Bringing the Edge to Life with Actionable Insights

NSP Envision IoT Edge & Insights

Data Analytics Engineering platform

Executive Summary:

NSP specializes in Industry 4.0, MES (Manufacturing Execution Systems), and industrial automation. We collaborate closely with our clients to harness the transformative power of data. We focus on turning the data generated by industrial operations into actionable insights, fostering smarter and more sustainable practices across various sectors, including energy, power, water, metals, minerals, and chemicals. Our solutions are designed to adapt to the evolving needs of a growing global population while preserving existing investments, introducing new capabilities, and accelerating innovation. This document outlines NSP's Capability and ongoing commitment to making a meaningful impact in IoT.

Content

Sustainable Cost Reduction with an Evolving, Secure, and Standards-Based IoT Platform

Empowering Profitability Through Extended Control Ecosystems in Digital Transformation

Enhance Engineering and Project Management with Flexible Work-flows for Efficient Application Engineering and Project Execution

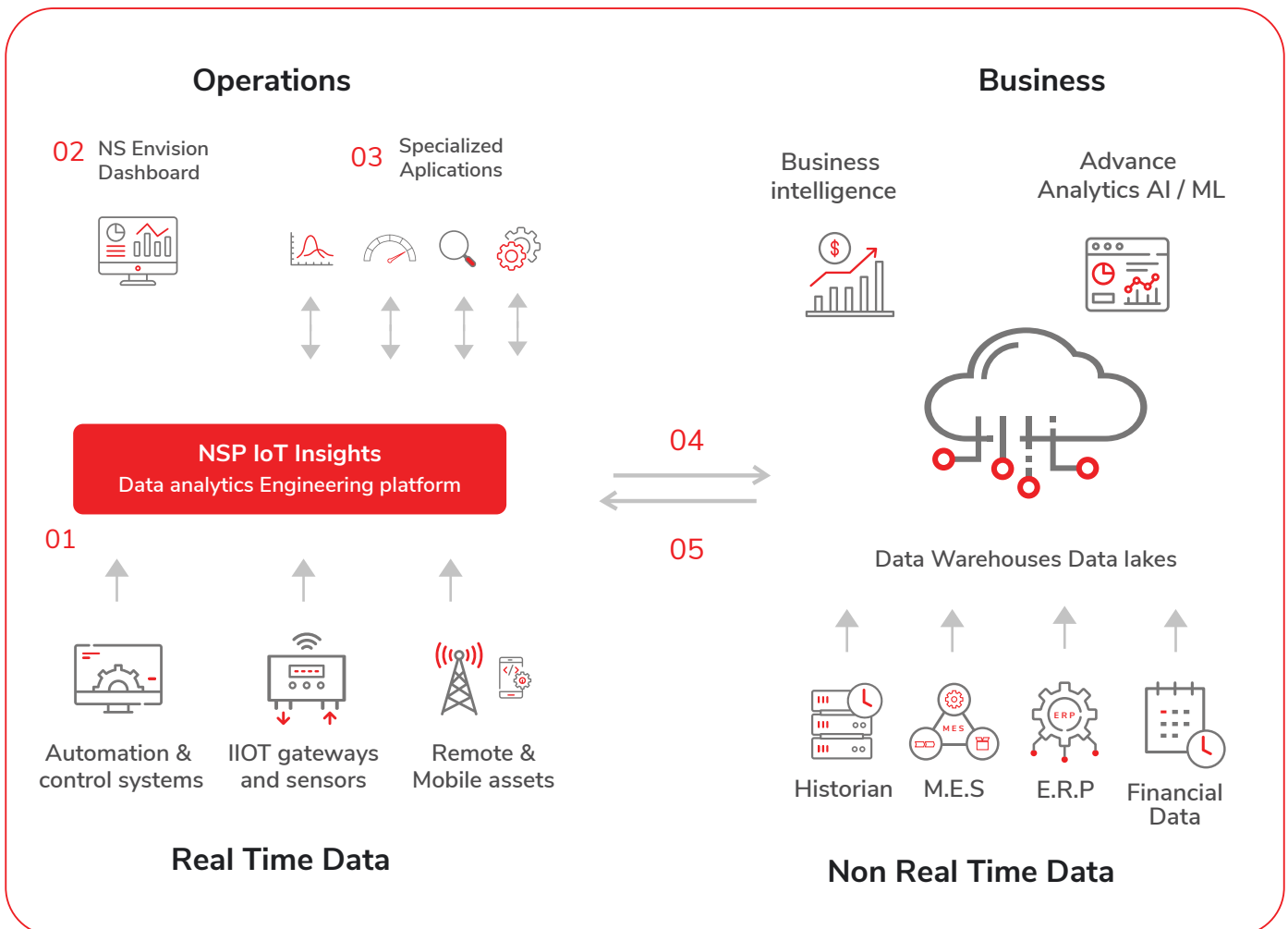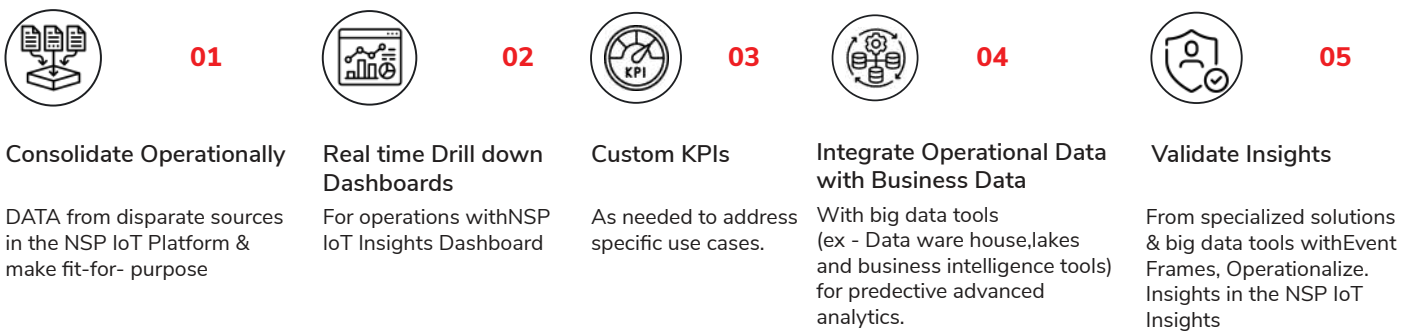"It has been determined that unplanned downtime is imposing a colossal financial burden of $100 billion on the world economy. An alarming 82% of companies grapple with the challenge of unplanned downtime on a daily basis. Surprisingly, industrial facilities are only utilizing a fraction, less than 20%, of the data they generate. Strikingly, 91% of companies have made it their top priority for the upcoming year to reduce downtime and enhance sustainability. To achieve this, they are planning to harness the potential of IoT and AI technologies, with a strong focus on compatibility with 5G networks"

Manoj Kumar
Founder & CEO,NSP
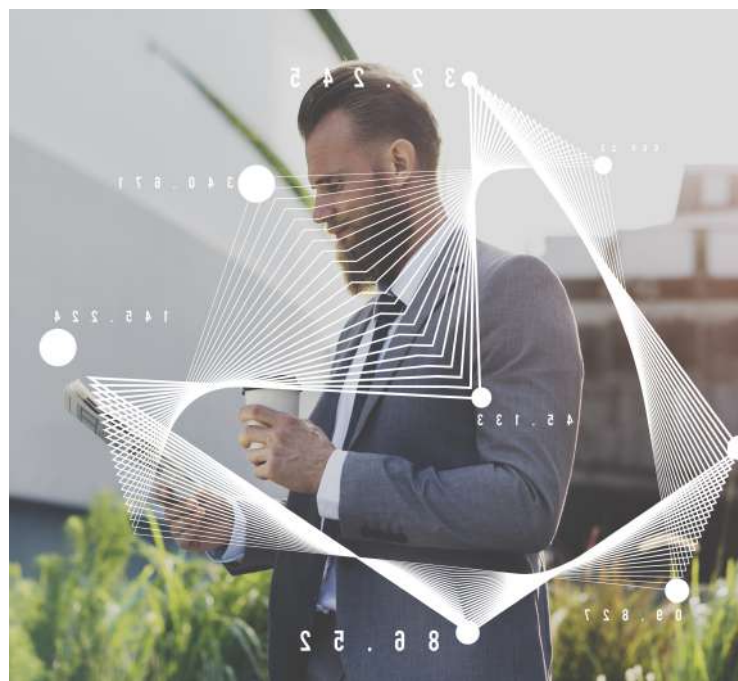
Enabling Real-time Performance Optimization across the plant

NSP Envision IoT Edge and Insights provides powerful, secure, reliable industry 4.0 compliant Industrial Grade IoT solution to enable digitalization across industries. Our solution is future ready, and fully compliant with 5G technology. The foundation of the solution is built with ensuring flexibility and scalability at every level. Because we understand Digitalization is not the destination, it is a journey for continuous improvement of efficiency and optimization of cost and downtime. With our solution, you start the journey of digitalization step by step, realize the value of digitalization, and then expand the solution to optimize the performance and enhance the productivity and quality. NSP offering OEMs the potential for new business models, increased spare parts revenue, reduced maintenance costs, and improved maintenance efficiency .Transforming Plant Efficiency through a 5-Step Real-time Optimization Process

01

Consolidate Operationally

DATA from disparate sources in the NSP IoT Platform & make fit-for- purpose

02

Real time Drill down Dashboards

For operations withNSP IoT Insights Dashboard

03

Custom KPIs

As needed to address specific use cases.

04

Integrate Operational Data with Business Data

With big data tools (ex - Data ware house,lakes and business intelligence tools) for predective advanced analytics.

05

Validate Insights

From specialized solutions & big data tools withEvent Frames, Operationalize. Insights in the NSP IoT Insights

Operations

02 NS Envision Dashboard

03 Specialized Aplications

Business

Business intelligence

Advance Analytics AI / ML

NSP IoT Insights
Data analytics Engineering platform

04

05

Data Warehouses Data lakes

01

Automation & control systems

IIOT gateways and sensors

Remote & Mobile assets

Historian

M.E.S

E.R.P

Financial Data

Real Time Data

Non Real Time Data

Connecting the Dots and Innovating : Effective & Secure IT/OT Integration in Digital Industries
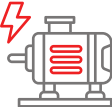
The NSP approach is rooted in simplicity, streamlining the entire process from data capture in the field to data analysis through communications and historical data within a tailored HMI (Human-Machine Interface) concept. Our integration of IoT and data analytics seamlessly fits into existing toolsets and IT infrastructures. Sensors are effortlessly integrated with the control system for data capture, and established fieldbuses facilitate communication through standard protocols, ensuring seamless cloud data exchange. This simplicity yields significant advantages, including cost reduction, minimized effort, and shorter training periods. It boosts operations by optimizing uptime and sustainability through analytics, accurate modeling, and real-time decision support.

Sustainable Manufacturing through IoT Integration

IT Management

Level 4/5
Enterprises

Web server · Dash board · Work station · Alarm / event · Notification

Cloud and Enterprise Analytics OT monitoring operation services
Digital twin and sustainability use cases (C02) by using NSP Envision IoT insights

Fire wall

OT Management

Level 3
Ability to build predictive maintenace model

IO server · Application server · Historian

Factory Visualization, Close loop Engineering / Planning using NSP

Fire wall

Level 2
Factory Floor AI

Scada · IoT Edge · HMI

Edge Solution to Digitalize Factory NSP IoT Edge app for Factory app, Device management and visibility

Software

PLC, RTU, DCS

Level 1
Basic Control

DCS System · RTU Server · PLC System

Level 0
Process

PLC data Harmonizaton and Normalization

OT security Assessment and SOC

Asset Management

Straightforward & Secure path to Cloud connectivity

In the NSP IoT Insights architecture, users have the flexibility to choose their preferred cloud service provider. The connection process is straightforward, regardless of the underlying scenario. It guarantees security through encryption machine and production data are transmitted to the cloud via MQTT, utilizing the NSP's IoT Edge as the IoT Edge device. Third-party systems can also be seamlessly integrated using the same approach.

The Simple & Secure Route to the cloud
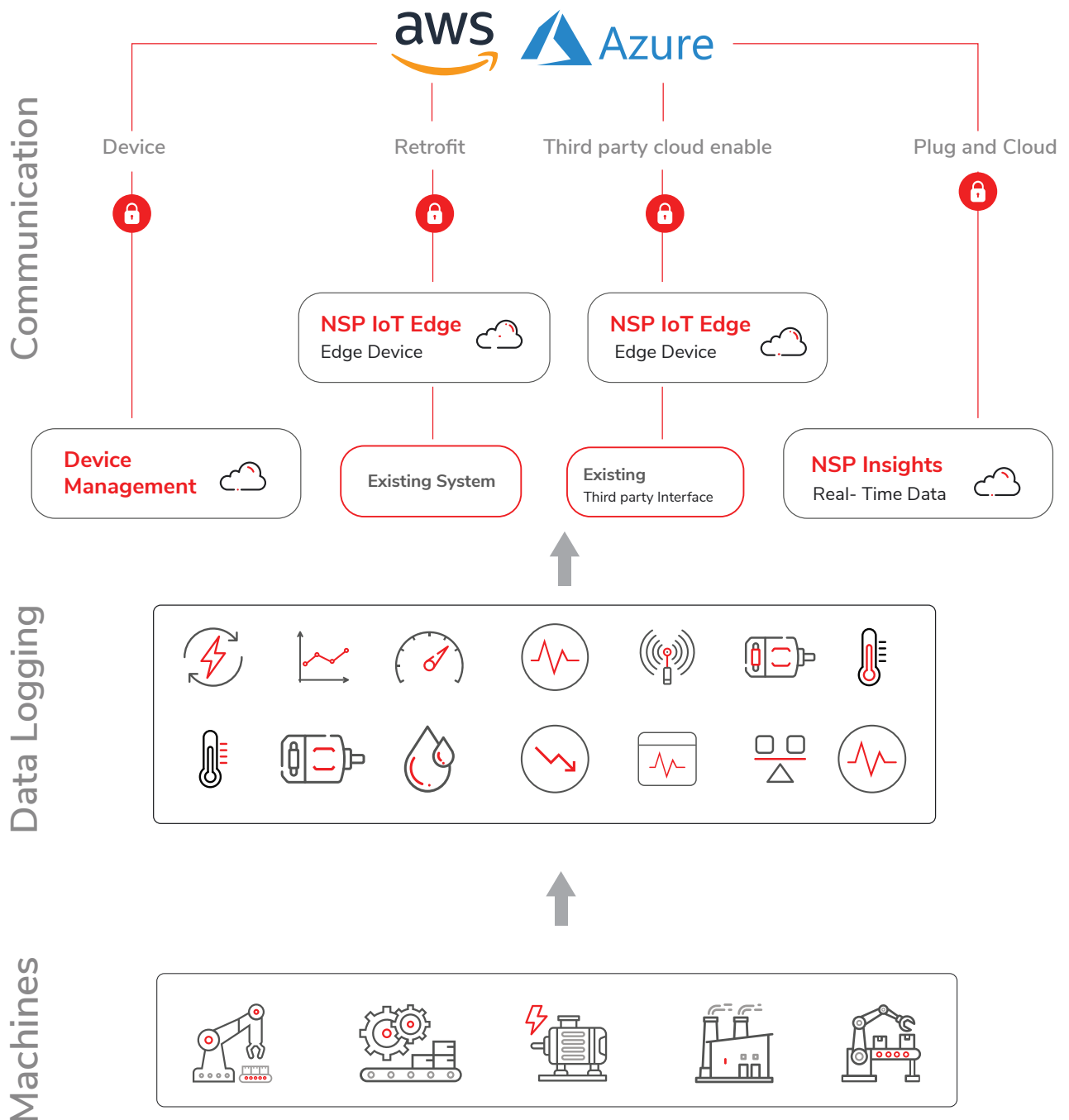
Sustainability & Digization

Meeting sustainability expectations Is paramount :

The statement "Sustainability tops societal expectations" reflects a growing focus on environmental and social responsibility in today's manufacturing industry. To address these expectations, IoT (Internet of Things) platforms and edge computing technologies are pivotal. NSP enable manufacturers to collect and analyze data from various sources within their operations, fostering sustainability efforts. This includes improving energy efficiency, optimizing resource utilization, practicing predictive maintenance, and monitoring environmental conditions. By leveraging these technologies, manufacturers can meet society's sustainability demands and position themselves for long-term success in an increasingly eco-conscious world. Below are few case studies.

Energy Efficiency Monitoring & Optimization :

Process optimization for energy conservation in diverse industries, including textiles, sugar plants, and thermal power plants, is a key focus. In the textile industry, this optimization entails the deployment of IoT sensors on spinning machines and related equipment to provide real-time monitoring of energy consumption. This data empowers operators to identify opportunities for enhancing energy efficiency and reducing operational costs

Improved productivity and decreased energy consumption have been realized through meticulous monitoring of critical operational variables and the strategic management of factors such as speed, yarn breakage, and energy utilization.This leads to lower energy consumption and reduced CO2 emissions .

Environmental Monitoring :

IoT sensors play a pivotal role in monitoring air quality and enabling the early detection of environmental issues, ultimately reducing environmental damage and the associated carbon footprint.

Air Quality Monitoring: IoT sensors are capable of measuring various air pollutants, including particulate matter (PM) in the form of PM2.5 and PM10, which are known to pose health risks.

Additionally, they can measure CO2 levels, assisting in the balance between ventilation and purification requirements. Furthermore, these sensors capture temperature and humidity data, which directly impact production efficiency. Real-time data is continuously collected, analyzed, and made accessible to the public, empowering individuals and authorities to take proactive measures aimed at enhancing air quality .

How NSP IoT Edge and Insights Enabled Round - the - clock Energy Management

At a client's location, NSP IoT Insights Analytics was implemented within a local network, facilitating the analysis of various machines within an end user's pool. The end user selected NSP for this project with the aim of expanding connectivity to additional machines while minimizing disruptions to existing ones. This goal was accomplished effectively, with NSP IoT Edge machines being easily accessed through Modbus TCP.

Data transmission was equally smooth, leveraging the NSP IoT Insights Storage Provider in conjunction with Microsoft SQL and MongoDB databases for recording both real-time and historical data. The analysis was executed using NSP IoT Insights, with a primary focus on monitoring machine cycle times, evaluating mechanical lifespan, and generating a variety of reports.

Online Energy Management & Monitoring Solution
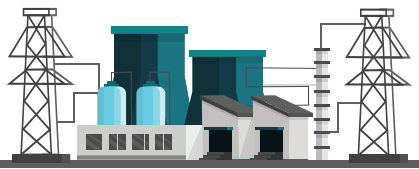
Power Generation Plant
(Thermal, Solar, **Hydel**, Biomass)

PLC and DCS RTU

IEC 104, 105 OPC Protocol

Converter

NS Secure Cloud Server

ABT Meter

modbus tcp/ip & dlms protocol

NS Envision™ SoftEdge

Switch

ABT Meter

RS-232/485 Protocol

Converter

Application & Database Server

Real time data Monitoring on web, mobile & Laptop
(Deviation & its Charges, Actual & Scheduled energy, Frequency)

Analytics dash board
(MW, Voltage, Current, MVAR etc.)

Historical Energy trends

Excel, Word reports, Web & PDF Reports
Block, Day & Month wise
(DSM, Energy Balance, Losses, sent out...etc)

Alerts & Notifications
(Unit trip, High/Low Frequency...etc)

Asset Performance Monitoring

NSP Insight for Continuous Monitoring of Machines

A chemical company aimed to minimize machine downtime and improve machine monitoring and maintenance services. To achieve this, they adopted NSP IoT Edge and Insights to implement their technical solution. NSP IoT Insights was configured on field machine computers to fulfill this objective.

The Logger meticulously collected process data from the machines and regularly transmitted it to a native MQTT message broker in a cloud system. For each machine type, a dedicated data analysis tool was developed. Service engineers utilized this tool to perform on-the-fly analyses of both real-time and historical data.

The end user encountered a challenge with critical equipment, especially pumps, which were experiencing abrupt shutdowns without clear reasons. Efforts to analyze the root cause using manually collected vibration data were futile and did not yield satisfactory results. However, with the implementation of NSP IoT Insights, the root causes behind these equipment failures were successfully identified and solutions were implemented using smart sensors and data analytics .

Data transmission was also seamless, utilizing NSP IoT Insights Storage Provider in conjunction with Microsoft SQL and MongoDB databases to record both real-time and historical data. The analysis itself was performed using NSP IoT Insights, focusing on monitoring machine cycle times, assessing mechanical lifespan, and generating various reports
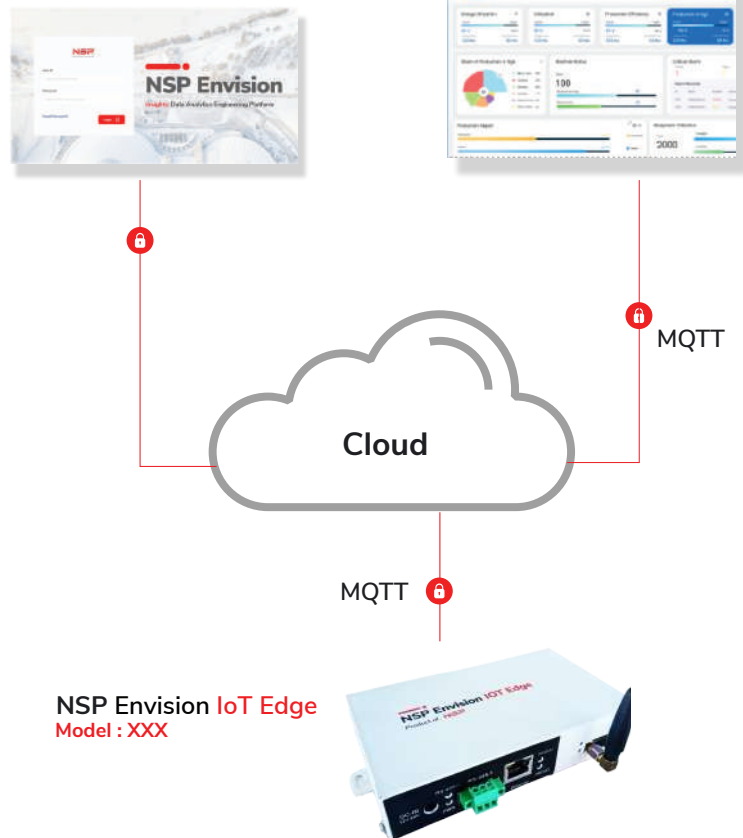
NSP Envision IoT Edge

Service technician
(Location-Independent)

NSP Envision Insights

Dashboards

Cloud

MQTT

MQTT

NSP Envision IoT Edge
Model : XXX

NSP IoT Edge

NSP Envision Platform is highly reliable, scalable and secure platform. The platform is capable of building end to end value chains. Our IoT platform is very flexible and configurable to build industry specific application. Below figure shows the architecture. It comprises of IoT Edge, Device Management, Contextualization Hub, Data Analytics, Knowledge Hub and different vertical application.

IoT Edge : The IoT edge provides an On-premise solution for connects, compute, and storage. It has ability to connect with industrial field devices and system using Open Protocols as well as using proprietary communication interface The Edge solution is fully managed solution. It is managed by central components which can be hosted anywhere, whether it a public cloud, private cloud or On-Premise Servers. There are many pre-built connectors such OPC UA , Modbus, CANbus, to connect with industrial devices and systems.

IT- Based Containerization technology at the edge

Digital twins to visualize physical assets

Integration of IT and OT tools

Low - code tools

Cloud - native tools for improved manufacturing OPS

MQTT protocol connecting OT and IT

IT programming tools and laguages for controllers

IT Cybersecurity models for OT

Virtual PLCs - containerized controllers

IT approach for industrial software quality Control

Communication protocol & Interface

MQTT
OPC UA
RS 485
TCP/IP
Modbus

IoT Edge

Specification

- ARM A57 (Quad Core 2.0GHz)
- RAM -4GB
- AI chip (8GB)
- Linux Ubuntu
- HDD:120 GB
- 5G, WiFi, LAN
- Communication protocol: Modbus TCP, MQTT, OPC UA, TCP/IP
- Interface : RS-485,RS-232
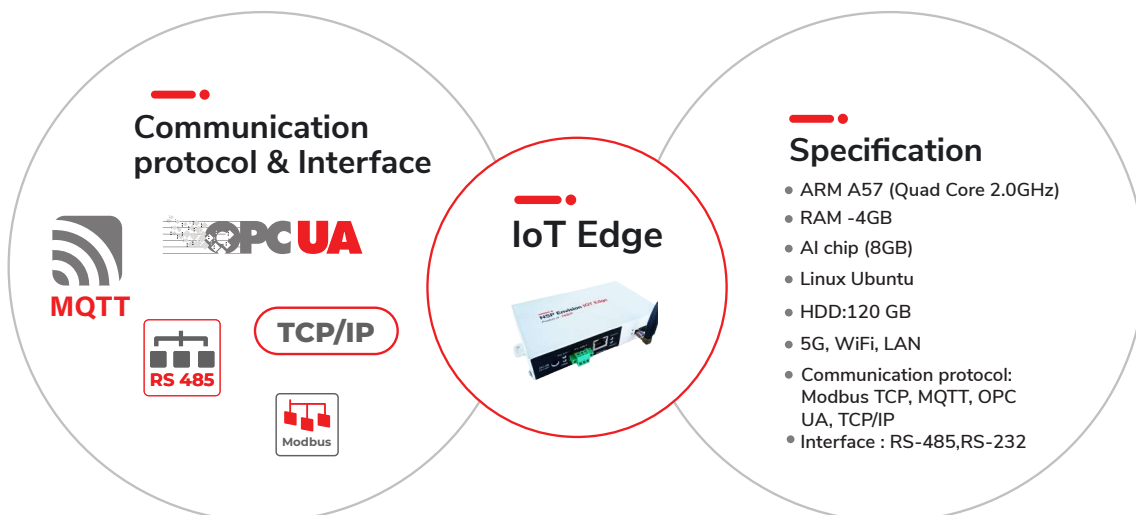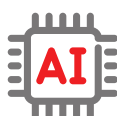
NSP Envision Insights

NSP Envision IoT Insights: IoT platforms are equipped with a wide array of features that enable seamless integration, management, and analysis of data from diverse IoT devices. These capabilities encompass data collection, device connectivity, real-time monitoring, data analytics, remote device management, and the capacity to develop custom IoT applications. IoT platforms play a pivotal role in unlocking the potential of the Internet of Things, offering the essential infrastructure and tools for extracting valuable insights from the wealth of data generated by IoT devices

A Solutions Specific to You

We firmly believe that solutions should align with a clear business case. That's why we've developed a modular, adaptable, and open offering. You can effortlessly choose the services that best suit your specific goals

Driving business value:

1. Smart Energy Management :

Manufacturing facility successfully reduces its energy consumption and operational costs. They can now make data-driven decisions to optimize energy use, schedule maintenance when needed, and ensure equipment operates at peak efficiency.

2. Predictive Maintenance :

IoT platforms add substantial value to the manufacturing sector by optimizing operations, reducing costs, and improving overall efficiency and safety.

3. OEE (Overall Equipment Effectiveness) Monitoring:

IoT platforms can significantly enhance OEE in manufacturing by providing real-time insights, enabling predictive maintenance, and driving continuous improvement

4. Remote Monitoring:

Remote monitoring using IoT platforms across industries, from asset management to environmental monitoring and beyond, offering real-time insights and operational control from anywhere

How it works:

Drill Down Dashboard: Offers an intuitive, web-based interface that provides complete visibility and control over your manufacturing operations, spanning from the plant level down to individual devices. It also facilitates the monitoring of associated KPIs and parameters while streamlining configuration and management

Data Management: Oversees the data collection process, defines the data transfer routes, manages data processing, and determines data storage locations

Alarm & Event Function: This feature notifies users of alarms and events generated by the control system. It includes tasks such as activating email alerts or forwarding data to other applications for immediate and targeted response

Database: Empowers flexible and secure data storage in various formats, sourced from multiple origins, and with the scalability to accommodate rapidly growing data volumes

APIs: Provides both inbound and outbound APIs, leveraging standard IoT protocols such as HTTP/HTTPS and MQTT/MQTTS. This simplifies the integration with diverse devices and applications

Why NSP ? When you choose NSP you get

Unified IT and Operational Technology Expertise: NSP harnesses its unique background as both an Automation and Software Technology services provider, with extensive experience in industrial automation. This equips us to have a deep understanding of both the IT and OT domains, offering the knowledge and hands-on experience needed to deliver truly effective IoT solutions

Simplified Complex Project Management: As seasoned IoT solution integrators, we excel in managing intricate projects. We adeptly handle multiple data sources, guaranteeing the seamless integration of our IoT platform with your backend systems, resulting in a tailored and fully functional solution

Comprehensive Support: NSP offers complete life-cycle management, bridging resource and skills gaps, allowing you to concentrate on areas where your IoT solution can bring the most value to your business. Through our managed IoT solutions, we empower your business while providing you with the assurance that you are in capable hands

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