Missouri Regional Life Sciences Summit, 2010
University of Missouri—Kansas City
Welcome and Keynote Address
Transcript

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The Missouri Regional Life Sciences Summit 2010 opened with remarks from Gary Forsee, President of the University of Missouri System, Dr. Brady Deaton, Chancellor of the University of Missouri--Columbia, and Senator Claire McCaskill. William H. Danforth delivered the keynote address, "Partnerships for Progress in Health and Economic Development."

GARY FORSEE SPEAKING

I'd like to welcome everybody and say good morning, my name is Gary Forsee and the president of the University Missouri System. Thank you so much for being here. If there was any question about the importance of our gathering for the next couple of days, if you hadn't had a chance to be next door and in the Swinney Auditorium, I think you will find out why it's important for us to continue to put a spotlight on research and put a spotlight on the theme of today's summit, which is animal to human health collaboration. What an array of research that we have, what an array of partners that are on display that want to start this morning by thanking everyone that's put so much energy and effort into that effort. Thank you so much. I would like to extend a very special greeting to this morning from Leo Morton, our university, Missouri, Kansas City chancellor, whose team is serving as our resident host for this summit. Leo sends his apologies that he can't be with us. His father passed away last Thursday. Not unexpectedly yet nevertheless, certainly a family emergency that he is tending to in Birmingham, Alabama.

In just a few minutes, you'll hear from a university of Missouri, Columbia Chancellor Brady Dayton, whose team has orchestrated the programing for this two-day summit.

We trust that it will prove to be a very meaningful two days for all of us. More than a year ago, as the recession unleashed a torrent of challenges on all of us, I committed to Governor Nixon and to our fellow Missourians at the university, Missouri would find ways to be part of the solution, to be creative, to be even more relevant to their, our historic mission and our state of teaching, of service, of research and economic development. One of our first initiatives in that regard was to host the first of its kind energy summit last April in Columbia. At that summit, we convened businesses, venture capitalists and faculty, researchers and policymakers from across the state and around the country to figure out how Missouri could activate its energy prowess. The goal at that point time was to showcase the incredible research underway on our Missouri campuses, as well as research with our partners around the state and both public and independent university institutions. The goal was also the creation of new businesses, greater investment in energy research, new jobs and an enabling public policy environment. And I would also say to be sure that we really focus on outcomes and we continue to do that today on all fronts.

This week we're hosting our second summit, this time focused on convening the outstanding life sciences researchers from across Kansas and Missouri with businesses, investors and policymakers. I'm also pleased that we have a representative from Iowa State University joining us today. The goal of this summit is the same as with the energy summit. New businesses, more jobs, greater research, collaboration and investment and public policy enables all of us to capitalize on our collective life science capabilities and again, with a focus on outcomes. Brady, Leo and I are particularly appreciative of the engagement and collaboration of our academic colleagues across Kansas, Missouri and the region in creating such a World-Class meeting of the minds on this important topic. We're pleased to see so many business leaders, potential investors and leading edge researchers as well as policymakers that could join us today as we all explore new opportunities for major collaboration's. As many of you know, or most of you should know, Kansas City increasingly is a very important venue for a wide ranging life science discussion and ventures, particularly with respect to the animal, to human health industry. The focused efforts of the Kansas City Area Development Council, the Kansas City Area Life Science Institute, Kansas City Chamber of Commerce Towers, Midwest Research, Mizzou, K-State K-U and UMKC and many other organizations, and then individuals over the past several years can be credited for branding the area's animal health corridor.

Today, the activities along this corridor account for almost a third of the nation's billion dollar global animal health industry. Twenty billion dollars and we account for almost a third of that here in our region. It is our hope that what happens at this summit will enable all of us to significantly ratchet up the national and global recognition and engagement with our collective life science research prowess and that spirit of innovation and entrepreneurship that Kansas City's own Kauffman Foundation encourages in all of us.

I'd like to also take this opportunity, extend a very special appreciation to our sponsors, without whom we could not have undertaken this summit, if you remember the Academy, I hope you will take time to visit our sponsors booths and talk with them and consider how we might be able to better engage with them to move our innovations from the lab more quickly into the marketplace. And for those of you in the business community, I hope you'll make time to get around and talk with our researchers to find out more about what they are doing. We have over exhibits and more than posters and nearby Swinney recreation center, so there's a lot of ground to cover and untold possibilities for new and expanded collaborations.

If you've not had a chance to do so, I hope you'll also take a look through the special supplement that was in both the Kansas City and St. Louis business journals that's been published in support of this Life Science Summit. I'd like to extend a special thanks to Joyce. Hey, how Joyce, please stand up and be recognized. There you go, Joyce. Joyce is the Kansas City Business Journal publisher who collaborated with their counterpart in St. Louis, Ellen Shurberg (?) to help shine the spotlight on this rich life science environment that extends beyond both Kansas and Missouri and, and beyond our borders. Importantly, though, this is also one of the largest supplements that the Business Journal has published, and it still does not begin to capture the magnitude of the life science prowess and business opportunities here in our backyard. One only needs to count the number of life science summits, conferences and symposia popping up all around us on a regular basis to get a sense of the extraordinary interest, capability and capacity that we collectively have to promote regionalization of life science activities.

So as we spend some time in the next couple days comparing notes and exploring possibilities, I hope we will all consider the underlying question; how can we take full advantage of this summit, as well as those gatherings that are shining a spotlight on our region and importantly, on an area that represents potential? And some of that potential has been partially realized. And the question is that we should all ponder for next couple days; how can we begin to fully realize that potential to ensure that our region becomes even more relevant in this topic than it has been in the past? We made incredible strides, incredible progress, the hard work of many in this room and the question we should think about; how can we be sure that we focus on those outcomes that will continue to make a difference for this region?

I look forward to hearing your thoughts over the next couple of days. We certainly have plenty of opportunity for engagement. We are streaming our program. Be sure that if you have questions during the course of this morning session, you grab one of the microphones that place so that our colleagues that are joining us on the web can have a chance to understand the discussion underway at this point time.

Please join me in welcoming Brady Dayton. Our summit chair from our campus, Brady.

BRADY DAYTON SPEAKING

Well, good morning, everybody. And Gary, thank you so much for your leadership and for kicking us off. This is a very, very exciting couple of days that you're in for here. And I want to thank each of you for putting it within you, getting it within your schedule and the will to be here this morning and to begin what will be a very exciting process. Collaboration is really the theme that we see being carried out here for the next couple of days. Collaboration among all components of our scientific, academic and business communities.

And I want to begin by just thanking the University of Missouri system and its staff. President Forsees' leadership. My fellow colleagues and chancellors. Unfortunately, Chancellor Leo Morton was unable to be here this morning and we regret the circumstances that led to that. We also have with us this morning, though, the chancellor of the University of Missouri, St. Louis, Tom George, over here, Tom. And Chancellor Jack Carney from Missouri University of Missouri Science and Technology. Jack is with us. And many of the staff and scientists from each of the campuses of the University Missouri are here with us today.

My own interest in the power of regional economic development stems from my professional background working internationally and domestically with business and economic development. And I saw the power of the linkages between the business sector, the scientific sector and the powers that can bring together the economic activity that's so vital to provide the foundations for quality of life in each of our regions. I became chair of Agricultural Economics at the University of Missouri in . Shortly thereafter, I was working with Mark (?) Soslan on a number of workshops here in Kansas City, and we began to see the power of what a regional economic thrust could be in this part of the country. These linkages, whether they're international and the international, is so linked to what we're doing domestically that it requires a very careful analysis and coming together to move with the scientific edge and the business innovation edge to create the kind of sound economic and social framework that will drive us into the future.

10 MINUTE MARK

We're here today to look at those advances in science, to look at those innovations in the business sector, to build the kind of world that will make it more habitable and a more sustainable pathway for our economic product process. New advances in bio sciences, which we're going to see a lot of here in the next couple of days, are impacting the food we eat, the medications we take, the medical therapies we use, and even the way that we expand energy and no segment of science advances in isolation.

Just as the world's economy and social relationships have become more interdependent. So has our research process at our nation's great research universities. We know that collaboration, those linkages among faculty from different disciplines, if you will, paves the way for the kind of groundbreaking discoveries that will lead the pathway into the future. And that includes external investments into our universities from governments as well as from the private sector. And those lead to the important significant benefits of citizens everywhere.

So our focus of this summit, animal to human health collaboration's, is a prime example of that collaboration. As I look out at all of you, I am looking into the faces and hearing the voices of the future. You're going to hear the future here over the next couple of days. And we've tried to say to the business community and the scientific community, if you're not at this conference, you're gonna be well behind the pace after after this conference. So we're glad that you're here because you will be leading the way into the future. That future is one of identifying the strengths we have in our academic communities and our business community, partnering our research universities with the private sector. To enable lifestyle, to enable that cutting edge of science, to simulate the innovations and the entrepreneurship of the future and usher in a new era of economic and social well-being here in the Midwest Bio innovation belt and that. Thank you for being with us today to share and this very, very exciting future.

It's my pleasure now to call attention to the senatorial leadership we have in Washington D.C. from the state of Missouri, we've been so fortunate with the leadership we have, you will later today be seeing Senator Kit Bond, who's been a great supporter of the life sciences and certainly of higher education generally. And one of our great supporters is our junior senator from Missouri. And an MU alumna Claire McCaskill. She was notable, as you're aware, and her effective oversight of government affairs at the state level and has since emerged as a national leader and strong advocate for all of us here at this summit. Senator McCaskill could not be with us today, but she has sent a video message and we will turn to that this time.

SENATOR CLAIRE MCCASKILL SPEAKING FROM A VIDEO RECORDING

Hello to everyone attending the Missouri Regional Lifesciences Summit. Well, I'm really sorry that I couldn't be there with you. I'm pleased to have this opportunity to speak to you. First, Congratulations on the initiative you have taken to hold this important summit. This is critical not only to advancing understanding of an innovation in life sciences, but also to advancing an important and modern field that can contribute substantially to the future economic prosperity of Missouri. We're all encouraged that our economy is beginning to stabilize, but it is now improving after facing the real risk of going into a depression. As many in our state are painfully aware, We continue to lack a full recovery of jobs. Unemployment remains near percent. What is more, we are faced with the fact that many of the jobs lost in the downturn are in sectors of the economy, like manufacturing, manufacturing that may never fully recover. The fact is, if we're going to attack the problem of unemployment and develop an economic base to drive our economy into the coming decades, we've got to make advances. Instead of slowly looking backwards and trying to recover our old industry. Fields advancing new innovations will

be the engine of the future. Fortunately, the United States is and has been the world leader in developing new ideas and pushing the frontiers of science and technology. And I'm very proud that Missouri has often been at the center of such innovation. In many cases, each new economic wave has been the result of our scientific advances, and many of those advances have come out of our universities. Looking back, building cars was the practical outcome of developments in mass production. The I.T. revolution was the practical outcome of advances in transistors, circuit design and really smart programmers looking forward. When we look at where the next wave will be, I believe that it will come, at least in part, from the advancements in biotechnology and the life sciences. As I know, many of you attending this conference today believe the stars may well be aligned for a huge growth in the life sciences. Why? Because the baby boom generation is about to reach retirement age. Making health care an increasingly large industry and increasing growing part of our GDP. World population continues to grow, Putting new pressures on our food supply while simultaneously increasing the risk of disease outbreaks like we saw with HN. And I know that while Congress has been working hard to try to figure out how to structure, provide and pay for health care in our country, you all have been busy back in Missouri working on the breakthroughs that will make it easier and cheaper to diagnose, prevent and heal diseases. It was almost a hundred and fifty years ago. That land grant institutions were created to use science and engineering to help transform agriculture and industry. Here you are today carrying on in the same spirit. Times have changed, But the goal of turning scientific and engineering advances into real world progress hasn't. Missouri and Kansas find themselves not only in the middle of a country, but also in the middle of a very talented pool of biotechnology and animal and human health. Know-how. I'm excited to have had a chance to speak to you, but as you as you kick off this summit, let me take this chance to present to you a few challenges. First of all, I challenge you to seek out your fellow Midwestern scientists to form collaboration's. I don't need to tell you that the coasts don't have a monopoly on talent. We have some of the brightest folks in the country and the world who have a can-do attitude. And through this summit, I hope you seek each other out and build even stronger relationships. Working together will make it easier to succeed in my second challenge, which is for you to find a way to transfer your knowledge of science and technology into products and businesses right here in Missouri. You have the wonderful opportunity to not only better our physical health, but also our economic well-being. I wish you a great summit, and I look forward to watching your successes. I'm proud of the ability of this administration to once again show deference and respect to science. Thank you so much for your tireless work.

BRADY DAYTON SPEAKING

Thank you, Senator McCaskill, for those very, very prophetic words, and I think they point to a future based on that kind of collaborative science and partnerships between academic research and business interests of our country.

We're going to begin with their major keynote address here in just a moment. And let me indicate as we go through our speakers, distinguished speakers this morning after each speaker, we trust that we will have time for some questions and answers. So I urge you to keep your thinking hats going and to a crowd like this. I don't think I need to say that you're a great group. And again, we're so pleased to have you with us this morning.

It's really a pleasure for me to introduce our keynote speaker this morning, Dr. William Danforth, chancellor emeritus of Washington University in St. Louis. One of our nation's greatest research

institutions, Dr. Danforth chairs the coalition of Plant and Life Sciences and is chairman of the board of directors of the Donald Danforth Plant Science Center, of which MU is very proud to be a founding partner and his chancellor at University of Missouri. I am pleased to serve on the board of the Danforth Plant Science Center with Dr. Danforth. Bill Danforth chaired the USDA's Research, Education and Economics Task Force in and in That group's report led to congressional legislation that established the National Institute for Food and Agriculture, which began with a powerful agenda to support high quality agricultural research. So in that responsibility and in so many others throughout his career, Dr. Danforth has been a pioneer, a pathbreaking leader in thinking, And I can think of no one that I'd prefer to have here this morning as Dr. William Danforth as our keynote speaker. Dr. Danforth, I welcome you to the lectern.

20 MINUTE MARK

BILL DANFORTH SPEAKING

Thanks very much for that generous introduction. More than generous introduction, and thanks for inviting me to this conference on animal to human health collaboration's partnerships for innovation. It seems to me thinking about this title, that our question is how can we Missourians best use our strength in the animal, And medical science says, and I'd like to add my own special interest plant science. How can we use these sciences better to innovate and innovate, not just for the sake of innovation, but for something more important to provide a better future for the people of Missouri and for the wider world? We'd like to collaborate and build partnerships among individuals and among institutions.

And in today's because in today's world, there's not much that any of us can do alone. We'd like these partnerships to create a strong and sustainable economy and provide productive and meaningful work for our fellow citizens and to bring together our special skills in the health sciences to improve health, diminish the pain and suffering and the costs of disease. Bill Gates annual letter calls innovation the difference between a bleak future and a bright future. That contrast, bleak versus bright, holds for us here today.

This talk is designed to fit in with what I understand to be the goals of the conference. But in the larger sense, we want to do something great to use the time allotted for us for important purposes beyond just ourselves. And we've heard about large and noble goals from the president of the system, Gary Forsee, and I like large and noble goals. They give purpose to our lives, bring out the best in us and can make every day an exciting adventure. Partnerships and collaborations seem the right vehicles to bring a success. So far, and I have not mentioned what is for me, the elephant in the room and that's science. From now on, I'll focus on science for two main reasons.

One, science is an essential part of innovation in today's world, two, Science can be our model for some. Scientists are showing us how to create effective collaboration and partnerships for innovation. Besides, how can we overlook science in a university sponsored conference? After all, universities are home to today's sciences, scientists and educate the future generations. Now, first is perspective. A little history. Sciences, we think of it today Is relatively new in the history of humankind. It started in the th century, years ago, when Francis Bacon and others noted that universities were teaching dogma and theories from the past that had little to do with understanding how the world really works. Universities were not preparing young people who could make life better for themselves or for their fellow creatures. In contrast, farmers were providing more needed food by increasing crop crop yields, and sailors were

traveling more safely by improving navigation. Farmers and sailors were making progress by observing and learning from nature and then figuring out how to work with nature to make their lives better.

Bacon developed two great ideas that are still valid today, as they were years ago. First, innovate. You must first innovate, You must understand. If you want nature to work for you first, learn from it by observation and experimentation. Set another way. You can't command nature unless you obey its laws. Bacon argued that scientific understanding, second point, Bacon argued that scientific understanding could and should be used not just for its own sake, but to relieves human human suffering and misery. That is, to make human life better. To bring us closer to the promised land, as Bacon thought, in the th century. So do we think today he could fit into the purposes of this conference? With these two new ideas, talented people began to observe the world and test their understanding with measurements and experiments.

Late in the th century, Isaac Newton, Isaac Newton discovered the components of light. And color, he invented the calculus and discovered the law of gravity and how the motions of planets could be explained. the new knowledge was so spectacular that the port of those days, Alexander Pope penned the words. And maybe this will be said someday about some of you here. Nature and nature's laws were hit at night. God said, let Newton be And all was light. Of course, not everyone applauded. Some argued that gravity was just a theory for Newton. Showed no mechanism. They said, in effect, show us the mechanism and then we'll believe it. Explain it how it works.

But despite arguments, human understanding from that time on grew. And as it grew, human misery and suffering decline, just as Bacon had foreseen. All the wonders of our modern world have come from deeper understanding through science as a result compared with our ancestors. We moderns live in an earthly paradise. I like to emphasize that point because I hear too many complaints today and too much negativity about our condition of our world. While I think we should count our blessings each morning, if any of you doubt this, visit an old cemetery and look at the many graves of infants and women in the child bearing age. we take it for granted that the vast majority of our children will grow to adulthood and almost all pregnant women will bear their children safely. And our general health continues to improve the life expectancy for a child born a newborn Today is years longer than when my parents were born or go into a supermarket and see it through the eyes of Americans. One hundred and fifty years ago, who cleared the land, labored in the fields day after day, plowed the soil, sowed seeds, chopped wood, carried water, made the family clothes and sometimes went hungry. A ride in an airplane to the West Coast. And compare your trip with the journey of Lewis and Clark. Or think of your microwave, telephone, computer, and imagine them being taken from you.

Never forget that our advances have led to economic benefits and enormous collective wealth, Which one has only to visit an underdeveloped country to appreciate. We live, We live better than kings and queens of just a century ago. And since I believe in science and innovation, I expect that unless science has stopped, my two great grandchildren will have lives that are fuller and more healthy than I.

As, As science has changed our world. A very interesting thing has happened. Science has also changed itself and continues to do so. to keep scientific work effective and productive Scientists have had to change their behavior. In ways, thank you. In ways from which we can learn a lot. I'll use my experience to illustrate. Fifty years ago, I went to work in Washington University's Department of Biochemistry. I had a small grant, a narrow question to answer 'how to enzymes change to speed the supply of energy to working muscle?' I devised and set up my experiments, cleaned my glassware at night, analyzed my

data with the slide rule and wrote up the results, submitted an article to the Journal of Biological Chemistry. Others help me with suggestions, but pretty much I had to succeed or fail on my own. That was then. Fast forward to and a project now being carried out with a million dollar grant from the Department of Energy to a consortium led by my current passion, the Donald Danforth Plant Science Center. The goal of this grant is complicated and important. It's to speed the development of competitively priced biofuels, biodiesel from algae.

30 MINUTE MARK

If successful, the results could be helpful or should be helpful to weeding us from Middle Eastern fossil fuels to providing the military with domestically produced aviation fuel, to preserving the environment, disappearing land for food production, and doing all this at reasonable cost. This large and important undertaking involves a consortium of twenty five institutions, including two national laboratories, public and private universities, independent, mostly for profit, but also not for profit institutions, And in total, they employee hundreds, perhaps thousands of scientists and engineers. Data will be collected and analyzed by computers and shared with everyone rapidly and frequently, electronically. No one will be an expert in all the parts or even understand everything that everyone else is doing. Decisions will be made by consensus of a group of scientists with different specialties.

Now, why has BioScience doing, bioscience changed so much? Because the problems are larger and more complicated, and the discovery of important new information is much more difficult. Today, no one individual has read can really master a field. Nor can the combined brains of one hundred or a thousand Very smart people understand all science. today Addressing a complicated problem requires more people with complementary skills and knowledge, and difficult problems require more and more powerful and sophisticated equipment and people who have who know how to build and manage the equipment. We've long past the limits of a single human brain.

Finally, all of these challenges are compounded if we wish, as we do in this conference, And as did Francis Bacon, to go from science to practical benefits to humankind. There is another advantage of doing research in the modern way. Multiple fathers are out exploring different, multiple feelers are out exploring different parts of the problem. This system can take rapid advantage of new information, new discoveries, Scientists with different perspectives can monitor progress against gets setbacks and identify promising new discoveries which may lead to new avenues of research and if thought wise. Redirect some of the resources and other inputs.

Now to some of the lessons that I think we can learn. This type of science could not work without scientists behaving very differently than certainly than I did in the past and than we did years ago. Large groups do not automatically work well together toward common goals. One needs the same basic kinds of people. We need in our scientists intelligence, scientific talent, energy, the ability to focus on problems, But then they have to work together in large groups.

And here are some of the behaviors that I consider essential trust, Put that first; Scientists must trust one another. sharing; They must be willing to share ideas and importantly, to share credit. Selfishness is out, unselfishness and cooperation are in hype among colleagues is out; modesty and honesty in speech and in writing are in; uncertainties, There are always uncertainties must be shared. Scientists must be willing to challenge each other's ideas. And what's more difficult? To have others challenge their ideas, all must realize that nobody knows everything. Common goals must be set. All must work together for

the success of the team, And that means compromise, Since no two people will agree all the time on every subject. Not everyone can be boss. in the old days, I could be boss of my project even though no one was working for me.

Not everyone can do his or her own thing Whenever he or she pleases. too much selfishness or any dishonesty among scientific colleagues could stop progress. now to be more specific, I want to quote from the from an interview of a Dr. Jose Olivares, who was a major architect of this coalition that has been put together of institutions. The question he was asked was, how did the consortium come together? And here is his answer We had principles. one, inclusiveness to make sure we had a broad perspective from the national labs, academia and industry. two; understanding the algeo value chain and making sure that we had good organizations in each area. Organizations were picked carefully.

Third, Being transparent and supportive, not coming in with 'mine is better than yours,' but rather with 'how can we build this together?' to believe that the best in the best outcome is what is important. In one or two instances, we had to take an institution out completely when they were not a team player and were undermining the health of the team. So basically what he's saying is that they were extending to the next level what had been learned in recent decades. It was a lot easier years ago, but science adopted the modern cooperative behavior, not because it's easy, but because it works better. Now, as scientists have shown us the way to make progress in complex terms, Why does everyone, Doesn't everyone follow the same blueprint? other fields could clearly benefit from the same organizational behaviors. And since we're all part of our national and international communities, it's good to try and figure all that out.

Unfortunately, we need not look far to see that while some have learned cooperation, collaboration, others have not. The needs of our time argue for trust, collaboration, cooperation, plain speaking, partnerships and compromise. But the mood of our time too often argues the other way. Suspicion and mistrust are widespread. One need look no farther than our nation's capital. We Americans value debate and argument that even our best customs can go too far. Despite two wars and a staggering economy, mistrust has brought our federal government almost to a standstill. Neither party trusts the other. compromise, so essential to collaboration and progress, is now too often taken to mean betrayal of principles. Political ads tell us to distrust some decent human being who is painted as dishonest, opposed to all what is good or respectable or even American.

The day will, of course, come again when politicians, political leaders will remember the responsibility to work together for the common good. And I thought it would just be great if we in Missouri could help point the way. So much for politics, but others contribute to undermining trust as well. We've learned to be on guard against cleverly designed advertisements that are, at best, only partly true. We wonder if we can trust the manufacturers of automobiles or the great pharmaceutical companies that have contributed so much to the health of our, and to our economy. The successes of some companies, advertisers and politicians that feed us hype or partial truths may tempts the rest of us to twist the truth, to ignore our own flaws, and to concentrate only on the flaws of that other guy. But we shouldn't let the bad coin drive out the good. Succumbing to such temptations is wrong. We humans can do better. The times call for partnerships, collaboration's cooperation, plain speaking, trust, compromise and agreement on some common goals. I'd like to see us and our state model how to best respond to today's challenges. Then two questions follow is building a culture that fosters cooperative attitudes our responsibility? And if so, what do we do? Well, I answer the first, Yes.

40 MINUTE MARK

If we were involved in institutional leadership or if we have any role in promoting science or innovation, helping people to work together is our responsibility. Deciding how to do so is a bit harder, But I'll share with you a few thoughts. We have to start with ourselves. First, we should try to be realistic to see our environment as it really is. We live in a complicated and complex world. If a practicing scientist can understand only a part of his or her total, of his or her field, imagine how difficult it is for any of us in this room to understand what is really going on in science, let alone the rest of the modern world. If we understand something of science, what do we understand about things that affect science? What do we understand about fiscal policy or the balance of trade or the effect of the tax code on recession? Can we name the countries of Africa or the former Soviet Union?

In sum, we don't know much. We don't know much about what's going on in the modern world of . billion people. And when we don't understand, it's hard to trust. Never before in human history has the world held so much knowledge. Never before had there been so many specialists. Never before have so many people known so much more than you or I can hope to learn. All this knowledge that we know we don't know can be confusing, discouraging, disheartening. It can make us feel inadequate and wonder if we can trust those that we don't understand. If you can't verify, how can you trust? these are natural tendencies, But we should recognize especially that we should recognize these natural tendencies, especially when the Times can't call for greater efforts of cooperation, Trust and compromise. And for people who can support the larger picture, even if they only, they understand only their small part. Understanding our environment is important. But what we do is more important.

So second, each of us and each of our institutions should strive to model the behavior we seek in others. Each of us has to admit to ourselves and to others that we have only one brain and that we don't really fully understand the modern world. We have to be open to learn from the ideas and criticisms of others. We have to listen more than talk. We have to trust others If we're going to accomplish anything. And trust takes courage, for there are always risks. Trust can always be abused. But then life is never risk free. We have to risk and dare, and compromise and trust or stay on the sidelines of life Today. as we're going to have to trust others so others will have to trust us. That means we must be trustworthy. We have to be careful always to speak honestly. We should not shade the truth in favor of ourselves or our institutions. Rather, we need to put first the needs of society as we see them. Institutional leaders should work for a culture in which every member of the organization understands and supports the idea that our institutions are there to serve society and not to aggrandize themselves.

Recently, I ran across a recommendation for an individual that read, In part, it just turn me or I'm reading this. X is the best that I've ever seen you develop a trust that he is telling the truth. He doesn't have motives for himself, He's all about what is best for his entity and the people he is working with. He tries to understand all sides and is always fair. I read that. I thought to myself, 'That's the kind of person I ought to be. I've got to try harder. And of course, that's the kind of person we especially need today.

Third, leaders have special responsibilities. They have to pay attention to the communications from themselves and their institutions. To use an analogy from George Orwell, our language should let people see through Our words to what is real and honest. It is. And he used the analogy. It's still we were looking through a clear window pane. And I've always liked that. that sort of language will help create the trust that is need, so needed today. We need to set goals that are noble, inspiring and achievable. We need to explain in our windowpane language how we are going to get from here to there. What the

goals are, how we're going to get from here to there, and why we chose the path that we did and allow no hype for exaggeration.

Fourth, like all who have ever tried to make life better through change, we have to justify what we do because change makes many uncomfortable. And science, as a change agent, as a change agent, will always cause worry and concern, even as it did. in Isaac Newton's time. years ago, the president of Yale opposed vaccination for smallpox because he believed that if God had decreed that certain children should die, man should not interfere. Well, I can understand that logic, Logic. I'm sure you can. And maybe he just overlooked the hidden corollary that humans should not use their intelligence to make the world more merciful. That sounds strange today, but there are today's, some of today's arguments will sound strange Two hundred years from now. people have opposed trains and hybrid corn and anesthesia and so on and on. The latest wrinkle is to go after teaching science to our children. We must understand these natural concerns, but also realize that also realized that we who are carrying the flag of the future, who are working not just for our time, but for the time of our great grandchildren, should not break down from our convictions. We need to move ahead to explain ourselves and to oppose the kind of restrictions that so many would like to put on us.

So what does that have to say about this conference? Here are my interpretations. If we can be open, honest and trusting, if we can work together on important common goals that are good for the people of Missouri rather than just for ourselves or our institutions, if we could, we can set an example for the nation. If we can call the issues as we see them without hyper self-serving twists, maybe others will do the same. And we can progress to higher standards of accomplishment. if we can aim to create jobs and improve health, not for ourselves, but for others, for the poor as well as for the wealthy, for those who lack education as well as those who possess it. Then we'll be worthy of our leadership role, for great leaders who have always seen beyond parochial goals and have worked for the common good. True leaders should be setting a moral tone, setting an example and by their example, helping people to be better than they otherwise would be. Are true leaders inspire trust because they merit trust. Leaders are all imperfect humans, just like the rest of us. But they or maybe I should say you, We, can work to make ourselves better and always do our best fan to fan peoples. Always do our best not to fan people's suspicions, but rather call, as did one of our greatest American leaders, on the better angels of our nature. We need road maps, and I have not provided any, but rather suggested human qualities that can help make progress in our lives worthwhile. Thank you very much. If there any comments, other views, critiques. I think now is the time to voice them. Is that correct? Am I right?

50 MINUTE MARK

AUDIENCE QUESTION

To accept science, I think we need a literate public. Missouri doesn't have a particularly outstanding reputation in K educator K education at least. We have outstanding higher education institutions. How can we do it? How can we sell to the public, not just the Missouri, but across the Midwest, that the value of an education so that when we do science, we understand the scientific process. We understand how to ask a question, but we're met with so much cat skepticism over the science or the new science, particularly, how can we convince the average citizen that education just flat out basic education is is critical to our future?

BILL DANFORTH SPEAKING

Well, there is, I'll just give you my my take on that. First of all, I certainly agree that education is the most important thing we could do for our future. And I'm sure a lot of people in this room have spent much time on education, both early childhood K through , higher education and so on. They're all important. And the more we can teach about science and the scientific method, the better. I just add one other thing, though, that I've thought about lately, and that is that, Even with that, even with teaching the science and helping people understand how it works, that doesn't really solve all the problems because when mistrust. And doubt is widespread in the land and is fanned by political activity, advertising, winds and so on, And it's very easy for mistrust to come, even for those who, who understand, and science is so hard to understand that any understanding coming out of first years of education is going to be pretty superficial. Maybe you understand some of the principles, but it be pretty superficial. So we have to teach not only about that, but the benefits of science. I tried to lay out some of those. And we have to be honest and trustworthy as we can be, setting a good example for us so that others won't be able to undermine it so quickly and easily.

AUDIENCE MEMBER QUESTION

With regard to that issue of education. And what I'd like to see from the summit here is there's an organization that actually my my wife is an executive director for the Midcontinent Association for Biomedical Research and Education. The problem that I see is that there's a lack of funding for public outreach and education. And the concern I have actually stems from something I saw last night at the Oscars where the documentary, one of the documentaries that was up for an Oscar was Food Inc, which looked at factory farming and so on. So what are going to be or are there going to be opportunities for more funding for public outreach and education to allow more public awareness on the benefits of biomedical research and agricultural research?

BILL DANFORTH SPEAKING

Well, I remember when my brother went to be a senator in Washington for the first time and I said to him, Jack, I want you to cut out all this unnecessary spending, all this waste, fraud and abuse. But I tell you, I want you to spend money on science and education. Well, of course, there are a lot of people argue differently. So on. So it is hard in our in our democracy to get funding for anything. And we should push for it. We should push for it as best we can. I would like to see our state, for example, spend considerably more on education than it does on outreach and so on. And I think we ought to work for that. But we can't wait for it. You know, we can't wait for it. We have to do as best we can with, with what we have and keep working away to explain ourselves, to explain scientists, science, to call on the better angels of our nation, of our nature, rather than all this suspicion and mistrust that's so widespread.

AUDIENCE MEMBER QUESTION

If I may. Thank you very much for such an outstanding keynote speech. I don't think I've heard a talk of agreed with more or found more personally motivating, really. Thank you so much for that.

BILL DANFORTH SPEAKING

Thank you.

AUDIENCE MEMBER QUESTION

But I was wondering specifically this excitement about oil from algae. Oh, I'm sorry. I've been asked by my wife to identify myself. I'm Rob Duncan, vice chancellor for research here at the University of Missouri. But no. I think that this algal development is one of the most exciting things of our time. And there've been great strides in terms of developing the metabolomics to make Algae more productive of, of oil for energy. I was wondering, could you share any vision or as you say, you didn't roadmap, but you see how this will move into mainstream agriculture, How will go from systems biology to systems agriculture at the scale necessary to make a substantial supply of our future needs in in portable energy?

BILL DANFORTH SPEAKING

The. Yeah, it's a good question. Of course, there are many steps that have to be taken. Many challenges to be worked out. But in theory, if one wanted to power all of our moving vehicles, cars, planes, so on, by ethanol from corn, one would need many more acres, to grow corn kernels, One would need many more acres to than we have in the United States just to grow corn. If you add algae and these are single celled algae, they can grow much, They grow much faster and they can they can produce more oil. And one could take the area of, say, New Jersey or Delaware and produce all of the biodiesel which might power, our machines. So from that standpoint, land usage should be much, much more effective than any other kind of biofuel that we that we know of now. And it's also, there's another great advantage. If you are dependent upon corn or soybeans for for your fuel and something goes wrong with a crop, you have to wait a year. If you, if you're algae, something happens to your algae, you should be able to be back on line in another week or two. So there are lots of, There are lots of promise to it. And we will, And lots of optimism that the costs can be brought down to be competitive with with oil from the Middle East. And we will, We'll wait and see. We'll have faith and science and faith and technology and hope it works.

AUDIENCE MEMBER QUESTION

Thank you for your remarks. I'm Lorraine Rost. I'm a UMKC undergraduate student in geography and communications. I'm very pleased, sir, that you mentioned in the body of your speech the need to encourage sharing and you conclude your remarks with the comment that you have not provided any roadmaps. This, to me, shows a real entrepreneurial spirit on your part. Are you then familiar with the rapidly emerging technology of geographic information systems or GIS and the , or not, I believe California University NSF funded research for sharing geographic information. They have a wonderful research outline. GIS is the great communicator that synthesizes research and puts the scientific knowledge on the map. So the second part of my question is, in order to communicate, we need to have the infrastructure. The national spatial data infrastructure is also rapidly emerging, but there's hang ups at the federal level. Do you see Missouri contributing as a national leader in terms of building up our telecommunications capacity? A couple of articles I read from the Kansas City Star indicates that Missouri is way behind the times, We have archaic telecommunications policy laws. What's your read on that, sir? Thank you.

BILL DANFORTH SPEAKING

Thank you. I would just like to pick up from the remarks I made, one thing I said, we should all admit that we don't know very much about the modern world. And I will admit right upfront. I've never heard of all those, those kind of things. It sounds wonderful. I appreciate your educating me. And I don't know

enough to have a opinion on whether these are, this is a good area, although there are advantages to, to Missouri joining or making this a priority. I just don't have an opinion on it. But I think that illustrates how important it is to listen to people, to keep learning and to, and to the fact that we have to trust and rely on others for our knowledge. So thank you for educating us. And I'm sorry I can't answer your questions.

BRADY DAYTON SPEAKING Thank you, thank you for sharing all of these every day. Let's get to Dr Danforth the big round of applause. Well, as our vice chancellor for research, Rob Duncan, said just a moment ago, this was an inspiring moment and certainly, I think, spoken by one of the angels of our society. Dr. Danforth, thank you for kicking off this conference for the kind of profound sense not only of the past, but of a future and the kind of principles that will enable us to be united as we move forward.