



Fostering data exchange in European rail transport

A talk with Mats Åkerfeldt and Gunnar Ivansson on LL#5 RFID in Rail ¹

Together, Mats Åkerfeldt and Gunnar Ivansson have over eighty years of professional experience –Mats mainly in the railway sector, and Gunnar with technology, specifically item tracking technology. When you add up that experience, you automatically arrive at the main technology used in FEDeRATED Living Lab #5: RFID-technology applied in the rail sector. This technology is not only used for the intermodal data exchange in Sweden, but also for international data exchange on a European rail corridor, running from a paper mill in the North of Sweden, through Denmark and Germany, all the way to the border town of Irún, in Spain.

Mats Åkerfeldt works for the planning department of the Swedish Transport Administration Trafikverket. He studied Economics and Business and started working in the field of rail traffic in 1974. Before he was employed by Trafikverket, Mats worked for Green Cargo, a rail freight carrier in Sweden. In the beginning of the 1990s he also advised the freight section of the Dutch railway company NS. Mats: “We ended up selling them our planning system for freight.”



Mats retired a year ago, but he decided to keep on working parttime. Within the planning department of Trafikverket he focusses especially on rail and European projects like FEDeRATED. And within Living Lab #5, Mats deals mainly with the business case, with is about providing shippers and other stakeholders with timely information on the whereabouts of the wagons and their goods, for “the information exchange in international rail traffic is still very poor”.

¹ Interview by Minne Buwalda





Gunnar Ivansson, who just turned 70, describes himself as a ‘technology nerd’. He has been involved with tracking applications for a long time, e.g. technology for tracking polar bears on Svalbard. Since 12 years he works as a consultant for Trafikverket, because he knows a lot about RFID-technology. Gunnar: “One of the first things I advised Trafikverket to do, was to use so-called passive RFID-technology.” The adjective ‘passive’ indicates the tags do not require any energy themselves. When a vehicle with a RFID-tag is passing a reader the energy from the reader wakes up the tag automatically. To which Mats adds: “The rail operators in Europe are not making enough money. That is why they cannot afford huge investments. But our RFID-solution is inexpensive. Attaching two tags on a wagon cost about 20 euro. That is why it is a big success in the Swedish rail sector.”





Gunnar continues: “Then we did a study on what was going on in the railway sector in the rest of Europe, and we found out that a lot of countries were dealing with RFID, but choosing different technical solutions. So, we made a proposal to standardize the RFID-technology for railway use in Europe, for rail transport is rather international. About 60 to 70 percent of all the railway wagons in Sweden is coming from all over Europe.” Mats and Gunnar proposed an open standard based on GS1, “because it is flexible and can also be adapted to other transport modalities.”

This GS1 global standard used for this application is called Electronic Product Code (EPC) and to share RFID information between stakeholders this information is called Electronic Product Code Information Services (EPCIS). It was agreed between a majority of European railway infrastructure managers as a railway standard and describes how the information in the RFID-tag should be structured. It also describes how the data format should be transferred from the reader to a server host. EPCIS enables users to gain a shared view of physical or digital objects within a relevant business context. Gunnar: “EPC and EPCIS defines how to put the tags on the railway carts, what kind of information is to be gathered and how to share it –that is all standardized– but each country still has its own take on things.” The specific data gathered and shared this way within this Living Lab is the identification and location of a specific train wagon, timestamps, and the direction of the train.

In the meantime, about 90 percent of the Swedish train wagons are RFID-tagged, according to Gunnar. And: “In the meantime Finland tagged all its wagons. And Deutsche Bahn also tagged almost all its 60.000 freight wagons. Other countries, like France, Austria, Switzerland and Denmark, are also active in the concept *RFID for Rail*. The usage of RFID might differ from country to country, but the concept and standards are the same. Applications can be developed for different purposes, like maintenance, track and trace for logistics, statistics etc. The RFID-application for logistics is evolving slowly.”

Intermodal data exchange in Sweden

The latest Factsheet of Living Lab #5 (February 2023) states that its main emphasis is to ‘scale up the current RFID-solution to rail and intermodal transport on a European level’, but reading the whole Factsheet it looks as if the multimodal part of this Living Lab is limited to Sweden, while the European part is limited to rail transport. Mats: “Yes, there are two separate sides to this Living Lab. The first one deals with data exchange in intermodal transport.” He starts explaining: “We cooperate with Real Rail, a private Swedish trucking and rail company, running trains from the port of Gothenburg to different destinations in Sweden. This is an intermodal system where you run containers on a fixed train from one terminal to another.”

Mats continues: “We attached RFID-tags on their wagons and share the data with their land terminal in Gothenburg, and also with the port itself. We have about 400 readers along the railway tracks in Sweden –about every 40 km there is a reading point. They can use these data within their own company and share the information with lorry companies through their Terminal Operation System. This way they can streamline their terminal operations.”

And then there is the intermodal use of RFID-tags in Umeå port –part of Kvarken ports. Mats: “There is a reader installed at the Umeå port train terminal that reads all the tags of incoming and outgoing wagons. But that is not part of our Living Lab #5 RFID in Rail. We are just helping the Kvarken ports Living Labs with that.”

Cooperation with Living Lab #21 SIMPLE

Lately, Mats and his team have been focusing mostly on the international part of their Living Lab. Within the EU, several rail freight corridors were established some ten years ago, based on European regulation. One of those corridors runs from Stockholm to Palermo in Sicily, through Denmark, Germany, Austria and Italy. Another one, called the Atlantic corridor, runs





from Mannheim in Germany through France all the way to the Port of Algeciras, in the South of Spain. Mats: “We strive to use these corridors as a testing ground for our FEDeRATED project. First, we wanted to use the Stockholm-Palermo corridor, but nothing came out of it so far. Then the Spanish rail authority ADIF came with the proposition to use the Atlantic corridor as a test bed, not only for the FEDeRATED project, but also, in a later instance, for the EuroRail project, which in time could be connected to the FEDeRATED project.”

So, that is what happened. Living Lab #5 RFID in Rail started cooperating with Living Lab #21, SIMPLE, in which the Spanish rail authority ADIF plays an important role. The use case that is worked out in this cooperation, is quite basic. Mats: ““We have a business case with a paper forwarder called ScandFibre Logistics. They are running single wagon loads from paper mills in the North of Sweden to all kinds of destinations in Europe. We follow their RFID-tagged wagons to Spain, using the EPCIS-standard.” This means that, in case a wagon would get lost or is delayed, its status and location can be tracked. This substantially improves supply chain visibility –or situational awareness– however you call it. This goal is very much advocated by STA through the Shift2Rail programme, coordinated by Jan Bergstrand



Jan Bergstrand

Within Europe, wagon loads can be sent across the continent using the trains and operational systems of other countries. Gunnar: “On this stretch from Sweden to Spain we use six different national operators to handle the wagon. That creates problems with information gathering and sharing.” Mats: “We talked with the French train infrastructure manager SNCF Réseau, but the organization in France is different from ours. As Trafikverket, we have a mission from our Ministry to foster intermodal freight traffic. The Spanish ADIF has more or less the same kind of mission. But as of yet, the French operators are restrained to maintenance and investments when it comes to using RFID. The French Ministry and operators seem to be interested in applying our approach, but at this moment they do not have a lot of RFID-readers installed –they use a hand scanning system instead.” To which he adds: “We are happy with the ADIF cooperation, putting a concrete solution in place now.” This solution might be an interesting starting point for future developments and data applications. Possibly it also helps to convince other EU Member States to join in.

Configuring extra information

For Living Lab #5 the use case ends in Irún, at the French-Spanish border. Mats: “Mid-February 2023 we did the final installation of the RFID-readers in Irún. In this France-Spanish





border town, two RFID-readers are installed on a private Spanish terminal side, and one on the Spanish ADIF-side. This makes it possible to track the wagons when they cross the border.” Locally, the RFID-information is key to improve the reloading capacity of the wagon for its return trip to Sweden, because they can plan their operations better. The information from the readers is shared in multiple ways –applying the concept ‘reporting one, multiple use’. Mats: “The RFID-data is sent to the Spanish SIMPLE-server, which in turn sends it to the Deplide-server in Gothenburg. The Deplide server then makes sure the data is shared with the forwarder and shipper in Sweden.”



Gunnar consulting with Deplide IT architect Eddie Olson (RISE)

Asking Mats if information on the content of the wagons, in this case the paper from the paper mills in North Sweden, is being shared, he says: “Each roll of paper has its own identification, but that kind of information is not part of our Living Lab. Before the wagons run back to Sweden, they are reloaded with consumer goods, mostly pallets with cartons of wine. The wagons going to Irun have around 90% reloading rate. But for us the cargo is not part of the information exchange.”

Yet, ADIF and SIMPLE do want to collect and share such information. Meaning that the information from the RFID-readers is only a part of the data that needs to be shared within and between platforms SIMPLE and Deplide. Mats: “We as Living Lab #5 have achieved our goals by showing that data sharing based on RFID-tag information can be done. Yet, the RFID-information is only about the where, when, what and direction of the train wagon.” For the platforms SIMPLE and Deplide the future has only just begun. Both have started to configure additional data to the use case, for example data on the cargo of the wagons, invoice information, train operator information, etcetera.

The FEDeRATED functional requirements of Discoverability and Security are covered in this Living Lab. Exchanging interoperable data in a harmonized way, Living Lab #5 only deals with RFID-data, which has its own standardized semantics. Asking Mats if the FEDeRATED

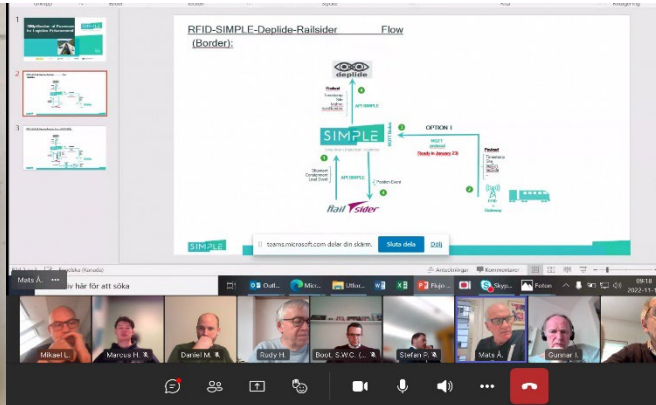




semantics is dealt with by the platforms exchanging the data, he says: “Yes, SIMPLE and Deplide discussed how to connect, and of course this includes applying FEDeRATED semantics.” But for Mats and Gunnar, the job on this European leg of their Living Lab is done for now. The proof of the pudding is in its eating: They have proven RFID-data exchange in Rail can be done between various countries.



RFID Receiver to be installed on a train



The SE-ES LL connection explained by Gunnar to FEDeRATED partners on 15 November 2022

