Hyper-Network for electroMobility

Horizon 2020 Programme

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2nd NeMo Stakeholder Forum Conference: Summary Report

Conference held at ERTICO offices, Brussels
Wednesday 10 October 2018

Prepared by Andrew Winder (ERTICO), October 2018

Introduction

NeMo is a 3-year project which addresses the issue of lack of interoperability in electromobiliy services. It aims to make electromobility more attractive, focusing on seamless interoperability of charging and other electromobility services. It will apply to electromobility services the concept of inter-operator and international roaming (as in mobile telecommunications).

Specifically, NeMo is developing a **Hyper-Network of tools, models and services** to create an open, distributed and widely accepted ecosystem for electromobility. This will allow charging points, roaming operators, the electricity grid, system operators and service providers, vehicles and their owners/drivers to connect with each other in order to exchange data and to provide electromobility ICT services in a fully integrated and interoperable way.

NeMo will facilitate increased service availability, better planning and more secure electric grid operation, by making backend data and services accessible to the right actors and bringing down barriers. An Open Cloud Marketplace will enable service providers to reach more users and provide more seamless services. NeMo will boost the market share of electric vehicles through better accessibility to charging infrastructure, ICT services and wider B2B interconnectivity.

The project started in October 2016 and runs for 3 years, until September 2019. It includes 19 partners representing the automotive, research, software, operator, public authority and energy sectors. NeMo is co-funded by the Horizon 2020 Research and Innovation Programme of the European Union (grant agreement no. 713794).

The **NeMo Stakeholder Forum** is open to all by signing up at http://nemo-emobility.eu/nemo-forum and/or by joining the LinkedIn group at www.linkedin.com/groups/12012387. It enables members to engage with the project in terms of providing feedback on project outputs as well as to be informed of project developments and to be invited to NeMo events.

Annual stakeholder events are planned in NeMo, in addition to participation in external events and other communication and stakeholder engagement activities. NeMo seeks to engage a wide range of external bodies in order to ensure the success of the Hyper-Network in achieving its objective of transforming electromobility in Europe. Potentially interested organisations include providers of electromobility and related services (navigation, payment, etc.), charging station manufacturers and operators, public authorities, electric vehicle (EV) manufacturers, application developers, researchers and academia, infrastructure owners (roads, car parks, service stations), energy providers and distribution operators, EV fleet operators (cars, buses, e-bikes, logistics), consultants, media, associations, etc.

The **First NeMo Stakeholder Forum Conference** was held on 12 October 2017 near Stuttgart. Presentations, photos and a summary report of this event are available on this page of the NeMo website: http://nemo-emobility.eu/stakeholder-forum-conference-report-presentations-available.

This document summarises the outcomes of the **Second NeMo Stakeholder Forum Conference**, which took place on 10th October 2018 at the premises of NeMo partner ERTICO – ITS Europe in Brussels.

Participation

A total of 56 persons registered for the event, NeMo partners included. Actual attendance was 55.

External stakeholders came from 17 different organisations including charge point operators, vehicle manufacturers, IT companies, service providers, associations (Intelligent Transport Systems, electricity sector) and public administrations. They came from seven different countries (Belgium, Czech Republic, Italy, Germany, Luxembourg, Spain and Sweden).

Event Report

Please note that the presentations made at this event are available on the NeMo website at http://nemo-emobility.eu/presentations

Session 1, Introduction and presentations: 09:30 – 11:05

Dr. Johanna Tzanidaki, Director of Innovation and Deployment at ERTICO – ITS Europe, opened the Conference and gave a welcome address. Clean Mobility is one of the four key focus areas of Intelligent Transport Systems (ITS) addressed by ERTICO, which is working with its partners and other stakeholders on solutions to improve air quality and reduce carbon emissions of road transport. This includes ITS to promote electro-mobility, where NeMo is a key European project.

Opening and Welcome, Johanna Tzanidaki (ERTICO)

Representing the Project Coordinator at the Institute of Communication and Computer Systems (ICCS), **Dr. Evangelia Portouli** introduced the NeMo project, including its achievements to date, the NeMo vision and current work focus. So far, the project has developed Common Information Models, data translators, common interfaces, smart processing and data management algorithms, the NeMo Inter-roaming protocol and the first version of the Hyper-Network, which is a distributed network based on blockchain, with nodes operated by different project partners (and in future by external NeMo users).

Evangelia Portouli (ICCS) presenting the NeMo objectives and status

Dr. Udo Pletat, Senior IT Specialist at IBM's research and development centre in Germany, gave an overview of the NeMo Hyper-Network, including its functionality and content. The key challenges were firstly to establish a decentralised marketplace for IT actors in the electromobility sector (making it easy for organisations to join it), secondly to allow the development of interoperable and integrated B2B and B2C applications for electromobility, and thirdly to cater for commercial and technical needs with respect to developing and marketing electromobility IT services. The NeMo approach to these challenges is to use hyperledger/blockchain technology together with a Common Information Model and semantic search for services, enabling a marketplace for electromobility applications and services. The different NeMo nodes are connected to trustee services, eRoaming hubs (platforms provides by the companies Gireve and Hubject which provide roaming for electromobility services) and directly to B2B and B2C applications.

The NeMo node architecture was described, which includes an identity and access management module, a low-level service finder and optimiser, an integration bus, and a blockchain and backend for service and contract registry. Integration between participating business partners was also described including service-to-service invocation.

External actors are invited to engage with NeMo by joining (initially as an Associate Partner but after the end of the project in autumn 2019 to the proposed Business Alliance for Electro-Mobility) and participating in the NeMo Marketplace. The NeMo IT infrastructure can be accessed via the installation of a NeMo node, for which the project will provide guidance and support. This will enable actors to develop and market electromobility services and/or consume services from other providers.

Mr. Stefano Persi, CEO of Mosaic Factor, a consultancy based in Barcelona focusing on IT solutions for mobility and transport, presented the benefits of using the Hyper-Network services. The NeMo Hyper-Network is organised with core services and the eRoaming platforms, with the addition of a marketplace for electromobility services. He described service use cases for a daily commute using an electric vehicle (EV) and a long-distance trip.

The key service use cases for a daily commute are EV driver monitoring and profiling, smart navigation, service brokerage, smart journey planner and Charge Point Operator (CPO) monitoring and profiling.

For a long-distance trip, the key service use cases are wireless authentication service, smart navigation, rating/pricing services, CP booking and CPO monitoring and profiling.

The benefits for service providers are the availability of online services, the ease of publishing services, the ability to combine different services and to increase knowledge of the users. For service users, the benefits include easy access to services, a single platform/interface, the ability to combine different services and eRoaming interoperability. Ideas for new services that could use the Hyper-Network were also welcomed.

To provide an example of a Hyper-Network service, "virtual sensors" were described by **Dr. Michele Roccotelli** of the [Polytechnic University of Bari](). These are software sensors which are used in different fields (energy, healthcare, mobility, etc.) to estimate or predict information or values from measured data. In electromobility they have applications such as in battery management, predicting Charging Point (CP) availability, itinerary planning, charge price prediction, etc. Algorithms are used to compute planning data from data collected from external sources (traffic, weather, CP use, etc.) as well as the internal state of the EV. For example, to predict the price for a charging session for a given driver selecting a specific CP, it requires the dynamic status of the CP, the charge detail record, the tariff, the mobility need of the user, the EV's position, the residual charge (SoC) and the desired charge.

Dr. Elif Eryilmaz from the [Distributed Artificial Intelligence Laboratory of the Technical University of Berlin]() presented the service creation functionality of the Hyper-Network. This is based on semantic web service concepts, such as service matchmaking and service composition, which use semantic service description languages such as WSMO, OWL-S, SAWSDL and SA-REST. The key goals are to support the semantical enhancement of service functionalities and to facilitate the development of electromobility services that automatically find, invoke and combine other services to reach a certain goal.

NeMo provides a cloud-based service development environment allowing the specification of service processes, integrating service search and enables service composition and testing. The Semantic Service Manager (SSM) allows the user to make a service description using OWL and SWRL languages, to find available services and functionalities (invocation of Service Matchmaker) and to make a direct request on the NeMo Service Registry. Service development can be done via the Visual Service Design Tool.

Session 2: Presentations, 11:20 – 12:10

Mr. Thomas Fousse from French-based roaming platform [GIREVE]() presented the latest developments in the Open European Inter-Roaming Protocol. The purpose is to allow the customer of an electromobility service provider (EMSP) to access a charging station of another operator, as well as connecting EMSPs to a large number of charge point operators (CPOs). Data exchanged includes information on charging stations, authorisation, charge detail records and business information. NeMo is merging and integrating two main roaming topologies via an inter-roaming platform framework and connecting two of the major electromobility roaming platforms in Europe: Gireve and [Hubject](). NeMo overcomes standardisation issues concerning IT protocol and business objects for electromobility through standardised access based on the Common Information Models and open interfaces.

Mr. Adrien Castagnié of [Renault]() outlined NeMo's approach to opening up the Hyper-Network to new partners. The purposes are to increase competiveness (cost savings and Europe-wide

business relations) and to ease the creation of innovative electromobility services. The types of business partners targeted by NeMo are primarily providers and consumers of electromobility services. In addition, there are business partners with specific roles of IT provider, service certifier and regulator (these partners ensure the availability and quality of the Hyper-Network and the services on it).

During the remainder of the NeMo project contract period (up to 30 September 2019), third parties are invited to join the Hyper-Network to use and test it, without any payment or funding. The enrolment procedure includes a first contact with the NeMo Project Coordinator (ICCS) followed by a presentation (business, technical, rights and duties) and then the signing of a Memorandum of Understanding (MoU) and a Non-Disclosure Agreement (NDA). Following validation by the NeMo Steering Committee, the joining entity is then considered as an Associate Partner and can use the Hyper-Network as well as joining the project's discussions on its management and operation in the future.

After the end of the project (1st October 2019 onwards), the Hyper-Network will be managed by a new association named Business Alliance for Electro-Mobility (BAEM). This will be a non-profit entity with an annual membership fee (to cover costs) and a Board, which will take over the role of the NeMo Steering Committee in approving new partners and signing contracts to join.

Two alternative business structures were proposed, one with a variable annual membership fee (possibly depending on organisation size, use of the platform, etc.) and another with a lower fixed annual fee with the addition of a commission on service transactions using the NeMo Hyper-Networks.

Following a final decision on the business structure, the enrolment process will be finalised and communicated, appropriate documentation (information and joining procedure) published on the project's website and the BAEM set up.

Mr. Andrew Winder from ERTICO – ITS Europe then provided some additional information on the proposed BAEM including proposed membership levels (BAEM Board members, BAEM Partners and Hyper-Network Partners – the latter being accredited users of the Hyper-Network who are not members of the BAEM). Business partner roles are based on the Common Information Model (CIM), presented in NeMo Deliverable 3.3 (available at http://nemo-emobility.eu/deliverables). A given partner can have more than one role, for example service provider and consumer. The BAEM will be not-for-profit, with fees covering items such as node costs, IT services and secretariat/organisation (including publicity).

Session 3: Panel discussion, 13:10 – 14:15

The panel discussion on **Business Aspects** was moderated by Mr. Adrien Castagnié (Renault) and included speakers Dr. Evangelia Portouli (ICCS), Mr. Federico Boni Castagnetti (IREN), Mr. Nicolás Brailovsky (TomTom), Mr. Vianney Devienne (GIREVE), Mr. Javier Julve (Electromaps) and Mr. Àngel López (City of Barcelona).

Question: What main types of services would you expect to see on the Hyper-Network?
A. López highlighted the public authority's role as a regulator. The City of Barcelona needs to have the role of charge point operator (CPO) to develop sustainability because in Spain operating charging points (CPs) is not so profitable. So it is a public investment. Many other municipalities in Catalonia are in a similar case, with a small number of CPs and want to link services and make agreements with global EMSPs.

J. Julve stated that most aspects are not up to his company (Electromaps) but are for municipalities and road operators to decide (parking, fees, data openness). Electromaps is an EMSP and is integrated with the roaming platforms Gireve and Hubject.

A. Castagnié pointed out that NeMo is providing a technical infrastructure so that other actors are able to provide their own services.

According to N. Brailovsky, the aim is to get people from A to B in a way they can trust, i.e. that their credentials will be enough to connect to different providers. The greatest value of NeMo is therefore the discoverability of different services from a technical and management viewpoint. Trust is a key issue: drivers need to know if they will really be able to recharge their vehicle.

A. Castagnié reminded that the electromobility field is not just the CP but the entire chain from home to destination.

Panel Discussion moderated by Adrien Castagnié (Renault)

Question: What are the strengths of the NeMo Hyper-Network and what will make it attractive?
V. Devienne responded by saying that GIREVE is not just a technical enabler but helps clients to get into contact, to be visible to electromobility providers, helping them to conclude agreements via a B2B marketplace and operating the data flow. It also acts as a trusted third party e.g. in case of an invoice disagreement, so a roaming platform is a neutral actor.

F. Boni Castagnetti said that the energy world is highly regulated. Energy regulation means a distribution system operator (DSO) cannot pay users to diminish their consumption at critical times, for example to avoid blackouts.

E. Portouli considered that the aim of NeMo is to unite all actors together. Some research organisations are developing services themselves, so they must have a role in the Hyper-Network. Being more neutral, researchers can help balance interests.

Question: Regarding the structure of the proposed Business Alliance for Electro-Mobility (BAEM): should there be a fee based on criteria (type of company, volume of transactions, etc.) or a percentage levy on transactions?

J. Julve pointed out that Tesla is offering nearly everything for free. NeMo has a platform of all the players, but if we make it expensive then the only winner will be Tesla. There should be as few fees and commissions as possible.

A. Castagnié added that Tesla is aimed at the premium market and is a closed structure.

Á. López said that from a public authority perspective, a closed system cannot be supported.

V. Devienne explained that a roaming platform needs to be cheaper for clients than making direct connections. NeMo is bringing a first answer to having only one technical protocol across all networks. He had a difficulty with the concept of a commission because roaming platforms do not take any commission, but they allow members to do their own business.

N. Brailovsky's view was that the model must be made as simple and easy as possible. He did not agree with the concept of a free trial. The attractiveness to energy players is a difficult issue because of different regulatory frameworks in each country.

In the subsequent audience discussion it was mentioned that NeMo needs to get additional users and a business plan now, to avoid a situation where at the end of the project there are only costs and no revenue.

During the discussion panel regarding business aspects, a short questionnaire on business aspects was distributed to the participants. The main results (from external partners) are the following:

- The most wanted electromobility services are roaming services, smart charging use cases and itinerary planning services;
- The Common Information Model is the main benefit that NeMo can bring. This confirms the key challenge that the electromobility field is facing;
- The majority are interested in being part of the BAEM and participating in the development of a future strategy for the Hyper-Network;
- The business structure type and the membership fees will depend on the number of members of the platform.

Session 4: Demonstration, 14:30 – 16:00

This session was led by Dr. Udo Pletat (IBM), with input from Dr. Michele Roccotelli (Polytechnic University of Bari), Mr. Thomas Fousse (GIREVE), Ms. Mariza Koukovini & Mr. Konstantinos Kalaboukas (SingularLogic), Mr. Jörg Küfen (Forschungsgesellschaft Kraftfahrwesen Aachen), Dr. Elif Eryilmaz (DAI-Labor, TU Berlin) and Mr. Theodoros Theodoropoulos (ICCS).

The demonstration session on the Hyper-Network started with an overview of the NeMo node topology and what we show, as well as the main steps in setting up a NeMo Node, including the hardware and operating system requirements and the installation procedure.

NeMo Hyper-Network demonstration, Udo Pletat (IBM)

Service creation was described via the creation of an atomic service (technical, semantic and translation specifications) and the creation of a composite service (charge point prediction, based on other services).

Service delivery showed how to browse NeMo Marketplace User Interface, the registration of services, offerings for services and contracts for buying atomic services. For example, service offerings are visible on all NeMo nodes but a contract between two business partners is only visible on the NeMo nodes of these partners, not on other nodes.

For service execution, the execution of a composite service from partner FKA was observed in the Service Creation Tool. A single call allowed execution of the service-to-service call from FKA to Gireve.

Finally, a sample electromobility application was demonstrated by showing a web app which invokes a composite service from FKA and returns results.

Session 5: Testing, Next steps and Closure, 16:00 – 16:30

In the final session, **Mr. Christophe Moure** from Applus IDIADA outlined the testing and demonstration of the Hyper-Network. He presented the five NeMo test sites, in Barcelona, Paris, Turin, Vienna and Berlin. The NeMo business scenarios and use cases will be tested under different scenarios according to the site, using key performance indicators comparing the results to a situation without the Hyper-Network. An example will be cross-provider booking authorisation and payment management.

A cross-country test will also take place in mid-2019 by driving a route which takes in the five test sites above, in order to test roaming functionalities (CPOs connected to NeMo partners, to other roaming platforms and those not connected to any platform).

A hackathon in early 2019 will allow participants to create web and mobile applications using services provided by the NeMo Hyper-Network and hence test and further valorise the network.

Planned demonstrations and testing in NeMo, Christophe Moure (IDIADA)

The event was wrapped up by Dr. Evangelia Portouli of ICCS, who summarised the main points of the day and invited feedback, opinions and suggestions which can help to refine and update the findings and outputs of NeMo. In particular, she stressed the efforts to connect with external parties to join NeMo and the future Business Alliance for Electro-Mobility. She also highlighted upcoming events, including the hackathon in early 2019, the cross-country demonstration in spring and the NeMo Final Event in September 2019. Dates for these events, once defined, will be communicated via the project's website, Twitter (@NeMo_Electro), LinkedIn (NeMo_Electro) and the Stakeholder Forum mailing list.

The NeMo Consortium would like to thank all the speakers, organisers and participants, in particular the external participants, who represented the following organisations:

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AVERE (Belgium)
Czech & Slovak ITS&S (Czech Republic)
Electromaps (Spain)
Eurelectric (Belgium)
European Commission (Belgium)
Honda Motor Europe (Belgium)
Infosys (Belgium)

MLC ITS Euskadi (Spain)
Motionwerk (Germany)
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ROUTE220 (Italy)
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Syniverse (Luxembourg)
Trafikverket (Sweden)
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