

**2013 THE "BORLAUG DIALOGUE"**

October 17, 2013 - 2:45 p.m.

Panel: *Thad Simons, Moderator*

*PANEL:*

**DIALOGUENEXT (PART 2): BEYOND THE BIG IDEA**

*Introduction:*

**Bian Li**

Director of Planning - The World Food Prize Foundation

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Now to close out the day, it's quite appropriate that we come full circle. This morning we started the day with a youth-based session, DialogueNext, Part 1. And we say DialogueNext, it really means cultivating the conversation to the next generation. And I see so many young people on this stage. How many people are students here? Raise your hands. Wow! Look at all those young, bright and shiny faces. Let's give a hand to the young people in the room. Thank you for being here.

At this time we're going to come full circle. Thad Simons is going to moderate our DialogueNext, Part 2, Beyond the Big Idea. I'd like our final session to please take the stage. This session is called, "Beyond the Big Idea," looking at innovating not just the next generation of talent but the next generation of technologies, applications and solutions to end hunger.

Now, everyone knows Thad from this morning, and he not only is President and CEO of Novus International, but he also the president of the International Food and Agribusiness Management Association, dedicated to cultivating talent in the next generation of agricultural leadership. And without further ado, I would like to invite Thad to come upstage and introduction our distinguished panel of the next generation of young leaders. Thank you very much.

*PANEL:*

## **DIALOGUENEXT (PART 2): BEYOND THE BIG IDEA**

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*Panel Moderator:*

**Thad Simons**

President & CEO, Novus International

*Panel Members:*

**Matt Burkhart**

Vice President and General Manager, Applied Technology Division,  
Raven Industries

**Peter Frykman**

Founder and CEO, Driptech

**Charity Mutegi**

Kenya Country Coordinator for the Aflasafe Project, International Institute  
of Tropical Agriculture (IITA)

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**Thad Simons**

Thank you. So, since we've lost a little time, I'm not going to take too much time myself. I'm so privileged to be here at the end of the day, as we started out the day. And as Bian said, it's really talking about those young entrepreneurs that are out there making a difference in the world and don't find any limits really, they just find opportunities. So I want to very quickly introduce them and let them do the talking.

So Matt Burkhart, Vice President and General Manager, Applied Technology Division, Raven Industry, and he leads the Company's mission to help farmers feed the world through design and manufacture of innovative precision agricultural systems. So we'll hear a bit more about that.

Peter Frykman, Founder and CEO of Driptech. Driptech is focused on increasing the profitability of small-plot farming. And Driptech's award-winning, low-cost drip irrigation has been installed on over 12,000 acres worldwide.

And Charity Mutegi, so she was a big winner last night. I think she deserves another round of applause. So as you know, she's working at the Kenya Country Coordinator for the Aflasafe Project, International Institute of Tropical Agriculture, and is an area that certainly is very close to Novus' interests as well as we're looking to support the livestock industry, and aflatoxin is one of the biggest issues we have in terms of being able to do that.

## PANEL DISCUSSION

Thad Simons            So we're going to run right into some questions here for the panelists. I'll invite you all to say something. Keep it brief – we have little time, and we'll try and see how much we can cover. So one of the issues we just heard in several of the panels today was the need for R&D and working between the private sector, the government NGOs, academic institutions. How can this really be implemented into the field? Where do you see it really happening in the field that all these different kinds of constituencies, which really have quite different approaches to solving problems, can work together? Start right here.

Peter Frykman        I'd say, just in terms of my own experience with Driptech, obviously I got my start in an academic institution. I had opportunities, as Howard Buffett talked about a little bit this morning, opportunities to expand my horizons and travel abroad through my academic experience. And in fact the research that led to the founding of Driptech happened while I was a graduate student; then obviously informing the company, the private sector, I'd see, obviously plays a role in development and commercialization. We work with NGOs as distribution partners. And we had the opportunity basically to counteract market failures with market development activities. And then finally we have just received a USAID grant to do further technology development and commercialization. So I see really a role for all four of those.

Thad Simons            So, Matt, how do you see that value chain coming together?

Matt Burkhart        I first of all want to thank Ambassador Quinn and the World Food Prize organization for inviting us to this great event, wonderful event, that's been going on here. It's an honor to ask Raven to be a part of this panel with Thad, Peter and Charity; so it's a pleasure to be here.

In regards to your question, I think you've heard a very common theme throughout the day today, which is the theme of partnering. And that partnering requires all stakeholders involved in order to be successful. From smallholder farmers to family farms to large farms to local state, federal agencies, to foundations, activist groups – everybody needs to be involved, and it needs to be a very healthy relationship and a very respectful relationship between all those partners in order to be successful.

You heard a lot this morning, what makes it successful – alignment of strategies. What a great alignment of strategies here this week on one, common cause to help feed the world. So that is essential to have an alignment of strategies.

But it can't be a top-down approach. I think it's very critical to also honor and work alongside the local practices and traditions that are prevalent

throughout the world. Raven Industries, we sell our products in the 52 different countries around the world. In order to be successful, we have to work alongside those local traditions, those local practices – many have been in existence for hundreds of years – to learn how they do their business and to tailor our products to make sure we’re successful in having them adopt our products going forward. So it can’t be a top-down approach.

I think Howard Buffett made a great comment this morning about predictability. We must have a predictable environment in that local area in order to entice research dollars to enter and also to entice private businesses to invest and businesses like ours to make products that are tailored to that area. I’ll give you a couple examples, both large and small.

One, Peter mentioned the USAID programs, so congratulations on your investment there, I think a great example of program and collaboration that’s working well to invest in technologies. I think the Alliance for a Green Revolution in Africa is also a great example. Or AGRA – AGRA is an African-led, dynamic alliance to help end poverty and hunger in Africa while doing it sustainably. So I think those are a couple of good examples on the public-private partnership, and they’re really tackling the big things – investments in seeds and research in seeds, soils, markets and policy.

On a smaller scale, I think university public partner relationships are important. You mentioned you started your business in a university setting, which is great to see. And, for example, Raven Industries, we’ve established locations, physical presences on or near the campuses of universities to have interaction. We have one university here with us today, which is renowned land grant university, South Dakota State University, is here with President Chicoine and Barry Dunn and Kevin Kephart are in the room with us here today. So we’ve found success in establishing locations on those campuses where we conduct our normal product commercialization. And then we have access to great students. Internship programs are constantly changing throughout our business. Students get access to see how we make products, and we get access to great students and eventual employees, and also access to great faculty, which leads to greater research. And it’s just a win-win relationship and success on both sides.

One last way we partner is on a more private to private sector partnership. But as we enter countries, what we’ve found successful as we’ve entered those 52 countries around the world, is to partner with a local business. And we distribute our products for the most part through dealerships, aftermarket dealerships. And it’s very successful to work with those dealerships, to understand their local practices, and that’s a great conduit into the local business and farming community. And I think

if you take Africa, for example, the agrodealers – I think there’s over 21,000 agrodealers in Africa – and I believe that’s a great conduit to get into the country.

So those are a couple of large and small examples of successful partnerships.

Thad Simons

Thanks, Matt. Charity, last night you were telling us some of the challenges you had in working with government – sometimes you’d maybe be against government – and really how you had to change a whole mindset over time. So what’s your experience really on the ground in terms of the same question? How do you work with NGOs, government and private industry to actually effectuate the change that you’ve been able to do?

Charity Mutegi

Thank you. I think what has been resonating and what I think should be is synergy between the different players, and that is making use of agricultural innovative systems. These are things that I’ve seen have actually worked – we’re not experimenting. And a couple of examples have been given here, and I’d like to give one example, because we’re talking about small-scale farmers here.

Sorghum, as many of you would know it, is what we call an “often crop” in Kenya. That means you cannot even get seed, improved seeds in agrodealer shops. And there is a brewing industry that requires sorghum for manufacturing beer. So, taking advantage of an innovative system like the value chain approach, small-scale farmers have been able to link with what we call “smart logistics,” who actually consolidate the sorghum for the farmers and then take it over to East African breweries who need it for making beer. So the farmer is able to benefit because there’s a ready market for the products, and ultimately he’s able to improve his income because he’s got a market for his product. But also these African breweries is more to get the product that they need because it has been consolidated. So that kind of approach works very well.

And back home on our biotechnology, we have applied the same approach. USDA, IITA, the International Institute of Tropical Agriculture, are the ones developing the technology. But we are not commercial players. And as I give the example, it is a partnership that I call “the winning team” that is enabling us to get this technology to the farmers. We have brought on board the African Agricultural Technology Foundation, and they’re very essential on regulatory affairs. And in countries like Nigeria where the product is now ready, they’ve also engaged private partners, Doreo Partners that are looking for markets for the premium product, that is, aflatoxin-free maize for a markets that need that. So that approach works best.

Thad Simons

So we're talking about technology, and of course we've heard a lot about biotechnology at this conference, and we're celebrating that. But what are the other technologies that are really going to change the nature of agriculture in Africa coming in the next ten, fifteen years? Matt, I'll let you go first this time.

Matt Burkhardt

Thank you. I think one other common theme we heard throughout the day is knowledge and the importance of education. And I think one of the most powerful educational tools that we all use on a daily basis, and some of you are probably looking at them right now, is the Internet. And I think global, ubiquitous and affordable Internet access is a first step towards transformation in many parts of the world.

And I applaud companies like Google who are embarking on these great challenges. They recently released a project called Project Loon where they're working on bringing global Internet access to the world via ballooning technologies that are made by Raven Industries. So let me just tell you real quick how it works.

So we hoist up their telecommunications equipment with our near stratospheric balloons or balloons that are up near the stratosphere. And they'll float, and then we either add or reduce pressure to have the balloons go up or down, and they catch a different windstream and they float back. So I'm simplifying the process, but that provides coverage to the ground in an affordable and ubiquitous manner, hopefully, throughout the globe. So that's their newest moon-shot release challenge from their Google X platform. So I think that's one of the biggest advances that will be made. Because it's not just that there is not Internet access in the world, which they claim there's two out of three people in the world who do not currently have access.

We have focus groups throughout the year, and we had some very high-tech, large farmers into our business, and we asked them, "What's the biggest transformation that's happened in agriculture?" And every one of them reached into their pocket and pulled out their phone. Because once you're connected and have connectivity, now you can have access to some of the challenges that we talked about this morning – access to markets, market information, pricing, weather information, those sorts of things. So that's a first key step that will be a large transformation.

As for technology products, there will be a myriad of new products that will come on the market over the next five or ten years. Raven Industries has produced variable rate technologies for many years. We're able to variable rate the application of fertilizers, chemicals and fertilizers throughout the season. We also can variable rate planting, so you can vary the rate of your planter in more fertile parts of the field at a higher population and less fertile parts of the field lower the population to maximize the effectiveness of your plants throughout the field.

And now we've just released the first commercially available multi-hybrid planter controlled system to the marketplace this year. So now you can switch hybrids on the fly to even get more benefit, so you can have a more offensive hybrid that's planted in that fertile part of the field and a defensive hybrid planted in the less fertile parts of the field. So that's one example.

I think autonomous vehicles are going to be coming in the next ten years. A lot of work is being done on autonomy right now, and I think autonomous vehicles, I don't think will be mainstream in ten years, but I think will be certainly pervasive throughout agriculture.

Thad Simons Will they be adopted in Africa, these kind of mechanization technologies?

Matt Burkhardt I think in a complementary manner will be the first phase of autonomy. And I think I'll take U.S., and then I'll answer your question on Africa. Complementary fashion, meaning there will still be somebody in charge, maybe a leader/follower situation, or maybe complementary practices in the field, if it's a grain cart going to and from a combine to a semi. So I think that's the first step in autonomy, will be more complementary.

Then I believe there's a lot of research going on in smaller size autonomy vehicles, robotics, micronutrient applications, things like that. And I think those types of applications can be applied, whether it's a large operation or a very small one- or two-acre plot. So when you get to a smaller robotic micronutrient application type, I think those are eventually applicable to those parts.

Thad Simons Are you able to use any of these kinds of approaches, especially the ICT mobile phone in actually getting the message out to your farmers? How do you get aflatoxin awareness into, across your country and to the farmers?

Charity Mutegi Let me start by saying that, due to the increasing use of the innovative systems to look at the agricultural problem, a lot of people within the value chain are becoming very much aware of what is required. And I believe the kind of advances we are going to see coming is going to be in a couple of areas. It's not going to be a silver bullet, one approach. Plant disease, drought issues are a big thing, postharvest losses, information dissemination. So I mean I see a couple of technologies happening at the same time to address those issues.

However, the pace at which this is going to happen is going to depend on whether there is existing infrastructure. And you bring in a very important point. Why is communication picked up, unlike other technologies? It's because, fortunately, so far the government has at least put infrastructure for ICT to peak. In fact, in some of the countries in Africa, we almost believe that the use of mobile telephony is matched

some of the countries in Europe. I mean, you can get mobile telephony to the most rural farmer throughout many parts in Kenya. And that is why information dissemination has become very good, and the person who has benefited is the smallholder farmer. And in that case, we've been able to use that to get other inputs to the farmer, not necessarily for creating awareness. But, for example, if a farmer wants to know what variety to grow, what is the problem with my crop, that, for example, have been able to capitalize and use that to get to the farmer.

However, beyond that, M-Pesa, which is a financing service that was actually developed by a youth, a young person, is now being used for farmers to be able to access financial services, people who have not been able to get the same kind of service because they do not have enough money to open a bank or there is no banking facility near where they are. But as you said, we haven't yet used that for raising awareness on aflatoxin, but I think it's something that should be exploited; because farmers can send short messaging services to get information about aflatoxin, which is very pertinent to almost every Kenyan.

Thad Simons So, Peter, you're about precision agriculture, so how is this all resonating with you? It seems like mechanization, but how do we actually reach to the farmers and get it to the level... Farmers that aren't today using hybrid seeds, how do we actually get to that next point?

Peter Frykman Well, I think when we think about technology, we think about a lot of things that Matt and Charity have been talking about in terms of new technologies, of course mobile technologies for disseminating knowledge. The thing that is most important or the thing that I think is most important about this is that, as these new technologies that we can anticipate and those that we can't anticipate are developed, those are going to change what is possible at the farm level as well as in the distribution channel. So it makes new business models and new models for impact possible.

So an example of this is that almost all of the distribution partners that we work with for our affordable drip irrigation have never distributed drip irrigation before. These are aggregators, contract farming organizations, ag inputs companies, NGOs, governments. And 30 years ago they decided that drip irrigation and other technologies were too complex and expensive to distribute, until we made it possible for them.

So I think it's important that we understand also when technologies become available and when they become appropriate and affordable, that that can also really change the business models in the entire ecosystem.

Thad Simons So the three of you, how would you put together a plan of action to, I guess I'll ask the two of you, to support Charity there in dealing with the postharvest losses in Kenya, to deal with getting the hybrid seed



production going. So you two talk with her right now in front of us and put together the plan.

Mark Burkhart

Well, the first step is we need to understand the customer. So I take a very engineering and product design approach to this. So I think it's not necessarily about applying technologies as much as it is about designing new products and technologies specifically for the needs of the intended user. So first step would be we'd have to understand the customers, the farmers; we'd have to go spend some time in the field, we'd have to really appreciate what their needs are, both voiced and unvoiced needs.

But assuming that Charity can kind of tell us what the needs are, then we can sort of...

Thad Simons

I think she knows. I think she's very aware what farmers' needs are.

Matt Burkart

Well, I think she hit on some great things earlier about connectivity, and Africa is pretty advanced in connectivity platform. And I think to help prevent aflatoxins and the challenges there and the postharvest losses, I think the key is information and knowledge, knowledge when to harvest, knowledge when to harvest at what moisture levels to make sure you're harvesting at the right time to prevent as much of that as you can.

And then I think what we talked about throughout the day with increased policy and investments in infrastructure, I think another additive there is infrastructure in terms of proper storage and education on proper storage and postharvest usage of those products I think is critical to helping eliminate that challenge.

Thad Simons

Charity.

Charity Mutegi

I want to put myself in the situation of a smallholder farmer. And one mistake we make is not understanding the context of what would work in terms of managing for harvest losses. I mean, what you would consider a factory or a processing unit in this part of the world doesn't apply there.

And I'm thinking innovation needs to start in our institutions. Why have we left behind agricultural engineering as a part of growth for that sector, for the processing sector? Why is that? Why are we leaving behind small-scale manufacturing units? That is what is going to resonate to the smallholder farmers.

So like you say, it's very important to understand the need of these people. Most of them are involved in cottage industry, and that need must be addressed. So I mean when I put myself in the context of a smallholder farmer, that is what I want. I want technology that can serve my needs. But for me to help the developer in the African context, our institutions that would play an important role in developing these

technologies needs to be revitalized. And I keep saying agricultural engineering has been abandoned for a long time, and rewarding innovation, linking with the manufacturing industry to properly put engineering students on board in terms of attachment, that can encourage innovation. And that is how we need to support innovators.

Peter Frykman

So to put this in context from the other side, we didn't start with the technology and went to look for a solution. We went to Africa, we went to Ethiopia and we met with small-plot farmers, and we had lots of ideas and preconceptions that were completely wrong. And when we were there, we saw the need was affordable, appropriate irrigation equipment and that the challenge was the ability to manufacture it and deliver it locally at a low cost.

So what we did was we then came back, we used our resources and our experience to develop a new manufacturing technology that could be distributed anywhere in the world. But the genesis of that technology was the farmers, the farmers' needs.

So that same process of user-based product design can be applied to any challenge. That can be applied to postharvest storage and processing just as easily as it can be applied to the input side and the product side.

Matt Burkhart

Great example, Peter, and I congratulate you on your product. That's a pretty good fit for your marketplace you're trying to target. And, as we talked on the phone the other day, the next step that you were talking about in our discussion is really just collecting that data. Now you've got a great product, you've really reduced the amount of water usage, you've increased their yields, and it's really working well. Now, start to track that data, capture all that data, and start to formulate some best practices. So whether it's drip irrigation or aflatoxin postharvest research, the important thing I think is to collect the data, start to analyze it, start to work with the engineering community, as you said, for greater innovations that can help you with challenge. But I think the key point that we always talk about is - start collecting the data. Make it standardized if you can, but you've got to start collecting the data, because you're going to use that data in the future to make better decisions.

Peter Frykman

I mean, to put this in context, what we were talking about is really..., well, from my perspective, what does precision mean? Precision is in some ways it's incremental, it's relative. Right? I mean, when I go and talk to a farmer in India about how much water they use, they say, "I have a 5-horsepower pump, and I run it for three hours a day." Well, that's not, for those of you who are not engineers, that's not a volumetric measure of water. That could mean almost anything. And literally the time of year, the groundwater table, the season, the pump, the electrical service - it could be almost anything. So when we get a farmer using

affordable drip irrigation, that is a huge incremental increase in their precision. But then there's still other increases, low-cost flow metrology, something that could cost \$5 or \$10 would increase their level of precision a tremendous amount. So I see precision in general and especially in agriculture as very much incremental improvements from basically nothing to the level that we see here in the U.S.

Thad Simons

So, Matt, you're talking collecting the data, and this morning's panel was much about that too, about the cloud and about the data and about the power we're going to have in terms of being able to reach some of smallholder farmers and how this accessibility to the information age was going to be transformative. But bring it down to a little more practice. How next week when Charity is back in Kenya, where is that data, where is it collected, who's analyzing it, how is it going to make a difference with her when she's a smallholder farmer? How is that really going to happen in the next five years or ten years, whatever you think the timeframe is we need to think about.

Matt Burkhardt

You bet, absolutely. There's a lot of companies working on big data right now, and that term is used very loosely. We have a partnership with a company called SST; they're a software-based company in Stillwater, Oklahoma, that we believe is the largest standardized reference database of information. A lot of companies are working on predictive agriculture technologies - Monsanto in their field scripts recommendation, which is a prescriptive recommendation for planting which types of hybrids based on multiple conditions, so you have to understand those conditions. You have to understand the soil types in the area, the climate conditions, typical weather patterns. All sorts of inputs will go into the predictive nature of the algorithms going forward. And I think that's really the Holy Grail of agriculture in the future, is really decision support systems that will give you the best yields based on your specific field, your specific environment, and your specific growing practices, regardless of what part of the world you are in. And the important thing is to have all that background information and that research.

So practical nature, someone, whether they're in Africa or Australia or the U.S., plugs in their information - this soil type, this type of climate, this type of information - they spit out a recommendation: you should plant X, you should apply chemicals A, B, C. And that's what I believe will be delivered across the globe in the future.

Thad Simons

So, Peter, in a minute, because you have one minute, what's your closing remark?

Peter Frykman

I'd say, first of all I don't think I've ever been in a place where so many people are talking about small-plot farmers. It kind of blows my mind; I really love it. I mean, I'm usually the only person talking about small-plot farmers. From a technology design perspective, I think it's important for

us to focus on the end-user from the very beginning and use the best practices of product design and engineering to develop products that are appropriate and affordable, not only for the small-plot farmers but also for the distribution channel.

And I would I guess also say that there is a session a little bit later today where I'm going to be going into detail about some of the tactics that we use to develop and disseminate products for the USAID grant that we've been given. So I recommend that you guys all join that at 4:30.

Matt Burkhart

Nice plug, good job. No. Thanks for inviting us to be on the panel again, and, Charity and Peter, good to get to know you, good discussion up here. In closing, I think agriculture and the future of agriculture is very bright. And I think the feature of precision agriculture in technologies within agriculture is even brighter. It was wonderful hearing Mr. Buffett this morning talk about his GPS-guided combine that he was using, so hopefully there's Raven controls in there. But whether it's auto-steering devices that help the farmers reduce input costs and inputs in total and protect the environment and ultimately increase their yields, or whether it's through season control systems on fertilizers and application equipment, I think the future of precision is very bright.

And to all those students that raised their hands in the room, wonderful to see you here, first of all. But there were some comments made this morning about whether agriculture was a sought-after field of work and a career. And that was troubling to hear, because to steal a quote from someone that made it yesterday, I'll just repeat it. They said, "Agriculture is sexy." And we of course think that the technology being used in agriculture is part of the reason for that statement. And most students coming out of school, they want to get into high tech, and then most people as well want to do something that has impact. They want to have purpose. They want to help leave their small mark on the world. And I think that agriculture and precision agriculture can allow a wonderful career and allow both of those things to happen.

Thad Simons

Well said. Charity.

Charity Mutegi

I think for me what is going to change agriculture, especially in Sub-Saharan Africa, is going to take a change in the way we do things in the mindsets and also is going to take a lot of application of modern technology. But having said that, modern technology can only work if we have existing infrastructure, a policy in place. And we must have champions.

I want to give an example for an example of biotechnology, and I want to pose a challenge for those who have used it and it has worked for them and for us who are trying to use it now.

How did the developed worlds get to where they are today, which is being industrialized? They started by making sure that agricultural sector and food security is right. How are they able to attain that? They use more than technology, especially biotechnology. When now you have reached there, why do you think it is no longer useful, for Africa for example, to use that technology and see the same benefits? That's question number one.

Question number two, to those of us in Africa: Why have you left the decisions on policy and regulative frameworks to people who do not understand the subject matter. Somebody said here yesterday in the morning that somebody thinks by taking GM food they're going to grow a tail. Of course, that is a point of misinformation. But to you who understands biotechnology, why are you not willing to take up leadership and make sure that the policy and regulatory frameworks that we need are in place and are working fast so that we can make use of them?

Having said that, because I still consider myself young, governments must be willing to invest in research and development. That is why you're going to get innovation moving forward. If you do not invest, you cannot expect to have innovation driving or thriving - it is impossible. And I know we have policymakers there, we have people in government. It is mandatory that you must see the need to invest in agriculture and research. Thank you very much.

Thad Simons

So thank you all, and thank you to the audience.