Michael: A number of years ago Nobel Prize winners, government leaders, heads of organizations, companies got together and came up with a list of what they thought were humanity's ten top problems for the next 50 years and luckily we have these business innovations that all three of these individuals have been involved with that have changed the world as we know it and maybe tonight we'll get some ideas about how we're going to solve some of those ten problems or are solving them already.

The first to join us this evening is Craig Venter. And Craig was born in Salt Lake. I was hoping to tell you that he's a little older than I am but that is not the truth. We were born in the same year, that unusual year 1946, the first of the Baby Boomers. And Craig was a swimmer who turned into a surfer who turned into a sailor. And you can read all of his background in your programs with getting much more detail. He founded in 1992 the Institute for Genomic Research which in turn he founded the Venter Institute today. He co-founded Synthetic Genomics, dedicated to modified microorganisms and focused on producing ethanol and hydrogen and other alternative fuels. Some of you, like myself, followed his exploits as he traveled the world in Sorcerer II, the 21st century's answer to Darwin's _____ and with that we're going to see a little short video on Craig.

VIDEO

Michael: Craig, in some ways the world knows more about you than any other person on the planet. Craig was the first person on the planet where we got to see in his entire human genome and why don't you let us know who number two was, Craig?

Craig: Jim Watson just published his genome just in the last week. So we now have two out there. We need another three billion or so.

Michael: Okay, well, we're going to go work on that. I think if we put back up that list of some of the challenges to humanity over the next 50 years and take a look at them, which ones would you like to talk about this evening?

Craig: After sequencing the human genome, my colleagues and I looked around at what we thought were the biggest problems facing humanity and decided if we can't do something about the environment, I said somewhat facetiously there's no point in trying to cure cancer. So I think the environmental issues actually determine the long-term future of humanity, possibly the survival of the species eventually. So I would certainly say the environment, energy. Water and food sort of go along with those as the big things that society has to produce as we go from 6.5 to 9 billion people.

Michael: So we've had 150 panels at the conference focused on many of these issues and many people are going to be very relaxed, Craig, knowing that you've taken three

or four of them on yourself here. Why don't you give us a little bit of insight into the concept of alternative energy that would affect the environment and some of the things you've been working on?

Craig: Well, one of the most important concepts is that we are in a society now that is 100 percent dependent on modern science. As we talked earlier that we're both born in 1946, there's now three people on the planet for every one of us that existed in 1946. Soon the projections say there'll be four people for every one of us. The human population has never expanded to this extent. So all the rules that we extrapolate from looking back don't apply to the future. So we have to come up with new sources of food, fuel and water to sustain human existence.

Also, we're now up to 4.2 billion tons of CO_2 being added and staying in the atmosphere each year. The number is growing more rapidly than anybody predicted. It looks like most of the carbon sinks, the CO_2 sinks on the planet have been saturated. And so we keep adding, we keep burning billions of gallons of oil, billions of tons of coal. That CO_2 all goes into the atmosphere. The only third major component is deforestation.

So those are the big three and they're all related to each other, trying to clear land to produce food and now fuel. So we're looking at biology. We're looking at what we can do with synthetic biology, making new species to come up with fuel alternatives to burning oil and coal. We have what we're calling a second, a third and a fourth generation fuel.

So if ethanol, corn to ethanol is this crazy experiment we're doing in this country that makes no sense to take food and convert it into ethanol as a fuel. We need, if we're going to have feedstocks we need to have feedstocks that don't compete with food in terms of the land usage or the same crops. So our second generation fuels are ones that fit in the existing infrastructure, again using sugar as a starting point but a variety of feedstocks feeding into that, jatropha, palm oil, a number of unique things that don't grow on a high yielding crop land.

Our third generation fuel is actually a neat fuel that is basically the component in gasoline that can be made from sugar. But the ultimate feedstock issue we think could be solved by starting with carbon dioxide. So part of what we discovered on the expedition is last year we published a paper with six million new genes in it, literally tens to hundreds of thousands of new species. And we view these as our design components of the future.

We now have 20 million genes in our database. So when you think of the start of the electronics revolution, there was a few dozen components: Resistors, transistors, capacitors. We have 20 million sets of tools in our toolset. That'll be a hundred million soon. We have new ways to fix carbon dioxide into proteins, into sugars. We have cells, obviously plants with photosynthesis take sunlight and fix

CO2 into sugars and into the plant protein. It's just not fast and efficient enough at the rate we're taking carbon out of the ground and burning it. The thing we can do with manipulating genomes is changing metabolism by a million-fold. So what a plant can do, we can multiply that by a million times.

Michael: Well, we're looking forward to the animal, to get back to it in a few minutes. Our second panelist tonight BusinessWeek called one of the greatest entrepreneurs of all time. As a high school student in East Pakistan, he ranked 16th among all the students in his area. He went and got his PhD from Vanderbilt. And in Bangladesh he deployed the best principles that any of us could have thought of, of free enterprise, loans, etcetera, to transform a country. And that transformation today has come to the United States with Grameen America. Muhammad Yunus won a Nobel Prize, Peace Prize in 2006. For all of us involved in finance and economics, it was a great day, the concept that finance actually can bring peace to the world. As we go back and look at some of those challenges of society and humanity over the next 50 years, at this conference we've been very focused on can we create financial instruments to incentive people to follow through on some of those areas, things like sulfur, the environment have addressed by these new climate exchanges to measure, to price out what the costs of these things are to the environment and have resulted particularly in the United States and other countries in a dramatic increase in the amount of sulfur dioxide going into the air.

But we have no better example to understand what finance can do than what Muhammad Yunus did and his leadership. Let's take a quick look at that.

VIDEO

Michael: Muhammad, obviously a large part of the world suffers from poverty today. Could you share your solution to eliminating poverty with us today?

Muhammad: The first solution is we have to believe that it's possible because unless we believe in it we'll never make it. We can create a world totally free from poverty and once we imagine that, half the work is done. Now it's a question of proceeding with that. We have been doing this work, the micro credit, Grameen Bank, giving tiny loans to the poor people, particularly poor women for the last 31 years now starting from one village, gradually building it up and now it's globally it's working. Experience shows that how easily people move out of poverty given the slightest opportunity created for them. Looking at them, you continuously come up with this conclusion: That poverty is not created by the poor people. There's nothing wrong with the poor people. They are the victims. Poverty is imposed on the people rather than poverty has created the people by themselves.

So something which is imposing them we have to go back there on the drawing board, which is creating those problems. One way we can say poverty is created by the system, everything that we do, the institution, the concepts, the policies, the

positions and so on. And one institution that we have struggled all along is the financial institution. It's amazing how financial institutions kind of reject such a large number of human beings on this planet, saying that they are not credit-worthy. And I've always been raising the question whether it should be the other way around. Instead of banking institutions telling people that they are not credit-worthy, whether the people should tell whether the banks are people-worthy.

And we started something. We just started giving loans, tiny loans to the poor people without collateral, without any lawyers and it works. People take these small loans, create income generating activities and move on with their lives.

Michael: Well, Muhammad, you know many years ago some people's definition of a bank was someone who would loan you money when you didn't need it and wouldn't loan you money when you needed it.

Muhammad: It's still the same way.

Michael: You've redefined that definition for us.

Muhammad: Well, today what we have done, just reversed it, what you said. The basic principle of banking is the more you have the more you can get. That's why you only say you don't need it because you already have it. We reversed that principle. We said the less you have the higher priority you get and if you have absolutely nothing, you get the highest priority. So that's how the whole Grameen Bank works.

We even lend money to the beggars. We started talking to the beggars, how they live, how they survive and tried to find out at what point in life they became beggars, what was the tipping point that society pushed them into such a position. And then we tell them that if you, as you go from house to house begging, would you like to carry something with you to sell like cookies, candies or little toys for the kids in the houses that you go. And the attraction is a simple thing was that you are going there anyway. You're not doing anything extra. So you just carry something with you. And they loved it. And we said we'd finance it, whatever you want to do. It became a very popular program in Grameen Bank.

Today, in 40 years, we introduced it 40 years back, more than 100,000 beggars are in this program. And they take a loan size about $10, $12, $15 and start selling things. Within four years more than 11,000 of them have stopped begging completely. They became successful door-to-door salespersons. And others, and the remaining 90,000, I would say they are part-time beggars. They are in the process of closing down their begging division. And after all, begging was their core business. It takes a little bit more time. So I said, "Don't rush them. They will figure it out." And it's amazing the way they respond to the situation. They will tell you which house is good for begging, which house is good for selling. I

said that is market segmentation. They know precisely which one. We don't train them, nothing.

And the entrepreneurial ability in human beings is amazing. You will not see it until you come close to them, start working with them, give them an excuse to open the can out(?). That is what is wrong in the whole system that we've built. We are not encouraging the wonderful gift that we all have inside of us. Many of us die without ever knowing what a gift that was because we never even peeked into that gift. Society never allowed us to peek into that gift. That's where it went wrong.

Sometimes I describe poor people with a bonsai tree. I said if you take the seed of the tallest tree in the forest and put it in the flower pot, it grows only this big. There's nothing wrong with the seed. Simply we've planted it in the wrong place. It's a very small base. I said poor people are bonsai people. There's nothing wrong with their seed. Simply society never allowed them the space to grow as tall as somebody else.

So we, Grameen Bank, with tiny little loans now people are coming out. They're opening them up. Their children are schooled. These are all illiterate people. The women are illiterate, men are illiterate but we encourage them to send their children to school. One hundred percent of the children of Grameen families are in school and we have 7.5 million borrowers. So it's not a small population.

Michael: Now, Muhammad, we have a number of people in this room who are having some difficulties in their financial institutions in getting their borrowers to pay them.

Muhammad: I know.

Michael: First, I think it might be interesting, as I understand it you have no legal contracts. Is that right?

Muhammad: We have no lawyers in our system. So legal contract doesn't exist.

Michael: Number two, you do not take collateral.

Muhammad: No collateral.

Michael: Okay. And number three, you have just a two to three percent default rate. Is that correct?

Muhammad: Hardly one percent, 98 percent, 99 percent repayment all the time. We've had no problem with that over 31 years.

Michael: Well, a lot of us would like to be depositors in your bank from that standpoint. Why don't we discuss for a moment who are your depositors?

Muhammad: Anybody can deposit but our borrowers are also depositors. We encourage. It's a part of our rule. It's a part of our system that when you join Grameen Bank you start out with a savings account. You put tiny little money, as tiny as you wish but you have to put some money every week. So everybody is putting tiny little money into their savings account.

It's amazing how this tiny little money grows so fast. Today we lend out over a billion dollars a year with loans averaging about $150. Sixty-seven percent of that money comes from the deposit of the borrowers. So it's a self-sufficient system.

Michael: Now we're going to come back and talk about this a little more but I want to let everyone know that the first Grameen American branch opened in September, 2007 in Queens. So if you want to get in with the program, let's get some deposits in there.

Muhammad: That's right.

Michael: Grameen America.

Muhammad: And they have 100 percent repayment.

Michael: It's not often that a brand name becomes part of our language and if we just think about it: Pass the Kleenex please; FedEx it; Xerox it; put Scotch tape on it; and lastly if you were coming to this panel and you wanted to know more about the panelists you could just say, "Google them." I knew some of my friends in the technology industries were in trouble when I went into one of our early childcare centers and we have 2,000 of them in America. And we have computers for the older kids, 5 and 6, and one of the kids turned to the other, wanted to know more information. He says, "It's easy. Just Google it." So at five they had penetrated a number of years ago. And so when you think about that opportunity and according to Fortune Magazine, for the last few years one of the most admired companies in the world but also the best company to work for, you would think that Eric Schmidt has an easy job.

As the CTO of Sun Microsystems and the former Chairman and CEO of Novell, he joined Google in 2001. Now some people say he has the hardest CEO job in the country. Now, there's ten reasons that Eric has given us to work for Google. So one, lend a helping hand. And life is beautiful in the others. But why is this described often as the hardest job in America? One, he actually does share authority with two highly very opinionated co-founders. Two, he's responsible for presenting the decision to investors and employees. The co-founders don't have that problem. Next, you're managing a company that is exploding with growth

and for all those of us in the room that have finance companies we know sometimes companies fail because they grow too fast.

He must maintain controlled chaos that helps foster creativity, enormous creativity fostering chaos. How do you manage a company? And even though some people might argue he doesn't have to, he has to do all of this while fighting competitors for market share. Let's take a look and learn a little bit about our next panelist.

VIDEO

Michael: Eric, a lot of people build small companies but growth changes them dramatically. I think we'd all appreciate it if you could describe the culture of Google to us and how do you sustain that culture as you've grown over time?

Eric: Well, thank you for that and it's certainly an honor to be here with such an incredible conference. We believe in scale. We believe in the power of information and we use it all ourselves. We believe in small teams and we believe in creativity of small teams. So the company is chaotic by design. Teams are constantly, constantly coming up with new ideas and we have a set of values that you were so kind to highlight, starting with don't be evil. And we debate and debate, "Is this a good idea? Will people like it?" And we organize around better search and making advertisers happy.

Michael: How did you come out with that idea of don't be evil?

Eric: Well, would you prefer to be evil?

Michael: No.

Eric: I mean it seems pretty simple. Seems like a simple organizing principle and I think…

Michael: Well, at Sun Microsystems was that an idea for the company?

Eric: They were more focused on their mission which was around…

Michael: And in Novell, did…?

Eric: Same thing. But in Google's case it's really a value and one way to think about don't be evil is my first year I thought the whole thing was a bunch of crap. So I come in and they're all young, right? And you're sitting around the table and an engineer, they're having a conversation and an engineer whose name is Ron says, "That's evil." And all of a sudden it was as if everyone had been accused of being criminals. Everyone jumped underneath the table. It was almost just like, "Oh my

God. There's a bomb in the room. It's evil." And it was as if you pulled a ripcord in a factory and it forced the conversation.

So what I learned about don't be evil is that since we don't yet have a book which defines exactly how technology can be evil or not, it provokes the conversation. It allows us to determine through consensus and through the way we do our decisions what we should do.

I have lived in certainly the last few years very much focused that the power of information is really the story of all of this. If I think about the incredible things that the three of you have accomplished, all of them have had the aspect of information and communication. And when I think about going forward, it's obvious to me that the rate of change in the internet is accelerating, it's not decelerating; that the technology that people are working on is going to give us even better opportunities to do the kinds of things that each of you are so famous and so extraordinary at. But even more importantly, the other billion people who have never had access to that information will now become part of our world. They'll be able to participate. They'll be able to take advantage of the things that we all saw as we were growing up, the great educations and so forth. And that's a great calling.

Michael: Eric, you've said ubiquity first, revenues later, a very interesting business model. I don't know how many people have ever financed companies with that concept at that time and if you build a sustainable eyeball(?) business, you can later find clever ways to monetize them. Now, to my knowledge that wasn't the strategy at Sun Microsystems, nor was that the strategy at Novell. How did that culture, how did that idea occur?

Eric: Well, we've always known that if we could build large audience businesses they've had value but we could never measure it. But you know that people are spending time with your information. There must be some way to get value out of that. It turns out that new techniques in advertising were the solution. And so we've taken the position and I guess we have the luxury now of we just focus about getting people to use our services. So if you love spreadsheets, we have a great one for you. If you love calendars, we have a great one for you. And ours are clever. They're interesting. They're new. They do things that you can never and you'd never think calendars are that exciting. Trust me. Our calendar is incredibly exciting because it interlinks with everything else, you and your family and your activities and so forth.

My point is that if we can get you engaged in Google we can ultimately find an opportunity to show you a targeted ad and targeted meaning about what you're currently doing and you're likely to click on it. Many people don't even see the ads because they realize that in most cases they don't need them. But when they need the ad, the right ad is there. So Google can be understood as a technological

achievement, our founders and the team that they assembled and also a new way of doing advertising.

Everyone here watches television. I suspect that you see a fair number of ads that don't apply to you, diapers ads in a household that has no baby in it, that sort of thing. Why don't they put a more targeted ad on the television? Why don't they show something that's more appropriate? If you buy cars, it shows you a car ad or that kind of stuff. The internet allows us to do very highly measurable businesses and Google is one of the companies but by no means the only one that has developed the ad networks and the technologies and that's really where the money comes from.

Michael: Craig, the world always wants solutions to problems faster. Obviously many people in this room, Dr. Von Eschenbach who's with us today and others who headed the National Cancer Institute and heads the FDA, have pledged to try to eliminate cancer as a cause of death and suffering in the next seven to eight years. But you took it to a reality. The government had a ten year head start with its program. They spent $3 billion before it was through out of maybe as much as five. And you decided you could do that in one to two years with a hundred million or so. How do you see us able to accelerate going forward? How can we build on what you did, whether it's for energy, the environment or dealing with our medical issues today?

Craig: I think a lot of science, particularly in this country, is done in a very parochial fashion, became very dependent on government funding and set up a system that funds the average, seldom that takes risk. So all the things that my team has had success at were all things started either with when I was with NIH at the interim(?) _____ program where you had the money to start with or we had the risk capital at the beginning to just go do the experiment. You can't do that the way science is done traditionally in this country unless you go outside the system. So it's private foundations such as yours, philanthropic individuals, the companies that have really become supportive of private research that are making the biggest changes. The government is way behind on the energy crisis. Here it is one of the biggest issues in national security and the money is a tiny fraction of simpler fields, trying to push the equation. It's all being driven by venture capitalists now and private money.

Michael: Craig, you've made a really interesting point here in that we've had all these things come together, the concept of defense, national defense, the concept of safety, of freedom, of the environment, all surrounding energy. And it's surprising that governments haven't played a more active role. But the lessons to be learned from what you've done in decoding the human genome is that private industry might be able to do it faster by taking the risk. What vehicles are you using going forward to achieve that?

Craig: Well, in fact, if there's not a financially viable solution for energy, there won't be a solution. We can have the best breakthrough in the lab and if it doesn't really work, if it doesn't undercut the cost of oil or coal or the damage that's been done, dependent in part of what price we put on carbon, there won't be a solution. But most people have…

Michael: Craig, I'm checking your background here at UCSD and Arizona State. It sounds like you've spent some time at the University of Chicago there with your free enterprise discussions.

Craig: Well, that's just from watching things over my lifetime of what works and what doesn't. My scientific colleagues come up with some phenomenal science but very little of it actually changes the world. We can see with Muhammad's work how one simple idea can change the world. That doesn't get applied to science.

Michael: What do you think the pace is to solve this issue of energy, environment?

Craig: I think with the capital that's going into it and some of the ideas, three years ago when we proposed trying to use biology to solve the energy crisis, nobody even wanted to listen. Now there's probably 50 to 100 companies getting formed a year with people now bringing out ideas. It's just it's a way of changing thinking. Just like Muhammad said, you change how you think and approach the problem. All of a sudden it's doable. It's not that it took us only nine months to sequence the human genome. Why in the hell was there a 15 year multi-billion dollar program to do it in the first place? Why wasn't there innovation?

Michael: Craig, did you read the book, The Voyage of the Beagle?

Craig: It was required reading by any decent scientist out there.

Michael: Now, when you decided to take the Sorcerer II out, 100 feet long, I guess you had a crew of about 12 when you crossed the ocean. What were your objectives on that voyage?

Craig: Well, it all started with a simple experiment of knowing here we are, we're looking at the genetic code. We knew the environment was important. There was no way to measure what was in the environment. Most people assume there were very little life in the ocean. It's in part because scientists were using hundred year old technology that Pasteur developed. We just took DNA sequencing to the ocean, filtered some sea water and discovered 40,000 new species in a barrel of water. It's life that nobody even knew. So now any child can take a cup of water and make more discoveries than scientists in the past 50 years. I mean it's really remarkable. And so we're just now able to see further. Darwin had no idea these organisms existed because he couldn't see them. It's beyond our visual limits. But now we can use these new tools of DNA sequencing and we're making these

discoveries that are giving us the tools to change biology, to produce food, clean water and energy. We have biological fuel cells that _____ will see in our institute developed that convert human waste into fresh drinking water or into liquid. These are tools that could change developing worlds very dramatically and it's the agricultural countries, the deserts near the sea that are going to be the winners going forward. They'll be the future OPECs as we capture energy from the sun, grow organisms in salt water, produce drinking water, produce food and fuel. The whole economy will change based on getting off of oil and coal.

Michael: Speaking of another technology, many of the people in the room, Muhammad, were involved with the financing of the cellular telephone industry. And we thought of a lot of reasons why you needed a cell phone. One was family peace. So if you're late coming home you can start to talk your way in, a half hour out, etcetera. Get all the things taken care of.

Muhammad: I didn't think about that.

Michael: But for me, telephone has found another use that we never thought about. Why don't we talk a little bit about that?

Muhammad: That's right. I'm a great fan of information technology. As soon as it came to an explosive state I got totally mesmerized that this is going to change the whole world and particularly it will change the life of the poor people if we know how to bring the information technology for the use of the poor people. Today information technology comes for the use of the people at the top, not for the bottom. So we need to use it for the bottom. So one opportunity came and we applied for a license for a cell phone in Bangladesh. Government was giving licenses and we got it. Our idea is to bring…

Michael: What did it cost you to get that license?

Muhammad: Well, it didn't cost anything. So that was -- you hit it right. But we were lucky. It didn't cost us anything. So we got the license and our aim is to bring the information technology, the cell phone into the villages and then give loans to the poor woman to buy herself a cell phone and start a business of selling the service of a cell phone. So a cell phone became a big business. And everybody says, "It's a crazy idea. This woman never saw a cell phone or any telephone of any kind and you are giving her a telephone?" And we did. And it worked. And it became a roaring business for women in the village by selling the service of a phone. Today Grameen phone became a very successful company but there was a catch to it. There's no electricity in the country. Seventy percent of the people of Bangladesh -- Bangladesh has 150 million people. Seventy percent of them have no access to electricity. So we brought the solar panel, plugged it into the cell phone and made use. And we created a solar company to bring solar home system to bring light, to bring entertainment. And we saw how readily people took it. We crossed 100,000

solar home systems last year and we are moving to the million solar home systems very soon. And the catch is and every time I say if we could reduce the cost of the solar panel from $3 to watt to $1.50 per watt, if the technology would make that happen, I think I can guarantee that every home in Bangladesh will have a solar home system.

Michael: That's fantastic.

Muhammad: And no subsidy is involved. People are just buying because it makes sense. With $100 plus oil price, kerosene and everything went up. We are just bringing it down so that people find it easy to have -- and we have plenty of sunshine. There's no problem.

Michael: It is estimated by one of our other panelists, Nobel Prize winner Steven Choo(?), that we are only using about eight percent of the sun's energy that hits earth and it looks like you're going to be able to deploy a lot more of that at this time.

Eric, one of the things that we've spoken about here is speed and time to market. And Craig has redefined speed. Now, you're strategically patient I understand. In fact, you gave a talk where you said it might take 300 years to achieve the mission of organizing the world's information. Now do you see a problem with Wall Street expecting to read 1,200 quarterly reports from Google before you accomplish that mission?

Eric: As you know, the fundamental goal of a corporation is to change the world. It's not to solve any one particular problem, shareholders, employees or even customers. We've taken the position and we have organized our company with dual class in such a way that we can achieve this, that we're not as sensitive to the issues at Wall Street. And because we have a good financial model, we don't need financing and so forth very much. So we have a luxury that many other companies don't. We can take the long-term. If I told you for example that there is -- in every minute there is ten hours of YouTube video being uploaded, what are they watching is beyond me. If I told you that in the year 2019 it'll be possible to have an iPod-like device that has 85 hours of video which means that you won't be able to watch it if you start as a baby until your death all the stuff that's on this iPod. It's a very frustrating device.

I don't think that we really understand the compounding that we're going to see but that ultimately it will be possible using computers to help us to really get to real understanding and really have computers work for us in some amazing ways. When I look at what Dr. Yunus has done, he truly is one of the saints of the world. He's actually moving to billions of people being able to get information literally on the spot for everything they do, whether it's dynamic markets for rice or where they should sell the fish that they've caught or developing markets. So you can imagine and be very optimistic that this model that we're one of the

companies doing it, it will take a while but that the intrinsic creativity of people worldwide when expressed is something that we've never seen.

Michael: Eric, if we take that a little further, is this increasing technology and interconnected that it provides people, a woman with a cell phone to find out that the person manufacturing fabric is charging her too much for the fabric she's using by checking prices in the city, is this the most powerful tool we've also had to address social problems? In fact, is it more so maybe than public policy?

Eric: Well, you're talking mobile phones or technology in general?

Michael: I'm talking about access via the internet and this technology.

Eric: I think it's an open question. I think it's a question for people at this conference to debate. I have my own view that information is power but that each of the sort of - - if you think of there are four major societies evolving now. You have Europe, you have the United States, you have China and India and associated countries. Each of them is different. I made a list. Europe: Educated, thoughtful, rule of law, empowering. U.S.: Innovative, creative, surprising individualists. China: Mono-cultural, chaotic, controlling, confronting individual truths. India: Following, accelerating, merging of cultures.

Each of those is a different societal experiment which is now encountering this influx of information and I don't think I know which of those is going to become the dominant or will they all rise or does one fail based on all this new information? But what I do believe is that the way in which information is used in those cultures will determine how successful they are. Will it ultimately be used to reward great behavior, to enforce the wonderful aspects of those societies? Or will it play to the worst parts of society? Will it be misused, the terrorist example and so forth.

Michael: Craig, when we think about the power of computing and data storage today, we can only dream of what it might be in the future. But we do know when Jonathan Simons, when I first met him, who today is the CEO of the Prostate Cancer Foundation, what he could accomplish in one day's work of decoding the human genome in 1993 a $5,000 machine today could do six million times the output. Is technology at the level that you believe you can use it to solve problems today? The cost of decoding your human genome today was…?

Craig: It's about $1.5 million to do a complete deployed genome today.

Michael: To compare that, Monsanto in 1974 estimated it would cost them $150 million to decode one gene. So we've gone from that. What do you think the cost would be for us to decode everyone's genome per person? Where is that headed?

Craig: Eric and I are both part of the X Prize Foundation where they have a $10 million prize for whoever gets the technology to do roughly a $1,000 genome. I expect we'll be writing that check sometime in the next five years.

Eric: Really? Oh, I'm in trouble now. That's good news I guess.

Craig: Eric will be writing the check. But it's changing very rapidly. But it's key timing to do this because what we need as we talked is not my genome and Jim Watson's. That's proves it can be done and shows the information is important to get.

                We need at least 10,000 genomes and all the associated phenotypic information. Imagine all the information it would take to describe your life physically, mentally, that we're trying to understand the genetic links and the environmental links. If we have 10,000 that's a starting point for answering every fundamental question about what's nature and what's nurture. That's the way we're going to solve disease. That's the way prostate cancer and all these other cancers are really going to begin to be sorted out because we have it's like the problem, the information that Eric's talked about. With six billion letters in our genetic code, 23,000 genes and these working combinations in our hundred trillion cells we need large datasets and we need to be able to attack them computationally. One lab at a time looking at one gene at a time is not going to solve disease. We've been lucky thus far with that that there's been progress at that level but the major diseases and issues facing humanity won't ever reach any degree of conclusion or satisfaction unless we tackle some really big problems.

Michael: Muhammad, the Nobel Peace Prize, not the Nobel Prize in Economics, it gives many of us who believe in capitalism and democracy hope that capitalism and democracy are a road to peace. How did you see winning that prize in peace versus economics?

Muhammad: Well, one issue that I have been always focusing on, that poverty is a threat to peace. If you leave it behind this will become the thriving ground for all kinds of violence, all kinds of disorder you can think of. Because after all, violence and terrorism, all these things come from some kind of an extreme sense of injustice. This may be economical injustice. It may be political injustice. It may be social injustice. Poverty is an economic injustice right there. So if you leave it behind, people will be extremely, extremely against the system that created that. And it's very easy to recruit a very hostile person giving him food or giving her food to fight for a cause, whatever the size(?). Give him a gun and he will _____. So this is what I always _____ improvement or the elimination of poverty is an enhancement of peace. So this is the connection that we see. And for capitalism, what I have been saying that it's a wonderful idea. It works so well but it's not complete because somehow the concept of business is such a narrow concept, because the concept of business is to make money. That's what the maximization

of profit, that's what the business is all about. And that puts the interpretation of human being as a very narrow sense, a very limited sense is that one dimensional being. Human beings are not one dimensional beings. They are multi-dimensional beings. They want to enjoy things, do things in a multi-various way. But the business world cannot capture it. So we have to go out of the business world, become philanthropists, become a charitable person and so on. I said, "No, we can accommodate it within the business world itself if we create another kind of business, business to do good." Nothing for me but everything for others.

That's a new set of business. We call it a social business. We can create such social business and address many of the problems that we are leaving behind. Nobody is addressing them. For example there are many diseases with vaccines that are already developed but nobody produces it because the profit maximizing companies don't find it attractive. But people die. And there are -- these diseases are known as orphan diseases. Nobody will touch it. And there are many problems which can be solved but never get solved.

For example, water problems, problem of in Bangladesh we the sufferers of this climactic change and all the things that is happening, sea level rise and all the pressure that's coming to our land. We are the first front line of the victims of climactic change. Along with this, something is happening with our water. Is our city contaminated? So nobody's paying attention to it. We can feed social business. Actually we have done the social business already with Veolia which is a large water company. It's a joint venture where Veolia will not take any profit out of it and Grameen will not take any profit out of it but we want to deliver good quality water for everybody in the village at an affordable price so that nobody's rejected from the system. This is a social business.

So we can create for -- healthcare could be one area of social business because poor people no matter where they live, whether they live in the United States or live in Bangladesh or any other country, are deprived from the good, quality healthcare services. So we can create those services which nobody does.

Michael: So Muhammad, we've talked a little bit about cell phones and solar in solving that issue. We've talked about access to small amounts of capital to bring dignity, particularly to the women of Bangladesh. How about the children of Bangladesh and their health?

Muhammad: So we again addressed this issue with a social business to begin with because it is a broad issue. Millions of malnourished children in Bangladesh because of the poverty related reasons. So what we did, we have a joint venture with Dannon, which is again a milk company and yogurt company in France. We have a joint venture as a social business. What we are doing, we are producing yogurt in the villages of Bangladesh. We picked up all the micronutrients which are missing in these malnourished children and put it in the yogurt and made it so cheap so that

even the poorest child can afford to eat it. And if a child eats two cups of yogurt each week over a period of 18 months, he regains all these micronutrients which is missed in his life. So he regains his health. Regaining health means now he is not the target of other diseases because malnourished child always attracts other diseases quickly. He becomes sick, cannot work the way he should.

So this is another example. We can address those issues which again nobody is addressing, neither the government is addressing nor is the private sector addressing or the profit making companies are addressing. So we can do that.

Michael: Creativity is phenomenal on the problems it can address, Muhammad and you've been so successful in that area. Eric, one of the last areas I just wanted to maybe touch base with you, with the group tonight is for many people in the audience, maybe a quarter, they spend a great deal of their career in the field of finance. When I was a student at Berkeley, I was able to access data free, which allowed me to test theories on my punch cards at the time in a 360. But one of the problems in medicine has been lack of access to information and data for whether they're undergrads or grads or PhD students and the ability to access information that could be useful. In Megatrends, John Nesbit wrote about almost 25 years ago that there's a lot out there. There's a lot of information but how do we turn that into knowledge and much of what you've done at Google, whether it's maps or others, holds that opportunity. How do you see what you're doing to be used in the field of medicine, medical information, DNA and other things that are coming down the pike?

Eric: Craig, of course, is modest about this. One of the things he invented was a new way of building computer software that actually helped him do the DNA work. Sometimes the invention and computing also goes with the scientist and the research. And I think the same will be true in health. We know today that there are large databases that we can index if people want to give it to us. And it's relatively easy to do that. We are also working hard to develop personal health records so that people can have their own health record and that data suppliers will give that information to the person and then they themselves can develop their own medical record and then they can carry that with them. If they go to doctor to doctor, the doctor can work on them. So once again, now we have the data sets and we have the personal health records, the x-ray scans and that sort of stuff. Then the next thing is to build software that interconnects the two, that says these new patterns have emerged. Think of this as disease tracking, evidence(?) tracking on a scale that's never been done before.

The technology is there. Computers are still under Moore's Law, doubling every 18 months in performance. Disk drives are improving by a factor of two every year. So for the next ten years, we have the capacity, we have the computing coming as this network gets built and a generation of people inspired by, for

example, somebody like Craig who will sit there and say, "What can I now discover? What's this new insight?" And that will be used for health.

Michael: That sounds great. I'm looking forward to using it myself.

Eric: Me too.

Michael: Craig and last, we have a couple minutes to go, what would you see as the best thing that you could achieve between now and the next global conference and what resources do you need to do to help you move along that path?

Craig: Well, there's two areas but I think if more importantly right now we can improve the concept that we have ways economically and scientifically to wean ourselves off of oil and coal I can't think of a better contribution to humanity just taking that thought then having other people help provide the thousands of solutions that we need. On the human genome side…

Michael: What do you need to help you achieve that?

Craig: Well, it's a complex area that we have a government that's doing subsidies of corn to go to ethanol. I would rather have no regulation than have stupid regulations. We do ultimately need a price placed on carbon to help everybody get weaned off of it. But I think these technologies are powerful enough we don't need government subsidies.

Michael: How much financial capital do you think you need to move the ball?

Craig: Synthetic Genomics is trying to raise about $200 million right now to take it through pilot plans and profitability. So on the scale of the human genome it's not much. But I think on the scale of what can be done, these are new tools that I think will forever change as we talk to particularly developing countries. Most of Synthetic Genomics' investors are from outside the U.S., most from the developing world because they see these technologies as transforming not just the environment but their entire economies.

Michael: And your number two?

Craig: Well and then on the human genome side we have to really start scaling up this experiment so that you can go to Google and get information, have your genome and compare it to tens of thousands to millions of others. So the government's not going in the right direction there. We need institutions like the Venter Institute to -- we're trying to push forward to do 10,000 genomes over this decade with all the associated phenotypic information. That's only going to happen with private funding. It's not going to happen with government funding.

Michael: Muhammad, you've come to America with Grameen Bank and others. What do you see yourself able to accomplish in America in the next year or so?

Muhammad: Well, first of all we wanted to demonstrate in New York, because New York is the hub of the world banking. New York does banking over the whole world. And now we are trying to kind of demonstrate that although it does banking for the whole world but it doesn't do banking with the neighbors.

Michael: You might not be familiar with the song, but if I can make it here in New York, I can make it anywhere.

Muhammad: So this what this is. If we can do it, it'll be drawing attention like it's drawing your attention so that people become aware it can be done. It's nothing funny, nothing fancy. It's a very doable proposition. So it just spreads because if it spreads here it will spread the whole world because if Americans accept it that yes, we need it, we can use it, the whole world will say of course we need it so everybody will get busy with doing that. So this is one thing I would like to accomplish. And the second thing is about the social business, like we did some social businesses already in place and I hope because of this conference all the people listening to this discussion come forward with, "I would like to participate in a social business. How can I start a social business? Let's design a social business. Let's get _____."

Michael: You are a living example that doing good is good business.

Muhammad: Thank you.

Michael: So Eric, I'm going to ask you a different question. You don't have much time to relax. What do you do to relax? It's often said we think sometimes of our best ideas when we're not at work, whether it's in the shower or whatever it might be. Do you get them when you're flying? Do you get them when you're looking at art? I know two things you enjoy doing. Where do you get…?

Eric: Unfortunately I fly the airplane so it's better if I'm not daydreaming. One of the interesting problems with this information economy that we've built is we've created devices that are so addictive we have no time for contemplation. So one of the negative things that's happening is people are taking -- have less time to read books, the kind of deep thinking that goes on when you think, whether it's fiction or non-fiction. They're so rushed. So what I try to do is at least have a little bit of time, typically on the weekends, to actually have some thoughts as opposed to just rushing from point to point.

               What I was thinking about is I think about the idea that you would end up with the largest set of solar houses by virtue of your Bangladesh work. That is a phenomenal idea. I think about the DNA idea, the million sets of DNA cross-

correlated to an individual to give better disease prediction. These are ideas that are ideas that truly can change the world. Well, somebody has to have them. We're fortunate to have two people that have done so. You of course invented a large set of financial instruments with a sort of similar stroke of brilliance. That brilliance just occurs and when it occurs it's important to respect it.

Innovation occurs and we try at Google to manage it to the degree one can manage innovation. It occurs randomly. It just occurred on Thursday. We try to spot it. We try to protect it. We try to nurture it. And I believe that if we look at the environment issues, if we look at the poverty issues we're creating platforms for innovation, my term, not a term that others use in those industries. But those platforms, the ideas are now coming. They're germinating. And by the way, they're coming because there's bright people everywhere and they have Thursdays and Fridays and Saturdays to have clever ideas.

So to me the message for all of us is to spend every day, since I'm not smart enough to have those ideas, look for somebody else who has them, befriend them -- and by the way, they're often very young which is a little scary -- hang out with them and make sure that they're successful, make sure that they achieve their vision and you'll do great if you hang on with them.

Michael: Well, I want to thank all three of our panelists today.

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