

UdZ

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The Data-driven Enterprise

FIR international

FIR Global Benchmark

» page 7

**Aachener Digital-Architecture-Management
With the Right Approach into the Digital Future**

» page 33

**Concept for an International Co-creation Platform
in the Furniture Sector**

» page 79

The next generation of wireless connectivity, 5G, is becoming a hot topic in industry. However, there are still many myths and misconceptions surrounding the new wireless technology. By enabling machine-based communications, 5G's capabilities go far beyond mobile broadband.

22 NEWS FROM THE RWTH AACHEN CAMPUS

42 FIR NEWS

50 RECOMMENDED READING

52 FIR PUBLICATIONS

// FOCUS – BEST PRACTICES

6 The Spark of Progress

10 FIR Global Benchmark

12 Successfully into the Future

16 Not All Sales are the Same!

17 Optimized Processes. Efficient Value Chains.

24 Digitization in Agriculture

27 Global IT Harmonization Project with a Professional Education Provider

30 5G for an Interconnected Industry

35 FIR to Collaborate with Adolfo Ibáñez University

38 The Digital Transformation in Manufacturing Companies

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43

BaSys4Dash

The aim of the 'BaSys4Dash' research project is to develop a partially automated, dashboard-based decision support system for two user companies. The BaSys 4.0 software system provides the basis for the partially automated evaluation of processes and the visualization of information on dashboards that is tailored to the situation and application at hand.

56

MarryIT

The aim of the research project is to support SMEs by providing a methodically guided as-is analysis and evaluation of the current IT-OT integration status.

59

EDI-Multiply

The aim of this sub-project is to achieve a multiplier effect in terms of potential business connections.

// SPECTRUM – THINK TANK

43 "Satellite Project" for Further Development of the BaSys 4.0 Software System in Practical Application

46 FIR Exports Its Professional Training Program for the Automotive Sector to Mexico

53 Concept for an International Co-creation Platform in the Furniture Sector

56 Tailored Recommendations for the Efficient Integration of Shop Floor and IT Systems

59 Connect Thousands of Business Partners Across Disparate B2B Platforms



BaSys4Dash: “Satellite Project” for Further Development of the BaSys 4.0 Software System in Practical Application

The aim of the ‘BaSys4Dash’ research project (duration: June 1, 2019 – December 31, 2021) is to develop a partially automated, dashboard-based decision support system for two user companies. The BaSys 4.0 software system provides the basis for the partially automated evaluation of processes and the visualization of information on dashboards that is tailored to the situation and application at hand. The architecture of BaSys 4.0 allows to leverage the potential offered by standardized interfaces for information exchange. This can be achieved by using the standardized interfaces provided by the Asset Administration Shell concept, which is a basic building block of BaSys 4.0. Decision-making processes can thus be digitally supported, so that it is no longer necessary to rely solely on experience and knowledge. The project on which this report is based receives funding from the *German Federal Ministry of Education and Research* (funding number 01IS19006A). >

The results generated in the ‘BaSys4Dash’ project are intended to show how the BaSys 4.0 software system can serve as a basis for partially automated evaluations and how the results can be represented on dashboards in a way that is appropriate both to the situation and the application. In particular, two aspects are to be examined more closely in this research: the testing of the implementation of the middleware and the aspect of data management. The project results so far provide a deployment-ready concept for implementation in the user companies – both from a technological and an information technology perspective.

Based on the initial project, the architecture is composed of the BaSys SDK (software development kit), a number of microservices, and service evaluations. The BaSys SDK is used to implement the administration shells, while the microservices and service evaluations are used for data retrieval and analysis. In addition, a registry serves as the central communication unit between, for example, PLC systems, sensors, and dashboards. This creates an end-to-end system (see Figure 1) that is particularly suitable for implementing container technologies within a microservice architecture using the C# and .NET languages.

Microservices are characterized by their modularity and flexibility, allowing services to be encapsulated and abstracted for deployment. This makes it possible

to dynamically update and adapt the services. Access to individual microservices is realized with the help of a broker. Retrieval is performed (as with all other system components applied) via a designation that is either standardized according to ISO 29000-2 or uniformly defined by means of URIs. Should a less dynamic version be preferred, the services could also be implemented as a partial model. In this case, the administration shells are to be equipped with an extension that offers the required analysis services. Domain-specific submodels are thus developed for the assets of the user companies, *Marienthaler Werbe-Offsetdruck GmbH & Co. KG* and *Ph-MECHANIK GmbH & Co. KG*, such as the asset environment or the monitoring of various parameters. Characteristics that can specifically query data were then subsumed under these models. The “temperature monitoring” submodel, for example, contains characteristics such as temperature limits or actual values.

One of the core objectives of the ‘BaSys4Dash’ research project is to develop a method to ensure that further use cases can be implemented. As a result, based on the identification and definition of data and service evaluations, first prototypes of generic dashboards were created. This provided the scientific foundation for the final implementation at the user companies. A superordinate goal of the project was to create general guidelines that could serve as implementation aids, a goal

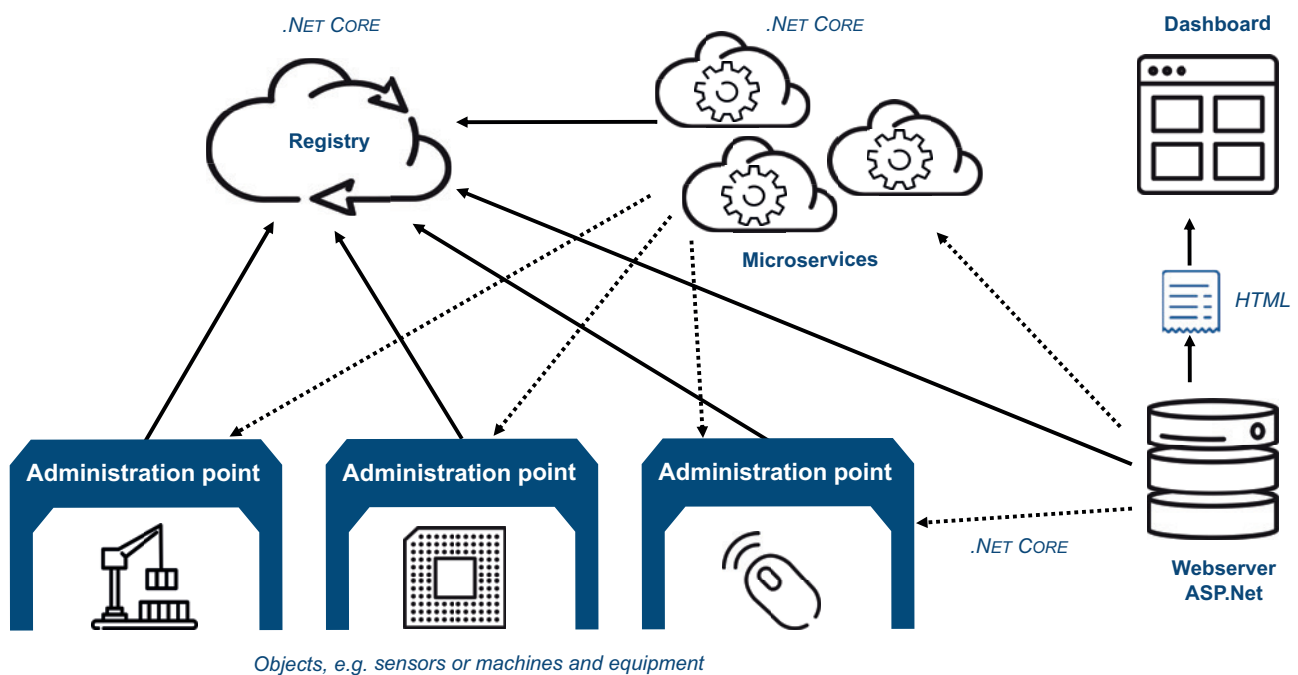
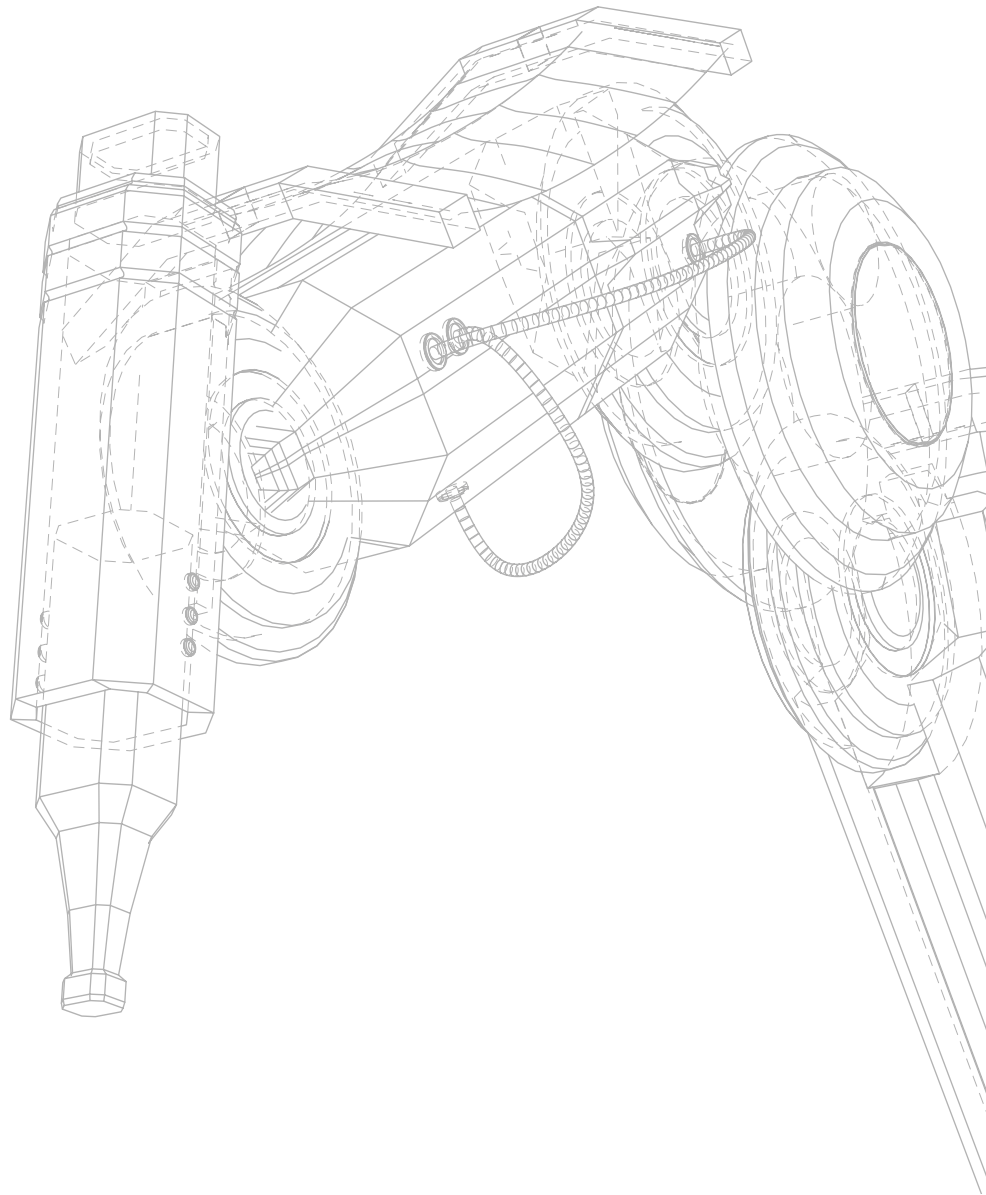


Figure 1: Schematic representation of the software architecture (own representation)

for which generalized concepts are necessary. For this reason, as an initial orientation guide, a variant tree for the structuring of service evaluations was developed. It consists of three levels and provides an intuitive template to assist other potential users. At the first level, the user can select a use case and the associated asset. Based on this selection, KPIs, sub-models, and data are chosen at the second level, while possible visualization forms are derived at the third level.

The implementation at the user companies is currently being planned. In a first step, the developed technologies are to be tested in prototype form. The resulting insights will then be used for rapid troubleshooting, iterative optimization, and preparation of the final implementation phase.



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