GUEST SPEAKER 1: Good morning. It's a real pleasure for me to be with you today. Appreciate Steve and Bill inviting me here.

For those of you that don't know me, for the last six years, I've been managing the Gillette Company's EPC initiative, and now I'm leading the strategy development and pilot implementation of EPC for the entire Procter and Gamble company, including Gillette. I look around the audience and I'm pleased to say that I see lots of familiar faces.

And I don't know whether that means I've been doing this for too long or that this technology is really a game changer that's going to dramatically alter the way trading partners go to market together. I'd like to think it's the latter. And I hope to share with you this morning some learning and some plans that Procter and Gamble has to implement this technology.

Procter and Gamble and Gillette have been supporters of RFID and specifically the electronic product code for many years, going back to the co-founding of the AUTO-ID Center, initially right here at MIT. And that led to the development of the electronic product code, which has now been turned over to EPCglobal and GS1. And I'm thrilled with the association that EPCglobal and AUTO-ID labs have to pioneer new research and continue to support the development of the technology.

In 2005, Procter and Gamble and Gillette merged to create one company. It gives us the proverbial opportunity to put one and one together and get three. The shared learning of these two companies has been combined to develop a unified approach to implement EPC. And the commitment of both these companies has not changed. In fact, it's accelerated.

It's all about transforming the supply network using the EPC to deliver better customer service so we know where our products are at all times. To generate less loss, less shrink, less theft, less products being misplaced and not being able to be found. It's there to help us have fewer inaccuracies, going from assumed receipt to EPC-verified receipt of goods.

And finally, and critically important, to give us greater product availability for consumers. As consumer marketeers, Procter and Gamble's number one complaint is consumers who come in to store and can't find the products they're there looking for. And we feel the electronic product code can address that.

So let me share with you some learning from Gillette and Procter and Gamble. Both companies have been actively engaged in pilots for a number of years-- pilots both in-house within our four walls and pilots with our retail partners. We've done this to test, improve the technology, develop scalable solutions, validate the business case, and drive deployment to deliver business benefits now. We can't do everything we want to do at once, but we need to keep moving in ever-increasing increments, starting with, what I heard referred to earlier, as low-hanging fruit. Capitalize on that, generate value, realize the benefits, and then capture that learning and move to the next stage.

Our research, much of which was done with team members from MIT, showed that the lion's share of the opportunity is the collaboration gains that exist between trading partners. We call it the collaboration zone, whereby managing deductions management, electronic proof-of-delivery, if you will, increased on-shelf availability, reduced inventory and improved working capital, we can generate serious business benefits. So we began in January of 2005, with one strategic retail partner to prove many of these benefits.

Our pilots led us to discover that promotional and new item compliance was a tremendous opportunity. Low-hanging fruit, if you will. One pilot we did was with our Venus disposable razors. These are our female shaving system.

This was a new item launch. It was supported by heavy advertising. It was largely delivered in displays because it was an advance of the regular planogram cycle.

And EPC-enabled displays were shipped to stores. And what we found was about 1/3 of the displays that we shipped to stores never got to the selling floor as scheduled. Maybe they got there late, maybe they didn't get there at all.

What's important to realize is, as a consumer marketing company, we had significant marketing programs, we had invested lots of money and significant marketing programs, as did our retail trading partner-- things like advertising, in-store coupons, promotional discounts, to generate awareness and generate trial of this new product. Because a large percentage of the displays never made it to the selling floor when they needed to, the late execution resulted in a 19% reduction in sales. However by using EPC, we're able to generate alerts to tell store associates or tell our own retail merchandising force that the displays were not where they're supposed to be and get them fast tracked to the sales floor so we could eliminate idle inventory, we can be in stock, and we can generate incremental sales.

After that, we did another test promotion with our Braun Cruiser electric shaver. This was done in the Father's Day time period in the month of June. This also was a promotion that was supported by significant advertising. It was a very time-sensitive program because it had to be on the selling floor in a limited window of time so consumers could buy these razors as gift items to give at Father's Day. No one wants to buy a Father's Day present after Father's Day.

What we found was very inconsistent execution of the promotion in the 19 stores that we tested in. In fact, only six stores actually delivered the promotional displays to the selling floor on time. Five of them put the displays out on floor at Father's Day or after. And the majority of the displays-- eight displays-- were delivered sometime in between. What this meant is that the stores that had the electric shavers out, ready for sale, on time, had a 61% greater sell through. So the opportunity clearly there for a time-sensitive advertised promotion to use EPC to deliver these displays where they're supposed to be in accordance with the promotional plan that the retailer established.

Now, let me talk to you about the launch of a new Oral B toothbrush from Gillette. This was a great new item. It is a battery-powered toothbrush.

We had research showing that advertising would generate strong consumer demand. And that was the results we were getting in all of our pre-market testing. These displays, when they were delivered to store, had a target of making it from receipt at the back room of the store to the store floor in 3.8 days.

However, as you can see, the results were very inconsistent. And we were able to track this using reads from the electronic product code. On average, the store executed this promotion in 8.8 days-- significantly beyond the target they had set for themselves.

What this means as far as a business impact is that after the displays actually made it to the sales floor, there was a five times daily sales increase. So the important thing to keep in mind is, when the displays were sitting in the back room and the advertising was running, they were not working effectively. But as a result of having the EPC tag on the displays in the test stores, tracking those displays, being able to respond to automatic alerts generated from the program, and moving those displays to the floor when they needed to be there, we were able to increase the sales potential five times.

In the test stores, the impact was around 600 lost toothbrush sales for inconsistent application, resulting in about $3,000 of lost revenue. If you multiply that times the opportunity across an entire chain of hundreds, if not thousands of stores, the lost revenue impact can be a half a million dollars or more. So the ability to use it to drive value on promotional displays is clear.

Lastly, this past holiday selling season, we were able to tag a number of our fast-moving holiday displays. Duracell batteries, for example, Braun electric shavers, what's known as a Tag body spray, which is a hot-selling new item that was launched last year, and our Mach 3 power shavers. We tagged these displays and delivered them to 500 stores where they could be tracked for compliance.

What we found is that 100% of the Mach 3 power stores were compliant within 14 days, versus over 20 days of dwell time in non EPC-enabled stores. The EPC-enabled tag displays generated a 91% sell through versus a 71% chain wide average, showing the impact of EPC being used to make sure the displays got to the selling floor when they needed to. And lastly, EPC-enabled Braun palettes had a 30% higher compliance to the sales floor than the rest of the chain.

So by applying EPC tags to these displays, we were able to significantly impact the ability to move these displays to the selling floor in accordance with the promotional plan, which resulted in incremental sales for the retailer and for the manufacturer, but most of all meant that the customer who came looking for these products because they had seen advertising, they had received a coupon, were able to find the product that they were looking for and left as satisfied shoppers. So the rationale for the display compliance business case is very simple.

It starts, first of all, from the high value of the display versus the small tag cost. It clearly does not make sense to put a $0.10 tag or a $0.05 tag on a $0.39 can of beans. However, if you take a $0.15 tag or a $0.20 tag and put it on a display that has 25, 50, 100 items, then the cost-value ratio is much better.

We also found from our research, that 15% to 40% of stores that were receiving our displays were not compliant with the promotional plan that had been established by management. With EPC, we can correct that. We can create alerts that allow store associates to know whether displays are in compliance or not. And if they're not, go find them and make sure they get to the selling floor on time.

By having displays on the selling floor in accordance with the promotional plan, we saw a 20% sales lift. And lastly, practically speaking, tagging displays is easier. They're bigger, it's easier to manage physically, read rates and tag survival rates are higher because they don't go through break pack operations, they're delivered straight to the selling floor. So the key benefits of moving forward against display compliance as a low-hanging fruit are very clear.

It's an opportunity for the manufacturer and the retailer to increase incremental sales. Improved availability of the product, improved visibility of the product, on floor when consumers are shopping, looking for that product, or to encourage an impulse purchase. And the fact of the matter is, in the consumer goods market, many, many of our products are impulse sales. Men go to retail not necessarily to buy razor blades, but they see them, they pick them up. The same with toothbrushes. So having the display on the floor generates incremental sales through impulse purchases.

Greater shopper satisfaction, which drives brand loyalty. The fact that I came looking for a Procter and Gamble product and was able to find it keeps me a loyal user of that brand, rather than being encouraged to switch to another brand because the toothbrush I was looking for, the antiperspirant I wanted, or the detergent I wanted was not on the shelf. It's a better marketing investment. It avoids spending advertising dollars, couponing dollars, promotional dollars against empty shelves, or creating excess inventory because you built displays that never made it to the sales floor on time and have to subsequently be broken down or returned.

And finally, decreased labor cost. It takes less time to find lost displays. Time that then can be turned into more productive activities within the retail environment.

Display compliance is one of the low-hanging fruit opportunities that we can go after right now to create immediate business value. Creating value now to drive adoption, to drive tag volume is the cornerstone of what Procter and Gamble and Gillette has created as the EPC advantage strategy. This is an evolving execution plan based on our experience, our knowledge, and our focus on delivering value through the use of EPC.

Our pilots, our shared learning and value confirmed to us that we can help both our retail partners as well as ourselves work together to better meet and satisfy the shopper, to meet their needs and satisfy them. Our EPC advantage strategy is designed to deliver business benefits, both to Procter and Gamble and our retail partners right now. Said another way, we can't do everything at once, but we can move forward and an ever-increasing, incremental way to build value, generate learning, and then plan future activities.

Our EPC advantage strategy consists of tiering our products and our product scenarios, like display programs, based on the value proposition that they generate and their specific product characteristics. For example, at the very top of the list, the top tier is what we call advantage products. These are higher value products with strong business cases for EPC. It could include display modules which support time-sensitive merchandise like I just described in the business case learning.

The mid tier, what we would call testable products, these are products chosen to support continued testing. We haven't wrapped our arms around the business case just yet, or maybe some technical challenges that we hope to overcome. And finally, are the challenge products. These are the ones where we really struggle to establish clear value. These are the ones that have significant technical hurdles to overcome. They need more work.

Tiering our products in this way then allows us to develop specific approaches focused on value creating to enable ever-increasing volumes of tag products. For example, the top tier of advantage products can deliver benefits now. These are the products we want to move forward with, we want to move forward quickly and capitalize on those benefits, and create value.

These are scenarios like promotional displays or specific products like Crest Whitestrips or Gillette blades and razors. The testable products need to drive new learning and they need to be tested and piloted between Proctor and Gamble and our retail partners to decide the next round of products and scenarios that we undertake. Products like Swiffer or Braun appliances would fall into this category.

And finally, they are products that are challenged. These need continued research. These need the help and support of researchers like yourselves. Manual toothbrushes, Pringles, Cascade, antiperspirants and deodorants fall into this category for Procter and Gamble.

So I'd like to close, now, by talking a bit about the guiding principles for our work and how you can help us in the future. As Simon said, we want to continue to play a role in understanding how EPC technology creates value for our stakeholders. Continue the learning. This is a journey and we're very much at the beginning.

It's important that we collaborate with our trading partners to identify, quantify, and secure EPC-enabled benefits through process optimization. It's all about changing or adjusting our work processes using EPC data and generating EPC alerts to tell associates or manufacturer merchandising forces how to take action to generate incremental value through EPC for themselves and increased shopper satisfaction for the customers that come looking for our products.

We need to continue to review our internal processes. Our current internal four walls efficiencies make internal benefits at the pallet and case more incremental to our overall effort rather than breakthrough. The breakthrough is really the collaborative space, the collaboration zone between Procter and Gamble and our trading partners.

As you heard earlier, we need to drive reductions in cost, and importantly, other EPC infrastructure that's required to create a total system approach in EPC solutions. We need to support the advance of EPC performance, development, and standards through EPCglobal. Tremendous progress has been made in this area and AUTO-ID labs have been key in helping to drive that. Generation II is just one example of the progress that's been made, progress that's going to allow us to accelerate what Procter and Gamble and our retail partners can do in the years to come.

Importantly, we have to improve read rates and overcome barriers to scalable implementation. Good read rates can be achieved at different points in the supply chain, but they're not there across the entire system. The applied tag performance initiative through EPCglobal is a great step forward in helping to address this.

We're still at a point of limited pilot implementation. We need to know how to implement broadly across all of Procter and Gamble's products, all of our physical infrastructures, all of our systems, all of our customers. And finally, we want to use the EPC advantage strategy to secure ongoing benefits.

Finally, how can you help us? You heard it before from the other speakers, low-cost tags are critical. We'd like to get to a $0.01 or less tag as soon as we possibly can. Increase tag quality, robustness, and longevity, better understand electrostatic discharge and other factors that might impede the longevity and the functionality of our tags.

Tag deactivation solutions are important and how they fit into an overall EPC architecture. Solutions to incorporate the tag into corrugate materials are a very, very important way forward that will help us lower cost and streamline the implementation of EPC. We need system solutions built into EPC appliances, so we don't have to rely on multiple integrators to help us deploy our implementation.

Spontaneous real-time exchanges and distributed EPC information management is important-- discovery systems that allow us to take a product that's off track, that we don't know why it's where it is, and find out what it is, where it belongs, and get it back on track in the system. Further robust studies on EPC-enabled retail availability improvements. And finally, consumer education and informed public comment on the use of EPC. All of these, in time, will help deliver the vision we have for an EPC-enabled supply chain that can literally transform in a step-change fashion the way we can go to market as Procter and Gamble with our retail partners. Thank you.

[APPLAUSE]

[CHATTER]

[? GUEST SPEAKER 4: ?] While he's hooking up your laptop, I'll--

GUEST SPEAKER 1: Yeah, thank you. Is this battery here, or--

[INAUDIBLE]

GUEST SPEAKER 4: Yep.

GUEST SPEAKER 1: OK. OK, thank you.

GUEST SPEAKER 4: It's a little tight on the [INAUDIBLE].

[CHATTER]

GUEST SPEAKER 1: Good morning, ladies and gentlemen. I'm very delighted to present DHL experiences with RFID technology here at MIT in Boston. I'm working in DHL in Germany as sector head for consumer retail, and I will focus in my report on these subjects. Listening to the requirements of our CPG fashion and retail industry, we design and implement supply chain solutions for the benefit of our customers.

RFID is one important enabler who can support our supply chain solutions. Let us start with the main opportunities for RFID, which we see for supplier logistics service providers and retailer in the supply chain, followed by the executive summary about that subject. The main opportunities for RFID in the supply chain-- and I have shown here the supplier plant, the DC of the logistics service provider, the DC of the retailer, and the outlet.

And the green color is the opportunities for the supplier, and there we see the counterfeiting protection, which we very often see on the fashion side, the enabling of tracking and tracing on item level, and the better customer service through proof of guarantee and proof of delivery.

In the warehouse, we can see out of our trials that we have more efficiency in the warehouse management, we have a better flow of goods, and we have faster and securer inventories. We have optimized picking in value added services, in kitting of textile and apparel, and consumer electronics. And we have all full visibility of each single case.

If we look at the DC of the retailer, then we can see a clear and better warehouse visibility. They can manage a higher number of stock-keeping units to reduce the stocks and minimize the shrinkage. The cross-docking shipments can be optimized, and we have a better and efficient recall of goods through RFID. On the shop floor, there is the real-time monitoring of sales. The last 50 yards are much better managed, efficient supply from back store to shelf.

There is a permanent monitoring of goods in the outlet, and for the shopper convenience you can have technical assistance like a personal shopping assistant who is giving you your last buy what you have done in the store. And last, not least, speeding up the check-out processes in the cashier area. Out of that, we want to give the executive summary up front. We see RFID is the solution for the future. We could see in our different trials cost reduction, quality improvement, and innovative new services like [? tech ?] [? fit ?] what we have done.

The entire supply chain will benefit from the use of this new technology after complete implementation and global coverage. We know that barcoding has needed about 25 years, and we see that we have to go quite a long run, but we are not looking at the 25 years. RFID will improve the processes in the supply chain. This is for sure. We could prove fast and accurate handling in unit tracking speeds up the lead time in the supply chain.

Secure data and shipment quality provides more transparency, and continuous test in various pilots leads to stability of subprocesses. But RFID today cannot be applied for all logistics processes. RFID technology development is not mature yet to steer the entire supply chain. There are still major issues to be solved, such as harmonization of standards, 100% read rates, and technical issues with liquids and metal.

What is the supply chain today like? And I'm referring now on a barcode supply chain. You can see here on the top of the chart. You see the product flow, the physical product flow from the manufacturer via the DC and the cross-docking point of the logistics service provider to the DC of the retailer and then to the outlet.

On the bottom part of that chart, you see the information flow from the data warehouse of the manufacturer via logistics service provider to the retailer. And you see there is a lot of processes to be done on the physical flow and on the information flow. I will not go deeper in all of these processes, but I want to show you on one process, the loading process, the difference between barcode and RFID.

You see here there is a pallet loaded in a warehouse on a truck, and you can see that this is automatically scanned. And then when you see when the traffic light went from red to green, it is at the same time booked out of the warehouse management system into the truck. Later on, the retail partner receives automatically a [INAUDIBLE] in dispatch [INAUDIBLE] format.

If you look at the same process in RFID process, then you can see there is a small difference. You have full visibility of each single case. You can see here that the reader has read all the cases on the pallet, and we have here one special case that the driver is leaving one box on the shop floor. And here you can see now all the other pallets are loaded, and the only thing. The black box was not seen. It went to the gate.

Now the dispatcher is calling the driver, and the driver has to return. And he will run back and--

[LAUGHTER]

And he takes that black box, bring it through the reader, and now you can see the reader has seen that everything is loaded. And here [INAUDIBLE] clear the special delivery is now loaded, and he can go to the retail site. What can we learn out of that?

We have the full visibility of each single case, which we don't have on the scanning side when it is only passing the scanner. We have a completeness check, and we have a fast allocation of not-identified goods by a simultaneous check. What have we done in DHL? Which RFID pilots?

We have done a pallet tracking, case tracking, and item tracking. We have looked at inventory, order fulfillment, and condition monitoring for temperature, humidity, and shock and vibration, and we have looked at value-added services which we can do out of the RFID technology. I will not go to all the industries. I will only touch now the fashion, retail, and CPG industry in the following pilots.

What we have done in three pilots was, the first one, flow steering of multi-use trace, then a fashion pilot in France, and together with metro in the Future Store Initiative, we have done another trial in Germany. On the flow steering off multi-use trace, in our telecom warehouse we have tagged multi-use trace with two tags, and what we learned out of it-- or what was the test results. We got a 100% tracking accuracy inside the warehouse, and we could reduce the assets by 50%, and we had 20% faster control processes.

On the pilot fashion logistics in France, there we tested hanging garments and flat packs, and there on the control process of hanging garment we could see we are four times faster when we take in the goods than was barcode. We could do the inventory of 20,000 hanging garments in 30 seconds, and we had a significant improvement in control of flat packed items. What were the key learnings? We learned that we had to limit in the carton 40 pieces. There we need further improvement, and we were not clear if HF or UHF is the right technology, and the customer once there are resolved.

And on the fashion items, we have quite a lot of privacy issues in Europe, and we are hard working on it with one group in Brussels and one group in Berlin. The third pilot was metro future store, and I must say here that we have only generation one in Europe at the moment. We are longing for that we get generation two, but we think they are still here in America and they don't want to come over to Europe.

[LAUGHTER]

And pallet tagging only shows nearly no improvement out of our learnings and to compare to barcode on the manufacturer and the [? LSB ?] site. But the key learnings were pallet tagging is a useful step forward in order to focus on the standardized supply chain. You can exchange master data, EDI messages, and delivery control with your partners, and you can do the information flow, and the alignment with a business partner is one of the key prerequisites to go forward. Another learning which we had was the smart label. We call it smart label, and it is a label which is a flack label. It's a little bit off the pallet, and this improves the read rates to 90%.

What is the benefit allocation, what we found out through RFID? We could say to work with a pallet was a good start, but we didn't see significant advantages against the barcode. When we went then to the box level, then we could see some advantages on the physical subprocesses and on the control side, and the best results we got when we went to the item level, and they're on the order picking side, and on the stock optimization were the best benefits.

What are the main issues for RFID as a supply chain? We could see that the manufacturers have very often their RFID labeling on box level separate as a separate operation. There are still technical issues to steer the production, combine the primary package with a lot number, and there are still high investments for RFID infrastructure, tech costs, reader, and middleware and we are now changing from gen 1 to gen s. There are investments again.

There has to be defined appropriate IT tools for enterprise resource planning and production planning systems. On the logistics service provider side, we see again high investments for RFID infrastructure. If you want to have your warehouse ready, you have to tech the locations. Reader, middleware, and others needs to [? buy. ?] We have to define appropriate IT tools for control systems, and what I showed you in our fashion trial that the data capture of bulk were still limited to small quantities.

On the retail side, we see there in Europe the read rate below 100% and only a few goods are tagged. Item level tagged goods are only in pilots, and the read rates for mixed palettes, which we use in Europe, are still below 100%. There are privacy issues for the consumer, and a lot of the employees are anxious to lose their jobs, especially on the cashier side. Then we have to solve the disposal of used RFID tags.

What is our assessment as logistics service provider for RFID? We want to be in line with the necessities and prerequisites of integrated supply chain management, and we are clearly saying we have to adopt the RFID technology because on the long term we will have a lot of advantages.

To share the investments and implementation costs on the short term, I think we can bear it if we see on the long term the profit perspectives. However, what we see-- the main potentials of efficiency and cost saving due to RFID implementation in the supply chain will not be realized by logistics service providers. We see more advantages on the retail side and maybe on the supplier side as well.

Our RFID positioning today is because we have clearly seen the tech lab label costs are going down. The performance is getting better, and I think we as DHL are between deploy and implementation, and we want to go further right. DHL after the purchase of Excel is now the biggest company in the logistics market. We are market leader in ocean freight, we are market leader in air freight, and we are market leader in contract logistics.

This area is a very fragmented market. We have only there 5%, but we want to redefine that market, and we think RFID can help us. And therefore, we as DHL have a very strong commitment to EPCglobal because, as I have shown you, DHL has to serve different industries with different products and services in all geographies of the world, and we have to face different standards. We need one global standard used by different industries for all products and services, and therefore our commitment to EPCglobal is very strong because we believe this organization can be the enabler of our vision.

Thank you for your attention.

[APPLAUSE]

Yeah.

[CHATTER]

GUEST SPEAKER 4: OK. Brian, just remember we have about 20 minutes.

GUEST SPEAKER 2: Yes.

GUEST SPEAKER 4: I think Brian's got like 200 slides.

GUEST SPEAKER 2: I'll only show half of them.

GUEST SPEAKER 4: All right.

GUEST SPEAKER 2: [INAUDIBLE] All right. I'll set myself up. OK. Good. So, before I start, I wanted to make a disclaimer because, as you know, this is being taped for OpenCourseWare, which means the audience can be very big, and actually I'm afraid of what my great grandchildren will think when they see this because it will be there on the web. I just want to tell them that I know I'm not going to say things that will be true, OK? I'm going to make some wild claims, and I just wanted to warn them when they see this. OK?

And I guess in passing I'll also warned all of you, but anyway. OK, good. So, let me start by summarizing. I added in the title one thing that was not in the agenda, which is building an academic discipline with a question mark, because I think that's one of the issues that we need to discuss as a community.

I'm leaning toward saying yes. But if you had asked me last week, I would have probably said no. So that's probably why I put the question mark, because I'm still not sure. But I thought in terms of being a bit provocative.

Let's take the position that, yes, and then let's see where this takes us. OK? Good. So this is the session that we had today, the people, and if I summarize what I've heard from industry thus far, I think the retailers are sort of seeing these as a serious opportunity. It's sort of like an iterative process. It's evolving.

There's many different approaches that they are using, many different things that they are trying, but I think what's important is that they are extremely collaborative with their partners but also with academia. So I see this as an opportunity. They obviously need the supplier to help them. They're trying to focus on areas where they see some gain, but they need this help with these deep issues that I've listed here, which are areas where I think we academics can help them.

I think very important in building their business cases, but there's a few other areas where they're talking about. What's important also is that, even though this is sort of a supply chain focus, I think what's important-- and that's another of the claims that I wanted to make-- is that they have a very interdisciplinary need. If you look at the list of things they need help with, they're just not operational things. They need things that have to do with things that all of us have been talking about over the last two days, and I will talk about once we finish. So I think that the supply chain needs interdisciplinary help on many, many issues. OK?

And if we look at manufacturers, you know, I think there's been again a focus on the supply chain, and I find this interesting that the manufacturers-- and I haven't seen any manufacturer really thinking about their products changing. They're still thinking, OK, I'm going to manufacture the same thing and just how it works through the supply chain. And if I look at retailers, it's a bit the same thing.

It's not like Walmart stores are going to change. They're just going to be more efficient. There's going to be less out-of-stocks, OK? But the reason I think [INAUDIBLE] of further change, and I think we as academics can maybe push a bit the envelope because I think both problems that our manufacturer will change because the channel in a way drives what is sold through it, and also I think new store formats we will emerge. And in terms of where manufacturers need help, I think it's very similar to what retailers need.

So I think the needs are very, very aligned, and it's not that there's some things that help manufacturers and others that help retailers. I think we're getting a very consistent message from everybody here as to what are the areas where we should be doing research. OK, good. So, in many ways, I think we're at the very beginning of an industry, and I use that as an analogy.

And this, they used to call it a horseless carriage, very much like some people still call RFID a wireless barcode. And if you think about the changes that had happened or that happened after the first cars were invented in over the last 100 years, you can see the kind of changes that we will see with RFID, and I think it will be actually a bigger change than that one. OK?

So, here's a couple of examples. Also with advertising we're seeing lots of changes. This is one of the first steamboats, and we had steams and sales. OK, so many, many changes. Here again, just to summarize, I think it's important that the supply chain needs a lot more than just supply chain research, and I think that in many ways if we figure out the supply chain we'll figure it out everything. That's why I'm saying this is NP hard.

It's sort of borrowed because I'm a computer scientist. In computer science, they say problems that are NP hard-- if you solve one of them, you've solved all of them. So I think that happens with the supply chain. And also [INAUDIBLE] Based on what I've seen, I think it's the supply chain problems are written off, but if you solve problems in the supply chain you'll probably be able to solve pretty much any other problems. But, again, question marks because I'm not really positive.

And if you look at how we started-- as a line borrowed from Sanjay and a lot of the work I've been doing together with him. You know, if you look at the opportunities, you can see also that this matches beat what the supply chain needs. OK? So I think there's here a nice match, and that's why I'm suggesting-- let's see if we can go to the next one.

OK, seems to be stuck. It's a very good slide. I know. The computer is smart. OK.

AUDIENCE: [INAUDIBLE]

GUEST SPEAKER 2: Excuse me?

AUDIENCE: [INAUDIBLE]

GUEST SPEAKER 2: No. Well--

AUDIENCE: [INAUDIBLE]

GUEST SPEAKER 2: OK, good. So, that made it. OK. So a suggestion I would make to all the researchers here is to use the supply chain as your laboratory, and I think they seem to be open, and I think they've proven they're open. I think it's sort of like an NP hard problem, so I would suggest we do that, and that's what we've done, and I'll give you an example of some research that I've done that I started in '97 by looking at a supply chain issue that I think apparently doesn't have to do a lot with the supply chain, but, as you will see, it ended up having a lot to do with it. OK?

And just to begin, some of the issues with the supply chain that, again, Sanjay already mentioned. You know, there's lots of issues, but perhaps the place where it seems to be harder to work on is at the edge of the supply chain. That's where the problems are a lot bigger. Customers come in, and they'll do all sorts of nasty things to you, so that's where I think it's very hard, so I think that's a research laboratory if you want to think long term what may happen.

If you want to think short term, I think there are some areas where they are better, like some of the portals that we saw with DHL and receiving. I think there may be easier to do progress there, OK? So one of the areas where I did some research was trying to look at a grocery store and see here what were some of the legal issues that would have to be overcome. And so here's a little video. You see a little grocery cart.

We actually implemented this and did some tests, and the products obviously have RFID, and they send a little advertising because they know what's on the cart. Right? So we said, OK, let's try and analyze what are some of the legal issues here, and we came up with a list, which I think you can then go to many other applications and say, OK, what are the legal issues of this sort of embedded intelligence or this product internet.

And it turns out that they happen to be a subset of this, OK? So that's why I think it's useful, and so we have at list. We actually even wrote a book and a bunch of papers on some of the issues, some of the legal issues that happened. Here are some of the issues that we came up with. So again, I think that working on the supply chain, you can really do progress that can help RFID in general, and again here, if we look at the opportunities, I think what we are seeing-- and Sanjay had these three columns, the technology, the applications, and the analysis.

I don't know if these are the three columns that we should use going forward, but I think it's a good starting point. What we see, even on this little example on the supply chain, is that these three disciplines are somewhat related. So, the technology that you use, depending on what kind of RFID tags you use, you can think of one application or another application. So that's sort linked the technologies [INAUDIBLE] the applications, and the kind of analysis whether legal issues are important or not is also related.

So I think that one needs to look at the three things, and that would be one of my bases for suggesting that we need a discipline. But before doing that, let's see. Maybe we need to go to-- ah, you were right here on the arrow. It really doesn't like this slide. OK, good. So, the other area where we did some work was on the supply chain, and we actually looked at receiving, and we looked at processes in different warehouses and in different stores collaborating with Walmart, Gillette, and many others, and trying to understand how things worked.

And what we did is a very detailed almost maniacal kind of analysis, where we were obsessed for understanding everything, and actually even with Richard and a few others we spent hours videotaping and mapping processes. And on a simple warehouse, we had thousands of processes to try and really understand what could change. So we don't really have time to go in detail, but we did learn quite a bit. We have a paper that details the methodology that we used, but that just by looking at one warehouses and just by looking in detail at something, you can really learn a lot of things.

Just like I showed you what we learned on the legal side just by looking at that little grocery cart in that little example. OK? But we did the same thing with a warehouse, and basically just by analyzing a warehouse you can come up with a bunch of areas where there can be improvement, and those are areas where RFID can help the supply chain, and they've been published quite widely. But here also again another way of looking at the different areas where there can be improvement, and that's again to prove the variety of issues that can be researched on the supply chain.

That's again a slide that Sanjay showed yesterday, and I think the nice thing also about RFID is that it can really help you do a very detailed analysis much more so than you could before. And I mean our inspiration for some of that work was the scientific management, the work that Taylor did almost 100 years ago on really understanding the details of shoveling. He did these sort of studies on how you shovel to try and design what's the perfect shovel, right?

So what happens is that with RFID-- and that's something that we've learned recently is that RFID really that's the time-in-motion work for you. So you no longer need to go with a camera and videotape and analyze because RFID tells you what happens. So I think that there are major areas for improvement that can be researched. Now, after doing this analysis, we tried and go a bit forward and say, OK, how will the world be? Now that we've seen in a few places how things are, let's try and look for the future, and our rationale-- I mean, imagine that fellow in the car, Mr. Ford.

If Ford could have come to the Harvard Bridge and Ford had sat there in the Harvard Bridge for 10 minutes, maybe 15 minutes, jump 100 years and then go back, just in those 15 minutes he probably would know how the world was. If you just have a snapshot of a small place, how it evolves, you really can tell a lot about the future.

And I think here, if you work on RFID, probably-- and on the supply chain, which is where I think there's the most advanced applications, by looking at one small place in the supply chain and really seeing how RFID impacts that small space you can then make some claims as to how the future will be. And that's what we've actually try and do by looking, having some experience in a few places with very deep experience, and so these are some of the things that we think will happen, and we probably don't have time.

I think a trend that we believe will happen is for increased fragmentation. So there will be a lot of fragmentation, and the supply chain will go more from a sort of supply-dedicated line of products that you ship to more of like a packetized network, if you know what packetizing is in telecommunications. So we think there will be a lot more fragmentation, and we also think that there will be new store formats, and a product may become a store in itself, and you may have stores that only sell one product, which is itself, because with RFID if you encapsulate everything you can have all the accounting.

You can have a little ERP system associated to a tag, and that's [INAUDIBLE] to the end in a way. [INAUDIBLE] the to end. OK? Good. So, again, this is another example where by looking at business cases you have to make assumptions, or by doing the analysis you make the assumptions of the technology and then you need to come up with the application. So again, all these things are very, very related.

So if we think-- OK, same problem. Good. So then a question that we have if we take this view that we need to work as a group-- you know, I think the question is how we collaborate. And I think some of the initiative, the [INAUDIBLE] Initiative that MIT has also been involved and a bunch of the people here in the audience.

I think that may be an example of how we need to collaborate, so do more of these events and try and see what are the different areas that we can work on, try and divide the work, and try and make progress together. Because I think to me one of the messages of the slide that Sanjay showed is that there is too much to be done almost.

It's like there is work for the next 100 years, so let's try and organize it, and let's try and build a research agenda. So these are just slides from the Peloton that we don't have time to go through, but the idea here is that different players from the industry are trying to collaborate and see how things are evolving. And [INAUDIBLE] over there is like the expert on this right now. So he can tell you all about it, and this is all the different players and how they see evolving, and it'd be nice if we had something like this for academia. What are the different areas of where we're going to do research? What are the problems we're going to try and solve?

I mean, Hilbert did this in math. You know, he came up with the Hilbert problems for the 20th century, and some of them are still not solved. OK? So very, very briefly. So when is it necessary to make an academic discipline?

So let's say we wanted to make a discipline. What are the things that we need to have? Right? So I think obviously it needs to be a fun thing so we all want to work about it, so we can get all these tenured people to collaborate, otherwise they won't.

So then there needs to be relevance, which there needs to be something that really makes sense. There needs to be some form of rigor to it, and then I think very important is the distance to other disciplines. I mean, is this something different that deserves its own space, or is it just sort of an incremental change? And then we need the community, and I feel that that's something that we can really have, a community.

And I see people-- I have colleagues. When my colleagues start doing research on RFID, they can't stop. It's very hard to find people that stop working on RFID. Once they start, they stay with it because it's very fascinating, and there's lots of stuff, and I think there's a business interest. So if you take, for example, civil engineering, or architecture, or even computer science or AI, I think we have something similar to those disciplines.

You know, if architecture has its own discipline, isn't this something a lot bigger than architecture? This is going to change the virtual world in a way that's, I mean, not even funny. If you look at computer science, all computers have all been linked so far to screens, right? And all of a sudden RFID now brings computing to the world, and the whole world is a computer.

If that doesn't deserve a discipline-- I mean, so that's my view. OK? I may be wrong. So that's my instinct, that we should create a discipline, OK? And obviously like civil engineering and architecture, we're going to draw from others. I mean, it's not like we're going to do everything from start, and I think we need to start close to the real buildings like architecture and civil engineering.

And I think the best place is the supply chain, so that will be my suggested laboratory. OK? And obviously we need to define the research agenda, and so now my final slide. In terms of next steps, I think we need to start with these Hilbert problems.

What are the big problems? And I think we need to take Sanjay's three columns and decide whether it's three or four, but then I think we need to go across and say, OK, what are some of the threats that we can work on? And I think we need to do it with industry and EPCglobal, so close to reality, and then we need to build the academic community and grow the discipline.

Anyway, that's just my thoughts. OK? Thank you.

[APPLAUSE]

GUEST SPEAKER 4: Thanks, Brian.

GUEST SPEAKER 2: You're welcome.

GUEST SPEAKER 4: OK. We actually have built in some time for questions, so I'll open the floor to questions, and, as we did yesterday, if you would come down to the microphone.

AUDIENCE: Oliver Hedgepath, University of Alaska. From all of your academic as well as business discussions just now, it jumps out at me that maybe there are going to be in the future-- again, Brian, if we look ahead like Henry Ford from the horseless carriage to now the automobile, the Hummer, and all the different terms and metaphors we use. Is there a new metric? Is there a new measure of performance that we're missing, or is there a metric we should think about retiring in the future?

Henry Ford didn't see the measures of performance we use today in the automotive industry. So I'd like to hear from Simon, you, all of you. Any metrics that are occurring or changes to the units such as measuring inventory by days versus inventory by second? Any comment?

GUEST SPEAKER 3: Do you have any suggestions?

AUDIENCE: Yes.

[LAUGHTER]

GUEST SPEAKER 3: I knew you had--

AUDIENCE: But I'm not on the panel.

[LAUGHTER]

GUEST SPEAKER 3: But go ahead. Say your suggesting.

AUDIENCE: [INAUDIBLE]

GUEST SPEAKER 3: OK. [INAUDIBLE]

GUEST SPEAKER 5: I think that-- yeah, this is working. You're right that the metric will change as we move forward. I think right now in terms of the metric on readability, read rates, appropriate tags, antennas, that sort of thing, that's only in its infancy of developing those standards. And I think we've got to learn from the barcoding industry of printing barcodes, and readability of barcodes, and how that transferred from the initial stages to business as usual of the business sort of working with suppliers on standards for barcode technology.

So we should learn from the past. You're right. We've got an opportunity to fast track, but in terms of setting those benchmarks, I think we're at a very early stage. And in terms of measuring the supply chain and efficiencies, you know, I guess we don't know what we don't know today. And we're starting to see the first signs of that.

And a few suppliers that we're working with are starting to see some of those wows and opening their eyes to what they believed were average lead times and actually seeing natural lead times, which identifies opportunities that may or may not be solved with RFID, but at least it's showing where opportunities exists, where they can actually then go and change a process to speed that product through.

GUEST SPEAKER 4: If I can add one thing to what-- if I could add one thing to what Simon was saying, I think-- because he said we don't know what we don't know at this point. And I somewhat quote Gary Cooper, the CIO at Tyson when he said the aha moments are yet to come. And I'll use an example from some of the early work at Walmart that we noticed when we started looking at the data.

What we call the case cycles, the movements of boxes from the back room to the sale's floor and then back again, that wasn't anything or-- Simon, correct me if I'm wrong-- that we kind of went in looking to say, hey, let's see how many times this is happening. The data started telling us this. Well, that actually could be now a metric of the efficiency of the shelf-stocking function that we're seeing these boxes going out.

But beforehand, nobody had written down anywhere, oh, let's look at case cycles. That was revealed to us through the data, and I think we've got a lot of that yet to come, and I think again I'll go back to the slide that I had on whether we view things as incremental or radical. Especially in that radical category, I don't think we yet know what some of those metrics may be, and I think they'll be revealed to us as we understand the data and how we can deploy that technology.

GUEST SPEAKER 2: Yeah. I think in terms of metrics. I published a paper in like '98 forecasting what's happening with Google, these metrics where every little ad has its own metric and you measure everything. And I think that's what's going to happen. So we are going to micro measure absolutely everything, and we're going to know whether is it worth it to take it right or take a left, and associates will know should I go to the right or to the left.

What is it more likely? That I'm going to generate value to do zoning, and we're going to make sure absolutely everything. And I think the metric will be sort of event-driven. Anything that you do will get a metric of how positive it is, and you will have all these computer scientists helping come up with measures and ways to improve it. Yes.

AUDIENCE: All right. Thank you.

GUEST SPEAKER 4: Thank you. Question over here.

AUDIENCE: [INAUDIBLE] I'm [INAUDIBLE] from supply chain and information system at Penn State. My question is about the actions-- in particular, remedial actions. Every speaker's talked about changed business processes, so I want go narrow. Can you tell me examples of some actions in those business processes?

So, Dick mentioned if you see some alert on promotional items, you can call them. I would call that remedial actions, whereas in the health industry the pedigree requirement, I would say it's changed business processes, but it's mainly recording the history. It's trace and track, and I want to add that it's not just operational-level actions.

At the strategic-level actions too again use Dick's example. If you can alert and you can see the displacement, maybe that means you can have a different kind of contract on promotions at the strategic level with your retailer now that the supplier can see better. So, again, my question is can you tell us some actions and remedial actions that you can take? Thank you.

GUEST SPEAKER 4: So, this would probably be for Dick, Simon, and Klaus. What are some actions that you've actually taken based upon data or process changes that you've made?

GUEST SPEAKER 5: Let me just comment on the observation you made around [INAUDIBLE] that Dick referenced. In the proof of concept in the trials, yes, you would react to those situations, but going forward what that identifies is how we can be proactive. And so we're not always chasing and firefighting, and so that on promotions, for example, instead of getting to a situation where today is D-day, and that product should have been out on the sales floor and it's not, actually using the data to count down and to alert in advance to store management and associates.

So a week out it's, OK, you're getting prepared for this. All the merchandise is there. In two days out, OK, that should be moving out, and it's not, so that we're actually more proactive and helping the associates and store management get that product out on time rather than just reacting.

GUEST SPEAKER 3: I would agree very much with Simon. I think it's a combination, and you kind of answered, I think, your own question by saying we're using the data, we're using the alerts to give associates information proactively in advance of the occurrence. And then it comes down to training them to use new equipment, handheld readers, which give them the ability to do their job faster, more accurately.

GUEST SPEAKER 5: The other thing I would add as well is that we talk about the out-of-stock study that the U of A conducted and the results we saw from that, but what that doesn't show and what is really hard to measure is how many out-of-stocks did we prevent. How many products did we save from going to the last two or three bottles of a product on the shelf? Which then maybe dented, or nobody wants to pick the last item off the shelf.

How many of those instances did we avert? And keep that shelf fuller and the display fuller, which we all know then sells more of that product. So I think we are being proactive in terms of that and obviously for those fast-selling items or things that didn't get executed correctly. Then we're getting that product out much quicker to fill that gap as well.

GUEST SPEAKER 4: Klaus.

GUEST SPEAKER 1: And from our point of view is in former times it was only a game between the supplier and the retailer, and the logistics service provider was not existent. And if you have then a proactive way that you bring forward, that you go into that technology that you learn, then you can show that you are connecting a binding medium and to help those to improve their supply chain. And this is what we learned out of the overall RFID trials, and the other one is that you have to work very close together, yet you have exchanged data. The biggest problem in the beginning was to have the right data available to start for RFID. Yeah.

GUEST SPEAKER 3: OK. I think also having better accuracy is going to lead to more accountability and better forecasting. For example, one of the promotional examples I used-- promotion didn't do. Well, did it not do well because it didn't get out to the floor on time? Or did it not do well because it didn't attract the consumer demand? Having accurate data which allows us to execute the display flawlessly is then going to allow the manufacturer to be more accountable to the retailer for all the right kinds of products and promotions, the retailer more accountable to the manufacturer, and together that will create a more ideal forecasting mechanism.

GUEST SPEAKER 4: OK. Thank you. Harold.

AUDIENCE: Hello. My name is Harold Beck from the University of Sherbrooke. I'm a professor of marketing. First of all, I'd just like to say I'm really excited about everything I heard today, and I have so many questions my head is spinning, but, Bill, I'm only going to start with one question right now. OK?

[LAUGHTER]

So I'm really glad to see on a retail point of view the diffusion of the RFID technology within the store, and we're going more and more towards promotions eventually helping customers do cross-selling and up-selling opportunities. Now, I know a while back Gillette did a pilot with RFID tags and the whole Caspian movement of consumers against supermarket privacy invasion and numbering. They started boycotting Gillette because of that initiative, and I know also Walmart had some difficulties with consumer tracking within their stores a while back.

Now, my question is do you foresee in the near future using RFID in order to interact with consumers. And the second part of the question is, what are you doing against the possible push-back from different consumer groups?

GUEST SPEAKER 3: Well, just two quick answers. I think right now it is a supply chain technology. It is a technology that's going to better enable us to satisfy shopper needs through supply chain improvements. So, no, we're not thinking about what comes beyond that.

Secondly, over the last few years through the good work of EPCglobal and EPCglobal subscribers who sit on the public policy steering committee, principles and guidelines have been put in place for the responsible use of the technology.

GUEST SPEAKER 5: I'll just add to that then. I think it is around communicating that message, educating our associates and customers of why we are using it, and how it's going to benefit them from us using it in the supply chain to better serve them.

AUDIENCE: Do you see within the next maybe 10 years the possibility of having enough education among the consumer in order to be able to use that technology to help them be more informed about their purchases?

GUEST SPEAKER 5: I think like the EPC and the logo will become ubiquitous, much the same as Intel inside. You know, consumers will relate to that and see the advantages of that case or product having that--

AUDIENCE: Thank you.

GUEST SPEAKER 5: [INAUDIBLE]

GUEST SPEAKER 3: Question?

AUDIENCE: Hi. I'm John [INAUDIBLE] from Mars Incorporated. So my question's about the benefit case, and if we take Dick's kind of diffusion model and cross it with Klaus's supply chain model and you look at the benefits and the costs, they seem to be lumpily distributed through that matrix. So, one of the barriers to adoption is the dislocation or the benefit and the cost, and I know that's starting to cause slowing the rate of adoption just even thinking about it, and not even working but thinking.

If that's a barrier to thinking, it seems to me one of the areas and if the combination between the cells in that matrix are really where the benefits are in collaboration. So I'd like you to answer two questions. One is, what about that benefit case? Is it really as lumpily distributed as it seems?

And two, is there a need for research in collaborative tools to help the supplier or the manufacturer and the retailer to get together to have-- if the benefit's in the collaboration space, do we need some research to help drive that? Because I think that's a big gap right now.

GUEST SPEAKER 3: I think the answer to your question is absolutely. The more research we have to understand the collaboration, so understand the cause and effect of putting an EPC tag on a product, and being able to track that product, and then adjust process to increase the efficiency of flow to the shelf to the consumer is clearly where there needs to be collaboration between manufacturer, retailer, and academia. I think what I tried to communicate is we believe that you can't do everything at once. You have to pick your lumps.

AUDIENCE: Right.

GUEST SPEAKER 3: We've picked displays, promotional displays, new [INAUDIBLE] as a big lump that can justify a favorable benefit-cost ratio. And some higher advantage type products like Gillette blades and razors or Crest Whitestrips that are high-margin, high-velocity, high-shrink, they are lumps that can justify the cost. So start there because you can't do everything at one time, and then based on that learning you want to better understand how to do other products, how to smooth out the lumps, and get consistency across your product line.

GUEST SPEAKER 4: Klaus.

GUEST SPEAKER 1: Yeah, we have done exactly the same. We are looking more to the fashion industry because we can see that the garment which costs $100 or $200 can bear more the costs, but we have more the efficiency there, and we will do this. We will roll out more on the fashion side, and we will do trials on the other sides to learn. This is our philosophy, and this we will follow.