FIWARE
Open APIs for Open Minds

SMART CITIES AND SMART INDUSTRY

FIWARE integrated IoT platform managing product life cycle

With the contribution of

NiViD TECHNOLOGIES

Challenge & Context

Internet of Things (IoT) is a fusion of technologies, starting with sensors embedded into devices which transmit data through various networks. When data is transferred to **cloud platforms**, **middleware technologies** are needed in order to effectively extract and utilize said data.

Middleware technologies[1], or IoT platforms, are essentially the supporting software connecting 'everything' within an IoT system. An effective platform must have the ability to aid communication, device management, data flow and the functionality of applications.

The global Industrial IoT (IIoT) Platform market size is projected to reach USD 329.8 million by 2026, from USD 289 million in 2020, and at a CAGR of 13.0% during 2021–2026[2]. In line with that study, the goal of an IoT platform is to provide all the necessary functionalities for an application in order to focus on developing features which can differentiate a product and add value for customers. **Industrial IoT platforms are transforming asset–intensive industries into digital businesses.** But not all platforms are created equally. Critical infrastructure investments such as IoT platforms require careful consideration. **Many companies** and organizations **embark on developing and deploying their own IoT platform**, and often **run into unexpected challenges**.

Some of these challenges have been identified by Gartner[3]:
- IoT has introduced unprecedented scalability and performance challenges for network, storage, and system architects;

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[1] "Middleware Technologies. Middleware is the software that connects network-based requests generated by a client to the back-end data the client is requesting. It is a general term for software that serves to "glue together" separate, often complex and already existing programs.Middleware Application Programming interfaces provide a more functional set of capabilities than the OS and network services provide on its own" Interesting article about it on Medium.
[2] Global Industrial IoT Platform Market 2021: Industry Overview by Size, Share, Future Growth, Development, Revenue, Top Key Players Analysis and Growth Factors up to 2026.
[3] Taken from Gartner Q&A with analyst Mark Hung exploring how IT leaders can take advantage of opportunities and address challenges, 2020.

- Vast numbers of smart devices such as sensors, wearables, autonomous machines, connected vehicles, etc. are generating an ever-increasing volume, variety, and velocity of data that must be processed and analysed quickly, reliably, and cost-effectively;
- Technology needs to adapt and include multiple connectivity standards such as NB-IoT (Narrowband IoT) LTE-M (Long Term Evolution for Machines), LoRa (Long Range) and 5G (Fifth Generation);
- Enhancing the traditional methods and avoiding remediation deploying the sensors (approximately 20% of the sensors are not deployed optimally the first time);
- An IoT platform must provide a set of centralized, efficient, and scalable tools for orchestrating the edge and cloud-based requirements of connected assets.

Nivid, a leading Digital Infrastructure solutions company, focused on delivering technology 'as-a-service' and one of America's 500 fastest-growing private companies, developed N-Smart specifically in order to address the above mentioned challenges.

Solution

N-Smart provides a modular, flexible, and scalable platform providing a single pane view for an end-to-end **IoT solution**. Using a combination of cloud platforms and mobile apps, **N-Smart** enables enterprises to deploy and connect sensors, compute data and build custom applications, and monitor and manage a global IoT solution in a highly scalable environment.

Real Time Insights
- Data visualization with real-time location-based data map;
- Dynamically monitor, track, and manage both mobile and fixed assets;
- Combine real-time data to proactively address challenges, reduce risks, lower costs, and increase operational efficiency.

Monitoring and Maintenance

- Authenticate, securely connect, configure, and organize devices;
- Continuously monitor devices, network parameters and failure indicators;
- Automated firmware updates over the air.

Scalable and Flexible

- Horizontal scalability to support multiple use cases and solutions;
- Open APIs to integrate with third-party platforms;
- High availability for mission critical applications.

Smart Response

- Context-rich applications for optimizing resources, asset management, engagement, safety, and security;
- Transform raw sensor data into actionable insights in a single pane of glass;
- Unified environment to improve operations and management efficiencies.

How it works

N-Smart's motivation is to allow users to meet the needs of IoT demands and achieve outcomes including **safety**, **sustainability**, **productivity**, **livability**, and **mobility**. To achieve this, there were a series of critical issues which had to be overcome during the development phase:

1. constructing an effective architecture in order to support the defined business needs;
2. optimizing the use of resources for various use cases such as smart cities, waste management, lighting, and intelligent water systems, all with the aim of improving efficiencies and reducing costs.

N-Smart is a next-generation solution converging multiple technologies into one platform. It turns data from a myriad of sources into useful, contextual information for people to act upon quickly and effectively. **N-Smart** comes with operational dashboards and capabilities such as complex event processing. The platform

supports both big data & AI algorithms, whilst offering different APIs for third party integration and advanced data driven maps.
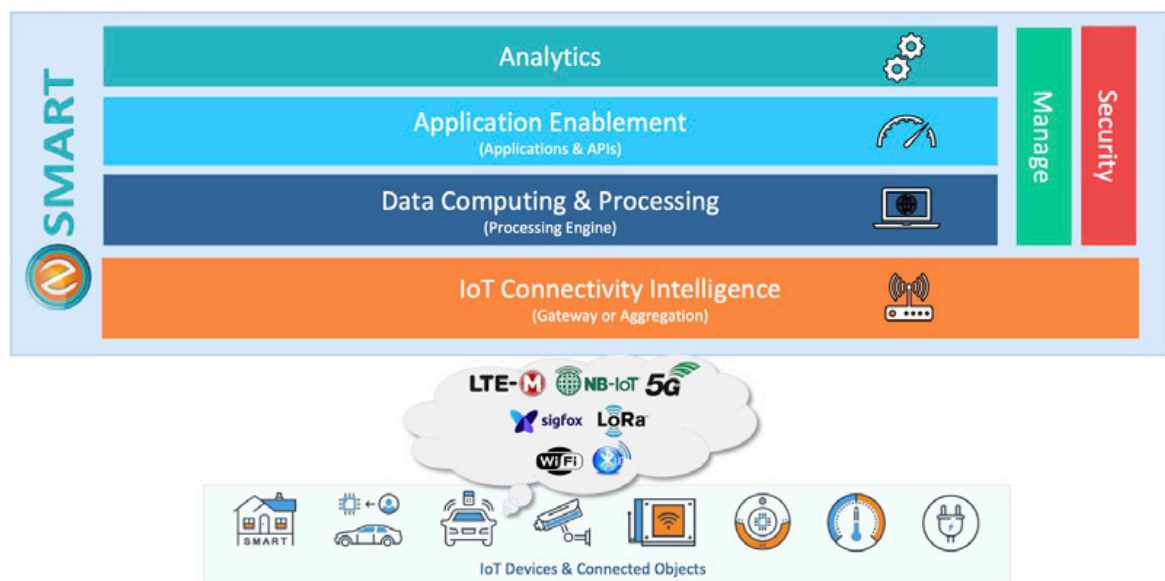

Figure 1 - N-Smart Connectivity

The **N-Smart** Platform is based on modular, scalable, and flexible architecture with a horizontal model allowing easy integration. Data is taken from integrated sensors and collected along with external data which are then transported, homogenized and processed by the **N-Smart** platform.

FIWARE's open-source platform components and reliable data, when assembled with N-Smart, provide a wide scope for development of smart solutions. Real time and reliable data offered by FIWARE has helped create applications in a fast and easy way replicable across many locations.

FIWARE's framework addresses the need for collecting and managing data from the most diverse sources to enable the development of smart solutions, which can be updated and used for various solutions. The **FIWARE ecosystem is industry proven**

for IoT use cases. FIWARE's **Smart Data Models** deliver highest flexibility and scalability creating a wealth of data which can be further analyzed and used in the future. The **FIWARE Data Platform enables aggregation of cross-field information from distributed & smart data models, services and events and makes them available to users and service providers**.
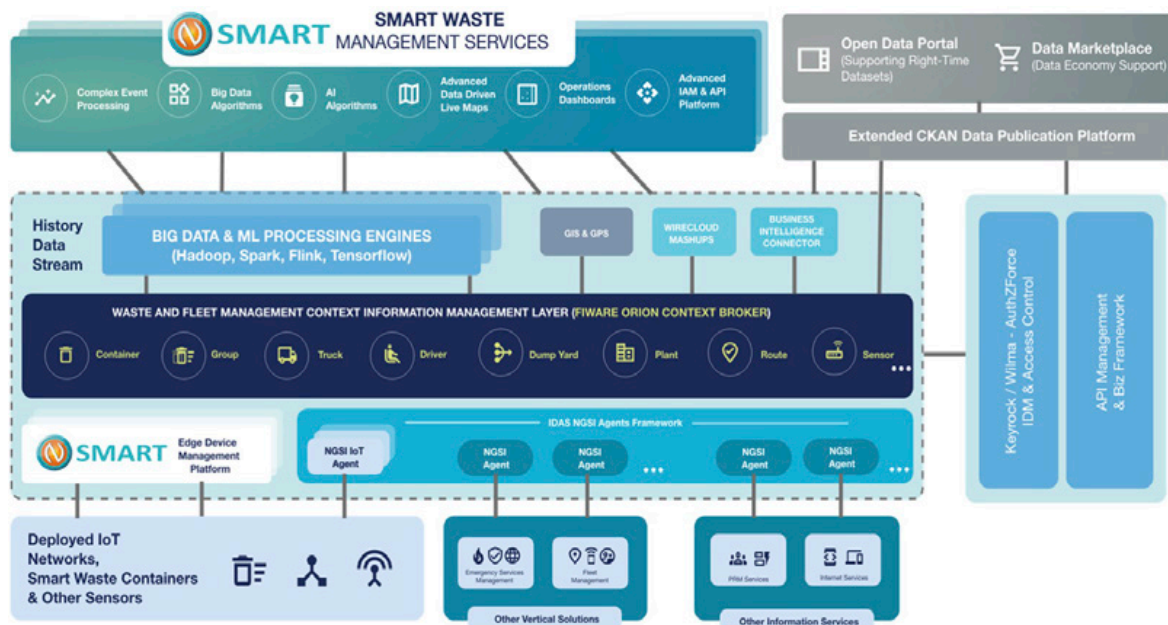

Figure 2 - N-Smart Waste Management Services

FIWARE Orion Context Broker

Orion Context Broker[4], which enables to manage context information in a highly decentralized and large-scale manner, represents the core to this waste and fleet

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[4] Orion Context Broker implements a cornerstone function in any smart solution: the need to manage context information, enabling to perform updates and bring access to context. It allows to manage the entire lifecycle of context information including updates, queries, registrations and subscriptions. It is an NGSLD server implementation to manage context information and its availability.

management context/information management layer. It enables the user to create context elements and manage them through updates and queries. Additionally, it helps cut the integration time and cost.
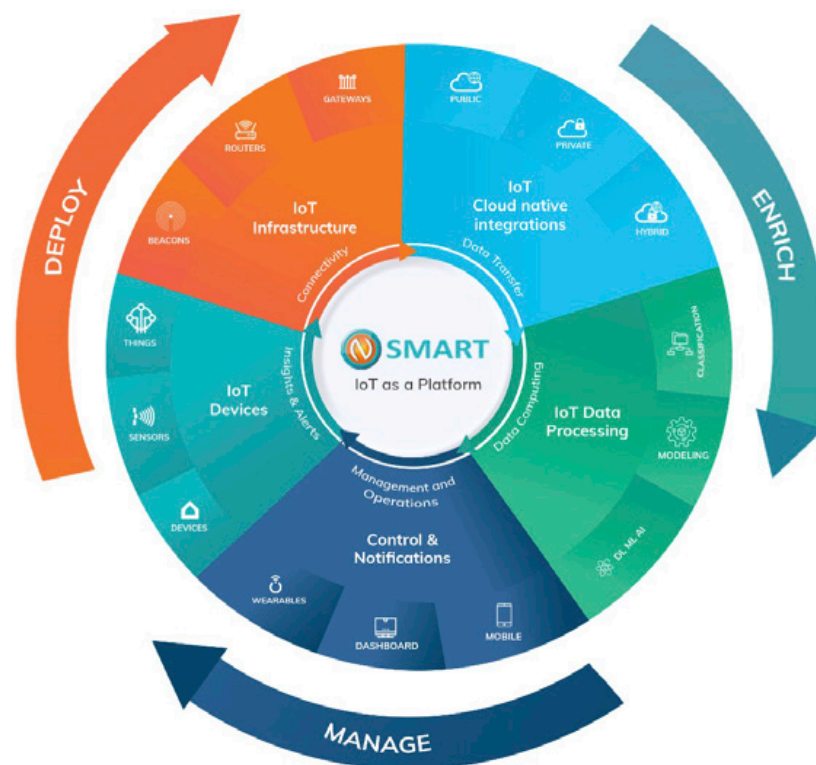

Figure 3 - N-Smart IoT Platform overview

Key Learnings

- Flexibility of the visualization framework enables quick reiterations of the data shown in an application;
- Single pane of glass portal to support the functional requirements;
- Infrastructure is capable of shifting loads according to defined use cases. The N-Smart platform is capable of adapting various applications/use cases using a seamless transfer;

- Novelty of the technology promotes adoption, but to encourage regular use, the platform needs to be informative and useful;
- Overall learning from the trial implementation is that **smart energy** solutions can be built on standard components. To ensure the stability and amenability, the setup should be as simple as possible and use components prepared for external interfacing and preferably the same type.

Benefits & Impact

Top four impacts and benefits:
- **FIWARE's** APIs enable distinctly new business models as well as delivering models for new services.
- Promising optimization results have been found and will be explored further.
- **Nivid currently has 500+ users utilizing the N-Smart platform**. To date, NIVID has 50 clients, primarily in financial services, telecom, retail, healthcare and industry. As they grow within the market, they expect more than 20,000 users for 2021 as a projection which translates to ca. 100 clients.
- Nivid estimates savings money per client would be between 20%-30% with the target groups being large global carriers from the healthcare, industrial and enterprise markets.

Added Value through FIWARE

Nivid has created this significant success after only having been using **FIWARE** for approximately 6 months and while achieving **GOLD partner status**.

"Open Standards", "Flexibility", "Scalability" and" Transparency" are necessary for a solution that guarantees technologies to citizens which impact everyday life such as waste management. **N-Smart** and **FIWARE** share common goals making it a great partnership and solution.

FIWARE technology sets the standards for merging existing data from different sources and developing a data model for networking **cities** and **municipalities**. Thanks to **FIWARE's** uniform data models and interfaces, developers can create independent applications. Increasingly, this data is also used in artificial intelligence applications, an area of development in which both partners plan to work together closely.

References

- Gartner, 2020
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