DIGITAL TWINS FOR ELECTRICAL INSTALLATIONS

GOAL

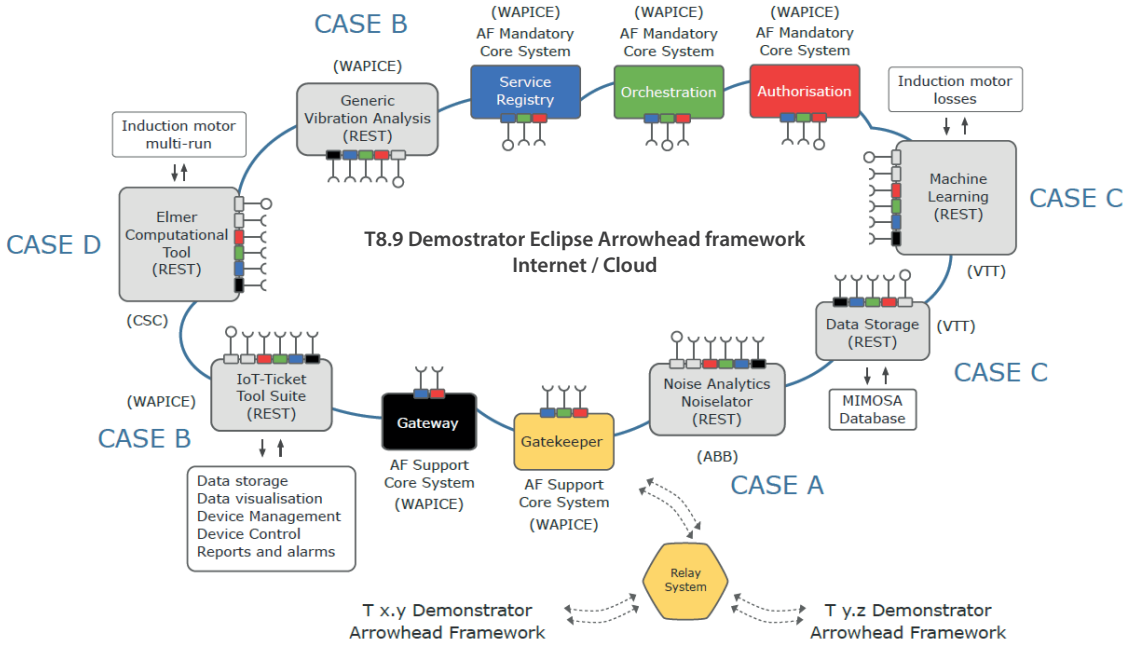
Lightweight run-time digital twins based on machine learning technology trained with simulation and measurement data.

Challenge

ABB has IoT measurement data and Elmer FEM computing models can be automatically build from the electrical machines it has produced, 70 million in total, but the two types of data are not used together. The computation models have unknown parameters depending on the installation and lifetime characteristics of the machine. For example, the characteristics related to the attachment of the machine to the floor or other base are only fixed in the installation phase.

However, presently the simulation models are not updated with the installation data or updated during the lifetime evolution of the machine. If digital twins could be kept up-to-date and if the computing times are shorter, many new opportunities for their use is possible. ArrowHead's solution is a machine-learning (ML) digital twin that can learn both from FEM computation results and from the IoT data.

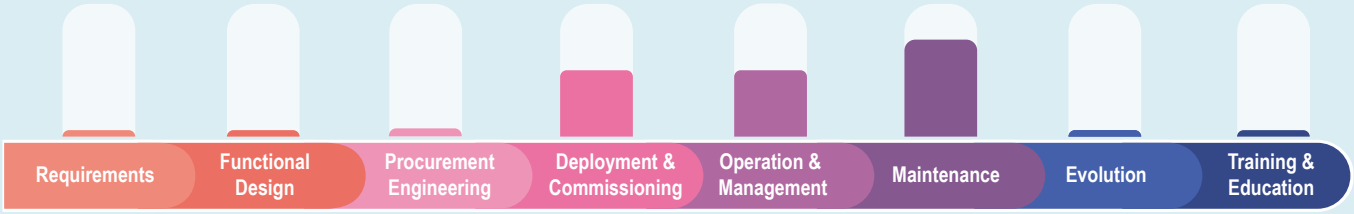
The Eclipse Arrowhead framework will be utilised in the required local and inter-cloud connections between the IoT and data analytics devices, electrical machines, drives, and controls accompanied with the modelling analysis services, and the digital twins. Each of the provided and consumed service is Eclipse Arrowhead framework compliant. This makes the system transformable and expandable, and easy to update when needed.



CASE E (integration with other demonstrators)

This project has received funding from ECSEL Joint Undertaking (JU) under grant agreement No 826452. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Norway and Switzerland.

Engineering Phases

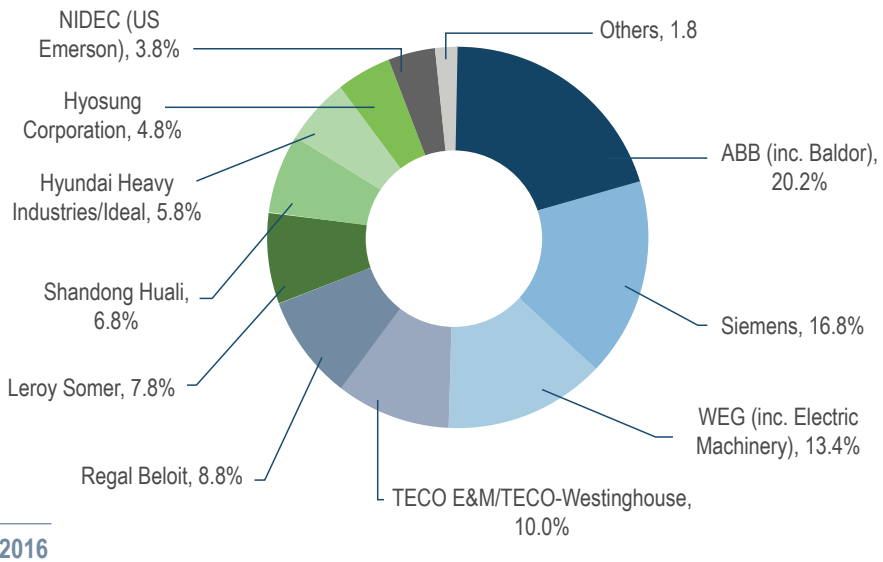


Results

ABB can utilize developed systems globally. As the Arrowhead Tools are open, it will allow other European manufacturers to benefit from the development.

The global electric motor market reached a value of nearly US$ 125 Billion in 2018, growing at a CAGR of 5.5% during 2011-2018. Looking forward, the market value is projected to reach nearly US$ 162 Billion by 2024. ABB has about 20 % global market share in low voltage Electric motors.

Global: Electric Motor (Low Voltage) Market: Breakup by Key Players (in %), 2016



Source: IMARC Analysis, 2016

Partner Data

***ABB** is the world-leading supplier of motors and variable speed drives. The company provides the widest range of induction and synchronous motors and generators, and inspires worldwide customer confidence with its reliable products and services, designed and built to optimize user's productivity. ABB Oy is a Finland country organization of global ABB. The group participating to the project is Advanced calculation group from ATEU (Advanced Technology of EU) which is part of the Motion Business area and Motors and Generators division R&D organization.*

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