PROFESSOR: So as people are gathering, you might begin to notice some common themes across different industries. We have unique identifiers called-- what did we call it in the aircraft industry? So it's not just RFID.

DIMITRI KYRITSIS: Smart labels.

PROFESSOR: Oh, smart labels. Right. We've heard how identification schemes are incorporated in airplanes. And now, we're going to listen to our colleagues from the automotive industry and how RFID is enabling changes in that industry. And we're fortunate to have a member of the conference committee, Dimitri Kyritsis, who's the associate director of the Lab of Informatics for Design at the University of--

DIMITRI KYRITSIS: Swiss Federal Institute of Technology in Lausanne.

PROFESSOR: OK.

[LAUGHTER]

It didn't fit. Thank you.

DIMITRI KYRITSIS: Thank you. Or if you prefer it in French, it's Ecole Polytechnique Federal de Lausanne. Good afternoon, ladies and gentlemen. So we will continue somehow same concept, but in the automotive sector. We will cover two things, two aspects today. So the product lifecycle management and logistics or external logistics.

I suppose you know that there are other applications in automotive sector like the reusable and active tag in assembly lines. Or there are other initiatives in wireless manufacturing. But we will not talk about that today. It's my great pleasure to present you this project, Promise, about the PLAM and information tracking using smart-embedded devices.

You don't see RFID in the title. I will explain to you why. So my colleague here from Research Center Fiat, Julien Mascolo, will present you a concept of a demonstrator. And Professor Scholz-Reiter will give you an overview of another project in logistics.

So as you see here, you see two logos in the back left. It's the sixth framework program of the European Union and the IMS. IMS is the Intelligent Manufacturing System program that promotes research at the international level.

I will start with presenting you little bit briefly the partners. So in European-- in Europe, together with Switzerland, we are 22, including end users. You may recognize them. Fiat, Caterpillar, [INAUDIBLE], and producers of white and brown goods in Italy, well-known. [INAUDIBLE] do machine tools. [INAUDIBLE] do telecom equipment in Greece. Bombadier in Switzerland. They're well known for not only for airplanes, but railway. Locomotives. And this division is with us.

In solution providers, we have ACP, a world leader in ERP solutions [INAUDIBLE], producing tags and other embedded devices. And the other that you see here are small companies that they provide the services in this field, and a number of number of universities from Europe, including Cambridge University who is also a member of this community.

[INAUDIBLE] international program. So we have partners in Japan, a consortium which is led by Toyota Motors and including University of Tokyo, Wasede University, and CHO University. In the United States, we work with the Intelligence Maintenance System, the National Science Foundation Center, which runs University of Cincinnati now because Professor [INAUDIBLE] moved to Cincinnati, Stanford, and University of Michigan. And in Australia, also, there's a small consortium with IRIS. IRIS is a Research Institute in the Swinburne University, and they do work in end of life management.

So our ultimate goal is to realize closed loop PLM for this kind of products. What do we mean by that? So if you take the phases of a product system lifecycle-- let's take these four runs. Two of them, the first two of them, design and production, are part of the beginning of life of product. The use and service is the middle of life, and the end of use is the end of life.

And you see the activities that are on a regular basis within them. And then if you take the flows, the information flows, you see that as the process level where designs, design is concerned, you have now some concurrent activities or some feedback, particularly between design and production with tools like concurrent engineering, design for manufacturing and assembly, et cetera. You have good tools there.

But if you go farther to the lifecycle, there is not a lot of feedback of information. At the product level, you have the documentation. You have design documents, user guides, manuals, et cetera. And if you take the material look then after the end of use, there is no track of information. Or in some sectors, there is, but usually, in most of the products, you don't have a lot of information coming back. So our goal is to provide the system that allows closing the information loop so field data, experience gathered in the field from various factors involved, goes back to design and helps improve quality of products and new generation of products.

So the concept is to use some product embedded information devices, as we call them, including RFID. We'll see in another slide the way we use this system that will allow to realize on ideas like this one. So when a product is delivered, a locomotive, for example, there is some initial information that is written in this product, Let's say in an embedded device.

Then during life, you have various active agents which are certified agents. And they have the right to conduct, to communicate with the product and talk to it and retrieve information, take decisions, or be able to retrieve information specific to that product through the internet and take decisions and update information locally if it is necessary, and also back to the producers.

So we are going to use various identification technologies. Some of them are here, and I present them here. We have RFID with EPCglobal. That [INAUDIBLE] now. But we have also other ID technologies that are referenced, and you are aware of them. The ID [INAUDIBLE], which is something developed by Helsinki University of Technology, is also partner in our project.

The WWAI is also another. A protocol promoted by Stockway, a small company in Finland. Finland again by chance, maybe, which is also partnered in our project. And then we have also some tools like the GPS or the GIS for the localization issues.

So our concept is as it is shown here. So you have exchange between values. This elements, the EL system that is used to develop the product, the product itself, and the various services that are executed by various agents through the life of a product. All this data and information and knowledge is created, how to manage all this stuff.

So this is what we call the concept of closed loop PLM. And in order to realize it, we think that we need this product embedded information devices to capture information within the product. And we think that it has to be closed in two directions, horizontally and vertically.

What do I mean horizontally and vertically? This is a very generic model of a product. So you have the product lifecycle phase here. Oops. Yes. Beginning of life, middle of life, end of life. And you have the application layer. So layer 1, for example, the RFID tax or, rather, at the productive level, at the hardware level.

Layer 2, for example, maybe the middle where I will-- there will be some more explanation after. And we want to close in vertical. In the vertical direction, that is that information goes from the product to the decision support systems and back to the product if it is necessary. And also along the lifecycles from beginning of life to end of life and back to the beginning of life.

So pillar modeling means for us that we have to manage the whole product lifecycle activities and manage not only product data, but also associated resources, including people, and agents, and machines, et cetera. There is a need to collaborate among various partners and stakeholders. And we need to have an enterprise ability to analyze related problems and take appropriate decisions.

So just to give you, I think, motivation, if you see in this, you're right diagram, the information associated with the products goes decreasing with the time. And what we want to do that is to invert the situation and going, let's say, from one phase to the other. Augment this information using available technology that will help to close the loops.

So what kind of data? So I saw some in some previous talks something similar. They have the contacts that we want to measure. For example, a sample of them. And a kind of metadata. For example, questions that the product should be able to answer.

This is an overview of our system architecture starting from the products, where we have this product embedded information devices in various forms, and then middleware to communicate with that and to develop applications for decision making, for knowledge management, and then business processes applications from design for [INAUDIBLE] to recycling to end of life. This is the architecture of the component that we have.

What we do here is we don't use only RFID. Infineon is developing a technology called PIDX Access Container that tries to modernize information contained in various tags embedded with the product. And then allow the transmission of this data in good interface with middleware and to debugging systems. For example, a possible scenario that we want to analyze with all of this promise system is, for example, with middleware from PAD to provide data from these devices to the middleware, then this data will be transferred to data analysis systems and decision support systems.

There is this analogy. There is an aggregation of data. Data synchronization was the term used before. And this will help to generate some knowledge to be used for various decisions. For example, there will be a request for an incident happened sometime in the past, or there will be some analysis of this data and the generation of records. And this will be helped to bring back some information to the product and concentrate business processes.

So in promise, we have various applications [INAUDIBLE] in these sectors represented by the partners from the automotive sector. We will see an example right after. To the refrigerators machine tools, et cetera. This is the list of the demonstrators that we are going to develop. We're developing right now. We're at the beginning, but they are in process. And the phase of lifecycle covered and the representative partners. And not all of them will demonstrated everything, but in this small chart, you have which demonstrated or contributes to what part of the [INAUDIBLE].

So if you want to know more, please visit us on this website. Now, you see it is W. We promise no. No's for Norway. But then it will be replaced by the we promise U from the United States.

[LAUGHTER]

Thank you very much.

[APPLAUSE]

PROFESSOR: Thank you. And now we have Julien Mascolo, who's the international liaison project coordinator for the Technologies Division of Centro Ricerche Fiat, which I assume means the Research Center for Fiat, in Milano.

GUEST SPEAKER 1: Well, actually, it's not really Milano. But it's OK. It's just as if you say Boston and Cambridge. It's nearly the same thing, isn't it? [LAUGHING] OK. So let's transfer my presentation. So my duty now is to make a short overview of the concepts that we are developing in promise in 10 minutes. So I think there are a lot of technical and business issues there that I would not have time in 10 minutes to address. So if you have some questions, you can ask me afterwards.

OK, this is an example of what we are doing in promise and how we use the data that we collected during the life cycle of the product to support the dismantling process and the reuse of components, knowing how the vehicle and the components have been used during the life cycle. So just a 10-second advertisement of who we are. We are the Fiat Research Center. We are working for the different companies in the Fiat group which are doing a lot, a lot of things.

You have companies which are more well known on this side of the Atlantic, for example. The [INAUDIBLE] new Holland is part of the Fiat group, and the Ferrari. But actually, the-- ah, OK. What we are applying RFID for in actually is in production systems and how to increase-- to optimize the maintenance process. For products, trucks, how to use RFIDs to optimize the maintenance coupons. And this application that I will present is on how RFID tags can be used to optimize the reuse of components at the end of life of the vehicle.

Well, what is the context? On one side, we have a lot of legislative pressure coming from the EU on reusing components. And reusing in weight and volume components of our costs. Then we have also pressure on the fact that now, anybody roughly can make spare parts and send them. This is not-- now, it's a thing that can be done by everybody, not only the OENs.

And then the spare parts business is one of the most profitable . Parts so we do not want to lose this business. So roughly, this demonstration is how to transform a business, a legislative pressure, into a business. How will we achieve this? By developing what we call an onboard diary, which collects the information during the lifecycle. It in some way aggregates it, and then at the end, gives the dismantling some hints on which are the components that should be dismantled and reused.

Well, roughly, it's-- the current situation is that the history of the components and the vehicle is very, very roughly known. We do not know except when the car comes back to the garage, we do not know how the components are and how they had been used. Well, we want to go from this as a situation, and it should be a situation where we exactly know how the components have been used during what we call the middle of life. The lifecycle of the car. And analyze this information. Give it to the recycler so that he is able to dismount the components.

Well, the context. The context for using these smart labels is quite harsh. We have typically a life cycle of a car, which is more than 20 years, maybe 30 years, maybe 40 years. So are we planning to use the same RFID tags for this period?

Then the second pressure, the second constraint is, well, our cars go everywhere in the world. We are not always connected to them. So how can we be sure that the information we need is still collected while the car is anywhere in the world and collected, stored, into the vehicle and then passed to the dismantler at the end of life?

Well, the cost has to be limited. We are talking about components which are the most expensive components in the car. For example, a clutch, a motor, an engine, starting engine, et cetera, et cetera. These are components which are $500, $1000 up.

But we have a lot of these components on board on the vehicle, and we have a lot of vehicles going around in the world. More than two or three million, and maybe five to six components per car. So that makes it a lot of tax. Then the memory is limited on this tax. But the information that is registered by the ECU, by the central unit of the car, is huge. There is a lot of information which circulates in the car, and we want to store this to aggregate this, to store it and to pass it to a dismantler.

Then we have a lot of other issues. For example, this data that we register that we store is about how the user has been using the products. So this is-- there is here a very sensitive issue of registering how our clients are using their costs. And then there are a lot of physical constraints.

We are talking about what is going on under the hood of the vehicle, where we have lots of rotating parts. We have liquids. We have metals. So transmitting something in these conditions and for this long period of time is quite a huge task.

Well, we are talking about product lifecycle management. We are talking about components and vehicles. Let's make an example. We have here all the lifecycle of the car. We have some information, some events and some information which is stored during this lifecycle.

Information related to the design and production. For example, which are the conditions in which it has been produced? Which are the recycling strategies which should be used at the end of the lifecycle? And during the operation of the car, we have a lot information that is coming through the different sensors which are already on board of the vehicle. A lot of information that should be aggregated.

This is what we call computing these summary statistics. We cannot store all this information. We have to use our, let's say, knowledge of what is the data, which is important for assessing the final residual value of the year of the car. OK, I have to speed up. OK. And so we have to aggregate in some way this information into what is really useful for the end of the life.

OK, this online data registered during the life cycle. And then offline, we have to know really what's worth. What's the business off of it? And how much could I sell these spare parts which have a residual life? How can I sell these to my customers? And then give this online data and offline data to the DSS so that we know what to do with the components.

OK, let's make two simple examples of what is happening during the lifecycle. One of the components, the clutch, for example, is being substituted. The RFID, which is on board of the component, was spotted by the antenna, the reader, which is connected to the central ECU. The ECU recognized that this clutch has been substituted and stored this data in the onboard diary.

At the end of life of the vehicle, this information is passed to the dismantler. So I recall that it's dynamic and static data. Static data is the data that doesn't change along the lifecycle. Dynamic data is what we call summary statistics.

So these are updated data. For example, in this case, the number of engine startups versus the outside temperature. So this data is given to the dismantler. Plus the cost models in the sense that we have to know if there is a business behind dismantling these components.

And the final result should be a list of the components inside the car from the component which is most interesting to be dismantled to the less interesting one. This information is passed back to the list, to the database of spare parts, and to the components, where it is printed on the RFID.

So in some way, the RFID is certified. We say that the component is 50% good. So it has a residual life of 50%. This leaves to the component detachment. And what are we doing in this period? We are testing this approach. As I said before, there is a lot of technical constraints behind this component.

There are a lot of technical constraints behind this concept. So we are currently doing some tests on static vehicle for the time being, and then on working vehicles. We have developed prototypes of the DSS, which is kind of proof of concept. Unfortunately, I wanted to come with this demonstrator right now, but I think passing the costumes would be strange, and components would have been quite difficult. So that would be for another time. And so we have a lot of consistency issues to test with this approach.

OK. So that's roughly another view of this demonstrator that we have. The best we are doing in this period and in the framework of this European project. I think we have some, maybe, four questions.

PROFESSOR: We'll have the questions again.

GUEST SPEAKER 1: OK. That's fine.

[APPLAUSE]

PROFESSOR: And so our next speaker is Professor Bernd Scholz-Reiter, who is the professor and director of Planning and Control Production Systems at the University of Bremen. And actually, while you're bringing that up, I should say that you had arranged to have the director of the Daimler Chrysler RFID effort here, or that was-- right? And then at the last minute, there was a scheduling issue. But I assume you'll be talking about that.

BERND SCHOLZ-REITER: A little bit about that product, yes. Good afternoon, ladies and gentlemen. At the University of Bremen, we have a so-called CRC, a Collaborative Research Center, which is funded by the German Science Foundation and is the long-term research of about nearly 12 years. And in this collaborative research center, we are now working about 80 researchers of four faculties, so in different disciplines.

And they try to investigate how conventional control, which usually is applied now in our industry nowadays, could be transferred to autonomous control, which will be able, in our opinion, to be applied in a couple of years when we have the RFIDs of the future, which means RFIDs which cannot only store data but also are able to calculate information and make their own decisions and gather data from their environment and exchange this data with other intelligent objects which are also-- which also have these RFID chips of the future on board.

So our idea is that we can work on autonomous control and logistic processes and figure out where the limitations are in our days, where the limitations are in different business cases, and where the limitations are in different situations in these specific business cases. The main idea is every logistic item will be intelligent and future based. On this basic research, we also are on the floor of research. And we work together with industry and RFID implementation projects.

And two of these RFID implementation projects we are involved in I would like to introduce to you now. The first one is a logistics project in automobile logistics, which means that we have an automobile logistics provider who transports the finished cars from the automobile manufacturer, which is shown here on the upper-left corner, to a terminal of the automobile logistics provider on the right-hand side, and from there to automobile dealers or automobile traders, which are on the lower left-hand side.

So the cars leave the assembly line, for example, here, and are stored somewhere on the plant area. Sorry for that. And are stored somewhere on the plant area of the OAM. Then the automobile logistics provider took them up, take them up, and transport them to the area of the terminals, of his own terminal, where some technical operations will be done on the cars. For example, to erase the bags before the car will be sold to the automobile trader. And also to assemble additional technical equipment. For example, s navigation systems and so on.

And also on this area, of course, the cars are stored. And a typical terminal here has about 10,000 cars which are stored. And this is not very easy to store them and find them back, and also to do this in a proper way with minimal transport time, and so on. And afterwards, the cars leave again on trucks to, for example, to the dealers, where they are stored again until they are sold to the end consumer. And the question now is, how can we support this process with another ICT technology and support this process also with RFID technology?

Because of our Collaborative Research Center, the automobile logistics provider Hans asked us to support them. Hans is an automobile logistics service provider for new and used cars. And it's in the range of transport not only but also technical treatment, storage, and handling of cars. It has auto terminals. Of course, transport and car shipping. And its field of action is all over Europe, so its the biggest automobile logistics provider in Europe.

And it transports not only the cars but trucks also by vessels, rail, and inland shipping, as well as short shipping along the coast in Europe. And what we do is we should investigate several possible fields of application of RFID systems based on the processes. And the first step, we limited ourself to an idealized automobile turn of the company Hans.

This is the current state of this process, and you see the weaknesses here. We apply at this stage only barcode labels. So the documentation of the vehicle movements our only via barcode scanners or keyboards. The barcode is very weak because raindrops condensate or snow on the windscreen make scanning unreliable or also impossible. The barcode labels bleach when exposed to direct sunlight, for example. And this can cause incorrect or incomplete data acquisition. And, of course, it's also then we have a result of high consequential costs.

The solution we figured out between different alternatives is now that we have an RFID label on the windshield, protection foil integrated in this windshield protection foil, which is the passive RFID label. And on this automobile terminal, the handling driver has a portable data terminal. And when he approaches a car, there is the connection of communication between the PDT and the passive transponder.

The PDT can be located via GPS. So if the connection here exists and the PDT is moving somewhere around the terminal, you know that the car has moved somewhere around the terminal. And then you can communicate the data to the IT systems. So to the scanning and control system of the automobile logistics provider. That is the solution which is now under development to support this automobile logistics process and the first step on the area of the automobile terminal.

The second case study in the automotive industry is tracking and tracing of returnable transport items this is a project involving Siemens Business Services, Red Ants, and my institute, the BIBA Institute. We have two pilot installations-- Daimler Chrysler and Lia Corporation as the seat supplier of Daimler Chrysler.

The supply chain looks like this. We have the supplier here, the seat supplier, and the production. Of course, a lot of the seats on the returnable transport items. Afterwards, the delivery by truck to an inbound buffer of the OEM of Daimler Chrysler here. Then the unload of the seats and assembly directly on the assembly line.

Afterwards, empty RTIs go either to repair or return directly to transport to the ingoing buffer of the supplier. And on different stages here in this process, we can implement RFID readers. And all the RTIs are also equipped with this RFIDs.

This as a project, goals here-- improvement of process reliability, of course. So delivery of seat in the right sequence and also in the right order. Left or right seat in the car, which was a problem in former times. And the main goal, of course, is reduction of cost and complexity and the reduction of the circulating assets or reduction of the number of RTIs.

The technical solution looks like this. We have two passive transponders or smart labels on the RTIs. Two because of the reading distance and the direction of the RTI to the reading facilities. And we have one removable transponder at this stage on the seat frame.

The removable transponder will be-- later on will be integrated in the frame of the seat and will be there for the whole lifetime so it has then some connections to the promise project. That was just a short introduction to two implementation projects with industry we conduct. But based on the basic research, I have also mentioned this investigation of autonomous control for logistic processes. Thank you very much for your attention.

[APPLAUSE]

PROFESSOR: So any questions for our panelists? If we could ask you to come up to the microphone. Thank you.

AUDIENCE: It's a long way down. University of Bremen was doing some testing projects with cool chain temperature monitoring of trucks and things of that nature. Is this project associated with that one at all, do you know?

BERND SCHOLZ-REITER: It's not associated directly, but it has also something to do with some colleagues of mine were also involved in this collaborative research center.

AUDIENCE: OK. So the same autonomous logistics process and taking everything from centralized to a localized control thing is going to be merged with the other data. Are you taking the two projects together for the results at all, or are you just comparing some different parts of the projects?

BERND SCHOLZ-REITER: You mean these two projects here, what I've introduced to do?

AUDIENCE: Yes.

BERND SCHOLZ-REITER: No, they are not related to each other. So the automobile final product logistic process is not related to the RTI.

AUDIENCE: OK.

BERND SCHOLZ-REITER: Because this RTI is this closed loop thing and has nothing to do with the parts or the products. It's just the means of transportation.

AUDIENCE: OK. Thank you.

BERND SCHOLZ-REITER: Of parts and assembly.

PROFESSOR: I know, in the context that we have people from a number of different countries and continents here, one question that's come up specific to the automotive industry but that may be affecting many of our other industries is just whether there's a global standard for identification or whether we come out by continent or by even by company in some cases with our own ID systems. In the context that you've all described fairly closed systems, I wondered whether you had a comment in that regard in your industry.

BERND SCHOLZ-REITER: This is a good question. I'll give you an example of an mobile logistic process. There should be something like an EPC code. But on the barcode level, there is no agreement so far. So they have, with every OEM, they have their own bar code. And also, the logistics provider have their own bar code. And the ideas are not comparable to each other.

So on the other side, we have in Germany the Association of the German Automotive OEMs. And now, for this RFID purpose, they are sitting together to get a common agreement on the ID, which should be stored on this passive tech, which should be integrated in this windshield protection form. But this is the first attempt to do it. It failed in the barcode area, and now, they tried to do it now.

PROFESSOR: Well, thank you very much. Just so you know, Nick Ferguson, who's actually in this room somewhere, has the charter to try to help organize the automotive industry or more of a global basis to avoid that fragmentation that occurred in the bar code. So he would be the contact person in the EPCglobal group that's working on that area.

GUEST SPEAKER 1: Just another comment is that just as the aeronautics, a lot of system providers-- I mean, component makers-- are also working for different companies. I have the example of Manetti Marelli, which is doing components on not only for Fiat. It's also for a Mercedes Benz or outside Europe as well. So there is a tendency to define standards.

PROFESSOR: There's a reason that the Auto ID Center was initially founded by suppliers who were dealing with very large customers that had all their own way of looking at things. And so that's true in your industry as well. Well, thank you very much.

[APPLAUSE]