INTRODUCTION
The digitalization of public transport opens up for innovative services and new actors to take the stage. But as the number of IT-systems increase, so does the complexity of procurement, installation and maintenance. A key challenge is that different systems owned by the vehicle manufacturers; the public transport authority and/or the public transport operator reside in their own silos with limited or no integration. To enable efficient and sustainable introduction of digitalization there is a need to share data in a standardized way.

Information Technology for Public Transport (ITxPT) [2] enables interoperability between IT systems in public transport by offering specifications of IT-architectures based on standards with open interfaces for on-board, over-the-air and back-office IT systems.

AIM & METHOD
Since 2017 Volvo Buses, Västrafik, Lindholmen Science Park, Actia, Consit, Ericsson, Flexitec, Hoja, Isomeria, Keolis, Mobitec, Pilotfish, RISE and Transdev have established an ecosystem around ITxPT as part of the ElectriCity [1] cooperation in Gothenburg, Sweden. The ecosystem has been granted research funding from the Swedish innovation agency Vinnova through the RIVSILOn project [3].

The aim is to further validate the ITxPT specification and explore its potential for novel and innovative services. Points of interest range from data sharing across silos to enable dynamic passenger information, plug’n’play of software and hardware components to how the ITxPT specification and existing legacy systems can co-exist in the same ecosystem.

The main work is done in two pilots where each pilot explores a concrete concept implementations for e-mob services. Points of interest range from data sharing across silos to enable dynamic passenger information, plug’n’play of software and hardware components to how the ITxPT specification and existing legacy systems can co-exist in the same ecosystem.

To summarise and synthesise the experiences from the pilots a series of workshops are organised with more general themes – Plug’n’Play, Digitalisation, Cybersecurity, Cloud services and Business models.

PRELIMINARY RESULTS
The results are so far preliminary as the RIVSILOn project will continue throughout 2019. In terms of the broader themes under investigation we have still identified key take-aways.

Plug’n’Play
From experiments where one gateway is substituted for another we can conclude that the specification facilitates swapping while the possibility for additional services means that it is not always a one-to-one relation.

Digitalisation
The standard has been successful in specifying shared data for digital services, but there is still work to be done in terms of version management of underlying standards.

Cybersecurity
We are currently exploring the possibilities and vulnerabilities of connecting the legacy PTA-network with the ITxPT-network and enabling secure access to FMS over IP using the ITxPT protocol.

Cloud services
In a collaboration three of the suppliers together enabled dynamic passenger information by transferring route data to a cloud service and then visualise the real-time connections using the on-board monitors.

Business models
From evaluating procurement based on ITxPT we can see that the relationship between suppliers change and that the responsibility of integration becomes more important.

FUTURE WORK
We plan to further explore how new data sources can be incorporated into the ITxPT standard by developing proof-of-concept implementations for e-mob services such as battery status and changing infrastructure (availability & location). By utilising the existing data formats and underlying standards we can show how the ITxPT standard can be enhanced.

A related topic is how geofencing can be facilitated through the ITxPT standard to enable dynamic zones for hybrid vehicles to only use the electric powertrain or speed control in case of temporary traffic adjustments, e.g. in case of events or accidents.

A third line of enquiry is to come up with a set of best practices when migrating from a legacy standard to an ITxPT-platform. This will not only affect the configuration of hardware and software components but also tendering and possible changes to roles and responsibilities between vehicle manufacturers, public authorities, operators and suppliers.

REFERENCES

ITXPT – INFORMATION TECHNOLOGY FOR PUBLIC TRANSPORT
ITxPT architecture is based on standards and best practices from in-operation implementations and projects like EBSF 2. The ITxPT specifications do not limit the design of IT. They just provide a framework for how to design hardware and software so that modules can be integrated in a coherent architecture. This simplifies IT suppliers’ access to the market and gives purchasers the flexibility to select services and components from many different providers. ITxPT should be understood as an agreement between many public transport stakeholders to enable digitalization and integration of mobility services.

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