Faith in the Future: Adaptation and Change in the Twenty-first Century

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ABSTRACT

On the basis of technological innovations, the 20th Century has been the Century of Change. Current trends indicate that the next century will result in accelerating technological and societal changes that continue to transform our world. What can we as individuals do to adapt to changing environments? How do we incite ourselves to action when it is not clear what direction to move? How do we prepare ourselves for a future that will be radically changed from the present? In this lecture we present some strategies for preparing ourselves to succeed in an environment of change.

BEGIN TALK

I would like to thank the organizers for inviting me to speak to you tonight. Sheridan Simon had a tremendous impact on my life and taught me a great deal about our universe. It is a pleasure to return to Guilford for this lecture series and to share with you some of my thoughts about the future. My main thesis is that the future will be a time characterized by extreme and rapid change. To be successful in this environment will require each of us to adapt to the change by developing strategies for gathering information, making decisions, and initiating actions.

A Demonstration

I'm here today to speak about rapid change. I'd like to begin this lecture with a short demonstration. Those of you who have seen me attempt experiments before will recognize this as a truly daring, and probably foolish, effort on my part. While at Guilford, my friends in physics used to bar me from the physics lab while data was being collected. They urged me to ``begin writing up the theoretical analysis,'' instead.

Nonetheless, I will begin with a demonstration. Behold: a hammer, a nail, and a block of wood. I lightly press the nail into the wood, raise the hammer up, and am now prepared to smash the nail into the wood by rapidly changing the position of the hammer relative to the nail. The hammer will be barely affected by this rapid change; the nail on the other hand, will greatly feel change.

An early lesson learned in introductory physics is that of potential energy. The hammer, poised over the nail, has the potential to do work. Each time a hammer is poised, it has the potential to build a table, a house, a physics lab, or whatever. It is not the case, however, that the hammer's potential actually accomplishes anything by itself! It is only by moving, and thereby gaining kinetic energy, that that hammer may drive the nail.

Now those of you who took experimental physics with me (or taught me!) may correctly suspect that when my hands try to guide a hammer onto a nail head, the most likely result is that the

hammer misses the nail entirely and puts a nice dent in the wood. If this happens today I will be truly embarrassed and I will have to live out the rest of my life in public humiliation. The second most likely result is that the hammer hits the nail at an angle, resulting in the hammer careening to one side while the nail flies off wildly in the opposite direction. The College's legal advisor has unfortunately informed me that the College's insurance will not cover me if this flying nail should cause injury; those sitting in the front row may wish to move at this time. In order to prevent injury to others, I could steady the nail between my thumb and forefinger while I swing the hammer, but this brings up the possibility of yet another unpleasant outcome, so I will not pursue this course. The last possible outcome is that the hammer may actually hit the nail and drive it into the wood.

Oh, I forgot to mention one small matter. The block of wood is connected by a cord to a weight, and I'm going to let the weight swing over the side of the table so that it pulls the block of wood with it. My goal, then, is to hit the nail on the head while it is moving. This is not to say that I could hit the stationary nail, but at least now if I miss I will have a better excuse!

Here's the strange thing. As a mathematician and physicist I can calculate all sorts of facts about the hammer-nail-weight system. By knowing the mass of the weight and the coefficient of friction for the table, I can predict where the nail will be at any point in time. I can measure the hammer's mass, factor in the approximate acceleration induced by my arm, and estimate the hammer's momentum when (and if) it hits the nail. With some knowledge of the hardness of the wood, I may even be able to estimate how far the nail should be driven into the wood. Given enough data and enough time, I should be able to predict what happens to the nail. In theory, I can predict, but in practice I can't because there is a human element involved. When I try to hit a small moving target with fast-moving hammer, I discover that have trouble controlling my aim.

The truth is, until I start the wood in motion and then slam down this hammer, I really can't predict what is going to happen. I can guess, I can calculate, and I can worry, but ultimately I only have two choices: if I decide that the inability to predict what is going to happen and the possibility of humiliation is sufficiently distasteful, I can lower the hammer; otherwise, I can smash the hammer down and hope for the best.

To this point, I've been holding the hammer above this nail for five minutes. My shoulder is aching, my muscles are tense, and my hand is starting to shake. You'll notice, however, that I have yet to actually do anything. I've just been posturing with this hammer, talking about what I could do with it and what might happen if I use it. This has gotten someone in the audience to think, ``He should just swing the dang thing instead of talking about it.'' Another person is thinking, ``The longer he holds that hammer, the smaller his chances of successfully driving the nail.'' Yet another is looking at her watch, wondering how long this opening demonstration can go on. They are all correct, so let's put this Rube Goldberg contraption in motion, swing the hammer, and see what happens. Let's turn the hammer's potential into action.

[Start the experiment. Slam down the hammer.]

This scenario was intended to demonstrate a few facts about potential, decisions, and dealing with change.

In particular, during periods of tremendous change:

- *Accurate information is scarce.*
- *Indecision is natural.*
- *Control is difficult.*
- *Eventually, we have to take action.*

We would find it difficult to accurately model the position and velocity of the hammer as a function of time---even if we had some experimental data on which to base our model. In the face of scarce information, indecision is natural, especially if the stakes are high. For this demo, there wasn't really anything at risk, but in life, sometimes it matters if we hit the nail on the head. Add in the fact that it is difficult to control a rapidly changing situation, and the indecision grows. Yet, eventually, we need to do something. We either choose to interact with the change, or we choose not to. Both choices are valid: choosing to do nothing is a legitimate action, and is different than being indecisive.

A Vision of the Future

Change is all around us. In the natural sciences, wind and water carve our world in geological time, biological species adapt in evolutionary time, and nuclear agents can transform our world in no time at all. Chemical changes in our bodies induce us to breathe, to eat, and to sleep. Change is so important that Newton, Leibniz, and others invented an entire field of mathematics, called calculus, to help scientists to analyze change. Another branch of mathematics, differential equations, is applied to every imaginable scientific discipline to help us model and predict how our world changes in time. It is interesting to note, however, that when change is rapid, as in problems involving shock waves or explosions, the standard mathematical theory breaks down.

I work at a well-funded research and technology center for the computation and graphical visualization of mathematical objects. My professional career involves teaching calculus, developing technological tools to assist in the learning of calculus, and conducting research on differential equations. I literally deal with change every day! What I have witnessed in the last ten years has been unparalleled change in the world of information technology. Most notably, the last two years has seen an information revolution due to the accessibility and growth of the World-Wide Web---a global network of linked computers that communicate and deliver information to each other through established protocols. In two years, the Web has undergone a dramatic transformation, from the domain of a handful of high-tech academic researchers into a (virtual) place where millions of people visit, meet, and shop. I have even ``walked" through the Guilford College woods while in my office in Minnesota! Over half of the people using the Web today began using it in the last year. I see Web addresses (known as ``URLs" or Uniform Resource Locators) on billboards, on the bus, and on T-shirts. What I do not see, is an indication that this phenomenal growth will stop, or even slow down. In fact, I see every indication that the growth of information technology will continue to accelerate.

When I try to gaze into my crystal ball to predict what the future will be like, I see two distinguishing characteristics:

- *The future will involve tremendous technological and societal change.*
- *To be successful in the future will require the ability to rapidly*
- *gather information,*
- *assess the current environment, and*
- *decide on a path to follow.*

To emphasize the magnitude of the change that I'm talking about, I'd like to return to my demonstration of the hammer trying to hit the slowly and regularly moving nail. Think of that demonstration as being indicative of how difficult it is to gather information and make accurate decisions in today's changing environment. Currently, the tools that we use to accomplish our tasks are changing, but they still look like the same tools that most of us are used to. At the same time, our society is moving from an economy based on manufacturing to one based on information processing. Our economic goals (the nail) are slowly changing, but in a mostly predictable fashion. Now, let's jump ahead ten years. The analogous demonstration for the next decade's decision

makers involves a nail whose position is moving rapidly and unpredictably.

I'd like two volunteers from the audience to help me. These two people will be holding cords connected to the block of wood. Their job is to move the block of wood in a non-uniform fashion. Sometimes move it forward, sometimes to the side; sometimes move it fast, sometimes slow it down. As they
pull the block in one direction and to the other, my task is still to try to hit the nail.

[Set up the experiment and try it.]

To try to hit a moving target requires an ability to gather information and try to predict where the target will be at a future instant in time. To do this in a competitive business environment, or when all eyes are upon you, is a frightening proposition. Trust me, it is embarrassing to miss all the time! It is natural to hesitate, and then before we can recover from our inaction, the opportunity is gone. I hope that you can see that if someone's professional career depends on her ability to hit the nail squarely and to hit it often, that this scenario can easily lead to frustration, demoralization, and a sense of personal helplessness.

The question for educators, parents, and students is ``How do we prepare ourselves and others for a future that will be radically changed from the present?'' What can we as individuals do to adapt to changing environments? How do we incite ourselves to action when it is not clear what direction to move?

I'd like to propose a few strategies to help us succeed in this future of change. I developed some of these strategies while I was a student at Guilford. No one in this room will be surprised to learn that Sheridan Simon had a huge influence on my development at Guilford and beyond, and that some of these strategies were influenced by watching him in the classroom, in the lunchroom, in the hall, and in front of audiences such as this. The strategies I will focus on are:

- *Develop broad intellectual skills.*
- *Develop the ability to laugh.*
- *Develop interdisciplinary networks.*
- *Initiate action.*

Develop Broad Intellectual Skills

During periods of tremendous change, accurate information is scarce. Therefore, those people who can glean information from several sources will be at a distinct advantage over those people whose information comes from a single source. The key, then is to develop broad intellectual skills that will allow us to learn new information.

I must say that the liberal arts education I received from Guilford has served me well. Most of my professors did not stuff my head with facts. Rather, my professors helped me to develop my abilities to think, so that I could teach myself the facts. No one can predict what facts will be useful in the next century, but, fortunately, the ability to think never goes out of style. At least it hasn't so far.

This is not to say that the ability to teach yourself new information is an easy task, even for a Guilford graduate! Learning is never easy---a fact that accounts for the employment of many of the people in this room, including myself! I therefore feel obliged to give some words of encouragement for those of us whose jobs will depend on our ability to rapidly learn new information, information that may be changing as fast as we can learn it.

The words of encouragement are ``You can do it; you are smart.'' You are smart. I remember very distinctly the first time that I heard those words from Sheridan. I was waiting to ask him a question, no doubt part of a long line of students lined up to see The Wizard in hopes of receiving a brain, a heart, courage, or some other wondrous gift. Sheridan was talking with a young woman who was taking a course from him known as Calculus IV, also known as Mathematical Methods in the Physical Sciences. This young woman was, to say the least, upset because she was finding the course difficult. In fact, she was not only questioning her ability to pass the course, but whether she had the ``right stuff'' to be a physics major. She was dejected, demoralized, and, it seemed to me, on the verge of quitting. She felt like the nail was moving too quickly for her to hit.

Sheridan's reaction to this situation was to say to her, ``You are a smart person, and you have no reason to be embarrassed by finding this material difficult. You are taking Calc IV! We are learning about Bessel functions! This is hard stuff. You are learning a subject that less than one-tenth of one-percent of the world's population ever attempts. Don't give up; you have the right to find it difficult.''

I teach collegiate mathematics, and I have had my own share of dejected students wondering why they aren't smart enough to understand simple things like Taylor series or differential equations. On occasion, I say those same words---you are smart---to my own students, to my friends, and to myself.

When faced with a problem that seems to evade our best attempts at a solution, I think it is human nature to feel dejected and even helpless. I think Sheridan knew that in these situations, the first thing that we need to do is remind ourselves that we are smart people who are confronting difficult problems. The challenges that each of us will encounter in the future are not problems whose solutions are printed in the back of the textbook for Life 101. These will be problems that have been addressed by less than one-tenth of one-percent of the world's population. For some of us, we will encounter problems that have never been addressed before, or even problems that never existed before. The problems may be ill-defined, and even in flux. The tools that we need may not be invented yet; the knowledge that we need may not be discovered yet. We have every right to find these scenarios challenging, but we are smart people, and I believe that we have the intellectual talents to invent the tools and to discover the knowledge.

This is not to say that we should expect to solve big problems overnight, but as times and people change, even big problems sometimes get resolved. During my very first semester at Guilford, all of the incoming students took a course that was then called Interdisciplinary Studies (or IDS 101). In that course, we read a short report on nuclear war and a hypothetical consequence called ``nuclear winter.'' This report was authored by the well-known astronomer and writer from Cornell, Carl Sagan.

I suspect that this year's entering class did not read that report. In the intervening ten years, economic, political, and social changes have lessened the threat of nuclear annihilation until it is no longer a daily concern for most of us. In its place, new problems such as global warming and rainforest depletion have grabbed headlines and are placed on reading lists for young minds. While few of us had the foresight to predict that the arms race would end in the manner it did, when the former Soviet Union began to collapse, hundreds of dedicated scientists and politicians stepped into that rapidly changing political climate to ensure that the threat of nuclear war would diminish, rather than escalate. They saw the opportunity open, they gathered as much information as they could, and they took action. This was surely an example of a rapidly moving target in a highly volatile environment, but somehow they hit the nail on the head. Because of their success, it is easy to forget about the forty years in which the hammer missed its target.

We are smart people, and therefore have the potential to solve problems, even in difficult changing

environments. But like the hammer raised over the nail, potential is not sufficient. Potential provides us with the faith that something can be done, but it is only by releasing our potential that we accomplish our goals.

Develop the Ability to Laugh

During periods of tremendous change, control is difficult. I didn't do so well at hitting the nail when the piece of wood was flying all over the table! In fact, I often missed my target.

The same is true in my role as an educator, software developer, and researcher. I miss a lot of my targets! Most of the time it is my fault, but sometimes I'm just a victim of bad timing and my changing environment. For example, I once learned a computer graphics language that became obsolete about six months after I started learning it. You might say that I hit the nail and no one cared. Another time I chose not to learn a new technology, and now it looks like that it is on its way towards becoming an industry standard and I have to struggle to catch up! I didn't even raise the hammer for that one! I didn't even see the nail! In the future, occurrences like this are going to become even more commonplace, especially for those of us trying to stay on the forefront of developing technology. It is frustrating and demoralizing to guess wrong, but I think it is even worse to miss an opportunity by not pursuing it.

With that in mind, I'd like to address how we can motivate ourselves to persevere in our efforts when we have tried, tried, and tried again, but have not been successful. There are two strategies that I try to use: first, I try to face my mistakes with a sense of humor, and secondly, I team up with others.

A few words about humor. When I laugh at myself or my work, I discover that there is a great deal to laugh at. We have to look for funny things in our life and in our world. If we look, we will surely find a great deal to keep us amused.

Sheridan was the master at seeing humor in our world. He would find humor in everything from math problems to the food in the cafeteria. I still laugh when I hear a Bob Dylan tune because I can hear Sheridan singing along. While a student, it was difficult to take Sheridan's exams because reading them made me laugh so hard that my eyes would fill with tears. One whimsical exam in December had Santa Claus falling down a hole through the center of the earth between the North Pole and the South Pole. We had to show that the falling Santa would experience simple harmonic motion due to the nature of the earth's gravitational field. Sheridan had a special fondness for jokes about Bessel functions. The homework that discouraged the young woman in Sheridan's office that day long ago, was from a lecture that he titled ``Take me to your Nuclear Bessels,'' and he spoke the title with a thick Russian accent. He had stolen the line from one spoken by Chekov in a then-recent Star Trek movie (the ``original generation'') that, of course, all of the physics majors had seen. The fact that most of us did not know anything about Bessel functions did not diminish his ability to use them to help us laugh.

Laughter helps us to relax and get rid of stress. Feeling relaxed and cheerful helps me to feel more in control of my life and therefore more willing to try something new or to take on a new challenge. This by itself, increases my ability to succeed at turning my potential into reality. But I think a subtler issue is also involved: I see laughter as a mechanism by which we people allow ourselves to take risks.

By laughing at ourselves, by joking about our failures, we salvage our egos. We allow ourselves to fail, and ironically, this means that laughter permits us to succeed, because by allowing ourselves to fail, we permit ourselves to try, and it is only by trying that we will ever succeed. The

human potential, therefore, can only be actualized when failure is accepted as a possibility. Nobody likes to fail, but in the future, I think that failed attempts are going to become more prevalent. For example, the combination of increased global competition and a changing high-tech workplace will make it harder to create and market successful products. We are already seeing pressures on large companies to downsize and refocus their development efforts in order to remain competitive in their market niche. Whatever our jobs may be, there will be times when we do not succeed.

A common reaction to this statement is fear and anxiety. For me, these emotions paralyze and prevent me from acting. Once I get into that mode, it is difficult to regain my balance and forge ahead. Something that often helps is for me to think about how paralyzed I am, and how many days I've been anxious, and how miserable I feel, and then I compare these feelings to the worse possible outcome of the scenario I'm facing. Usually this is sufficient to make me laugh, because my reaction is so out-of-proportion as to be ludicrous. Once I see this, I can feel my shoulders relax and my teeth unclench and my mind open. At last I'm ready to get back to work. If I succeed at my task, I'm ready to laugh at my unfounded fears; if I don't succeed, at least I am ready for the worse-case scenario. In either case, I'm ready to test out my potential and see what happens.

Develop Interdisciplinary Networks

As we've seen, during periods of tremendous change, indecision is natural, especially if failure is a real possibility. A second strategy that I use to motivate myself is to team up with others. Sometimes we are too close to a problem to be able to see the solution or to see the inherent humor in the situation. These are good times to remember that humans are social animals. We live in groups, we work in groups, and we often play in groups. If we find ourselves facing a problem that seems more difficult than our perceived abilities, we owe it to ourselves to find a friend or coworker that can lend a hand, or at least lend an ear.

That we are social people is incredibly important in our collective attempts to address our society's present and future problems. Several of us swinging our hammers at the same target increases the probability that one of us will hit the nail on the head. Colleges like Guilford perform an immeasurable service to our world by teaching us how to work together and to communicate with each other. The interdisciplinary writing, speaking, and thinking skills that I developed at Guilford have helped me to successfully work with engineers, publishers, educators, administrators, and the media. By working with others, we are able to accomplish tasks far beyond our individual abilities.

This is not to say that we should downplay the ability of the individual working alone. There is a story that is sometimes told in order to emphasize the power of the individual:

A young woman was walking along a rocky beach just after dawn. She saw an old man walking towards her. Every so often she saw him stoop down to pick up something and throw it into the ocean. As she got closer, she saw that he was picking up starfish. ``Excuse me, sir,'' she said as they approached, ``but I do you mind if I ask you what you are doing?'' ``Well,'' the old man began, ``these starfish have been washed up into these tidal pools. With the sun coming up and the tide retreating, I need to throw them back into the water before the pools dry up and the starfish die!''

The young woman smiled at the old man's spirit, as he stooped to pry a stubborn starfish from a rock. ``Sir,'' she said gently, ``you are very kind, but don't you see that there are dozens of starfish in these pools? And that there are thousands of pools along this beach, and hundreds of beaches along this coast? In spite of your efforts, starfish are going to die. You can't possibly make difference!'' The old man straightened himself and cast the starfish into the sea. ``Hmph,''

he said, ``made a difference to that one."

To me, the power of this story is not in the individual's role, but in the vast potential that exists on a regional and global scale if we social animals can every manage to coordinate our individual efforts. It has been my experience that collaboration does not increase human potential in a linear fashion: the collective potential of a group is much greater than the sum of three or four individual potentials. To put it more mathematically, the potential of the sum is greater than the sum of the potentials.

One of the reasons that I became a physics major at Guilford was the intense camaraderie and support that the physics majors give each other. The most intense learning environment on campus is not in any classroom, but in the famed Data Reduction Lab in the physics department. It is there, day and night, seven days a week, that physics students and their friends help each other to master all aspects of theoretical and experimental physics and related courses such as mathematics. The success of Guilford's physics students is directly related to the fact that we are social animals.

In my personal case, I would not have realized my potential as a physicist without the support and encouragement of that peer group. I suspect that my case is not unique. The encouragement that we give to each other is essential in developing our potential, and one only needs to look at the impressive list of accomplishments of Guilford physics majors to see that, collectively, we have made a difference in this world.

When you extend the list of accomplishments to those of all Guilford students, faculty, and friends, then the value of interdisciplinary networks and teams becomes even more evident. There is an appropriate aphorism that says, ``to the person with a hammer, everything looks like a nail." Thanks to our different backgrounds and training, some people not only have a hammer, but also a collection of other tools to use. By working together in interdisciplinary teams, we can apply many tools to our problems, and communicate with those whose tools differ from our own.

Initiate Action

I began this lecture talking about change and the abilities that we individuals will need in order to be successful in a future marked by rapid and large-scale change. The skills are to gather information, to assess the current environment, and then to decide on a path to follow. We can gather and assess information because we are smart people with broad intellectual skills. We are not afraid to make decisions because our ability to work with others increases our ability to succeed, while our ability to laugh at ourselves decreases our fear of failure. There is still an unresolved issue, however. We can choose a path to follow, but how do we know which path is the right one? When we come to a fork in the road, which path should we take?

I believe that during periods of tremendous change, we have to pursue our goals and ambitions by initiating action. We do not have time to be reactive; we must be pro-active. Since this is a Quaker school, I must emphasize that initiating action is different than being aggressive. Being pro-active means choosing a deliberate path based on the best available information, and heading down that path with the expectation that this route is a fruitful path to follow.

Returning to the demonstration in which I tried to clobber the nail on the moving piece of wood, being pro-active might mean developing a strategy for hitting the nail, and then implementing that strategy. The strategy might be simple, such as always swinging the hammer straight down and hoping for the best. Or the strategy may be more creative, such as deciding not to swing the hammer until the wood is changing direction, and therefore moving relatively slowly. What we cannot do, however, is be reactive and continue swinging the hammer at the location where the nail used to be.

What was not contained in my demonstration is the fact that, in many fields, being pro-active actually contributes to the change occurring around us. I have seen the following scenario played out over and over again. Two computer companies, each vying for the lion's share of the personal computer market, introduce new operating systems at approximately the same time. Hundreds of small software firms with limited resources are now faced with the following quandary: for which environment do they write their new software? If they guess correctly and choose the environment that eventually dominates the market, then they may become successful; if they choose the wrong operating system, they are surely sunk.

What could (and does) happen is that a software firm may wait to see which operating system wins the battle, and then writes software for that platform. I think, however, that this option is already unwise, and that that the pace of change in the future is going to make this option even less attractive. During the year in which market forces determine whether Platform~A will dominate the market over Platform~B, the software firm is losing money, and losing its advantage over other software companies with similar products who are willing to take a gamble. By the time the firm decides what to do, the opportunity is lost.

By being pro-active, on the other hand, we become part of the change and can actually influence our own direction. With respect to software companies, what happens surprisingly often is that a small software firm takes the plunge and develops its software for Platform~A. When the software hits the market, it is so successful that people who are buying new computers actually place orders for Platform~A, so that they can use the great new software written for it. This increases the demand for Platform~A, and shifts the balance of power. The software company has affected its own survival by initiating action.

It is often surprisingly difficult to initiate action when we are uncertain as to the ``best" action to take. About eight years ago I was trying to decide which graduate school to attend, and whether to pursue a degree in physics, pure mathematics, or applied mathematics. As was often the case, I approached Sheridan for advice. His comments not only helped me choose a career and a graduate school, they've helped me deal with other important decisions since then.

``Rick," he said, ``you're a smart person. All the schools you are looking at are good schools. Each career is a good career. You are used to solving math and physics problems that come out of textbooks and have one correct answer, but this problem is not like that. It does not have a `wrong answer'; it doesn't even have a `best answer.' "

I've used Sheridan's advice many times. The key observation is that when we are faced with several good choices, it is not necessarily true that there is a best choice. It is not always possible to linearly-order our lives, saying the most important issue to consider is X, and the next most important is Y. When faced with several different choices, we need to accept the fact that our choice will affect our lives, but we don't need to lose sleep choosing between paths that are mutually good. Furthermore, most choices are not irreversible. If I go to a graduate school and find that I am unhappy, I can transfer to another school. If I move to a new job in a new city and find that I hate the weather, I can always relocate again. Yes, by all means, let's make our choices as best we can, but sometimes the question is not ``what is the best course of action," but rather, ``based on the best information I have, what is a good course of action, and when can I get started."

Perhaps my point was made most succinctly by the famous New York Yankee manager and philosopher, Yogi Berra. He said

When you come to a fork in the road, take it.

To that I add my own ending (which reeks of modern quantum physics):

In doing so, you may affect where the road leads.

Faith in the Future

My premise has been that the future will be a time characterized by rapid and large-scale change. Technology will lead the way, but will also induce societal, political, and economic changes that will affect all of our lives. During periods of rapid change, I propose that it is difficult to gather and assess accurate information about what is happening, where we are, and in what direction we will soon be heading. Those people who have the intellectual and social skills required to glean such knowledge will have a distinct advantage in tomorrow's climate of global competition. It will not be sufficient, however, to merely have this partial knowledge, it will be necessary to make educated decisions about how to use that knowledge. Interdisciplinary networks of colleagues and friends will help us to make these decisions, and a good sense of humor will be invaluable in dealing with the stress and anxiety that may otherwise paralyze us.

I have faith in our ability to succeed in this somewhat hostile environment. We are smart people with broad intellectual skills. We are funny people, with the ability to laugh at ourselves and the world around us. We are social people, and can assemble and communicate with an interdisciplinary network of associates. And we are ambitious people, who are not embarrassed to initiate action and try to affect our future. These are the skills that will take us into the next century, and these are the skills that we educators need to help our students to develop.

I think that these are among the skills that Sheridan possessed, and are among the skills that he passed on to his students. I hope that we former students are as successful in the twenty-first century as he was in the twentieth. I have faith that we will be, and I know that Sheridan did, too.

I'd like to conclude this evening by sharing with you part of an electronic mail message that I got from Sheridan a few months before he died. I think it reveals his own faith in the future and his own faith in us. He said:

I can get real pleasure out of the thought of my students going on and doing good things far into the next century. That's my own (albeit indirect) contribution to human society, and it's a kind of immortality I can believe in. It is surprisingly comforting.

So my message is... to do the best you can for yourself. That is truly a reward for me. I know that your ambitions are ones I respect and admire---pursue them! It will make both of us happy.