Derrick M. Kuzak

Introduction by Cynthia H. Wilbanks

I'd like to introduce Derrick Kuzak of Ford Motor Company. Derrick also has his biography and his experiences listed in the program book. Suffice it to say, he has spent a great deal of his career at Ford Motor Company. He was born in Detroit, a product of University of Detroit in engineering and brings a wealth of experience and background from the corporate business community. I have to say that part of the theme that we've heard this morning very much focuses on the need to partner and the need to be very much more collaborative with industry partners in business and that is exactly what Derrick Kuzak represents for us. And so today we are delighted that he was able to join us and share some of his perspectives from the corporate side.

Kuzak

All right, good morning everyone. I'd really like to thank you for inviting me to speak today. And I'd like to really speak on the themes of the conference and really start with the fact that if you read only the popular press, it would be easy to believe that much of the technical work done in our industry will be transferred to lower cost locations, and to do that around the globe at some point. There's an expectation that exists that globally distributed technical teams communicate and work effectively; that they easily hurdle the barriers of geographic distance, language, time zones, culture, and multi-site locations. And this concept has, in fact, been imbedded in our thinking for quite some time. In 1997, if I could have the next slide, please, an editor at *The Economist,* Francis Cairncross, published a book that was titled, *The Death of Distance*, contemplating a world where much of our work could in fact be transferred seamlessly and efficiently from country to country at a moment's notice. But Cairncross actually didn't have the entire story. To quote to local experts on the subject, they're right here at the U-M, professors Gary and Judith Olson, "The truth is when it comes to project work, distance matters. Distance is not only alive and well, it is in several respects immortal."

From our point of view at Ford, we believe the challenge is to put the right work in the right place to enable the best performing global product development network. And because distance still matters, and will always matter, we can embrace change and globalization while finding opportunities to use that advantage for our local economy and work force, especially with the help of engaged universities to support us along the way. I plan to cover four themes today, all highly relevant both to our own business success as well as the long-term economic success for southeast Michigan.

First, how our product development network is changing and how we can work together to improve the vitality of auto engineering here in the Midwest. Second, the dramatic technical changes and commercialization challenges that are surrounding sustainability in the auto industry, and how they may have a positive impact on the local economy. The third thing is to make some observations about the challenges we face in educating our future work force to help deliver on those opportunities. And finally I plan to ask universities and academia more broadly to take on a specific challenge, to step in to help facilitate the development of a rational, national energy policy.

So let's begin with the topic of improving the vitality of technical sector jobs here in Southeast Michigan. At Ford we already have significant product development capability in many locations around the world. Our challenge is how we move from a multi-local product development system to a truly global network. Next slide, please. So when we look at new vehicle development programs, one of the key questions we face is what should we be engineering and where should we be doing it? Although that might sound like an easy question to answer I can assure you it's not in the end. The solution becomes a balancing act between various and sometimes competing objectives.

For example, although engineering in low-cost countries is attractive, we don't want to create a global engineering network that's too complex by being located in too many different locations, not when we're working to simplify our product development system. Other factors we consider include protecting the revenue and quality of our vehicles by making sure that the teams engineering them have profound customer knowledge. Ensuring the availability of highly trained, while educated and experienced personnel. And minimizing the various significant costs of transferring capability and in some cases people between countries and locations. The end result is a complex challenge that begins with our current structure and ends with a vision of where our long-term value added capabilities should be located.

So bringing all of this back to the theme of the conference, the key take away for us here in Southeast Michigan is understanding that, although there are pressures that might tend to move that engineering employment away from Southeast Michigan, there are other factors that work in our favor in keeping work here, like minimizing your network complexity, protecting our revenue, and improving the productivity of our teams. The balance of those forces dictate the end result. Next slide.

We've concluded that for Ford, Southeast Michigan will remain a core engineering center and the lead engineering activity for several of our vehicle segments such as pick-up trucks and large cars. These are market segments somewhat unique to North America where we have deep customer knowledge. Our capability to engineer built Ford tough pick-up trucks is one great example. It's the combination of customer knowledge, experience with the vehicle type, proximity to the supply base and the assembly plants that give Southeast Michigan a competitive advantage.

In addition to specific platforms and vehicles, Southeast Michigan will remain the core engineering center for many of our global systems. Ford engineers here will develop the required technologies, prove out design principles and consolidate global knowledge from our various product development locations. And our research and advance activities will also remain centered here. Importantly, it's the type of work that most logically remains here in Michigan that provides the real opportunity for engagement with universities. The work requires the deep engineering knowledge to develop all new vehicle platforms from the ground up. It will include our most precious intellectual property that we would not want to risk losing in some developing countries. Next slide.

So recognizing automotive engineering is here for the long-term, let me move on to my second theme, how commercialization of new technologies should bring us together with universities. I want to be quite clear that the auto industry will make deep and fundamental changes over the course of the next several decades to reduce the carbon footprint of our products and our business. Consumers faced with rising fuel prices and increasingly concerned about the environment have moved fuel economy to the top of their list of purchase considerations. Governments the world over are grappling with policy decisions and industries are shaping new business strategies to find workable solutions for an increasingly carbon-burdened world. Frankly most automakers are scrambling to respond to appear more advanced than the competition.

So, where do we fit in? Ford is committed to being part of the solution to adjust to climate change and secure our energy future. For us, doing our part is both a social responsibility and a business imperative. As we all know, the challenge is complex. There is no silver bullet solution here. For us the vision of success is clear. We must achieve the most economically efficient CO_2 reductions possible. Commercializing that technology is a great challenge. I'd like to walk you through what that really means, how we plan to do it and the role you can play in developing and commercializing affordable new technologies. Let's start with some important background on the CO_2 challenge. Next slide.

Scientists agree that to minimize the ongoing risk of environmental impact and to stabilize the Earth's surface temperature below two degree rise versus the world's pre-industrial levels, we should target atmospheric CO_2 levels between 450 and 550 parts per million. Next slide, please.

At Ford we accept that simply not getting worse is not good enough. The auto industry, along with suppliers, government, the fuel industry and even consumers need to collectively work to reduce CO_2 levels from vehicles so we can help bring down overall CO_2 concentrations as you see here. To achieve real and lasting results all of these sectors on a global basis must make long-term commitments for a sustainable future.

With that in mind, a team with Ford has been working hard to find solutions. Given the complexity of the decisions, we have developed two modeling tools, which are guiding us to the appropriate plans to meet customer, business and societal needs. Next slide.

The first model helps us determine the necessary contribution to CO_2 reduction from a transportation or energy provider if a specific CO_2 atmospheric concentration is to be reached. As you might imagine this model could be used to help develop energy policies in a rational, scientifically based matter. The second matter enables us to optimize economic margins by choosing the right technology progression over time. We have used this modeling framework to determine the most cost effective technology migration to improve CO2 and to significantly improve fuel economy while maintaining customer priorities such as performance and interior dimensions.

Most important for our customers, certainly for Ford brand customers is affordability. We need to find solutions, not for hundreds of cars, not for thousands of cars but for millions of cars that consumers can afford. What really counts, what will make a difference, is applying the right technology on volume vehicles. So, the commercialization challenge that we face is not one to improve feasibility at a pilot stage, but rather one of applying new technologies at large scale. Next slide.

In the near term, during the next five years, we are planning to better leverage existing technologies. While making sure our vehicles don't grow larger or heavier, we're going to further boost our internal combustion engine's fuel economy with technology such as direct injection and turbo charging. We're introducing new transmission technologies, adding more hybrid vehicles to our lineup and looking at midrange diesel engines for more products and more markets. The most dramatic introduction to our lineup will be a new family of gasoline-turbo-direct-injection engines, really the corner stone of our near-term environmental strategy. We expect to launch these GTI engines in both I4 and V6 form on a significant number of our vehicles from the Ford brand globally. The beauty of gas-turbo-direct-injections is that it let's us simultaneously downsize our engines while still boosting their power, so we deliver both performance and fuel economy that our customers want. Next slide.

Now, mid-term between 2012 and 2020 is where the opportunity starts for all of you. In this time frame, weight reduction becomes critical to our strategy. While not something new to our industry, the magnitude of the weight reductions will require many hundreds of pounds per average vehicle all without compromising safety. Indeed, one of the most important learnings we've had through modeling is the importance of weight reduction. Although it may seem obvious, the synergistic benefits of weight reduction surprised even us. Substantial vehicle weight reductions enable smaller displacement engines, which in turn lower vehicle weight even further. Next slide.

For a small car, 500 pounds lighter than today, a one-liter GTI provides the same performance level as today for the engine size maybe as large as 2.0 liter or even bigger and the fuel economy is dramatically better. Importantly the economics of such a vehicle are significantly better than a hybrid. Such significant weight reductions means we're going to need to use even more aluminum in the future. Our Ford GT realized a 45 percent weight reduction this way, the aluminum body Jaguar XJ achieved a 40 percent weight loss. But while the use of lightweight materials will be necessary, such as a significant vehicle weight reduction will only occur if we as an industry, suppliers, OEMs [original equipment makers, and university partners are dedicated to make it happen. Next slide.

Now I can make my second point, the role universities and governments can play in working with us on a dedicated effort on weight reduction through materials research and the commercialization of

alternative materials. An example is nanotechnology's role, a great enabler of future weight reduction. This technology brings both the promise of fantastic progress and significant challenges in commercialization. Foamed aluminum with nano-structure controlled process may offer weight savings of up to 30 percent, enabling closed cell aluminum, foamed aluminum to replace other materials. We need this advancement. We need it within the next five years in volume and at affordable cost. Next slide.

In the longer term, by around 2020, another major theme is the large-scale inclusion of hybrid technology in our vehicles. While hybrid gasoline vehicles will only represent a small potion of our total vehicle fleet today, we expect that by 2020 these vehicles will represent a significant portion. To make this feasible we need commercialization of various new technologies around battery cells and systems, control systems and vehicle energy management. Next slide.

As I mentioned earlier, fuel composition needs to play an important role in achieving CO_2 stabilization. Fuel providers share about half of the responsibility for addressing CO_2 reduction and transportation. The fuel providers should develop similar near- through long-term plans with lower carbon and renewable fuel supplies. Your participation in the development and commercialization of the needed technology, again, is essential. Near-term we need fuel providers to support production, infrastructure and marketing for renewable biofuels like ethanol. We're working to make all our gas and diesel vehicles biofuel compatible. Biofuel compatibility will enable us to meet the strong desire for reduced CO_2 footprint and energy independence. As one example, cellulosic ethanol reduces CO_2 by as much as 80 percent versus gasoline.

In summary, we believe the most cost-effective solutions to lowering CO_2 emissions from vehicles must be a combination of biofuels and vehicle technologies, from lightweight materials to energy storage to alternative fuel production. Meeting the CO_2 challenge will depend on our ability to develop and commercialize this new technology and to do so faster and most cost-competitively than our competition. If we win that race these jobs in technologies will be created in Michigan. Having stronger university involvement, not only in new technology development, but also commercialization requires taking some risks for both industries and universities. In some cases, changing the focus of research allocation from pure research to application and development will be necessary. This will be a difficult but important transition if we are to form an effective alliance and really make a difference in an area as important as sustainability.

The third theme I'd like to touch briefly on is that of education. As I mentioned the type of engineering work that we will continue to focus on here in Michigan is our most knowledge intensive vehicle development work. The technical challenge I mentioned and the challenges of commercializing new technologies, increases the required skill levels of our engineering work force. Next slide.

Our best engineers need to be more than good electrical, mechanical or chemical engineers. We need engineers who can think in terms of systems as opposed to just components, engineers who can think total value chain as opposed to piece cost, engineers who can understand customer needs and optimize systems to best meet those needs. At Ford we've changed our processes to be more integrated and to move away from narrow component, or functional, focuses.

However, I suggest the issue goes well beyond Ford. It is a culture and educational challenge, at least for the North American's amongst us. We have been taught to break down problems to the lowest level. Indeed, to think component or function, as opposed to seeing a problem in the context of a broader whole. Thinking across disciplines will be key for the knowledge intensive jobs of the future. Next slide.

I don't pretend to have the answers to this challenge, but I do know the people within Ford that perform well in the competitive, global environment are our best systemic and creative thinkers. A suggestion I do have is to add required to classes to all engineering and science curriculum, classes in control systems, linear programming, and economics. Simply put, the best engineers we have are those who have systems engineering training.

My final topic is the issue of a national energy policy. We don't have one, and we need one. It's in this area that I believe there's an opportunity to move from engagement with academia to leadership from academia. You might be surprised at the call for policy leadership driven by people form outside our industry or the energy industry and perhaps even more surprised that we would call on academia to lead the debate. But the auto industry has nothing to fear from an energy policy driven by rational balance of physics, chemistry, and economics. In fact, we would welcome it, we will work to support it and we will find ways to accelerate it.

Why would we think that academia could do this? I can think of lots of good reasons. You're nonpartisan. You're not beholden to any one industry or interest. You can handle the complexity of the multi-dimensional policy challenge. You can do math, and you don't need to get re-elected. There are certainly examples of where universities and scientists who have had a profound effect on developing and shaping policy. One such striking example was the development of a national vaccination policy led by the scientific community, which at times we see significant resistance from some sectors. Next slide.

Your leadership could begin with an increasing level of critical thinking on the multi-dimensional and multi-disciplinary nature of the challenge. Yes, we want to reduce our carbon footprint, become energy secure and improve the competitiveness of the U.S. economy. Yet so far we've made little progress on any of these three objectives in isolation let along in a coordinated manner taking into account the critical interactions that occur amongst the three. Only the academic community can develop models of understanding and communicate the interplay in interdisciplinary aspects involved.

We need strong, empirical research that looks at all three dimensions of energy policy and is able to develop and test hypotheses. Academic research in the sciences and applied energy, in climate change topics is critical to successful policy formulation, serving as a necessary but not sufficient anchor for policymaking. We need to convert the results of that empirical research into broad principles that can be used to evaluate alternative solutions, combined with geographers and internationals in a variety of fields, political science, international relations, energy economics, the fruit of research to enable a community to develop the principles of good policy.

The modeling in CO_2 frameworks I discussed earlier could support the development of rational CO_2 targets by industry sector based on sound science, economic analysis, and policy goals. Such an integrated solution is far more likely when guided by informed parties supported by strong modeling tools. At which point comes the difficult challenge of facilitating the process of stakeholder agreement. Through your commendable efforts on Congressional task forces and commissions and think tanks as well as active involvement in the political process, your contributions should enable good policy making. And, of course, throughout the entire process is the overriding concern of insuring that bad policy is not passed into law.

Since we are bound to encounter periods when the political climate is not right for effective policy making, you in the academic community can play a leading role in helping to ensure that bad policy is not being made. True leadership is a tall order in any professional destination, but to all of you working in the areas that touch energy security and climate change, I must say that we are truly coming to what could be a very unique occasion to make a difference for this millennium. Taking the next step where you can be more effectively engaged in policy and political energy making, please be truly leading the debate and the policy outcomes. That could truly be the chance of a century. Next slide.

So, I hope you can see how all of this comes together from my perspective and how the four themes I've discussed today are related. We need to recognize and understand the impact that globalization is having on the engineering community in Southeast Michigan in particular. The situation is challenging, but I am certainly hopeful on that front. Improving our commercialization skills and processes for new technologies will be a critical enabler for our collective success. Sustainability in CO_2 stabilization is one of our society's and one of our industry's most important challenges. Focusing your research efforts here and, importantly, extending them to commercialization would be welcome. Educating a future work force

to improve system's thinking, critical thinking and creativity will be increasingly important as we continue to adjust to the forces of globalization. And finally, the energy debate, and irrational energy policy will be one of the factors that help reinforce a vital engineering sector in Southeast Michigan. I invite you consider how you may lead that debate and the energy policy process. I hope these ideas will stimulate some debate and discussion and hope that I've been able to present them with humility and in a sense of true partnership. Thanks for your attention.