2017-1.3.1-VKE Project
Managed IoT Framework Development

The Consortium led by NETvisor Ltd. with the participation of BME AUT Department and CS-Process Engineering Ltd. launched a two-year long project on the 1st of November 2017. The project aims to develop a managed IoT framework that enables production companies to quickly and cost-effectively transform or expand their activities in accordance with digitization and Industry 4.0 objectives. The framework enables the development of industrial-scale distributed sensor and control networks by providing the unified and closely integrated software components needed for long-term operation and efficient use of the networks.

The prototype IoT framework is a framework and platform based on "big data" principles that support the collection, analysis, display and commercialization of data, collecting data of various fields and applications (such as vehicles, transport, manufacturing, production lines, utility services, intelligent cities), management, and analysis, and supports application and service development based on these data.

This Factory Infrastructure Monitoring and Supervision demonstration has been implemented using the prototype of our Managed IoT Framework. The demonstration has been devised in the frame of project no. 2017-1.3.1-VKE-2017-00042 by the consortium of NETvisor Ltd., BME AUT and CS-Process Engineering Ltd., and implemented by the participation of BME's students. Project no. 2017-1.3.1-VKE-2017-00042 has been implemented with the support of the National Research, Development and Innovation Fund of Hungary, financed through the 2017-1.3. funding scheme.

Presentation of the organizations participating in the implementation

NETvisor Ltd. has achieved success in the field of system integration and system management at domestic and international level, thus contributing to the creation of the IoT framework with its knowledge and experience. NETvisor is responsible for the development and integration of components supporting the high quality and safe operation of the system and continued product development beyond the scope of the project.

The Department of Automation and Applied Informatics of BME is one of the largest departments of the university. It is at the forefront of education, research and development, reflecting real-world practical needs in technical sciences. Among its competencies, software development has a key role, which is one of the strongest areas of the department. The department has outstanding results in software design, multiplatform and mobile software development, IoT, and data management and visualization techniques. The Department of Automation and Applied Informatics has participated in a number of international projects in which prototypes of IoT systems have been created. The task of the department is to develop and integrate the back-end system of the IoT framework, the storage, analysis and visualization of the data.

CS-Process Engineering Ltd. is a dynamically developing electrical and control engineering company, industrial automation solutions provider, manufacturing, assembly and maintenance company, is a pioneer in the development of electrical, automation and software solutions. The goal of the company is to implement research and development solutions in the field of new technologies, automation and software development and play a role in the launch and marketing of the development results created. CS-Process Engineering Ltd. ensures that the IoT framework prototype in the project is tested in an industrial environment. CS-Process's role is system validation, Industry 4.0 applications and services development.

Short introduction of NETvisor

As the head of the Consortium, NETvisor's primary role is to turn solutions developed during the project into marketable products. It is a perfectly suited task, as NETvisor has extensive experience and a successful track record of transferring the results of research & development collaborations into customer solutions, with post-sales services including bespoke customizations, continuous support and development tailored to customer needs.

NETvisor Ltd. is a Systems Integrator specializing in the design and implementation of ITC systems, offering related value-added services. Innovation, research and development play an important role in its activities. NETvisor has several self-developed Operations Support System (OSS) and Geospatial Network Design products.

Building on these products, NETvisor designs, implements and delivers turnkey IT, ITC and Telecommunication solutions, including Operations Support Systems to support their efficient operation. NETvisor is the market leader in Hungary for OSS solutions designed for Networking and ITC environments, and its products are deployed in over 40 countries. In strategic partnership with key Higher Education and Industry stakeholders, NETvisor is able to develop products with continuous innovation to quickly and proactively meet market needs.

In addition, NETvisor focuses on innovation in key areas of ICT development, supporting the design and deployment of new generation wired and wireless networks, as well as commercial and industrial IoT developments.

Of primary importance among the business and professional development opportunities of NETvisor, is to ensure that the technology innovations in IT and telecommunications of the last decade (miniaturization, High Performance Computing, cloud services, mobile communication, sensor technologies, next-generation data systems, etc.) are utilized en-masse and ubiquitously in a number of business areas related to IoT, including Industry 4.0, and in all areas of society and economy that can be enhanced by digital transformation. Such areas include transport, energy, utilities, healthcare and agriculture - these are the domains where NETvisor maintains a focus on innovation.

Our foremost goal is to allow organizations to reach unparalleled efficiency in their design, planning, manufacturing, operational, and support workflows based on long-term and real-time process monitoring capabilities and complex analytical methods enabled by our products and solutions.

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Factory Infrastructure Monitoring and Supervision

2018

Operations Support Tools
for Industry 4.0 Solutions

Our Operations Support Tools for Industry 4.0 Solutions is composed of IP Explorer (IPE), Network Inventory (NETinv), PerformanceVisor (PVSR) and Fault Manager (FM) dedicated to discovery, inventory management, monitoring and fault localization tasks, respectively.

Discovery

IPE

Automatically discovers network resources and automates the network documentation and inventory processes. The up-to-date topologies and node information discovered by IP Explorer efficiently support the design, audit, fault management and troubleshooting processes of modern network operations.

Inventory

NETinv

A map based integrated multilayer technical inventory for communication service providers, IoT service providers, utilities, government and enterprises. Accurate, comprehensive and authoritative registry of service and network resources provided by NETinv is essential for efficiently performing daily operational tasks.

Monitoring

PVSR

Provides unified performance management features for comprehensive, real-time control over the performance of your IT services. Its proactive problem solving and accelerated diagnostics capabilities lead to improved resource and capacity planning, better resource utilization and optimized spending.

Fault Localization

FM

Gathers alerts from PVSR and/or other third party monitoring tools and provides root cause analysis based on predefined correlations and rules, and purpose driven data storage (using graph databases) and handling, which results in pointing out the problem's original cause.
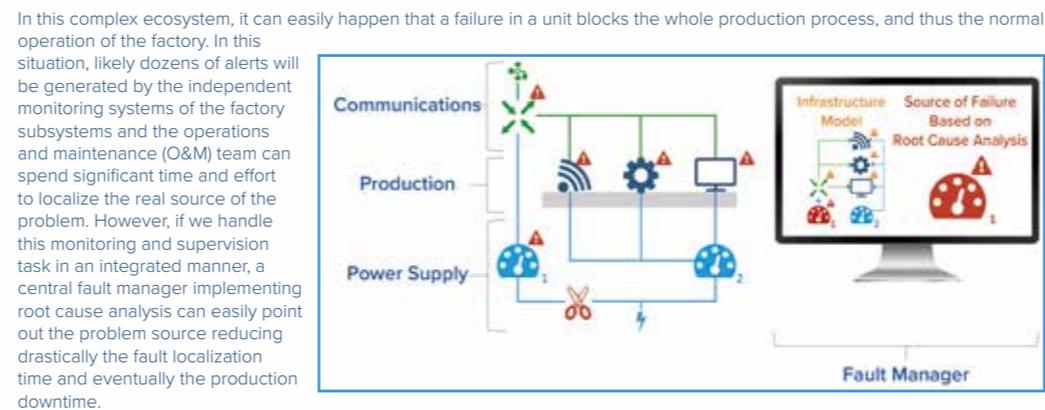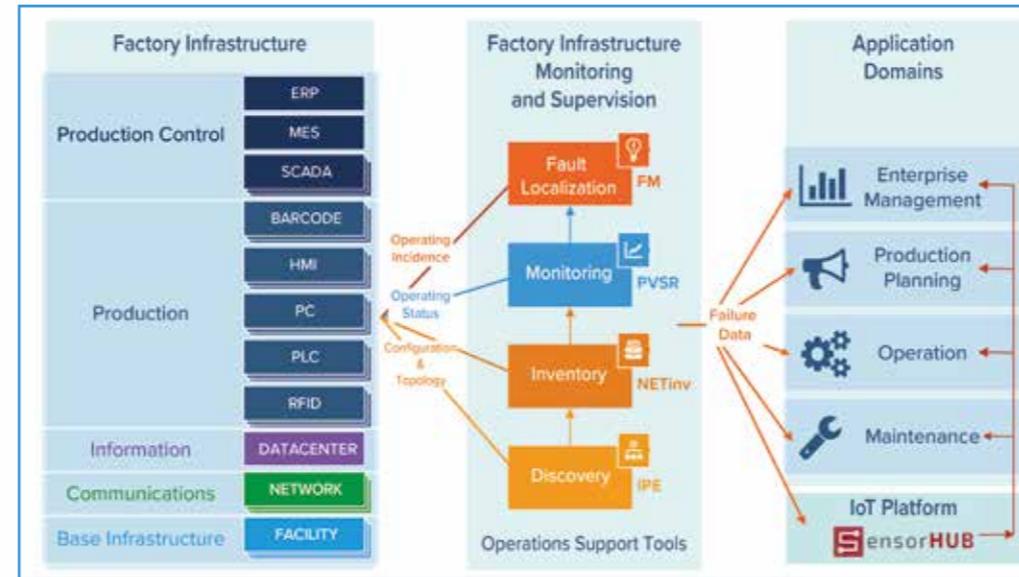
Factory Infrastructure
Monitoring and Supervision

Our solution is an integrated framework, consisting of our **Operations Support Tools** and our **IoT platform**.

Modern, Industry 4.0 ready factory infrastructures are pretty complex. The factory subsystems, such as

(i) production lines/machines, including PLCs, RFID and BARCODE readers, HMI panels, PCs, and their control system (SCADA, MES, ERP);

(ii) factory ICT (information and communications system of the factory);

(iii) and the factory base infrastructure (facility including power supply, water, heating)

constitute a complex production ecosystem. It is paramount for every factory to assure the quality and continuity of production, which can be measured by the waste product ratio and the production downtime.

In this complex ecosystem, it can easily happen that a failure in a unit blocks the whole production process, and thus the normal operation of the factory. In this situation, likely dozens of alerts will be generated by the independent monitoring systems of the factory subsystems and the operations and maintenance (O&M) team can spend significant time and effort to localize the real source of the problem. However, if we handle this monitoring and supervision task in an integrated manner, a central fault manager implementing root cause analysis can easily point out the problem source reducing drastically the fault localization time and eventually the production downtime.

IoT Platform
for Industry 4.0 Solutions

IoT Platform

SensorHUB

Efficient implementation of IT projects and their sustainable and cost-efficient maintenance requires the usage of frameworks during the development process.

Internet of Things (IoT) is transforming everyday physical objects into an ecosystem of information that enriches our everyday lives. Sensors detect and measure changes in position, temperature, light, and many others, furthermore, they are necessary to turn billions of objects into data-generating "things" that can report on their status, measure various parameters and often interact with their environment.

SensorHUB framework is a data monetization enabler, which supports application domain-specific, - i.e. transportation, health, production lines, smart cities, - data collection and service development to utilize sensor networks, smart client devices and cloud-based backend environments.

The capabilities of SensorHUB can inspire any kind of usage where large scale data ingestion, storage or analytics must be involved in the cloud or on premises. This platform can be an efficient tool for anyone facing new challenges in the field of large scale analytics.

Main features:

- Hadoop based system
- Device registry, authentication and authorization
- MQTT, HTTP support
- Web UI based dataflow editor
- MySQL, HBase support
- Integrated BI reporting tool

Advantages of the SensorHUB platform:

- Supports the most common open interfaces and data storage technologies thus easy to integrate with existing systems
- Cloud or on premises install package
- Highly customizable and flexible architecture