? Despite the pervasiveness of organizations in the “real world”, economists had no solid answer to this question until Coase raised the issue. Coase’s response, which led to the development of transactions cost theory, was to show that in some circumstances organizations are indeed more efficient in coordinating resources and human activities than are individuals interacting directly through markets.

This interchange among economists no doubt seems terribly esoteric to those of us who live and manage in the real world of organizations on a daily basis. We take organizations for granted, and although we often criticize their performance, we rarely question the need for them. Think of how much poorer the world would be if there were no symphony orchestras and a hundred professional musicians had to negotiate with one another and with audiences of music lovers every time there was a desire for a classical performance! In point of fact, of course, some musical performances do take place more or less spontaneously – without much formal organization or planning, for example in “jam sessions” of musicians who have not previously played together. And the manner in which such ensembles achieve
sometimes extraordinary coordination is a matter of great interest (Eisenberg, 1990).

Nonetheless, Coase’s question is just as important in the practical world of management as it is among academic economists, for two reasons. First, it bids us to ask – when do we really need to invest in the infrastructure and overhead of formal organizations and when might we be better off trying to coordinate activity without them? Second, it encourages us to inquire further by asking the obvious follow-up questions: in what circumstances do organizations do a better job of coordination than market transactions and exactly how do they achieve that coordination? Coase’s answer to the former question was more profound than his answer to the latter one. By focusing on the “margins” of organizational activity, Coase anticipated the “shamrock organization” that Charles Handy (1990) has written about, in which organizations downsize to their essential core (what management analysts called the “core business”) and contract out every function which costs more to carry out inside the organization than securing it on the outside. Coase, and later Oliver Williamson (1975), also identified the presence of uncertainty as a key factor underlying the circumstances where organizations are needed. If there is little clarity on what precisely has to be done or how performance is to be judged, then it is often best to employ people within an organization under general terms of service than to undertake complex market-based negotiations with them for various hard-to-specify inputs and outputs.

While economists have offered important insights on the questions of why we have organizations and when they are more efficient than markets, they have left the remaining question poorly explored: Exactly how do organizations achieve more efficient coordination than markets? What are the specific means at the disposal of organizations that managers can use to bring about high levels of coordination? Coase’s answer to this question was fairly rudimentary:

Within a firm these market transactions are eliminated, and in place of the complicated market structure with exchange transactions is substituted the entrepreneur-coordinator, who directs production. (Coase, 1988, p.35)

In other words, Coase saw the achievement of coordination in organizations as the result of top organizational leadership. In the metaphor of this monograph – the conductor does it!

We all know that coordination is more complicated than this, and it is the purpose of this movement to explore the multifaceted ways in which coordination is achieved in organizations. Coase was correct in observing that the essential purpose of organizations is to coordinate human activity in circumstances where markets cannot accomplish this as well. Furthermore, the metaphor of music makes it quite clear that “ensemble” is not only the essential purpose of organization but that it is one of the most important criteria for judging organizational performance. To approach perfection as an ensemble means working together so well that all members of the group meld into an inseparable whole. This is at least one of the things that distinguishes outstanding musical
ensembles from lesser ones. Thus, when Plain Dealer music critic Donald Rosenberg cited the resurgence of the Berlin Philharmonic as one of the world’s great orchestras, he noted “...the Berlin Philharmonic’s seamless glory...” and observed that “...The musicians work superbly as a unit...” (Rosenberg, 1996, p.9D).

The achievement of coordination in organizations is complex in at least two ways: First, it involves much more than the work of Coase’s leader, but also a host of other organizational elements and strategies combined in just the right way – organizational plans and procedures; communications and working relationships among organizational participants; education and training of workers; rehearsal of tasks and activities; leadership at several levels; and indeed a clear vision of how things should work. Second, there appears to be no simple formula for coordination. Different coordinating strategies apply to organizations of different sizes, workforces with different levels of professional competence, missions and tasks of varying complexity, and different kinds of operating environments.

The fact that musical ensembles vary in so many ways provides us with the opportunity to understand how coordination is achieved through alternative combinations of strategies and in various organizational circumstances. We have the luxury in music of observing large and small ensembles, ones with homogeneous as well as heterogeneous instrumentation, amateur as well as professional groups, and ones which play numerous types of music at varying levels of difficulty and in more or less accommodating surroundings. While the strategies for coordination may vary substantially among such circumstances, there are also a number of common elements underlying the achievement of ensemble, no matter what the situation.

The Elements of Ensemble

Even if we accept Coase’s idea of the entrepreneur-coordinator as a key to organizational coordination, it is clear that leader must take advantage of a broad spectrum of tools to achieve this objective. These “elements of ensemble” include a variety of familiar components including the use of written plans and procedures, assembling a mutually compatible organizational team, facilitating communications throughout the organization, ensuring that workers are appropriately trained or educated, practicing key tasks and routines, and providing leadership guidance at various levels within the organization.

Formal Plans and Procedures

Give a group of competent musicians who have never played together a modestly challenging musical score that they have never seen before and they will sit down and before long be able to play the piece together reasonably well. The better these individuals are at “sight reading” the better they will play together right off the bat. To those schooled in the rudiments of music, the score contains the basic
instructions for different players to carry out their tasks (play their parts) in tandem with one another. The score specifies what notes each player is to play at a given time and how loudly or softly they are to be played, it specifies the pace at which the overall piece is to proceed, and it even offers guidance on the overall mood or feeling that players should try to create through their playing. Overall, scores can be seen as plans through which organizational action (music making) is supposed to unfold over time (Albert and Bell, 2002).

Substantial coordination is achieved by a clear instructional score whose parts are given to players sufficiently schooled to understand those instructions and interpret them competently. The quality of the score is thus an element in the achievement of coordinative precision. Indeed, it was the need for better synchronization that initially led to the development of written music in the first place, as European musical compositions became more complex. Around the year 1000, the stave system was developed for choirs to help choral members sing the proper notes in unison. As harmony and polyphony were developed, written music was used to specify rhythm so that different parts, with differing note values and combinations, could be synchronized in time. Eventually, systems were developed to distinguish the time value of individual musical notes and later, time signatures to specify overall tempo (Gammond, 1995). The history of development of Western musical scores illustrates both the possibility of coordination without such a tool (early on, for relatively simple music), and the increasing need for this tool to achieve coordination reasonably well when the circumstances (musical offerings) became more complex. The history also suggests that scores in musical ensembles, as for written procedures in any organization, are never completely comprehensive or determining. In various ways, ensembles learn to use the score as a foundation and to interpret and supplement it as needed to achieve a desired quality of performance.

Indeed, in improvisational jazz (and other musical venues) written scores are often eschewed. However, this does not mean that jazz ensembles operate without "plans". In the jazz context, the "song" and its concomitant set of chord sequences, along with the basic rules of jazz composition, define the boundaries within which the music is played (Barrett and Peplowski, 1998). Playing without written plans does have important implications for innovation and other aspects of performance, but it does not imply the absence of a common set of guidelines and procedures, though it does put additional pressure on other means of coordination.

Communication

A well specified score is of limited value in achieving coordination, even to well schooled musicians, if musicians cannot communicate with one another. Musicians must at least be able to hear one another in order to play together. This isn’t quite as obvious as it seems, however. If a group of competent musicians with similar musical backgrounds sitting together with plugs in their ears and blinders to keep them from seeing each other all read a fairly straightforward score in the same way they might actually have a chance of playing reasonably well
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together for some period of time. However, they would certainly have trouble starting and finishing the piece, and beginning and ending phrases, together, unless they could signal to one another or were prompted by an outside agent (e.g., a conductor or a metronome or blinking light) on when to begin, and they would eventually lose synchronization with one another as slight differences in individual rhythms led to larger discrepancies over time. This became Beethoven’s problem as his hearing worsened:

His hearing was never very good, but as it worsened, musicians began to dread his conducting. They tried ignoring him and taking cues from the head violinist, but he managed to interfere and wreck the performances any way. One time, during a long soft passage, which he couldn’t hear, he lost count; when he jumped high for a loud passage, nothing happened because he was much too early for the volume change. Finally, his hearing became so far gone that all delicacy was thrust aside in favor of the music. He was asked to please go home and not conduct ever again. Which is what he did. (Carlinsky and Goodgold, 1991, p.90)

Saxophonist Paul Winter’s ensemble successfully mastered another dramatic situation where visual communications among musicians was difficult, in the sixth annual Summer Solstice Celebration in the Cathedral of St. John the Divine in New York City:

The stage remained empty as the performers played from secluded corners of this magnificent edifice. Mr. Winter’s keening horn melded with the pipe organ, played by Paul Halley; eventually the pan flutist Damian Draghici and the cellist Eugene Friesen joined in. Niamh Parsons stood in the nave and sang a plaintive verse. The church’s darkness precluded a visual experience. (Powers, 1999, p.B5)

Clearly Winter’s talented musicians were able to compensate for the lack of visual contact by their mastery of the music itself and their ability to hear each others’ musical cues, in order to synchronize in the darkness.

Ensembles achieve internal communication in several ways. First, musicians usually do need to be able to see as well as hear one another. They tend to deploy themselves in semi-circles or other spatial arrangements so that there are clear sight lines between members. In smaller ensembles, players will exchange glances and give each other signals on when to start a new section of the music or how to stay with one another through a difficult passage or a change in rhythm or mood. In larger ensembles, section leaders and the conductor will be watched for the signals they send to maintain the group’s coherence throughout a piece.

It is interesting that passages in many pieces of music are often described as “conversations.” In particular, improvisational jazz performances are sometimes characterized as dialogues among players of different instruments, employing a common language (Hatch, 1998). This metaphor at once describes the importance of communication among players in achieving precise coordination and also a particular strategy of serial coordination. The allocation of responsibility to one player and then another for sequential passages helps maintain the coherence of the
music by specifying who is in charge at any particular point in time, and what the
linkages are from one player’s part to another. In such a serial conversation, the
players actually communicate with one another through the structure of the music
itself.

But communication in ensembles is much more than signaling during a
performance. Significant discussion of how to play a piece usually goes on among
members of an ensemble during rehearsals and prior to performances and
understandings reached during such preparations help individuals players maintain
ensemble with their colleagues during performances. Moreover, the importance of
communication highlights the significance of longer term relationships among
ensemble players. Players, for example members of the Chieftains Irish band, who
have worked together for long periods of time or who are personal friends of one
another, can achieve higher levels of coordinative precision because they know
each other’s thinking and playing styles so well. This is why personnel changes
can be so traumatic for long-standing ensembles, especially strong chamber
groups. The Juilliard String Quartet appears to have surmounted such changes.
This group has played exquisitely together for more than 50 years. In 1997, it
faced one of its most serious challenges when the first violinist retired, the second
violinist took over the first spot, and a new artist joined as second violinist
(Rosenberg, 1998e).

The benefits of developing close working relationships among members of an
ensemble point to the desirability of selecting compatible members at the outset.
Hence, an important element in coordination is recruiting individuals who not only
have the appropriate complementary musical skills but who have the personal
rapport that enables them to communicate and play well together. In an interview,
blue grass banjo player Pete Wernick observed of his fellow blue grass band leader
David Grisman:

...he gets called back for encores after playing a long all-instrumental set. How does he
do it? I can see that he starts with really hot players....whatever he plays, the
instruments are going to have a great tone and he is going to ... make it sound good. I
think he picks players that feel and hear like he does... (McKay, 1996, pp.15-16)

Education and Training

It is obvious that the rudimentary elements of coordination – plans and procedures,
effective communications and compatible players who know each other –
presuppose a certain level of competence on the part of organizational members.
Indeed, the degree to which organizational coordination is achieved depends
substantially on the competence levels of individual participants in the ensemble.
This is not just a matter of players’ abilities to correctly understand written
instructions or communicate in an informed way with one another. The more
members have their own capacities (instrumental skills and general musical
knowledge) under control, the more attention they can pay to the needs of the
group, the more easily they can adjust to the idiosyncrasies of other group
members, and the more they can compensate for possible weaknesses in other parts of the ensemble. Moreover, the more highly skilled the players, the more easily they can adapt to the overall style of a particular ensemble. This is especially true at the professional level where ensembles such as a symphony orchestras differentiate themselves by how they interpret the tempo and phrasing of particular pieces of music.

For ensembles below the professional level, the continuing education and development of individual player skills also contributes significantly to the coordinative capacity of their ensembles. Some of this development is in the hands of ensemble leaders who can teach and coach as they lead.

We can already begin to see the “trade-offs” among different elements of coordinative strategy. Musicians with enough individual training can walk in off the street and play together in a “pick-up” situation even if they have not previously communicated with one another or studied the score. Their level of education or experience allows them to catch on quickly to the particular musical piece, to player preferences and to inter-player signaling, in order to achieve respectably coordinated ensemble playing. As noted by Eisenberg (1990), this is well illustrated by musicians with a common educational background in jazz.

Cross-cultural music making provides a dramatic example:

Last week at the Kitchen, several Japanese musicians who had been featured in a weeklong festival of new music from that country took part in unstructured improvisations with various American collaborators...Japanese and American musicians who were grounded in jazz were able to play together naturally, developing group improvisations that had both variety and direction. (Palmer, 1987, p.28)

Rehearsals

In an old joke, a tourist asks a New Yorker how to get to Carnegie Hall. The answer from the wizened native is “practice!” That stricture applies almost as much to group as individual playing. All other things equal, the most exquisitely coordinated ensembles are those that spend considerable time practicing and discussing their music together in rehearsals. Rehearsals are opportunities to facilitate communications among members of the ensemble and to achieve higher levels of mutual understanding on the character and details of the music. Thus, rehearsals allow musicians to move into performances with a common strategy and set of ideas in their minds (on mood, rhythm, dynamics and other aspects of the music), and an understanding of each others’ moves so that they can react appropriately as they proceed through the performance. Rehearsals also provide opportunities to work out difficult passages, detect and correct mistakes, and interpret details in the score that may be unclear, so that errors and misunderstandings are minimized. In any case, rehearsals are all the more important in ensembles weak in other factors that affect coordination. An experience of the Ohio Chamber Orchestra some years ago provides testimony:
The Ohio Chamber Orchestra took a ragged ride through a lively stretch of American history Friday night... The music ranged from Scott Joplin's rollicking piano rags to Igor Stravinsky's sophisticated take on ragtime... the performance as a whole lacked balance and cohesiveness...more rehearsal time was needed by the 25-member ensemble, which contained a mix of weak and strong players who do not perform together regularly. (Salisbury, 1998b, p.3-E)

Rehearsals may be adjusted to the level of difficulty or familiarity of the music. For larger ensembles, there is merit in rehearsing sections separately from the ensemble as a whole. Overall, as the experience of the Robert Shaw Chorale attests, rehearsals can make the critical difference in achieving coordination:

...The first rehearsals [of the Messiah] were spent with each part alone learning the correct pitches. Later, pairs of voice sections were rehearsed, each part having the opportunity to sing paired with every other part....Shaw's sectionals served a far greater purpose than learning difficult passages. They provided opportunities to work on rhythm, blend, balance, intonation, phrasing, musical direction and line, diction, and all the other ingredients of "polish" that resulted in the universally recognized brilliance of the Robert Shaw Chorale. (Mount, 1980, p.15)

Again, it is obvious that none of the coordinating elements can be viewed in isolation from one another. A highly educated group of players who have worked together for a long time may need less rehearsal time to achieve a high degree of coordination, and they may be able to use rehearsal time more efficiently and move more quickly into discussion of larger concepts of mood and gesture than another group that has to work out smaller technical problems.

Leadership

Certainly Coase's idea that the entrepreneur/leader has a central role in coordinating organizational activity is important. However, musical ensembles illustrate the subtleties involved in this notion. In one sense, the conductor of an orchestra appears to be all-powerful. One wave of a stick and dozens of musicians follow by playing in unison. In another sense, the conductor looks silly - waving a little wooden rod that makes no sound itself, while the members of the orchestra do the real work, sometimes seemingly oblivious to the conductor's antics (or possible incompetence or incapacity - as in Beethoven's case). Indeed, guest conductors have been known to follow their orchestras rather than lead them, and some orchestras have even played practical jokes on their conductors, performing music entirely different from what the conductor expected when he or she gave the downbeat to start playing! This may be a good way for an orchestra to wish its conductor a happy birthday, for example, but the situation can be more serious than that:

Sir Landon Ronald was ... done in by a memory lapse. He changed a symphony program, subbing Wagner's Tannhauser for Mendelssohn's A Midsummer Night's
Dream. When he reached the podium, he forgot about the switch. Sir Landon gave the downbeat for the Mendelssohn. The orchestra started the Wagner. Sir Landon fainted. (Carlinsky and Goodgold, 1991, pp.88-89)

Orchestras often rise above those notorious occasions when the privilege to conduct is given away as a prize, or to honor a benefactor, or for entertainment purposes – as in the case of the late comedian Danny Kaye, who despite his inability to read music humorously led the New York Philharmonic through the works of Beethoven, Ravel and other composers on several memorable occasions (Schonberg, 1981). Other distinguished orchestras have been guest-led by such characters as Big Bird and the San Diego chicken (Carlinsky and Goodgold, 1991). Clearly, musical ensembles, even large ones like symphony orchestras, can coordinate themselves with moderate success using various mechanisms discussed above, without benefit of (indeed sometimes overcoming) central direction. In the early days of orchestral performance, such ensembles were led from the key board and conducting was not considered so important as to require someone specializing in that function alone. Only after music became more complex, and orchestras became larger, did the conductor’s role emerge and grow in importance:

In the seventeenth century, it was commonplace to accompany voices with instruments and the job of unifying the forces had become considerably more complex. The [church] cantor ...would now direct from the keyboard instrument and beat time...[Later] Responsibilities for controlling the orchestra were ... shared between the Kapellmeister on the keyboard...and the leader of the all-important violins...the Konzertmeister .... They would dictate the pace of the performance together, the Konzertmeister using his violin bow. It was not a wholly satisfactory arrangement and, as the keyboard contribution became redundant..., the single figure of the conductor emerged to take sole charge of controlling the orchestra.

It was a change that coincided with the time of Haydn, Mozart and Beethoven. Haydn...directed from the keyboard....Mozart also led from the keyboard, but Beethoven conducted from a podium in front of the orchestra, often visually conveying the emotions in his music as well as the musical essentials. (Gammond, 1995, p.22)

Even in modern times, the role of the conductor retains some ambivalence. Notably, the Orpheus Chamber Orchestra is famous for its operation without a conductor altogether:

Orpheus...not only plays without a conductor but rotates among its instrumentalists the traditional leader positions of concertmaster and “first seat” players. [Professor Richard] Hackman [of Harvard] thinks that Orpheus has achieved its greatness not despite the absence of fixed leadership but because of it: each member is compelled to take personal responsibility for the music. (Traub, 1996, p.101)

All this is not to say, however, that leadership has no essential role in organizational coordination. For smaller ensembles especially, leadership is often combined with instrumental playing. Someone in the group is usually looked to as
the leader and consulted for prompts and signals on when to begin, how fast to go, how loud to play, when to stop, and other nuances. Or, leadership may be shared in some agreed upon fashion so that responsibility for maintaining ensemble always lies somewhere. Orpheus, for example, does not lack leadership, but leadership in that ensemble is a shared, collegial responsibility:

...Orpheus developed a system it calls “the core”, in which the executive committee chooses a concertmaster, and each instrumental section a representative, for every piece... While Orpheus is a conductorless orchestra, it is not... “a leaderless orchestra.” There is leadership, but it changes from piece to piece, and even within a piece. The trick that Orpheus has pulled off is to establish authority without establishing an authority figure. (Traub, 1996, pp.102, 104)

In the Orpheus system, the concertmaster is key:

The person manages the rehearsal process for that piece – beginning each rehearsal, fielding suggestions from members about interpretive matters, deciding when spirited disagreements among members must be set aside to get on with the rehearsal, and taking the lead in figuring out how to handle transitions in the music that in a traditional orchestra would be signaled by a conductor’s baton. (Hackman, 2002, p.194)

Even where there is a central leader or conductor, which is the normal situation for larger ensembles, leadership is also distributed throughout the organization. Instrumental sections – strings, horns, woodwinds, percussion – can each have their leaders. Indeed, the breaking down of the large ensemble into smaller, more homogenous units which can be more easily refined and coordinated internally and then connected with the playing of the whole group, is a key element in achieving a high level of organizational coordination. (That is one reason why Mount (1980) argued for sectional rehearsals.) Finally, individual virtuoso performers – a lead violin, clarinet, or trumpet or a singer or piano soloist – also take leadership in particular parts of musical compositions, where the soloist sets the pace and expects the ensemble (often even the conductor) to follow. Usually this works out well; sometimes it doesn’t. In one concert in Ohio, the piano soloist was so fast, furious and unpredictable that the Cleveland Orchestra and its renowned conductor did all it could to stay with him much less polish the performance (Rosenberg, 1998c, p.4-E). By contrast, the careful attention which the accomplished piano soloist and the conductor of an orchestra in Michigan paid to each other led to a fine overall performance (Page, 1992, p.21).

What is it that leaders actually do in helping an ensemble achieve coordination? Faulkner (1973) cites the conductor’s responsibility to set the tempo and maintain “proper ensemble and balances.” (p.149) Gammond (1995) sums up the role of a conductor as providing four sets of instructions: tempo, dynamics (the volume of the sound), rubata or changes in tempo, and phrasing (indicating where to give emphasis so as to interpret the composer’s intent). More dramatically, the Oxford Companion to Music (1970) asserts that “Conducting is generalship on the battlefield of music. Forces often large and very varied in their functions, have to
be so controlled that they will combine together not only accurately but with unity of spirit” (p.240).

As the functions of rubata and phrasing suggest, while the score normally contains instructions about tempo and dynamics, this information may not be precise and may be subject to interpretation or adaptable to different tastes:

The art of conducting, Mr. [Ilya] Musin said, lay in “making music visible with your hands”. A conductor “must have expressiveness and exactness”, he continued. “These are incompatible. The conductor’s challenge, therefore, is to find a way of combining them.” (New York Times Obituaries, 1999, p.A21)

Leaders help provide that interpretation and translate the general instructions about tempo into a specific pace at any given point in the performance. Obviously, there must be clarity about tempo in order to achieve a coherent, coordinated performance, although this clarity may be achieved either by conductor specification or by consensus among ensemble leaders and players. It serves no purpose to have different sections playing at different tempos unless this is a specific part of the plan! Interestingly, however, differential rhythms are sometimes part of the plan just as they are in nonmusical organizations. For example, the tempo in a large corporation of the basic research department, which must painstakingly advance the state of knowledge of a given technology, will differ substantially from that of the marketing or sales departments which must respond to current market conditions.

Multiple tempos obviously make the challenge of coordination all the more difficult. Here’s how the Orpheus Chamber Orchestra grappled successfully with the challenge of a multi-tempo piece:

...Lee Hyla’s “Trans” still had everyone in knots... “Trans” seemed to be testing the limits of the conductorless orchestra....[Hyla] had responded to the Orpheus commission by writing a piece that most conductors couldn’t have handled properly, because of the difficulty of beating out two tempos at once. But he wasn’t worried about the outcome. “They’re such unbelievably professional musicians as well as good musicians”, Hyla said. (Traub, 1996, p.105)

Interestingly, while leadership becomes increasingly important in such situations of great complexity, the Orpheus example also shows the advantages of distributed leadership to handle parallel challenges more easily by sharing responsibilities. In particular, in addition to relying on a concertmaster for any particular piece, Orpheus constitutes a “core group”, consisting of principal players involved in the piece, whose function is to work out problems in advance and then to coach the rest of the ensemble on the nuances:

The core meets prior to the first full-orchestra rehearsal to work out the basic frame for the piece being prepared. Then, when the rest of the orchestra joins in, these individuals have special responsibility for helping other members of their sections understand and implement the ideas the core has roughed out. (Hackman, 2002, p. 122)
Similar challenges are associated with leadership’s role in controlling the dynamics of a performance. Dynamics not only involve modulating the sheer volume of sound over the course of a performance, but also coordinating the “balance” among relative contributions of the different sections and instruments at any given point in a musical piece. If the volume of the different instruments is not coordinated to ensure that they are heard in correct proportions, the piece as a whole will sound distorted. The melody in the string section may be drowned out by overplaying of the percussion instruments, or the delicate flute sounds may be overwhelmed by the horns. Leadership helps to specify and signal the relative contributions of different instruments at different times, and sectional leadership may be needed to maintain the proper levels within instrument groupings. Balance is also achieved by specifying the appropriate spatial layout of instrument sections, relative to one another. For example, low brass and percussion instruments are deployed towards the rear of a symphony orchestra so as not to drown out the more delicate sounds of strings and woodwinds.

Leadership helps to achieve coordination in other ways as well. As mentioned earlier, leaders give cues to instruct players on when to begin specific parts of the score so that all instruments start together. And leaders may detect and correct errant playing (hopefully at the rehearsal rather than performance stage!) In particular, leaders must ensure not only that correct notes are being played by all members but that everyone is interpreting the rhythmic instructions of the score in the same manner. Particularly at the amateur level, good leaders must be good teachers. Part of the work of both central and sectional leaders is to monitor the playing and to make corrections and adjustments as needed to ensure that all of the parts fit appropriately into the whole.

In all, there is no question that leaders make a difference in how well ensembles are coordinated, and indeed, in precisely how they utilize all of the mechanisms of coordination to achieve ensemble. Given the same score, for example, orchestras led by different leaders may produce very different results:

The two Schubert performances could be described in terms of “more” and “less”. Dohnanyi’s account was more lithe and propulsive. Masur was less extreme in dynamics but more extreme in tempo and weight. The Cleveland performance was almost four minutes faster than the Philharmonic’s, partly because Masur took a repeat in the Scherzo that Dohnanyi omitted. (Rosenberg, 1997a, p.5-B)

In summary, formal plans and procedures, communication, player compatibility, education and training, rehearsal and leadership are the key components, which in various combinations permit musical ensembles to coordinate their work efficiently. Moreover, these various elements complement one another over broad ranges of operation, so that a de-emphasis of one can often be suitably compensated by greater stress on another. The variety of circumstances in which organizations must achieve coordination, and the ways in which various means of coordination can be used in different combinations, are subjects to which we turn next.
The Circumstances of Coordination

Organizations differ substantially from one another in several ways that make coordination more or less difficult. In this section, we examine five such dimensions – the size of an organization, its internal complexity or heterogeneity, the level of competence and professionalism of its workforce, the stability of its workforce, and the complexity or level of difficulty of the work the organization must perform.

Size

Larger organizations are generally more difficult to coordinate than smaller ones. Duets can coordinate themselves by simple communication between the two players. Chamber music ensembles, ranging in size from two to ten players, can work well without formal leadership; indeed chamber music is renowned for its democratic, nonhierarchical culture in which authority is distributed among players as needed. In the 1980’s, the Emerson Quartet was on the cutting edge in this respect:

The members of the quartet have an innovative and, they believe, unprecedented approach toward internal hierarchy: Mr. Setzer and Mr. Drucker alternate in the first violin chair, changing during nearly every concert. Thus, the Emerson Quartet lacks a “second fiddle”. However, certain strictures are observed. Each composition belongs exclusively to one musician – Mr. Setzer always plays first violin in Beethoven’s Quartet in A minor (Op.132), for example, while Mr. Drucker plays first in the same composer’s Quartet in E flat (Op.127). The six Bartok Quartets are equally divided. Mr. Drucker plays first violin in Debussy’s Quartet, while the Ravel Quartet belongs to Mr. Setzer. (Page, 1984, p.H21)

Of course, one should not discount the possibility of breakdowns occurring in small, democratic ensembles. Young and Colman (1979) point out that “lasting deadlocks” can occur especially in even-numbered groups and that ensembles of four members are particularly vulnerable. Such explicit conflict situations notwithstanding, larger ensembles require a fuller array of coordinative mechanisms and more intense application of those mechanisms, than smaller ensembles. For example, symphony orchestras rarely if ever forgo having a conductor or allow players to perform without their parts of the musical score in front of them, although it is less rare for conductors to eschew using scores themselves.

Heterogeneity

More heterogeneous organizations are more difficult to coordinate than homogeneous ones. A men’s chorus singing Gregorian chants has but one melody and one type of instrumentation to coordinate. Everyone has the same part and it takes just one set of instructions to keep them together. An orchestra of the same
size is more complex; it has different types of instruments playing various parts that must dovetail with one another. A homogeneous chorus, even a sizeable one, may achieve coordination with a single choral leader and a simple score. A symphony orchestra requires a multi-part score, sectional as well as central leadership, and more practice, educational preparation and internal communication to make it work reasonably well. At the extreme, imagine the challenges of both size and heterogeneity that confronted the Cleveland Orchestra playing Mahler’s Eighth Symphony:

Gustav Mahler’s Symphony No.8 stretches the resources of orchestras, choruses and vocal soloists like few pieces in the symphonic repertoire....[Robert] Shaw and the [Cleveland] orchestra transported the eighth to Carnegie Hall for the first of two performances that are sure to go into the Carnegie history books as colossal events. Where Severance [Hall in Cleveland] claimed close to 450 performers, Carnegie had nearly 700, including five choral ensembles... What a spectacle it was. The 562 choral voices belonged to the Atlanta Symphony Orchestra Chorus, Cleveland Orchestra Chorus, Cincinnati May Festival Chorus, Oberlin College Choir, and American Boychoir. Shaw, the choral magician, had taken only two days to transform these groups into a mighty aggregate of singers capable of roaring or scaling their voices to an almost imperceptible hush. (Rosenberg, 1995, p.12-E)

Shaw’s leadership and his mastery of rehearsal strategies, as well as the competence of the various ensemble components, were obviously essential elements for successfully coordinating this very complex, heterogeneous mega-ensemble.

Professionalism

Organizations with more highly trained workforces are less difficult to coordinate than ones with more amateur, less schooled participants. Getting a grade school orchestra to play together is far more challenging than maintaining the ensemble of a professional orchestra. Ask any music teacher! Nor is this a matter of age or maturity alone, as the same can be said of coordinating an adult amateur group versus a professional one. Consider the experience of the Retired Men’s Chorus in Yarmouthport, Massachusetts:

The chorus has also had its share of concert mishaps. Sometimes, the group’s director, Danny Rowntree, will signal the end of a song and a few men will keep singing. Once in the middle of [a] concert, “We were singing ‘Let Me Call You Sweetheart’ [and] we had to stop and start over,” Mr. Schmitt [a member of the chorus] recalled. “But we had a lot of fun over it.” (New York Times, 1987, p.51)

Professionals have their own sense of what is needed to make the whole operation work, they have internal standards developed through their individual educational and work experiences, and they have the technical preparation to understand and utilize the various elements of coordination (plans,
communications, rehearsals, leadership signals, and so on) more effectively. Still, raw, motivated talent and nurturing leadership can often substantially overcome the skill limitations of amateur groups. The Cleveland Orchestra Youth Orchestra is one example of an ensemble with superb but unpolished young talent which has achieved great precision and performance quality, in challenging pieces such as Dvorak's Eight Symphony, under the guidance of a skilled conductor-teacher such as Steven Smith (Rosenberg, 1998d).

Instability

Coordination is less difficult to achieve in stable organizations where personnel turnover is low than in organizations where transience is high. This is a particularly sensitive area for musical ensembles, in several respects. First, it is the relatively rare ensemble that has sufficient financial support to be able to employ its members on a full time basis. Thus, there is always pressure for members to move in and out of different groups, following their individual artistic and economic interests. Second, in this dynamic environment, ensembles may make frequent use of "pickup" musicians who have particular instrumental talents but are not affiliated with any one particular organization. Third, for symphony orchestras at least, the "star system" that makes celebrities of famous conductors, leads to frequent changes of leadership. Many concerts are led by guest conductors, and some orchestras work with their own music directors relatively infrequently. These various manifestations of transience make the task of coordination more difficult because players do not get to know each other very well and may fail to develop close relationships with their leaders. As a result, communications are more difficult, signals and styles of operation must be relearned each time there is a change of personnel, and rehearsals must revisit the same ground more often. Ensembles that have enjoyed long term stability of personnel and have worked together intensely over a long a period of time have an advantage. The Guarneri String Quartet, for example, having played together for decades, achieved technical mastery over an impressive repertoire (Rosenberg, 1994c). Even a larger ensemble such as the Orpheus Chamber Orchestra benefits greatly from the fact that most of its players have worked together for years (Hackman, 2002).

Task Complexity

Organizations differ widely in the complexity of the work they must perform, and complexity is a major challenge to coordination. Certain kinds of organizations are, of course, better adapted to taking on highly complex assignments while others are better suited for simpler tasks. Professional symphony orchestras are more likely to be at home with the difficult compositions of Mahler, Shostakovich or Schoenberg, while amateur or high school groups are usually better advised to stick to a relatively more straightforward repertory. Fast and intricate music, with rapidly changing or unfamiliar tempos, rhythms, harmonies and keys will require not only ensembles with greater professional training, but more intensive use of
other coordinative mechanisms as well – more intensive rehearsals, closer communication among members, more careful study of the score, and so on. Even with all this, however, the results may be imperfect if the challenge is strong enough. Even the Cleveland Orchestra continues to search for answers in pieces such as Charles Ives’ “The Unanswered Question” even though they have played it many times (Rosenberg, 1998f).

Another aspect of task complexity is uncertainty. In certain musical situations, for example, the road map for performance is not well specified. Improvisational jazz ensembles, for example, may specify a particular song and even know generally how they intend to play it, but they determine on the spot exactly who will play what at any given time. Such ambiguity is an inherent part of the nature of certain kinds of work that cannot be completely preprogrammed for fear of losing some its special quality. Here, coordination is difficult because it must be achieved on a dynamic basis. In such circumstances, greater reliance on certain mechanisms such as communication and education may have to compensate for less dependence on formal plans, rehearsals or central leadership. Consider the difficulty Charles Ives’s music has posed even for accomplished symphony orchestras:

[Ives is] a composer apparently throwing craft to the wind, jumbling mismatched rhythms, keys and tunes against one another, exalting the fragmentary, and leaving all sorts of coordinations to work themselves out as best they may in performance. To invite the indiscipline, chaos and contradictions of experience into music – to give them so dramatic and visceral a presence – had to seem in some measure an affront. (Crutchfield, 1987b, pp.19,22)

In summary, coordination is more difficult in organizations that are larger in size, more heterogeneous in their internal composition, have lower levels of professional training in their workforce, have more transient work forces, and must perform work of greater complexity or ambiguity. The more intense these factors, the more heavily organizations must depend on each of the various mechanisms of coordination to achieve satisfactory ensemble. Moreover, the most effective combinations of the elements of coordination may vary with the situation. Indeed, some of the most interesting issues of coordination can be framed in terms of choosing the appropriate combinations of means of coordination under different circumstances.

Strategic Combinations for Achieving Ensemble

Suppose a maestro was commissioned by a “World Music Collegium” to advise all sorts of musical ensembles on how to coordinate themselves as well as possible. That maestro would have quite a problem. He would operate in a universe of ensembles that varies greatly along each of the five dimensions of coordinative challenge (size, heterogeneity, professionalism, instability, and task complexity).
Yet, the maestro would also have impressive tools at his disposal. He would carry in his portfolio infinite solution possibilities, consisting of adjustable quantities of each of the key elements of coordination (plans and procedures, communication, education, rehearsal, leadership) which can be used in varying combinations with one another. For each ensemble, the maestro would ask what particular combination of elements would come closest to achieving perfect ensemble. The answer in each case would obviously depend on the particular nature of the band or orchestra, its operating circumstances, and the music it is called upon to perform.

Like any other human being, the maestro would have great difficulty contemplating the infinity of combinations of organizational circumstances and coordinative solutions. But he would also discover that certain kinds of cross-cutting questions arise frequently, and that addressing these questions can provide guidance to broad clusters of his organizational clients. In particular, when is a central leader really necessary? And, when should an organization rely on a written plan versus other means of coordination?

*When Is Formal Leadership Really Needed?*

It is especially interesting to ask this question about musical ensembles of different sizes. In smaller ensembles, communications and practice can go a long way towards achieving a high degree of coordination without having to delegate one of the group members as the formal leader. Indeed, one of the attractions of small organizations (chamber groups) is the egalitarian environment that it can sustain without loss of coordinative benefits. In larger ensembles, some manner of formal leadership must emerge if only to ensure that signals on “what to do when” are not lost in a cacophony of competing voices. There is no clear watershed number of participating members above which formal leadership is absolutely necessary, but small chamber orchestras (10 to 20 members) usually have a conductor and even in smaller ensembles, one member often serves nominally as the leader.

As noted earlier, a now famous example of a fairly large ensemble (26 players) that performs exquisitely without a conductor is the Orpheus Chamber Orchestra. There is no doubt that Orpheus achieves a very high level of coordinative efficiency with excellent ensemble playing, but not without leadership. The leadership is collective and depends on several members of the group taking responsibility, working things out among themselves, and respecting each others’ opinions. In all, the collective leadership in Orpheus requires greater dependence on the other dimensions of coordination than might be necessary if it had a designated conductor/leader. A very high level of individual competence and proficiency is required of the members, rehearsals are more prolonged than they would otherwise be, and internal communications among members is more intense and highly critical to the success of the group:

Orpheus routinely spends thirty hours preparing for a two hour concert – three times as much as a typical orchestra. And yet it’s precisely this painstaking process of arriving, almost unconsciously, at a shared vision that accounts for Orpheus’s distinctive
sound... I still don’t quite understand how Orpheus works," the pianist Alfred Brendel...says. "I still can’t understand how they play so unfailingly together. How do they divine what is going on?" The answer, he suggests, lies in the musicians’ sense of trust, the intensity with which they listen to one another, and the responsibility each player takes for the entire score, and not just his own part. (Traub, 1996, p.104)

Orpheus does not operate without a conductor because it wishes to achieve better coordination than it might otherwise. It has other reasons for doing this, having to do with player satisfaction and overall musical quality. But Orpheus demonstrates that there is more than one way to achieve precision in organizations by utilizing different combinations of coordinative strategies.

Larger symphony orchestras invariably employ central leaders (conductors) and this size of ensemble also tends to have a differentiated leadership structure. Section leaders facilitate coordination at the level of different instrument groupings, helping to monitor individual players, so that conductors can concentrate on the larger issue of coordinating major orchestral parts.

Where, as in concertos, there are soloists who play major parts, often in front of the orchestra, or where the orchestra itself plays a supportive role in a larger context, as in an opera or concerto, the conductor may share leadership with others. A conductor and a concert soloist or opera singer must maintain coordination with one another, and the conductor must in turn keep the orchestra playing together and in tandem with the soloist. The operatic or the soloist situation is illustrative of organizational collaborations in which leaders bear responsibility not only for internal coordination but liaison with external autonomous partners as well. This can be problematic if the ensemble leader and the soloist differ in style or approach. In a recent performance of a Mozart violin concerto, for example, the soloist was forceful, precise and energetic, while the conductor had a more relaxed approach, requiring the soloist to adjust in various spots in order to maintain the continuity and momentum of the music (Rosenberg, 1998c).

The question of when formal leadership is desirable does not hinge only on the issue of coordination, and thus it will arise again as other dimensions of organizational management are considered in subsequent movements. However, coordination is a core management function and it is also the core of ensemble conducting. Indeed, the history of the emergence of conductors in musical ensembles indicates that it grew from this core function of coordination. Even as late as Mendelssohn in the 19th century there was a common notion that maintaining a minimum level of coordination was the main function of the conductor (Gammond, 1995).

Finally, it is interesting to briefly examine the downside of formal organizational leadership through the example of the orchestra conductor, especially in the contemporary era when conductors have become celebrities in their own right and are often away from their home organizations. It is not unusual now for star conductors to hold the principal conductor’s post in several orchestras, splitting their residencies over the course of a year. This limits rehearsal times and can engender a degree of cynicism among players, arguably affecting the quality of
performances (Faulkner, 1973; Gammond, 1995). This situation at once illustrates the essential role of top leadership in larger ensembles and the possibilities of compensating for this leadership when it becomes less available. For example, some orchestras rely more heavily on assistant conductors because their principal conductor is not always available. In essence, leadership lower in the organization emerges to compensate capacity limitation at the top. But there is another disturbing possibility as well: a reduction in one coordinative element may also cause reductions in another. Thus, a limitation in top leadership can lead to poorer plans, inattention to the education of members, breakdowns in internal communications, or shorter and less effective rehearsals. Although dependence on the direct contributions of top leadership to achieve coordination may be minimized through increased reliance on other coordinative elements, care must also be taken to ensure that a leadership framework is in place that will maintain the efficacy of all of the other coordinative mechanisms.

To What Degree Should We Play by the Book?

Organizations vary widely in terms of how much they rely on formal plans and procedures. Plans and procedures obviously contribute to coordination but they can also limit flexibility in dynamic situations. Again, size, heterogeneity, and task complexity influence where detailed plans and procedures are most helpful and where they can inhibit the achievement of coordination.

In very small organizations, one can envision achieving coordination without heavy reliance on formal plans and procedures. Once the music is known, small ensembles can operate well without scores, relying instead on memory, close communications and extensive practice to keep together. And operating without strict reference to the score allows a certain amount of flexibility and individual expression that smaller groups can accommodate without members’ losing pace with one another. This is best exemplified by small jazz ensembles whose players rely heavily on their common understanding of the rules of jazz, as well as visual and aural communication to signal to one another where they are going with the music at any given juncture (Barrett, 1998).

It is rare, however, for larger ensembles to play without scores. There are several reasons for this. For one thing, not all musicians are able to completely memorize large, complex pieces without error, or to have mastery of skills required for improvisation. Thus, larger groups are less likely to be able to recruit entire ensembles of members who have such abilities. Moreover, smaller groups are more likely to attract players with soloist ambitions. Soloists must be able to play without the music in front of them, and they need the flexibility of forgoing strict reference to the score in order to indulge their own interpretive styles. But a large ensemble consisting of even virtuoso-level talent would probably need continual reference to written scores in order to play well together. Large ensembles simply cannot reconcile substantial numbers of idiosyncrasies in a short period of time without heavy reliance on a common reference plan.

One may well ask, however, what about the big bands and large jazz orchestras,
especially those of the 1930s and '40s that were famous for their apparent spontaneity? Certainly these larger ensembles relied less on formal scores than classical ensembles of similar size. But they did use written musical scores, and they also played their music in a manner that relied less on ensemble playing and more on serial coordination of solo performances. The highlights of these ensembles were often the conversations of solo instruments as the musical spotlight was passed sequentially from trumpet to saxophone to clarinet to bass to drums, and so on. Here, reliance on scores gave way to improvisation, and ensemble playing became relatively less important. Emphasis on individual virtuoso players tended to distinguished one band from another. Speaking of Count Basie’s band, successor Grover Mitchell observed:

We’ve got Bill Hughes on bass drums, Kenny Hing on sax with us about 20 years; Melvin Wanzo on trombone since 1968, John Williams on baritone sax for 18 years and Charlton Johnson on guitar.... There are a lot of youngsters in this band [too] who will be future stars. (Scott, 1995, p.9-B)

For smaller ensembles, it is quite possible that above a certain level of coordinated playing, written scores become a hindrance to further coordinative refinement. When scores are completely memorized and digested, when players are of the highest individual quality and achievement, and when they have played together for a long time, perfection lies in fine-tuning and nuanced interpretation, even some implicit refinement of the written plan. That seems to be the case for small chamber groups that have achieved exquisite levels of ensemble playing. It is also the experience of some early music groups that value spontaneity and also emphasize some special coordinative advantages of playing from memory:

When the music is internalized, you don’t have this process of it going from the page to your brain and out to your muscles. You’re free to play together better, to play more in tune. You can add more improvisationally to the music than you would otherwise. (Cohn, 1996, p.34 quoting David Douglass of the King’s Noyse)

After we started performing from memory...it gave us more musical freedom. We’re more secure in the music. We listen harder, and we depend entirely on our ears, not on a sheet of music. (Cohn, 1996, p.35 quoting Mary Anne Ballard of the Baltimore Consort)

The experience of early music groups reemphasizes the point that trade-offs between formal plans and other means of coordination are possible and provide flexibility in achieving ensemble precision in different types of situations. Not only must players intensify their listening to one another, but rehearsals become all the more important:

“Rehearsing over and over again is the best way to memorize,” say Sequentia’s Barbara Thornton, whose group has four medieval programs in its memory bank.... But group memory is a little more difficult to achieve [than individual memorization]. According
to [Mary Anne] Ballard, the first time the Consort performs a program, they always have sheet music in front of them. Then, little by little, it disappears. (Cohn, 1996, pp.35, 36)

**Priorities and Trade-Offs**

Our focus here on the issues of leadership and formal plans highlights our two central themes — that different organizational circumstances require different combinations of coordinating strategy, and that the elements of coordination work in tandem with one another, usually permitting helpful trade-offs where one element is lacking and another is more readily available. At one level, the relationships between circumstances and coordinating strategies can be summarized very simply from our discussion: As the organizational circumstances become more challenging, the more intensely must each of the coordinating strategies be employed. That is, the larger, more heterogeneous an organization, the less professional and more unstable (transient) its workforce, and the more complex its work, the more emphasis needs to be put on formal plans, internal communications, education and training, rehearsal, and formal leadership. That much is fairly obvious. The interesting question is how much relative emphasis to put on each of these coordinative strategies for different types of organizations. Answering this question requires that we characterize particular organizations in terms of their special circumstances and then assess how those circumstances influence the mix of strategic choices. For that purpose, the matrix in Table 1.1 considers several stereotypical musical ensembles and their circumstantial characteristics. Obviously the number of possible ensemble models that could be listed here is unlimited. A few are chosen to illustrate a wide variety of coordination challenges. In subsequent movements, this exercise is repeated for the other challenges of management.

Each of the listed ensemble stereotypes presents different coordination challenges. The professional symphony orchestra is typically large, has many different parts and undertakes complex musical tasks. But its work force is highly professional and relatively stable. Hospitals are similar in these respects. The challenge is to make the myriad, diverse complex parts to work smoothly together.

The amateur chorus consists by definition of participants who are not previously highly trained but who bring special enthusiasm to their work. The work itself is relatively straightforward consisting of music that the group enjoys singing. The membership of the chorus is relatively homogeneous and experiences moderate turnover. The analog suggested here, in terms of these variables, is that of a volunteer fire department, although the fire department would probably experience greater urgency in the act of performing its services. The essential challenge is to harness together the relatively raw energy of an enthusiastic, well meaning group and direct it to the accomplishment of a clear but still daunting task.
Table 1.1 Ensemble Attributes and Coordination

<table>
<thead>
<tr>
<th>Ensemble Type</th>
<th>size</th>
<th>heterogeneity</th>
<th>professional level</th>
<th>instability</th>
<th>task complexity</th>
<th>nonmusical analog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional symphony</td>
<td>high</td>
<td>high</td>
<td>high</td>
<td>low</td>
<td>high</td>
<td>hospital</td>
</tr>
<tr>
<td>Amateur chorus</td>
<td>moderate</td>
<td>low</td>
<td>low</td>
<td>moderate</td>
<td>low</td>
<td>fire department</td>
</tr>
<tr>
<td>Pickup jazz orchestra</td>
<td>moderate</td>
<td>high</td>
<td>moderate</td>
<td>high</td>
<td>moderate</td>
<td>consulting firm</td>
</tr>
<tr>
<td>High school marching band</td>
<td>moderate</td>
<td>moderate</td>
<td>low</td>
<td>high</td>
<td>high</td>
<td>restaurant</td>
</tr>
<tr>
<td>Professional string quartet</td>
<td>low</td>
<td>low</td>
<td>high</td>
<td>low</td>
<td>high</td>
<td>air force squadron</td>
</tr>
</tbody>
</table>

The pick up jazz orchestra is distinguished by its transience or instability, with players coming in and out as suits their availability. Musicians need to be fairly proficient to participate in such an ensemble and they represent a mix of skills on different instruments. A consulting firm that engages people of different talents on a project basis, depending on the particular contracts in hand, offers a nonmusical illustration of these characteristics. The challenge is to establish a framework in which skilled strangers with similar backgrounds can work well together in addressing a common task.

The high school marching band is distinguished by its amateur status and its transience, since students move in and out as they progress through their grades and then graduate, and by the difficulty of the task – producing coherent music while marching. A restaurant is similar in these respects. The work force is transient and mostly nonprofessional, and the meals, and the personnel who handle various aspects of them, are constantly in motion. The challenge is to overcome transience and movement, yet still get the job done in good order.

The professional string quartet is small and homogenous, and relatively stable in its membership. It is distinguished by the difficulty of the music it undertakes and the degree of professionalism of its membership. It resembles an air force squadron in these respects, flying in precise formation in order to accomplish its mission. The challenge is to get the members of the organization working so well together so that they can excel in a very complex task that requires great precision.

None of these musical stereotypes is completely characteristic of their counterparts in the real world, nor are the suggested nonmusical analogs exact. The stereotypes are nonetheless useful in thinking through the coordination strategies of different kinds of organizations. One way to analyze this issue is through the matrix in Table 1.2 which prioritizes the different coordination strategies for each ensemble type.
Table 1.2  Coordination Strategies

<table>
<thead>
<tr>
<th></th>
<th>written score</th>
<th>communication</th>
<th>education</th>
<th>rehearsal</th>
<th>formal leadership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional symphony</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Amateur chorus</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Pickup jazz orchestra</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>High school marching band</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Professional string quartet</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

The matrix suggests that each of these widely varying ensembles should employ different strategy combinations to meet their coordination challenges. The numbers in the matrix represent a priority ordering of strategies, with "1" being the highest priority (or degree of emphasis) and "6" the lowest priority component of an overall coordinative strategy.

The professional symphony needs to rehearse and it must depend on direction by its conductor. The score is important but opportunities for internal communications are limited by size and spatial arrangements. Since players are professionally trained, limited improvement in coordination would be achieved by further education.

In contrast, the amateur chorus depends strongly on the choral director but also on training that can be provided to improve the individual proficiencies of the singers. The score is an important, common reference as well. Rehearsal is key and will improve play given that the forgoing elements are in place. Opportunities for internal communication are limited and have relatively less potential for improving coordination.

The pickup jazz orchestra offers minimal opportunity for rehearsals or for training of participating players. It presumes that participants have a basic proficiency and it uses the score (or songs) and basic rules of jazz as key coordinating mechanisms. Since much of jazz is based on improvised musical conversations, players will coordinate themselves during performances with a considerable level of internal communication. Formal leadership can be significant in helping to facilitate this communication and to reference key aspects of the score, by appropriate guidance and direction from the podium.

The high school marching band is highly dependent on rehearsals because it is limited in the extent that internal communications are possible or by the ability of the players to stay in touch with the conductor as the band moves about. The scores are helpful as well (although it is wise not to depend on them too much as they sometimes blow away in the wind!) Education is very important to these
amateur players, and much of this can be provided by the conductor as teacher. In particular, the more proficient the players become with their own parts, the more easily they can pay attention to fitting their parts into the play of the whole ensemble.

Finally, the professional string quartet consists of highly proficient players who value an egalitarian environment. Hence, little gain in coordination is achieved by further training or by strong formal leadership. The written score provides a foundation on which to build coordination through rehearsal. Close communication among the players is critical, both in rehearsal and performance.

Case Studies

Herbert Kaufman's classic study of the U.S. Forest Service (1967) provides an excellent illustration of the array of mechanisms a complex organization can use to coordinate its operations. The Forest Service can be thought of as something like a military marching band. Its many different departments (instrument sections) are far-flung across the parade route, and cannot easily communicate with one another or be communicated with all at once; still, they all play together as they do their work in assorted local venues at any particular moment.

At that time of Kaufman's study, the Forest Service managed 181 million acres of national forest land, spread over 149 National Forests and 763 Ranger Districts throughout every region of the United States. Many of these districts are in remote locations, far from the eye of the central command in Washington, D.C. Yet, the Forest Service had a reputation as a smoothly functioning organization whose parts were well synchronized. Like the military band, the Forest Service exhibits a clear nominal hierarchy, with a central commander (conductor) and heads of each section. But, given the far-flung nature of this organization, direct central leadership control can be only one element in an overall coordination strategy. As Kaufman observed: "...so much of the work by which the objectives of the national forest administration are accomplished depends heavily on the Rangers" (p.47). In particular, great emphasis is placed on strategies that allow the Rangers to internalize what they need to know, so that they can operate in concert with one another without direct or immediate central supervision. These strategies include - in rough order of importance - education and training of the Rangers, emphasis on manuals of procedures (scores) for instructions on how to deal with particular tasks and situations, and practice drills (rehearsal) to ensure competency. Communications among Rangers and between Rangers and supervisors play a part too, but only to the degree permitted by the dispersed character of the organization. Similarly, central and distributed leadership play their parts as well within contextual constraints.

Like members of a marching band, Forest Rangers are subject to local events within their particular neighborhoods that may divert their attention and pull them out of alignment with the direction of the organization as a whole. Just as members of the brass section might develop their own internal comradery, or may
be distracted by something unusual along the parade route that may lead them to miss a few beats on occasion, a Forest Ranger can be drawn into local issues or co-opted by local interests at odds with the policy of the U.S. Forest Service. One interesting device that the Forest Service uses to minimize this threat to well-coordinated performance is to rotate the Rangers into different locations and assignments over the course of their careers. It is as if members of the military band were to be given opportunities to learn multiple instruments and to do tours of duty in different sections of the band – woodwinds, brass, percussion and so on, so that they maintain an overall loyalty and perspective of the band as a whole. (Alternatively, one could conceive of the military marching band dividing itself into heterogeneous mini-ensembles for purposes of playing in different parts of a parade or in different venues simultaneously. In this case, players could be rotated among subunits without having to differentiate their instrument skills.)

The Forest Service manages to maintain a high level of ensemble in the face of serious contextual challenges, in large part because it employs mechanisms for maintaining an internal consensus and understanding about the work it is supposed to accomplish. From this basic premise, the organization is able to put in place managerial strategies, appropriate to its context, that keep its parts properly synchronized. By contrast, the more recent experience of AOL Time Warner illustrates what happens when an organization has insufficient consensus about what music it is supposed to be playing or how the parts of the organization are supposed to work together. AOL Time Warner was more like an orchestra-chorus combination, each division with its own membership, leadership, and style; each division with its own sense of what it wants to play; and neither division with a clear concept of how the two parts are supposed to fit together:

...bitter executives from the Time Warner side of the house say that some of the plans to synchronize their businesses with AOL’s were flawed from the beginning. They say that so far many of the merger’s promised synergies have cramped their businesses, including empty announcements about cooperation between Time Warner magazines and television networks; a proposal, still unfulfilled, to broadcast shows made by the Warner Brothers studio on Turner Broadcasting; and even a failed companywide push switch to AOL e-mail accounts. (Kirkpatrick and Rutenberg, 2002, p.19)

Without an accepted common set of concepts, none of the prospective managerial strategies of coordination could work: there was no clear score or song to work from; no music that could be practiced together; no common educational program from which choral and instrument (AOL and Time Warner) players could draw common understanding and inspiration; limited communication between the two divisions; and enormous challenges to top executives who might try to force coordination from the top. As noted by Rob Walker (2002): “There is...a gap between the theory of far-flung businesses working in seamless concert and the reality of protecting corporate turf. Reports have detailed the intense lack of interest among various divisional chiefs at AOL Time Warner in consolidating and ad-selling operations and cutting sweeping marketing deals across multiple units...."
Successful coordination of orchestra-chorus combinations, do often succeed—when the units understand each other, have common work to do in taking on Beethoven’s 9th or some other clear challenge, have a sense of the intent and purpose of the whole organization, and work from the same play book. Without these elements, ensembles and their organizational counterparts can easily disintegrate.

Diagnosing An Organization

The experiences of musical ensembles contain many insights for managers of all kinds of organizations, but these insights must be adapted to specific contexts. One way of applying the musical metaphor to the coordination problems of a particular organization is to ask, what kind of musical ensemble does that organization most closely resemble? With respect to coordination challenges, is it like a large symphony orchestra, a jazz ensemble, a marching band, or an opera orchestra that supports the play on-stage? With a comfortable analog in mind, the two matrices discussed in the previous section may be constructed: first the circumstances under which the organization operates can be described (Table 1.1), and then the priorities for a combination of coordination strategies to address these circumstances can be considered (Table 1.2), as illustrated for the stereotype ensembles above. One may also find that different ensemble metaphors are needed to describe different parts of an organization. A university, for example, might view its academic departments as jazz ensembles and its student services division as a chamber orchestra. Large organizations are complex and multi-faceted and can benefit from this analysis at multiple levels. Once the particular components are analyzed separately, the operatic company can be put back together again for analysis of the whole production!

The forgoing matrix analysis provides a general sense of the nature of the coordination issues for a given organization and the priorities with which it can consider alternative coordination strategies. Whether the focus is on a particular part of the organization, or on the organization as a whole, it is also helpful to ask more detailed questions about the fundamental conditions that create coordinative challenges in the organization, and the combinations of coordination strategies that best apply in its particular circumstances. The questions below derive from the discussions in this movement. The experiences of musical ensembles suggest that these questions are appropriate for diagnosing and resolving coordination issues:

- Which are the largest sections or departments within the organization?
- Which sections are most diverse in terms of the types of work being done by their members?
- Which parts of the organization employ personnel with the least training and education relative to the work they must perform and the level of understanding they need of the organization’s work overall?
First Movement: Coordination

Which parts of the organization experience the most workforce and leadership turnover?
Which areas of the organization have the most complex or least predictable work to perform?

The foregoing questions will help to locate the parts of an organization that may be weak links in the chain of overall coordination. In addition, one should ask about global aspects of the organization that affect coordination:

Is the organization larger than it needs to be?
Is the organization more complex than it should be, in terms of its specializations in capacities, skills, procedures and work tasks of different parts of the organization?
Are all parts of the organization synchronized to the same overall rhythm or cycle of activity over time?
Are some parts of the organization out of balance with other parts? Should emphasis be reallocated from some sections of the organization to others?
Is the level of difficulty of the work of the organization incompatible with its capacity and level of expertise?

Affirmative answers to these questions suggest that the overall conditions under which the organization operates make the task of coordination difficult and may require modification.

Given a diagnosis, one may then consider the various coordinative solutions appropriate to the circumstances:

How can formal plans and procedures be made more clear?
How can interpersonal communications be improved within and among departments and key individuals, through changes in spatial arrangements, opportunities for conversation, opportunities to review and practice routines, and so on?
Where does leadership need to be designated or cultivated to ensure that accountability for all tasks is made clear?
How can practice sessions be designed to ensure that all workers know their parts and can work well with one another, within sections of the organization and in the organization as a whole?
In what areas should workers be required to commit organizational plans and procedures to memory?
How can policies be designed to increase workforce stability and reduce turnover?
How can procedures be designed to select workers who are compatible and work well with one another?
Where can education and training programs be best used to raise the technical and organizational skills and competencies of workers?
Can the size and complexity of the organization as a whole be reduced?
Should the organization take on simpler work or reduce the number of its commitments?

– Can the organization, or large subsections of it, be broken up into smaller parts within which coordination can be refined? Would doing so yield benefits that outweigh the costs of coordinating additional parts with one another?

– How can the overall rhythm of the organization be made more clear to all parts of the organization?

– Should some parts of the organization be reduced and others increased to ensure greater balance?

– Is stronger central leadership needed or should leadership be shared more widely throughout the organization?

– If there are weaknesses in some coordinative mechanisms, such as communications or leadership, how can they be compensated by strengthening other mechanisms, such training or practices?

Bridge

It is clear that coordination is not the only issue that management must face in making choices of coordinative strategy. In particular, reliance on different combinations of plans, communications, education, rehearsal and leadership also has implications for the enthusiasm and motivation that organizational members may bring to their tasks, and to the flexibility that the organization can muster in adapting to new circumstances and developing innovations. In this larger picture, managers face even larger trade-offs than those involved in simply running a well coordinated organization. Without coordination, there may be no advantage to organization, but coordination alone is not in itself the final measure of organizational performance.