# An innovator who wants to boost knowledge

### A talk with Henk Mulder on LL#11, the Internet of Logistics[1]

*Henk Mulder is Head of Digital Cargo at IATA, the global representative of international airlines, and he manages FEDeRATED Living Lab #11, the so-called Internet of Logistics. Henk is passionate about disseminating the knowledge required to move the transport sector forward on the path of digitization. Within the FEDeRATED-context he is known as a teacher on topics like 'semantic modeling', a good-humored teacher, who knows what he is talking about. Another way he tries to boost knowledge in this area of expertise is through organizing IATA Hackathons.*

In the *FEDeRATED Milestone 10 report* Henk's Living Lab ticked almost all the required boxes with a 'yes', meaning it fulfilled most of the FEDeRATED requirements by October 2022. How come this Living Lab seems ahead of other Living Labs concerning the FEDeRATED requirements? Henk: "Although we are a Living Lab – so a development environment in which, together with other LL's, we try to demonstrate something to the European Commission – our Living Lab is entirely based on IATA ONE Record. And in terms of objectives, IATA ONE Record is a carbon copy of the FEDeRATED Project. Like FEDeRATED, ONE Record is about creating a digital standard, but then aimed at the global air transport industry."



With the ONE Record standard, IATA wants to connect every single airline in the world with every single forwarder, shipper, ground handler et cetera, so with the entire air logistics community. Henk: "We cannot do that unless we have all these digital elements in place, the same elements as FEDeRATED is aiming to build. And since our timing is such that our standard has to be fully fledged and finished by mid 2024, it is only natural that we intend to fulfill almost all of the requirements of FEDeRATED."

So, LL #11 is an application of the global air transport standard ONE Record in the multimodal, government involved European context of FEDeRATED. Henk is adamant about this point: "Our Living Lab differs from others Labs, in the sense that it is not based on the implementation of a system, but on the ongoing development and application of a standard. My contribution to FEDeRATED is a data exchange standard for air transport that is integrated with and can link to FEDeRATED. Therefore, any company that uses ONE Record, is automatically compatible with

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[1] *Interview by Minne Buwalda*

FEDeRATED"

Henk Mulder started working for IATA in 2001, but the first years, until 2010, he worked on the passenger side of air transport. Henk: "My professional approach is about innovation and change, and as soon as that is done, I move on." After working for other contractors, in industries like banking, he returned to IATA around 2015. Henk: "As soon as I realized that air cargo as an industry is far behind industries like banking in terms of digital technologies, I thought: here is an ideal new project for me."

### Web technology

Henk also has a passion for web technology. He explains: "In 1990 I worked for CERN, the European Organization for Nuclear Research. Around that time CERN developed the World Wide Web. The actual inventor of that WWW, Tim Berners-Lee, started from the premise that universities and research institutes should be able to exchange their research papers directly, without first having to send an e-mail to a secretary of a university somewhere in the world." He continues: "Back then I did not believe in Berners-Lee's invention, but he clearly proved me wrong, and around 2015 I thought: I can do this for the air cargo industry. I can bring in exactly the same philosophy, saying: if you want data, you should be able to get them without having to send an e-mail to a secretary first."
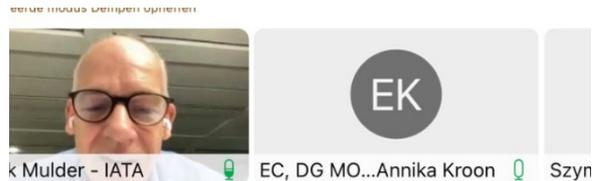


Henk's message is clear: concerning a digital solution for air cargo one should start with the idea of the World Wide Web. Henk: "It is all about developing standards for air cargo around web technology." Because of that, it only seems natural he calls his Living Lab the Internet of Logistics, although he did not invent that name himself –electronics firm Ericsson did, who was the first to work with IATA on this.

Henk continues: "You can compare the Internet of Logistics with the WWW. At the base of the WWW are a few web standards. Take the URL in your browser, where it says 'http'. This 'http' is a so-called hypertext transfer protocol, meaning that it is a definition of how you access and share data. This single http-protocol –plus the "s" for security, making https– is the foundation of the WWW. Now ONE Record is our equivalent of http. What we do with that, is create an Internet of Logistics within FEDeRATED, by sharing data, and by coming up with new use cases and processes in this European, multimodal and government-involved context, using ONE Record as its underlying protocol."

ONE Record creates a virtual record of all freight data related to a particular shipment in the industry of air cargo. Henk: "Without having all the data yourself, you still need access to all of the data to get a comprehensive view of your freight. You need to understand what the shipper is actually shipping: how much it weighs, and what the nature of the goods is. You need to understand from which warehouse it has to be picked up; you need to understand what the status is when it moves forward, if customs are cleared, et cetera. ONE Record allows us to do that, by being able to access information from the shipper, the forwarder, the handler, customs, the airlines and whoever else involved. By accessing those data, we can construct a complete view from end to end."

The ONE Record protocol is pretty successful so far in terms of scaling. Henk: "At the start of FEDeRATED around 50 companies participated; in July 2021 it was 140 companies, and now, by the end of 2022, it adds up to 200." Henk talks about the network effect taking place, with initial slow growth turning into exponential growth: "Every node you add increases the connectivity exponentially. The more connections, the more the network is worth." Henk is quite confident the growth will continue, because: "there are no good alternatives to ONE Record for air transport right now."

**Connecting modalities**

Asking Henk about the objective of his Living Lab to create "a semantic model for air cargo, including multimodal application", he says: "The reason for IATA to join FEDeRATED was partly motivated by our need to expose the airline industry to multimodal data exchange. This means linking our IATA model with the semantic model of FEDeRATED and use that for multimodal transport. We need to connect to other transport modalities, since you will not fly anything unless a truck brings the goods to the airport."

He continues: "What the FEDeRATED model has to do, is to provide a semantic description for multimodal freight, the whole story of the cargo being transported across transport modes. When is my next pick-up? How long is my next leg going to be? Will I be accepted by customs? But the air and maritime 'cargo-stories' are different. Henk: "The air cargo story is about what happens with a shipment in an airport warehouse or in the hold of an airplane. In the maritime industry it is about containers, about the handling by stevedores etc. Separate modalities create different stories on their cargo, using their own modality-specific words. But we need a cross transport mode language to get the whole story of the goods. That is what FEDeRATED semantics are about. It is an overarching semantic model on top of all the data models of the separate transport modes, with all their transport mode specific vocabulary. All transport modes need that intermediary semantics, understood by all." So, all in all FEDeRATED constitutes an overarching translator between various systems and standards.

Asking about the digital maturity of the air cargo industry in relation to other transport modalities, Henk says: "When I started working for the air cargo industry, I realized air cargo was 10 years behind the air passenger business. Now I realize we are not doing that bad compared to other modalities." About those other modalities he says: "The digital maturity of the maritime sector is catching up with air cargo." Asking about the modality Road, Henk estimates they are lagging behind

Maritime. Henk: "This is not because they do not understand how this works, but because the road industry is very fragmented, with lots of SME's."

Asking Henk why the air cargo sector apparently has its act together earlier than the other transport modes, he says: "The advantage of the airline industry is that very early on, in the 1920s, we realized we could not work efficiently without having a framework for cooperation, since no single company could carry freight and passengers to all global destinations. And this cooperation of private companies became IATA. The maritime sector did not develop such a joint approach between private companies, probably because there is only a limited number of such companies in the maritime sector. And those companies decided to compete mostly, rather than cooperate. Concerning the modality Road, there are simply too many road transporters to cooperate efficiently, so effective central coordination, at the scale of IATA for airlines, is also missing in that modality." Asking about Rail, Henk says: "Rail has a very different dynamic, because most railway companies and/or their infrastructure are historically nationalized. Therefore, their governance and budgets for innovation are all centrally managed per country. Yet, in Europe there is cooperation across European rail systems. All in all, I think the modality Rail is easier to modernize than Road."

**Testing multimodal touchpoints**

In the *Factsheet* of Living Lab #11 it says that one of the objectives of the project is to 'test multimodal touchpoints'. Asking if these are touchpoints between Living Labs, Henk says: "In the beginning of the project we were not yet talking about use cases amongst Living Lab's, but I did want to see the modalities Road and Air connected, so, that's what we started doing within our own Living Lab." Henk mentions two multimodal use cases that were tested: "CDM, a road transporter based on Schiphol airport, started using ONE Record to obtain the latest estimates of arrivals and departures of planes, in order to align their trucking operations and thereby minimize waiting times at the airport. This is exactly the kind of use case I wanted to see, because you minimize congestion at the airport and you maximize the use of your assets. Another use case across transport modes we tested was about the transport of perishables in Germany, again connecting road transport and air transport."

It is quite interesting to learn that in reality the gap between the digital systems of the modalities Air and Road is often less wide than suggested, since most European airlines have their own so-called 'flying trucks', meaning trucks that are operated by the airliner. The data on these truck rides are automatically tied to the airline data of the airlines.

In the meantime, collaboration between Living Labs is on the agenda. Henk is especially interested in working with Living Labs #1, #2 and #3 (CAAS), #17 (EU Gate) and #20 (eGovernment Logistics or BDI), but he is also very aware of the limitations of that cooperation. "Talking about connecting the labs: What exactly are we connecting? What data are we exchanging between transport modes? The exchange is often pretty basic and limited: estimated arrival and departure times, size and weight of goods… Transporters from different modes are not interested in a lot more than that."

Yet he comes up with some extra possibilities created by lab-cooperation. As a possible extra

application of multimodal transport data systems Henk mentions $CO_2$-emission tracking, an important issue for future transport systems. And: "Bringing all these basic pieces of information together could also give us insight in the efficiency of transport across different modes." Yet, it will be most challenging to explore opportunities for cooperation that goes beyond a limited data set and Peer2Peer connectivity.



All in all, the cooperation with the other Living Lab's stays pretty basic, according to Henk: "The Living Labs we cooperate with use ONE Record for their implementation in their use case, but I am not involved in that implementation." And: "When I formulate it in WWW-terms: I give them the http specifications and that's it. However, I consider any Living Lab that uses ONE Record part of the Internet of Logistics –that's the beauty of developing standards."

### Semantic technology

The FEDeRATED project aims at creating and using semantic technology, or SPARQL endpoints, instead of the more mainstream API technology. This is partly because SPARQL endpoints create the possibility to use sophisticated query-technology –for example to get $CO_2$-information– just by doing a query on that network of semantic endpoints.

SPARQL queries offer more possibilities than API queries. To paint the picture in more detail:

API-requests include fixed parameters that help the server find the right data. So, if you always exchange the same type of data with the same partners, you can use an API. SPARQL-requests on the other hand include a flexible query definition. So, if you need to exchange data with new or even unknown partners, you preferably use SPARQL endpoints.

With the development of ONE Record, IATA seems to have its API technology in place. Henk: "ONE Record is a semantic based standard for the airline industry that uses API technology for data exchange." Henk is confident that, despite IATA's present use of API technology, the step to

semantic endpoints is not that big: "In line with the FEDeRATED set-up we are now working on adding a semantic endpoint to the ONE Record system, so everybody working with our standard will automatically have this semantic endpoint."
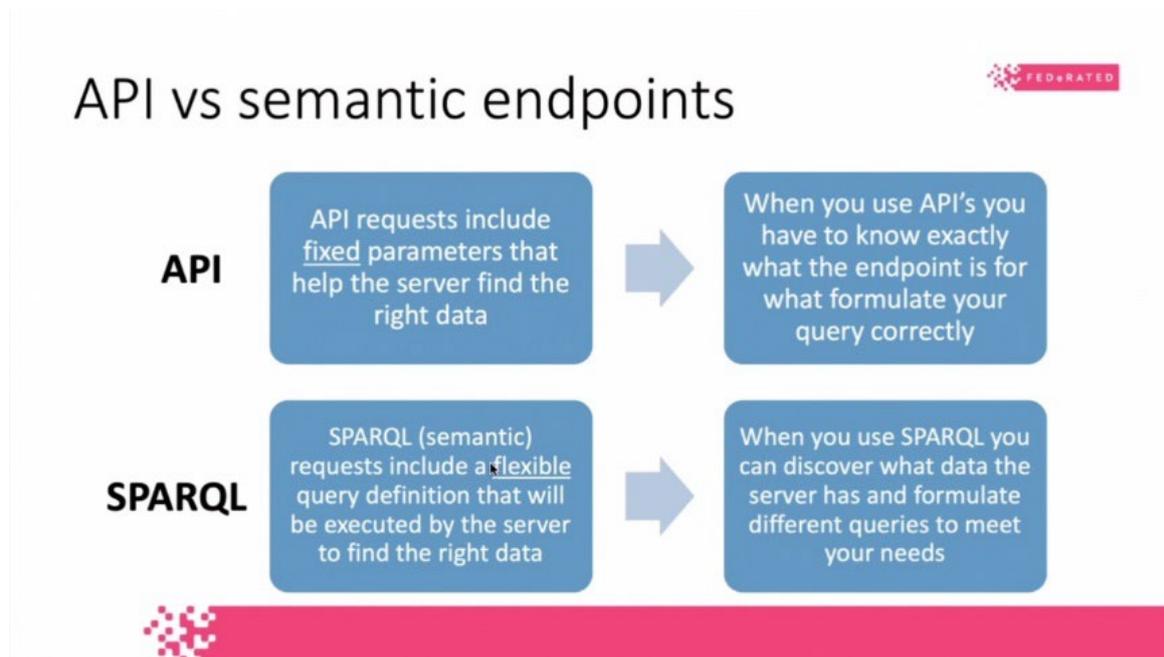


He continues: "Airlines will come through the API, but FEDeRATED Living Labs, in particular Living Lab #20, could connect to ONE Record via our SPARQL endpoint, and then internally in our system we connect that semantic endpoint with the API." Henk then comes up with examples of what the addition of such a semantic endpoint can achieve: "That semantic endpoint can become a bridge to everything else. For example, when a Living Lab wants to know the ETD of a specific cargo flight and it does not have a semantic endpoint, they can come to our semantic endpoint and get the information via ONE Record." And: "At the moment we have some 200 companies participating in ONE Record, and all of these companies will be able to use this FEDeRATED compatible semantic endpoint, because we built it into the standard."

## The IATA-hackathons

As mentioned in the introduction to this interview, one of the ways Henk tries to disseminate knowledge about the digitization of logistics and transport, is by organizing IATA hackathons. The last hackathon was organized in October 2022 in Toronto, and a new edition is planned for June 2023, in Frankfurt. Henk describes how these two-day events are set up: "We provide the ONE Record standard that the participating teams have to use, and then we give them challenges, for example: Come up with an app or solution to improve $CO_2$-reduction. Or: use our ONE Record standard to implement a booking system. The 10 to 20 teams get the assignment a week before the actual hackathon." Henk is enthusiastic about the results so far: "The teams come up with amazing solutions. Last May, a team came up with a booking system that, in addition to minimizing costs and maximizing efficiency of transport, also takes into account the minimization the $CO_2$-emissions. With such a booking system you can decide what is most important, price or time or $CO_2$-reduction."

For the next IATA hackathon, in June 2023 in Frankfurt, Henk has proposed to invite FEDeRATED Living Labs to join, in order to connect the labs there. Henk: "By then each and every Living Lab should be so advanced with their implementation that, if it is ever going to work, it has to work by then." The Living Labs will bring their teams, and we will give them a challenge that has to do with connecting the Living Labs. Participating teams that are not part of FEDeRATED, for example a German car parts exporter, can use ONE Record as a starting point and then also connect with FEDeRATED Living Labs, because by then, ONE Record will also have a FEDeRATED semantic endpoint. It will be an amazing opportunity to create new connections."

"Since we provide Living Labs with the ONE Record environment, including semantic endpoints, it will be easy for all of them to take whatever they have done, connect it to the provided ONE Record, and thereby giving them the semantic endpoint they have been dreaming about. That way, they can make a big leap in what their lab can do."



Henk reassures everyone that he is not doing this to serve his own business: "I am not doing this because I think they should use ONE Record –they are not our target so to speak, airlines are our target. The purpose of a hackathon is to bring people and organizations together, in order to come up with creative ideas and new implementations." He concludes: "What we can do in 48 hours can significantly add to the output of the FEDeRATED project, I think. In those 48 hours we can bring the things together people are struggling with."