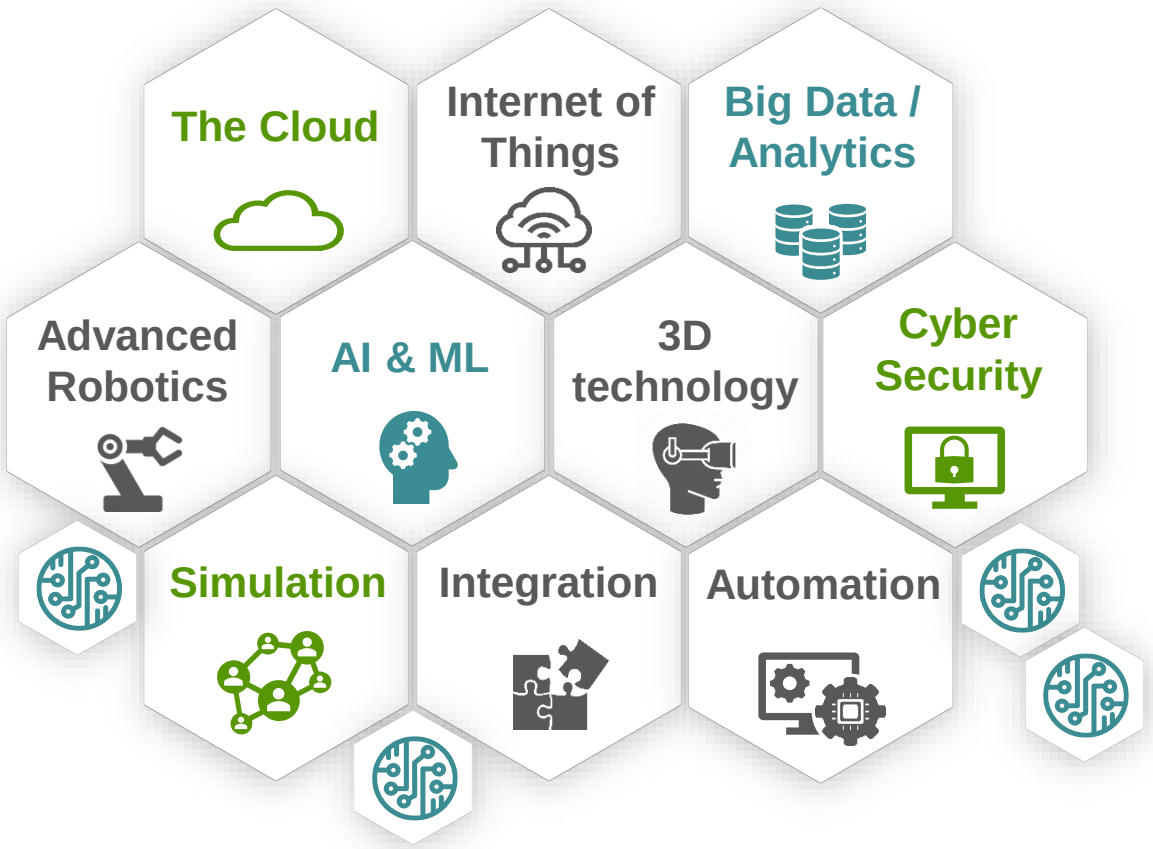
✓ Extensive experience in enterprise automation
✓ Compliance with INDUSTRY 4.0 requirements
✓ Open source multi-cloud platform
✓ Exclusively industrial solutions
INNOVINNPROM
INDUSTRY 4.0 IIOT PLATFORM
SAKURA-IIOT

INDUSTRY 4.0

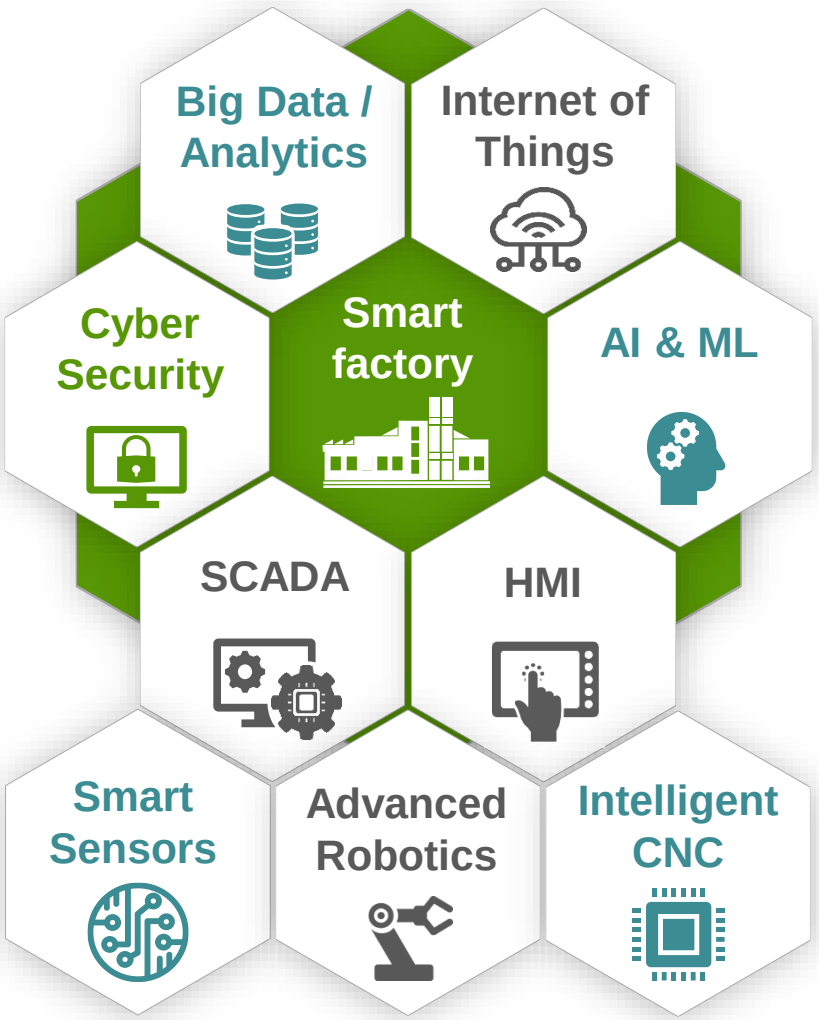
- ✓ Industry 4.0 is an urgent need of today, which guarantees financial success, development of technologies, real growth of production
- ✓ Industry 4.0 provides development and combination of automated production, data exchange and production technologies into a single self-regulatory system with minimal human intervention in production processes



Main directions of development:

- ✓ Implementation of the Digital Double of the product creation
- ✓ Horizontal integration of productions and suppliers into a single information space
- ✓ Vertical integration of production systems

INDUSTRY 4.0



Industry 4.0 is transforming businesses and should be part of the CEO's daily agenda

- ✓ A new level of organization and control of production processes at all stages of product creation
- ✓ Products (from semi-finished product to finished product) contain all information about the technology of its production
- ✓ Manufacturing of products is carried out by a network of cyber-physical systems, based on data extracted from a semi-finished product

INVESTMENTS

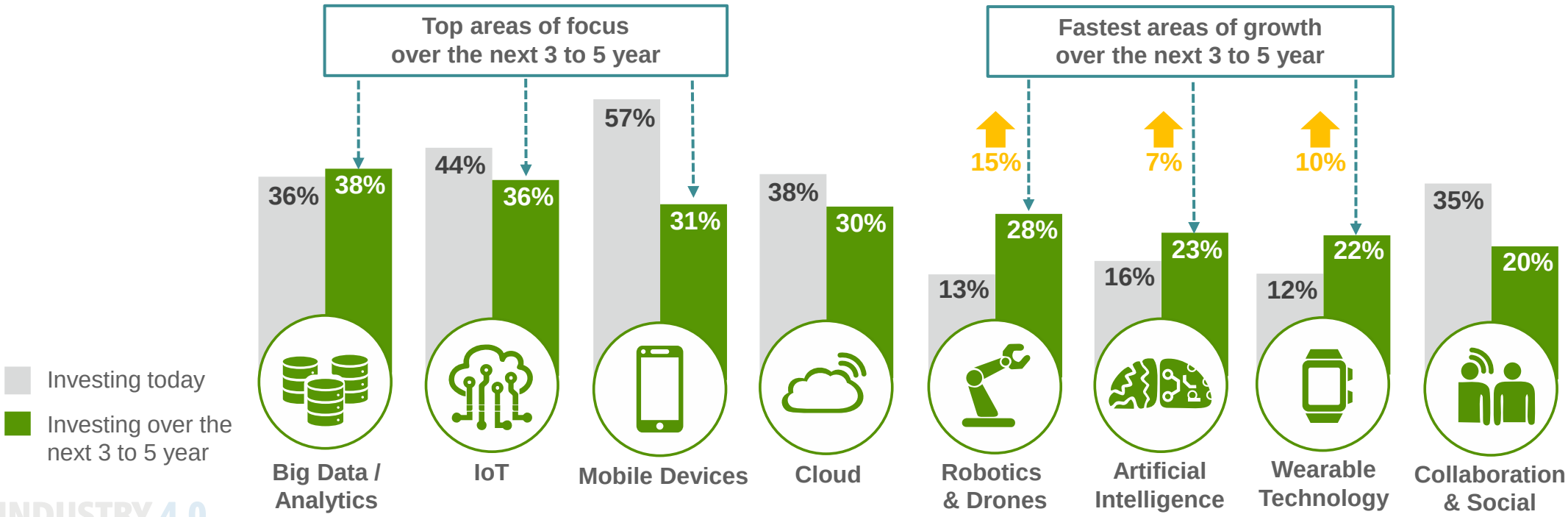
The results of research network of companies in the field of consulting and auditing PriceWaterhouseCooper (PWC):

Until 2025, European industry will invest around € 140 billion in Industry 4.0 annually

More than 80% of enterprises, within 5 years, will digitize the entire product chain, including suppliers

By 2025, an 18% increase in labor productivity is expected due to the introduction of the Industry 4.0 concept

Digital products and services generate around € 110 billion in additional revenue for European industry annually



CREATING

1 **Creating an alternative open source IIOT system**

that does not require licensing, works freely with a variety of databases, has a sufficient number of ready-made tabular and graphical forms for quick configuration of projects to customer needs

2 **Transfer of 30 years of experience of INNOVINNPROM LTD**

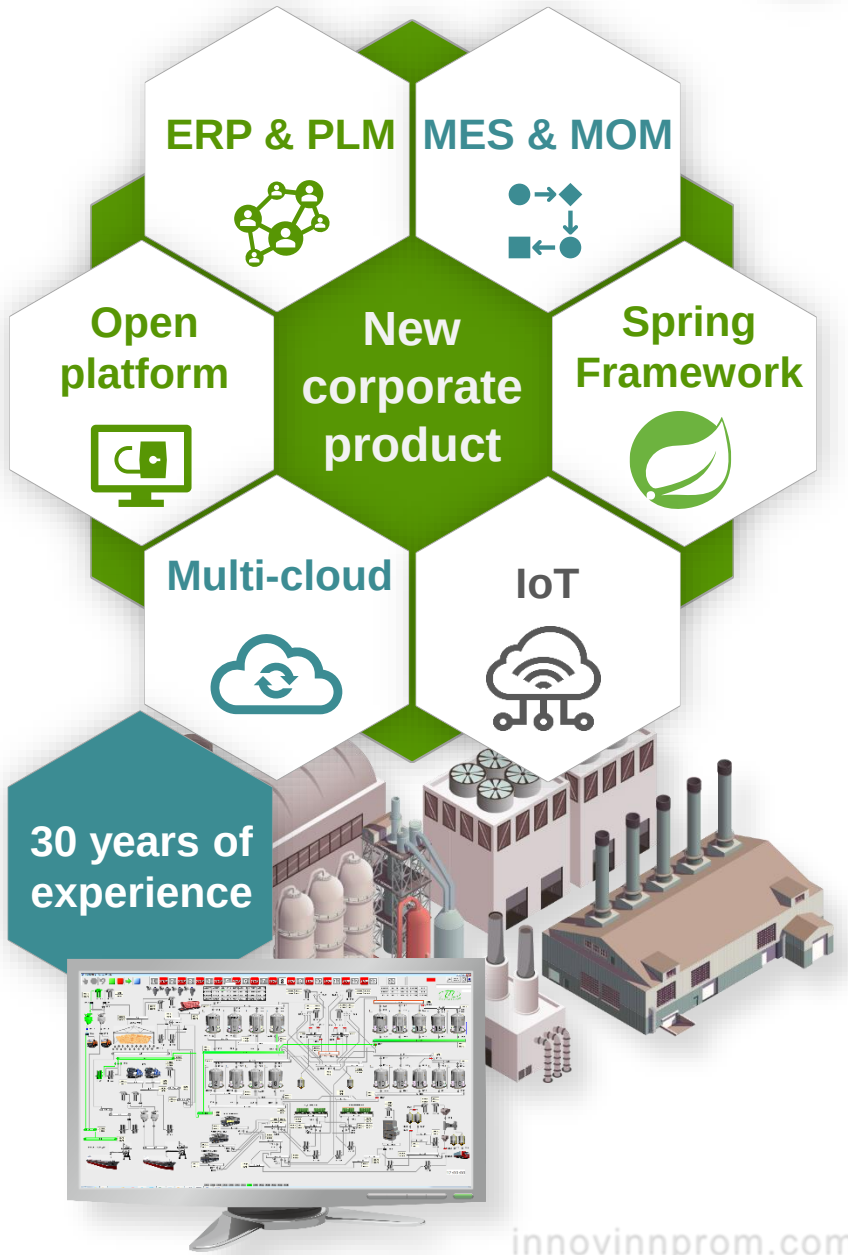
in creating information and analytical ERP and PLM systems and experience in integrated enterprise automation to a modern software base, the use of the most modern databases, computing and cloud solutions

3 **Combining data sets of MES and MOM systems with data sets of ERP and PLM systems**

into a single information space for the formation of analytical information that will provide a qualitative calculation of productivity and energy efficiency of production

4 **Ability to quickly create corporate projects**

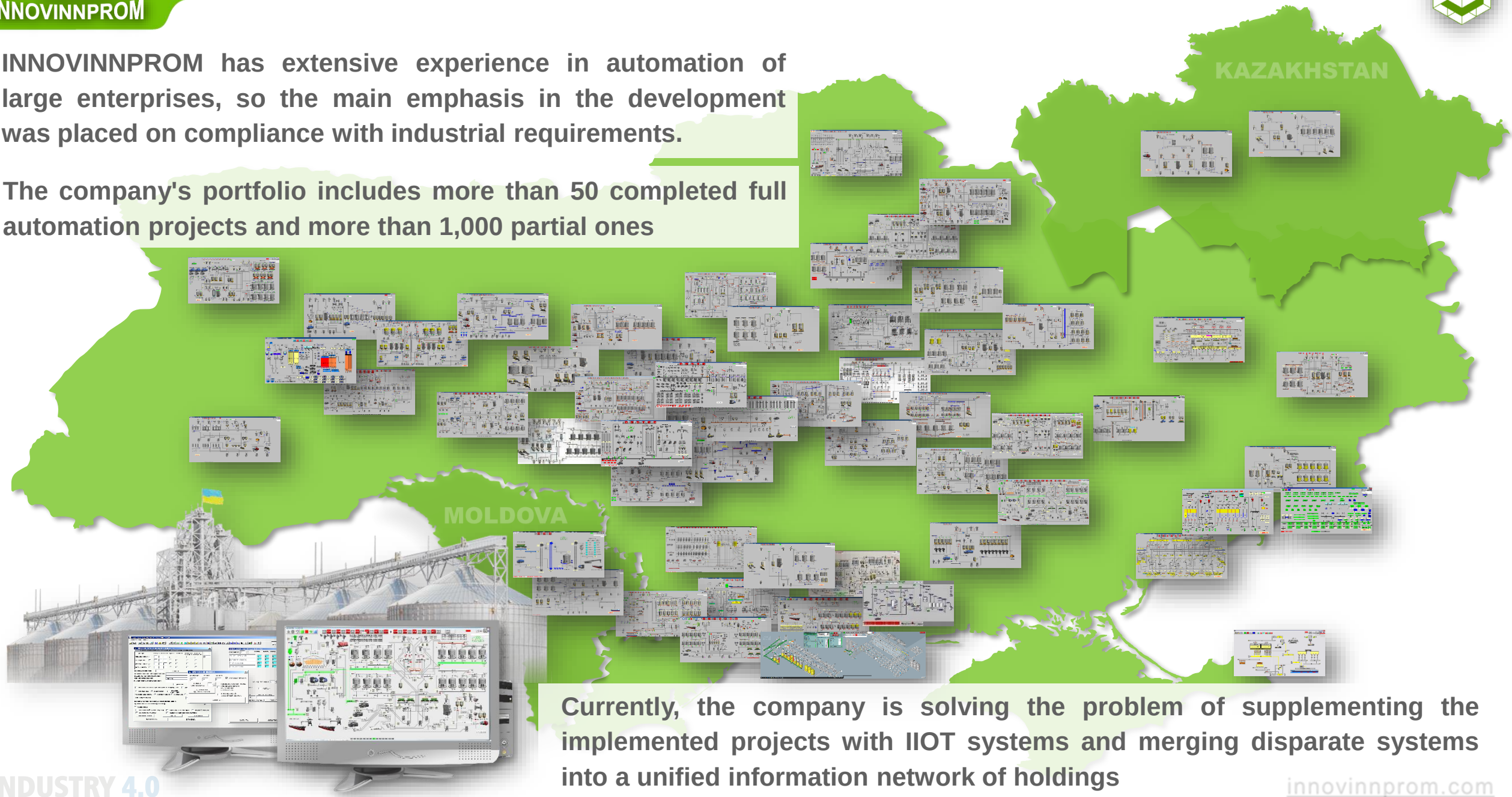
by configuring ready-made computing software modules, visualization modules and databases without the involvement and training of highly specialized professionals and programmers



EXPERIENCE

INNOVINNPROM has extensive experience in automation of large enterprises, so the main emphasis in the development was placed on compliance with industrial requirements.

The company's portfolio includes more than 50 completed full automation projects and more than 1,000 partial ones



Currently, the company is solving the problem of supplementing the implemented projects with IIOT systems and merging disparate systems into a unified information network of holdings

SAKURA-IIOT

To implement the task of merging existing SKADA into a single information network of holdings, INNOVINNPROM has developed the IIOT platform **SAKURA-IIOT** and deployed on its basis MES, ERP, PLM systems at several enterprises. The main purpose of the systems implemented on the **SAKURA-IIOT platform** is to increase the productivity of enterprises.

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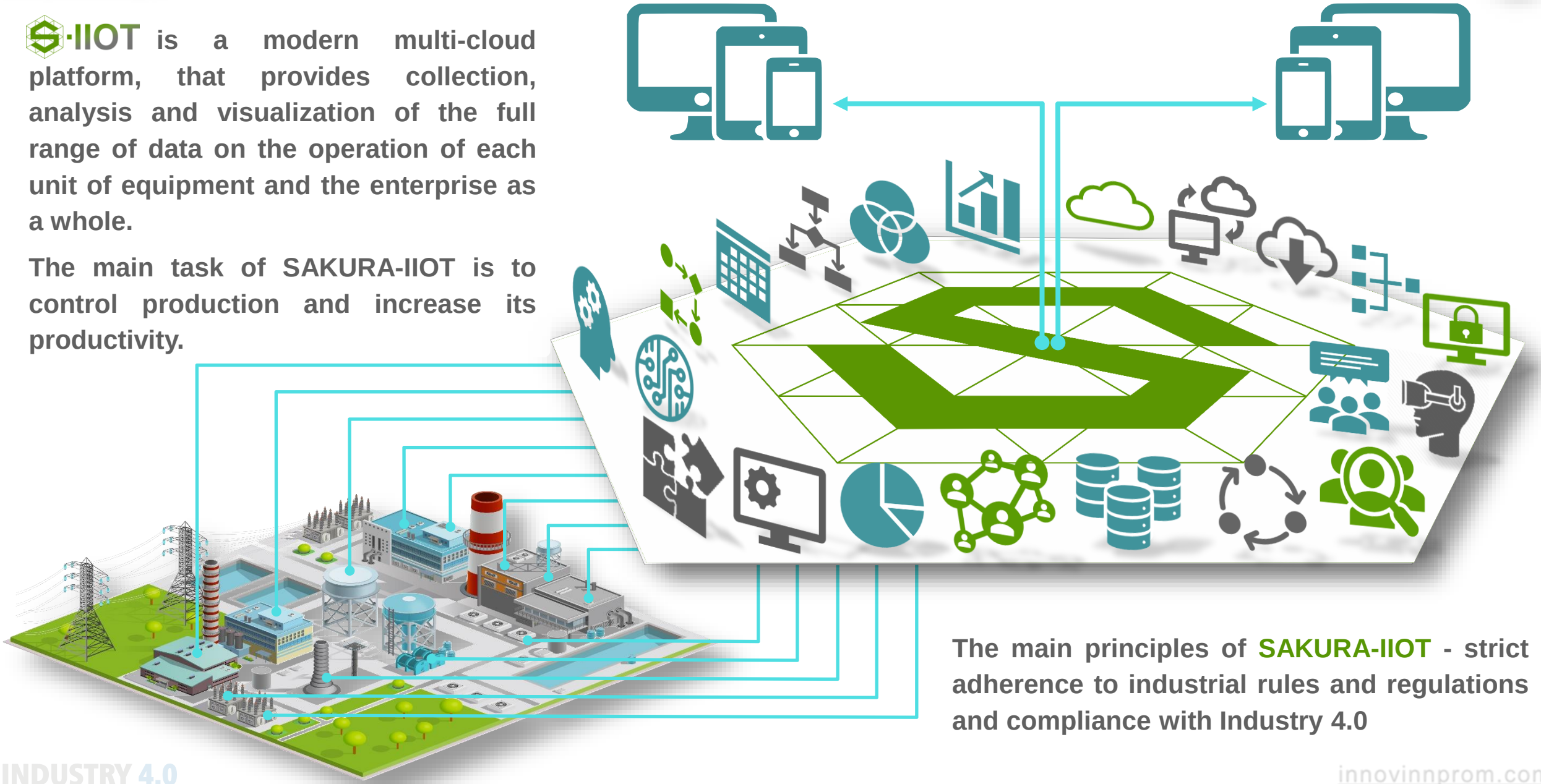
SAKURA-IIOT

S·IIOT is a modern multi-cloud platform, that provides collection, analysis and visualization of the full range of data on the operation of each unit of equipment and the enterprise as a whole.

The main task of SAKURA-IIOT is to control production and increase its productivity.



The main principles of SAKURA-IIOT - strict adherence to industrial rules and regulations and compliance with Industry 4.0

FEATURES

S·IIOT compiles mainstream JVM technologies into a powerful environment, responding to modern development standards and common requirements of business applications.

MODULAR

The unique architecture allows any SAKURA-IIOT application to be embedded into another SAKURA-IIOT application.

This makes modularization practically trivial - split your task into a number of loosely coupled parts, develop them separately and assemble together into one comprehensive system.

SCALABLE

The framework is designed to be scalable both vertically and horizontally.

It provides multiple deployment options depending on the planned application load and permitted downtime.

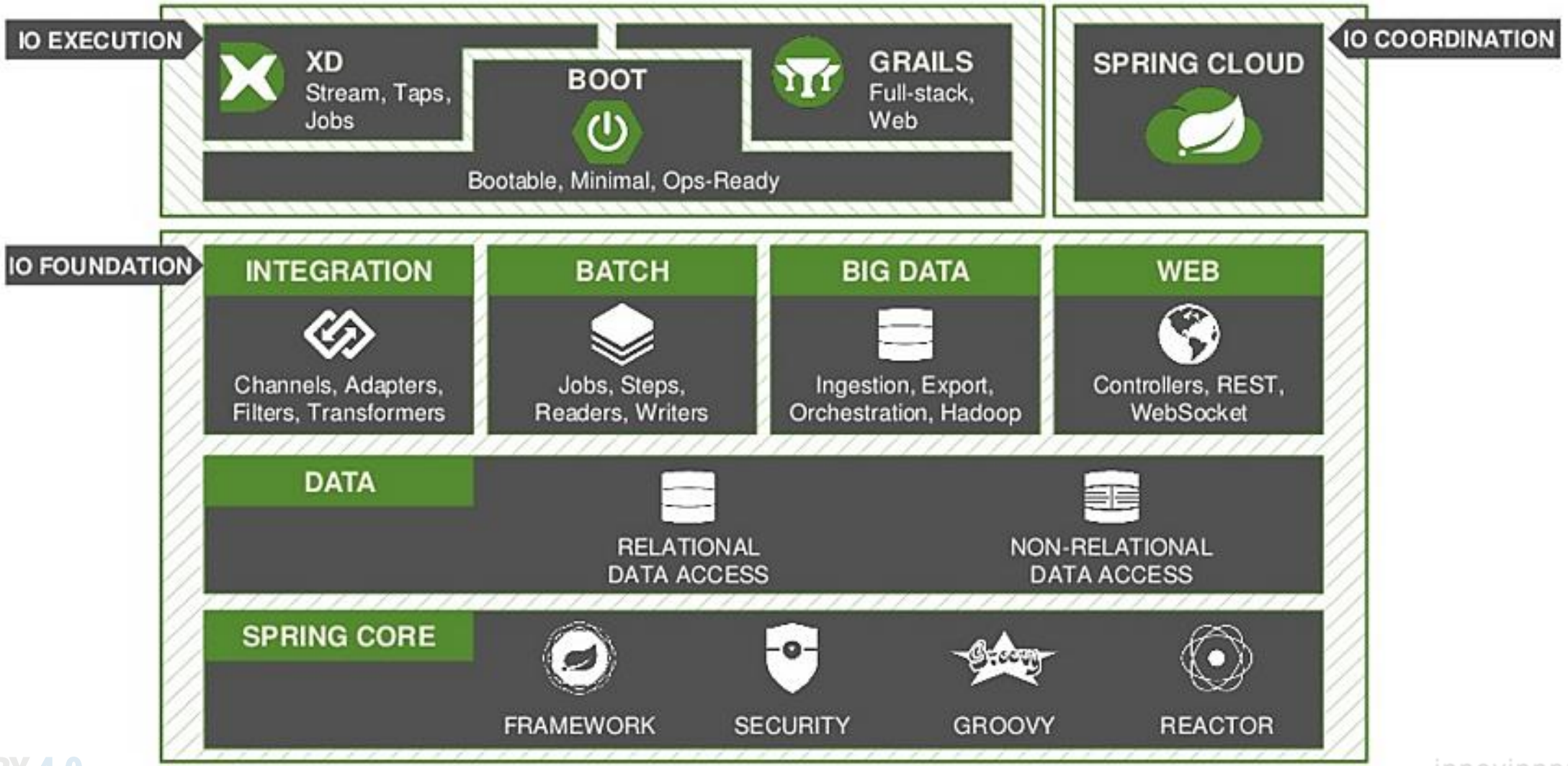
COMPATIBLE

SAKURA-IIOT applications are compatible with most popular RDBMS and run in any Java servlet container.

They can be distributed as WAR, Docker image, UberJar or deployed to the clouds.

SPRING IO PLATFORM

spring S·IIOT naturally adopts most features of Spring Framework, so you can rely on its wide ecosystem and apply your expertise gained before. Based on Spring Framework



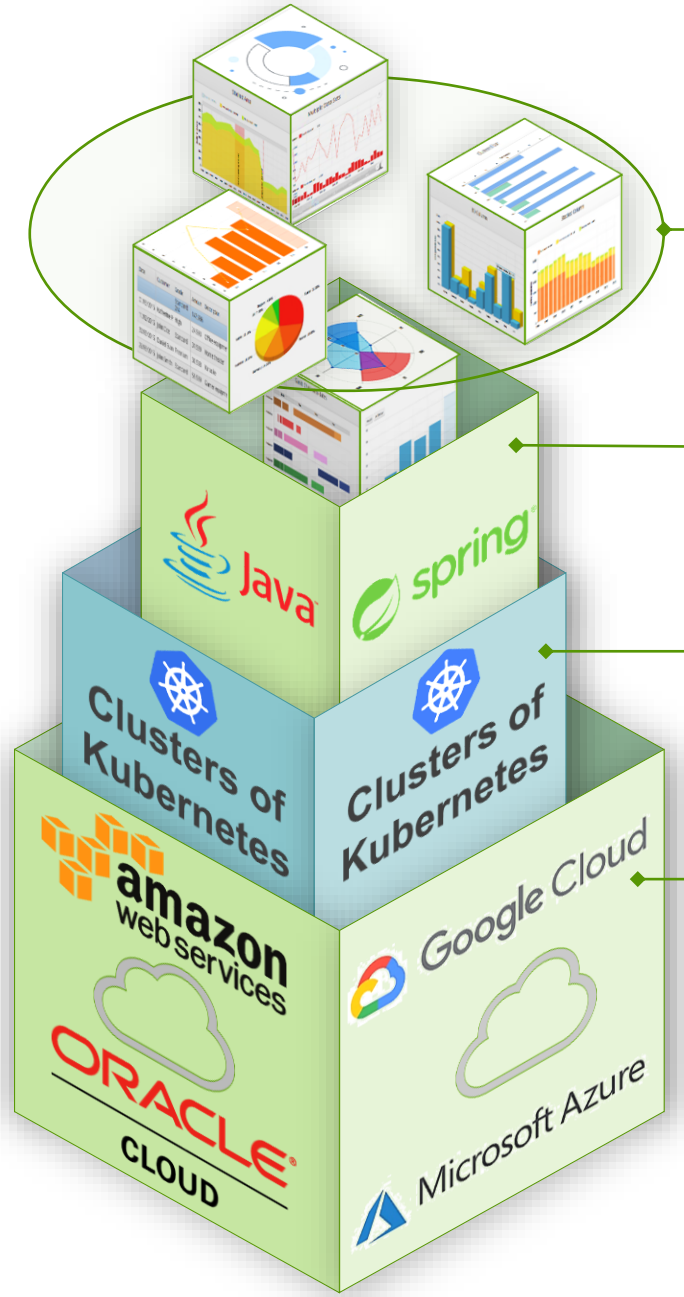
ARCHITECTURE

S-IIOT is implemented on the basis of a high-level open source Java platform for creating corporate information systems, as well as the server part of portals and mobile applications

SAKURA-IIOT has a scalable modular architecture based on popular frameworks, designed to work in any environment

In addition, SAKURA-IIOT modules such as databases and application databases are arranged in Kubernetes (K8s) clusters

The SAKURA-IIOT architecture can be integrated into the cloud services of the world's leading providers selected by the customer and effectively use the storage, backup protection, data processing and computing capabilities guaranteed by these services



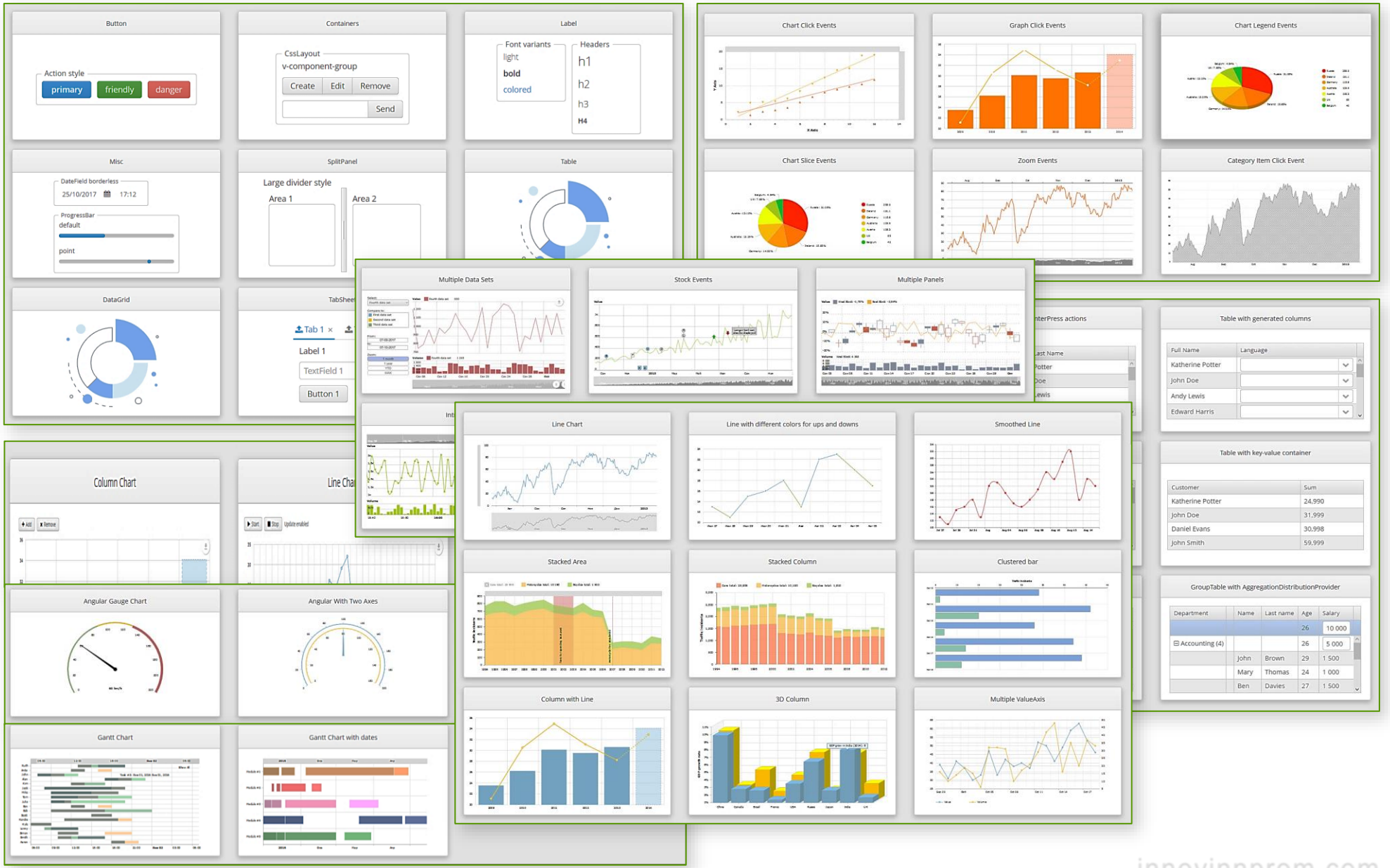
РІШЕННЯ

The most modern solutions of the world's leading IT companies were used in the development of S·IIOT

Google Cloud
Microsoft Azure
amazon web services
kubernetes
docker
HAULMONT
spring
Flowable
BPMN
DMN
IntelliJ IDEA
Java
Polymer
React
Swagger
influxdb
chronograf
Grafana Labs
PostgreSQL
HAPROXY
PATRON
APACHE HTTP SERVER PROJECT
Apache Guacamole
UltraVNC

FRAMEWORK

S·IIOT marketplace contains a rich collection of ready-to-use add-ons that cover all typical requirements for business applications and can be enabled with a mouse click – components, containers, dialogs and notifications, charts, pivot tables, maps, predefined styles



BUSINESS PROCESS ENGINE WRITTEN

The Business Process Engine Written allows to describe business process steps right in the application using the integrated BPMN 2.0 modeler. It enables seamless integration with the runtime application parts and visual process customizing.

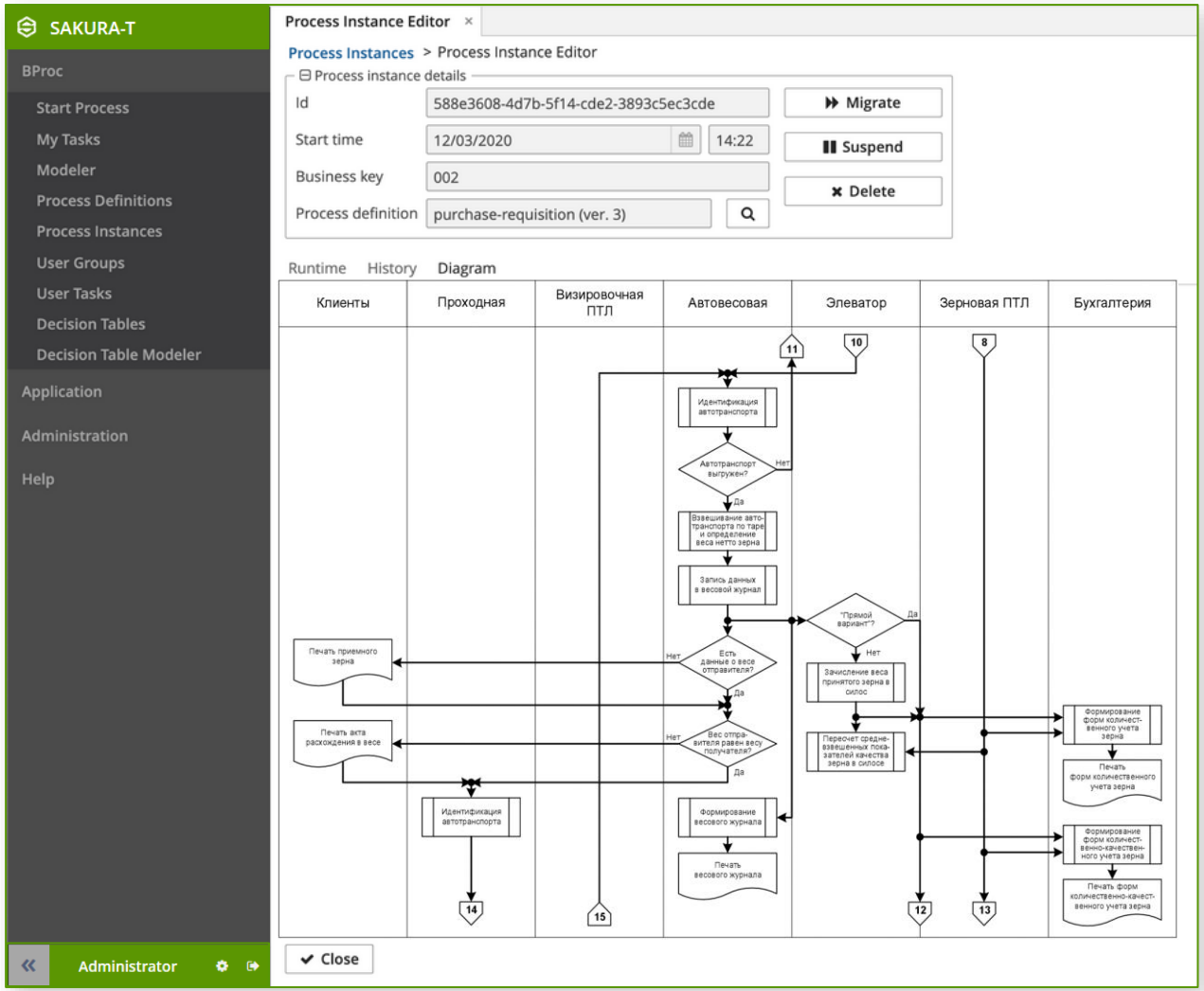
The business process engine written contains:

- The embedded light-weight Flowable runtime engine
- BPMN 2.0 visual designer based on bpmn-js framework
- DMN 1.1 decision table designer for complex decision logic

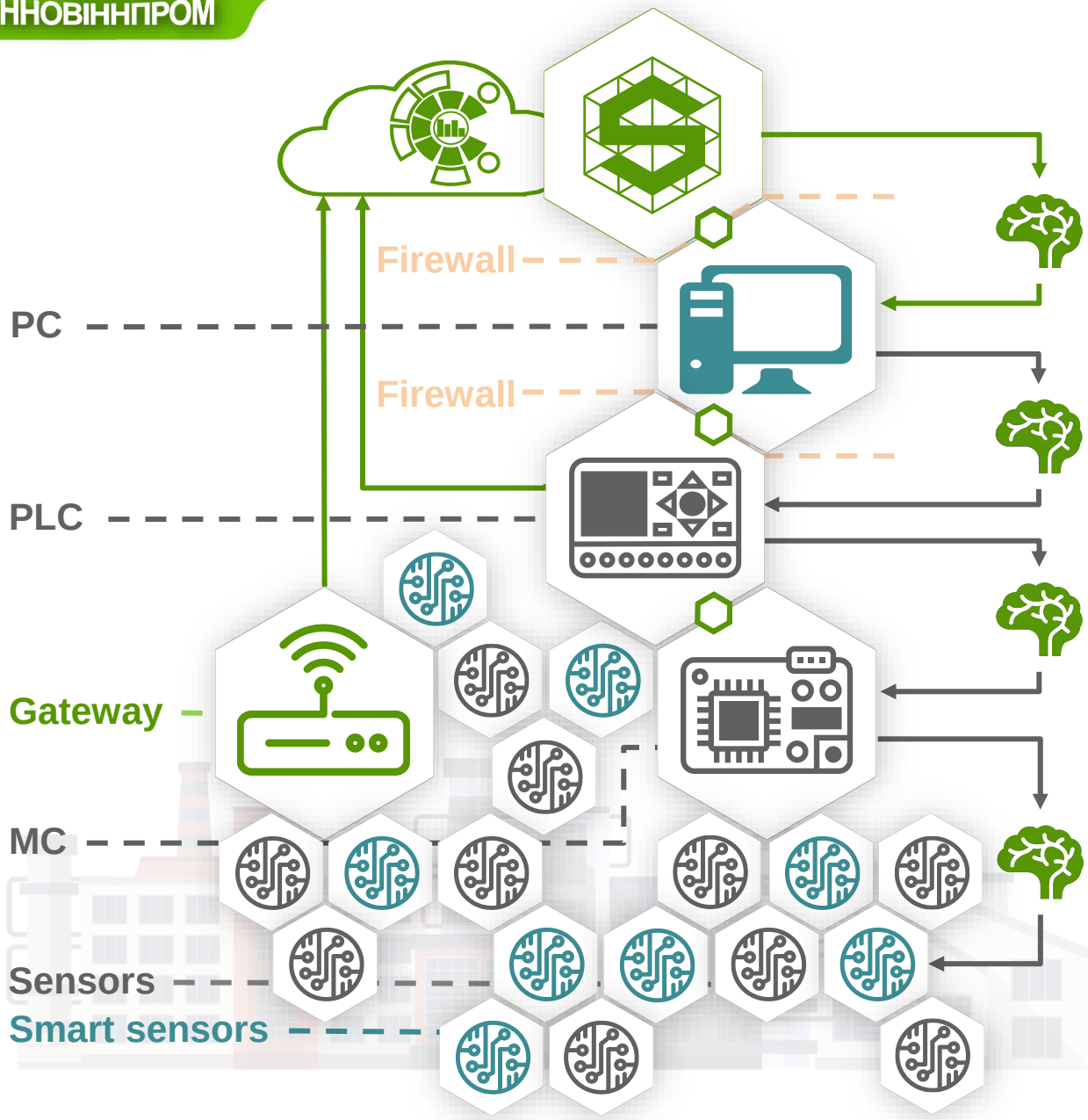
Flowable is a light-weight business process engine written in Java. The Flowable process engine allows you to deploy BPMN 2.0 process definitions, creating process instances of those process definitions, running queries, accessing active or historical process instances and related data, plus much more.

DMN is a modeling language and notation for the precise specification of business decisions and business rules. DMN is easily readable by the different types of people involved in decision management.

These include: business people who specify the rules and monitor their application; business analysts.



AI & ML SOLUTIONS



S·IIOT supports Artificial Intelligence and Machine Learning technologies.

S·IIOT adjustment principles are based on strict adherence to SCADA's multi-level industrial architecture:

1. Hardware microcontrollers and built-in sensor microcontrollers are responsible for adapting and configuring intelligent sensors;
2. Control and management of equipment microcontrollers is performed by programmable logic controllers (PLC);
3. Control and management of PLC is carried out by SCADA
4. SAKURA-IIOT on the basis of data array processing makes general adjustments at each level of management

Additional sensors and gateways are installed to obtain the most complete information about the system operation. They provide data transfer directly to SAKURA-IIOT cloud services.

FUNCTIONALITY

S·IIOT works in any customer-friendly browser on any operating system. To enter SAKURA-IIOT, simply enter the Internet address in the corresponding browser menu. Access to SAKURA-IIOT is provided on the basis of login and password.

The configuration of SAKURA-IIOT windows and pages, access rights, staff roles are determined at the stages of terms of reference and system configuration, but staff are given the opportunity to adapt the display of data in a convenient form for personal perception.

Thanks to the integration of SAKURA-IIOT into cloud services of the world's leading cloud service providers has virtually unlimited resources for storage, processing, analysis and visualization of large amounts of data.

ADVANTAGES

SAKURA-IIOT

- Licensing not required
- Open programming platform
- Open source code
- Popular programming languages
- Works with any cloud service
- No need for installation

Alternative systems

- The need for high-cost licenses
- Proprietary programming platform
- Closed source code
- Specific programming languages
- Payment for the imposed cloud service
- The need to setup installation packages

IIOT GATEWAYS

S·IIOT receives data from the equipment (PC, PLC, MC) and / or software available at the facility, without interfering with the technological process

Additional IoT gateways are installed to provide maximum data directly to cloud services

SAKURA-IIOT supports most industrial interfaces and data protocols

The greater the volume and completeness of the data received by SAKURA-IIOT, the better the control and calculation of productivity and process efficiency

APPLICATION

Real-time control of technological processes in production in any industry.
Based on the analysis of large amounts of data, optimization of technological settings and delays in the formation of recommendations for improving production productivity.

Calculation and analysis of energy efficiency of equipment, technological operations and production in general, the formation of summary and comparative graphs and tables of energy efficiency for selected periods of time and in different modes of operation.

Control of personnel work, blocking and prevention of mistakes and emergency situations.
Planning production changes and controlling the placement of personnel in accordance with the level of training.
Control and analysis of personnel productivity separately, in shifts.

Planning and control of maintenance and repair of equipment.
Accounting for operating and consumption of energy resources by equipment.
Accounting and planning the use of spare parts and materials during maintenance and repairs.

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WORKSPACE

The workspace of information business systems based on the SAKURA IIOT platform covers all stages of the holding's production and business processes. In accordance with the access rights, the consumer receives the necessary technological, financial, analytical information designed specifically for him.

FUNCTION

Business systems developed by INNOVINNPROM based on the SAKURA-IIOT platform have built-in elements of artificial intelligence and perform self-regulatory functions to optimize the financial costs of the enterprise by optimizing interconnected production and technological processes and reducing the role of the human factor.

Currently, INNOVINNPROM is deploying the following industrial analytical systems for control and management of all production and technological processes at industrial enterprises:

MES/ERP/PLM system SAKURA-P

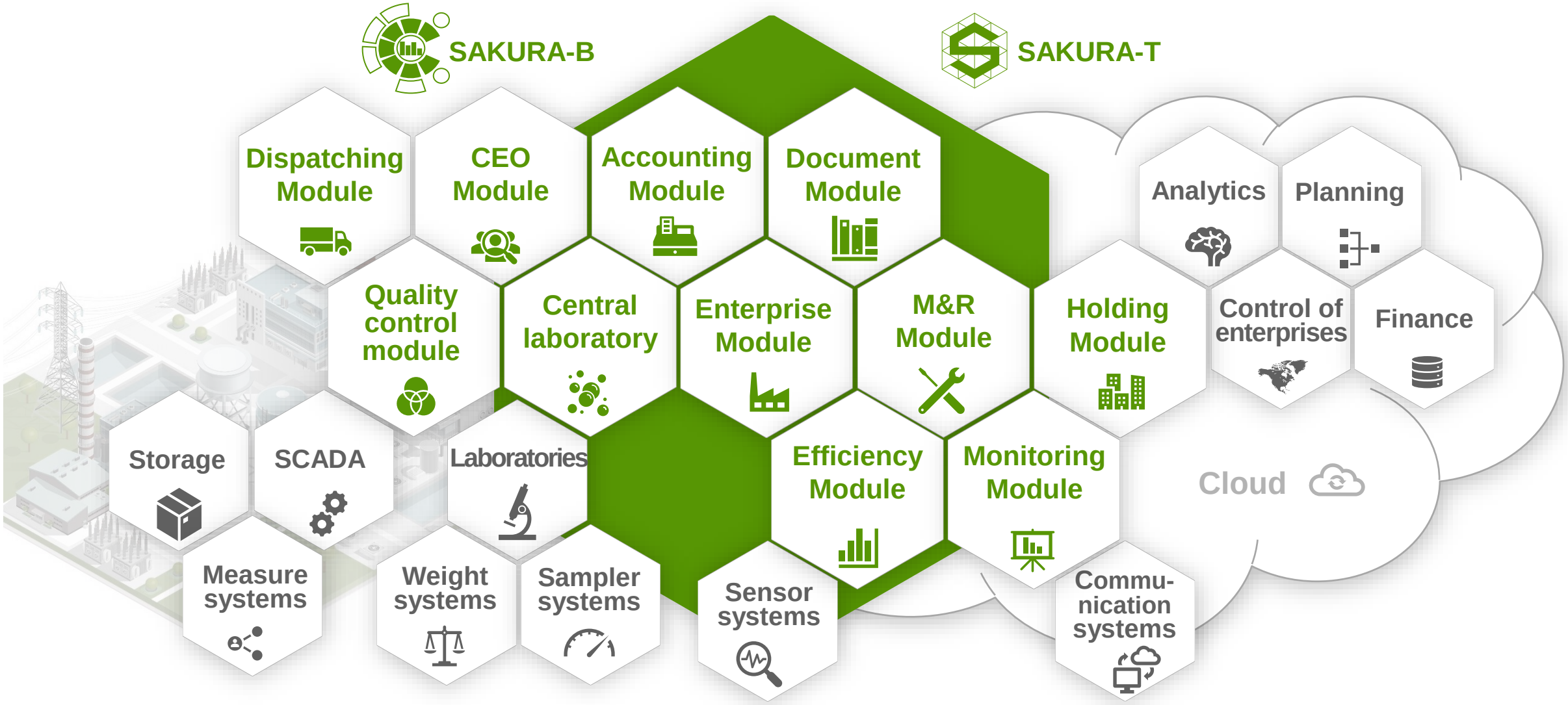
SAKURA-P provides horizontal integration of production and suppliers into a single information network and is responsible for obtaining information about the work of enterprise, planning, operational control and management of production and material resources.

Information-analytical IIOT system SAKURA-T

SAKURA-T provides vertical integration of production systems and is responsible for control of technological processes at the enterprises (enterprise), control and analysis of energy consumption, control and analysis of efficiency of the equipment use by the enterprises and control of production processes' productivity.

SYSTEMS MODULARITY

SAKURA-P and SAKURA-T systems have a modular structure. The customer receives the basic modules and modules that he needs. When applied to system architecture, changes can be made to suit today's needs.



STRUCTURE

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EMI
Enterprise Manufacturing Intelligence

PLM
Product Lifecycle Management

ERP
Enterprise Resource Planning

MES
Manufacturing Execution System

Cloud

MOM
Manufacturing Operations Management

TIA
Totally Integrated Automation

SAKURA-T

Control of enterprises

Analytics

Planning

Maintenance

Energy efficiency

Energy control

IIoT gateways

APS
Advanced Planning & Scheduling

Analytics

Planning

SAKURA-B

Registration

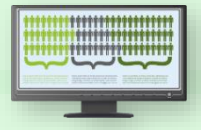
Raw materials laboratory

Technological laboratory

Central laboratory

Silo board

Quantitative & accounting



Accounting

Dispatching department

Automobile weight

Railway weights

Samplers

Raw materials storage

Finished products storage

SCADA

PLC

Measurement

Controllers & Sensors

Sampler systems

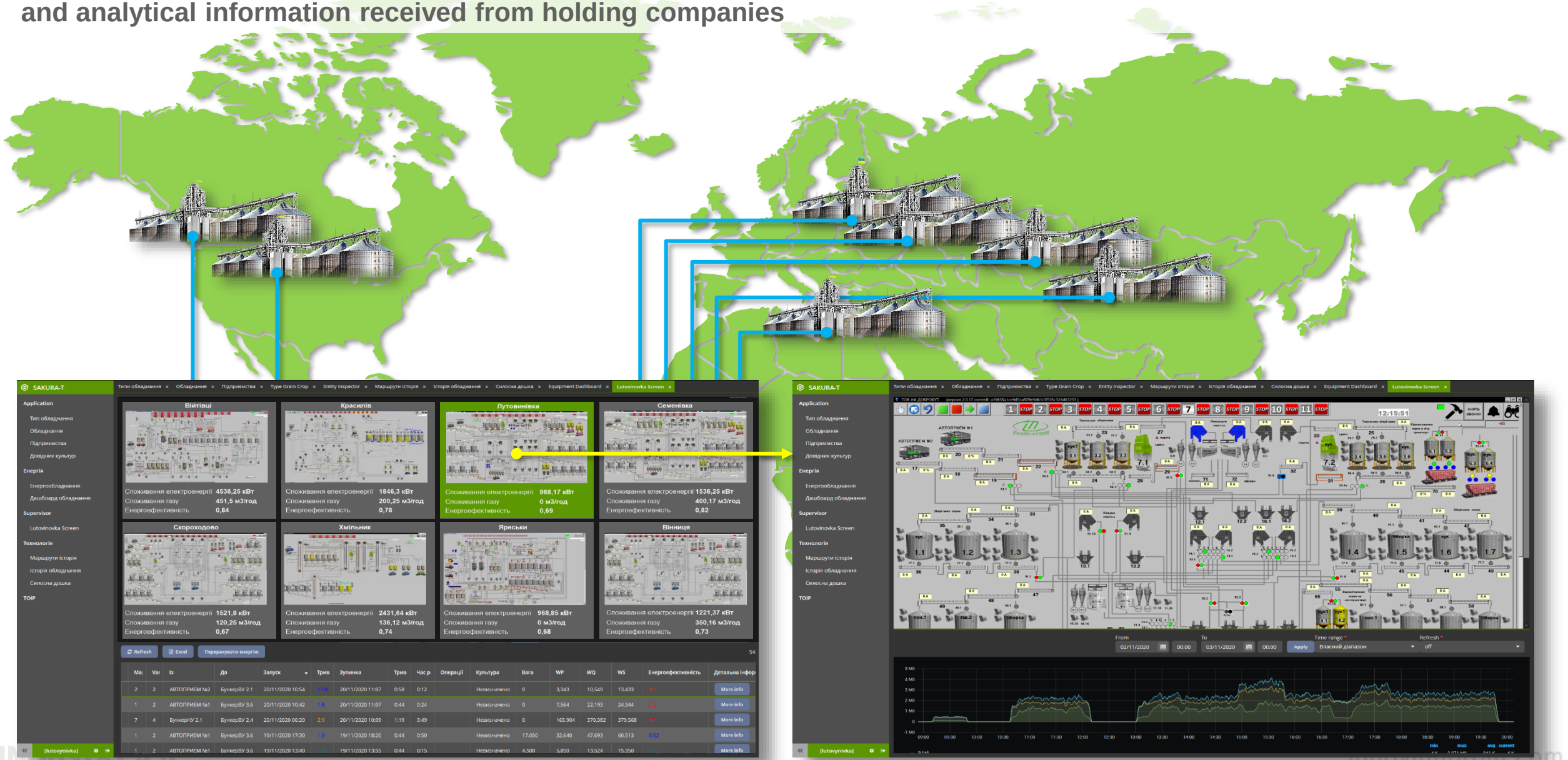
Samplers

Weight systems

Weights

HOLDING SOLUTIONS

The Holding module provides collection, analysis and display of generalized, comparative, concretized and analytical information received from holding companies



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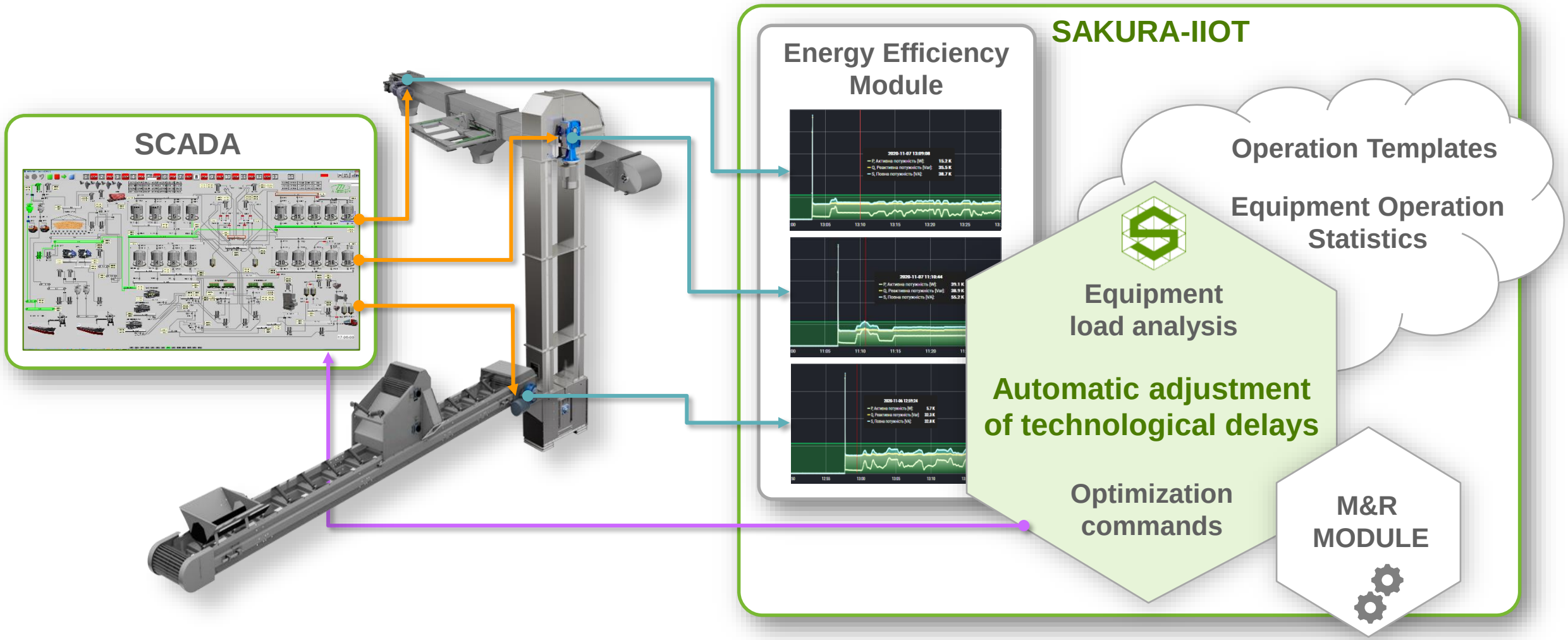
ENTERPRISE SOLUTIONS

The Enterprise solutions provides the collection and display of generalized, comparative, specific and analytical information in the enterprise. The module analyzes the productivity of technological processes and forms commands for its optimization.

ENTERPRISE SOLUTIONS

S-IIOT monitors the equipment load and automatically optimizes technological operations based on an array of statistics. It provides an increase in energy efficiency and productivity.



ENERGY EFFICIENCY

The Energy Efficiency Module provides measured and analytical information on the consumption of basic energy sources by equipment, technological group, enterprise as a whole and generates data on the efficiency of technological operations

The module provides measurement and analysis of active, reactive and total values of current, voltage, power and energy

The module calculates and analyzes the energy efficiency of technological operations and informs about reaching the limit values

The energy efficiency factor is the amount of energy used to manufacturing and processing a ton of product

M&R

The Maintenance and Repair (M&R) Module provides planning and control of equipment maintenance and repairs. The main types of information are information on the operation of equipment, its energy consumption, use of spare parts and materials during maintenance and repairs

The basis of the module is a schedule of maintenance and repairs, which reflects the planned activities and the results of their implementation

The module operates with equipment cards, which carry information about the assembly and condition of the equipment

The M&R module receives information on the operation of the equipment and its modes of operation from the Energy Efficiency module

POWERMETERS

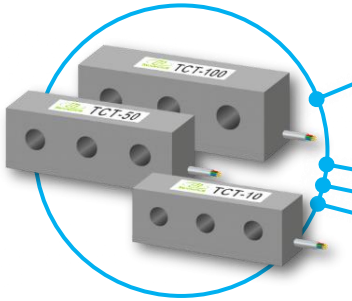
Since in most cases energy monitoring equipment must be installed in existing cabinets, INNOVINNPROM specialists have developed a specialized energy measurement equipment set.

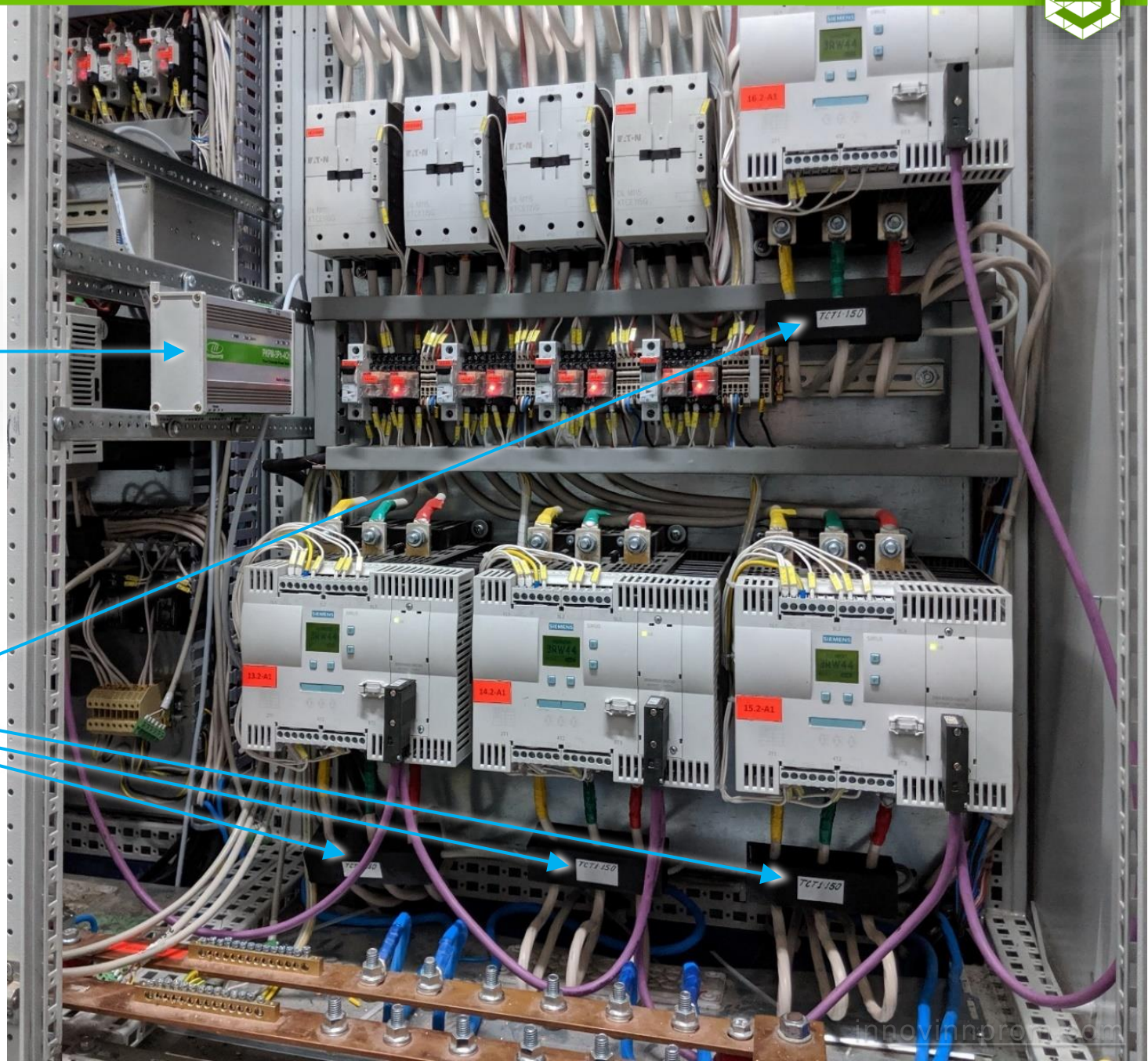
This set includes a compact four-channel energy meter of three-phase power supply and a series of compact three-phase current transformers.

This set carries measurement of active, reactive and full values of current, voltage, power, power coefficient and energy in three phases of four energy using equipment and sending of data to the IoT gateway.

Three-phase power supply four-channel energy meter PKZM-3F-4Ch

Compact three-phase current transformers





MANUFACTURER SOLUTIONS

Control of machine tools and planning of their maintenance by the manufacturer

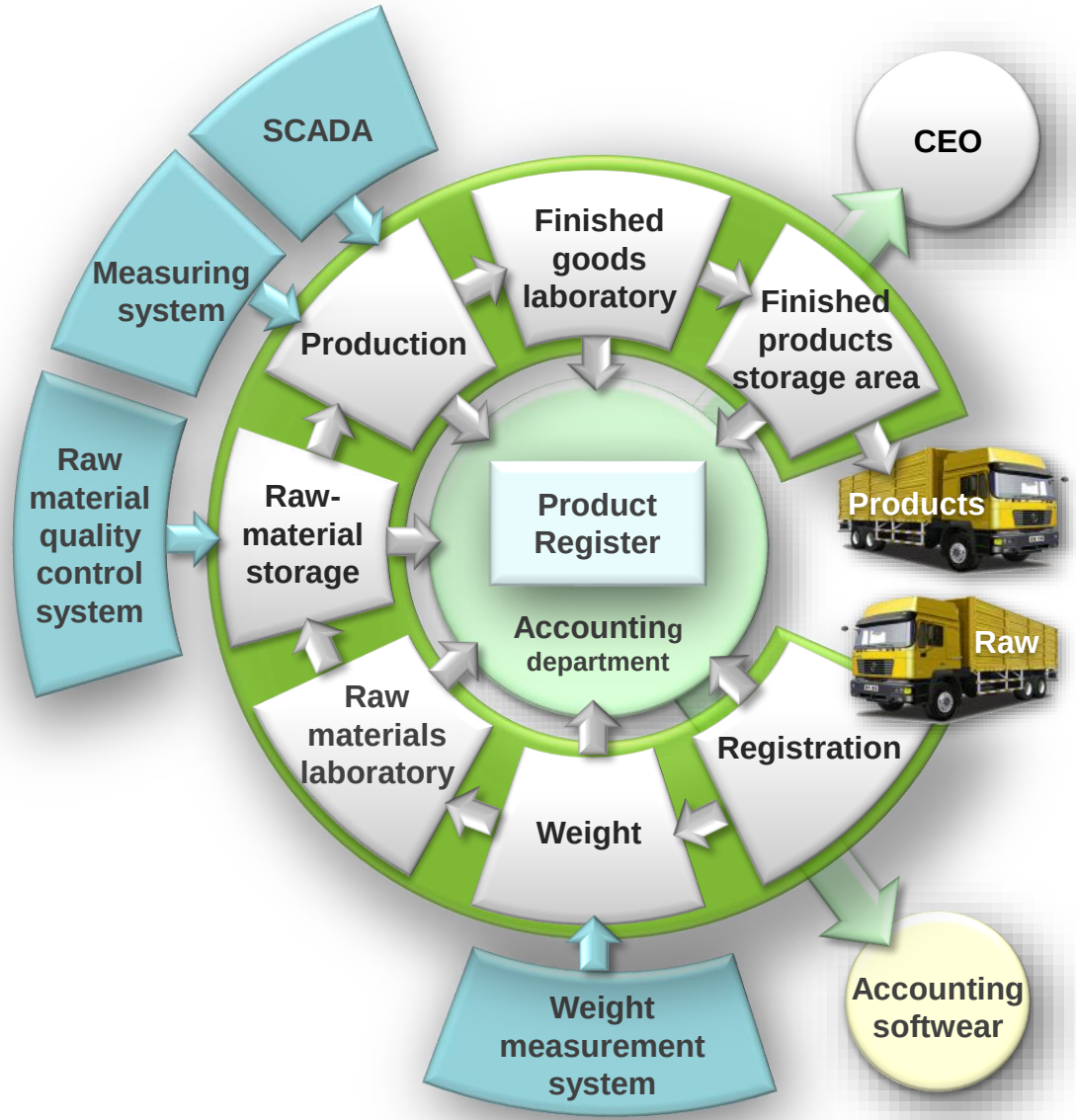
SAKURA-B

SAKURA-B is an integrated MES / ERP / PLM system.

SAKURA-B is designed for full automation of enterprise management processes.

The main functions of SAKURA-B:

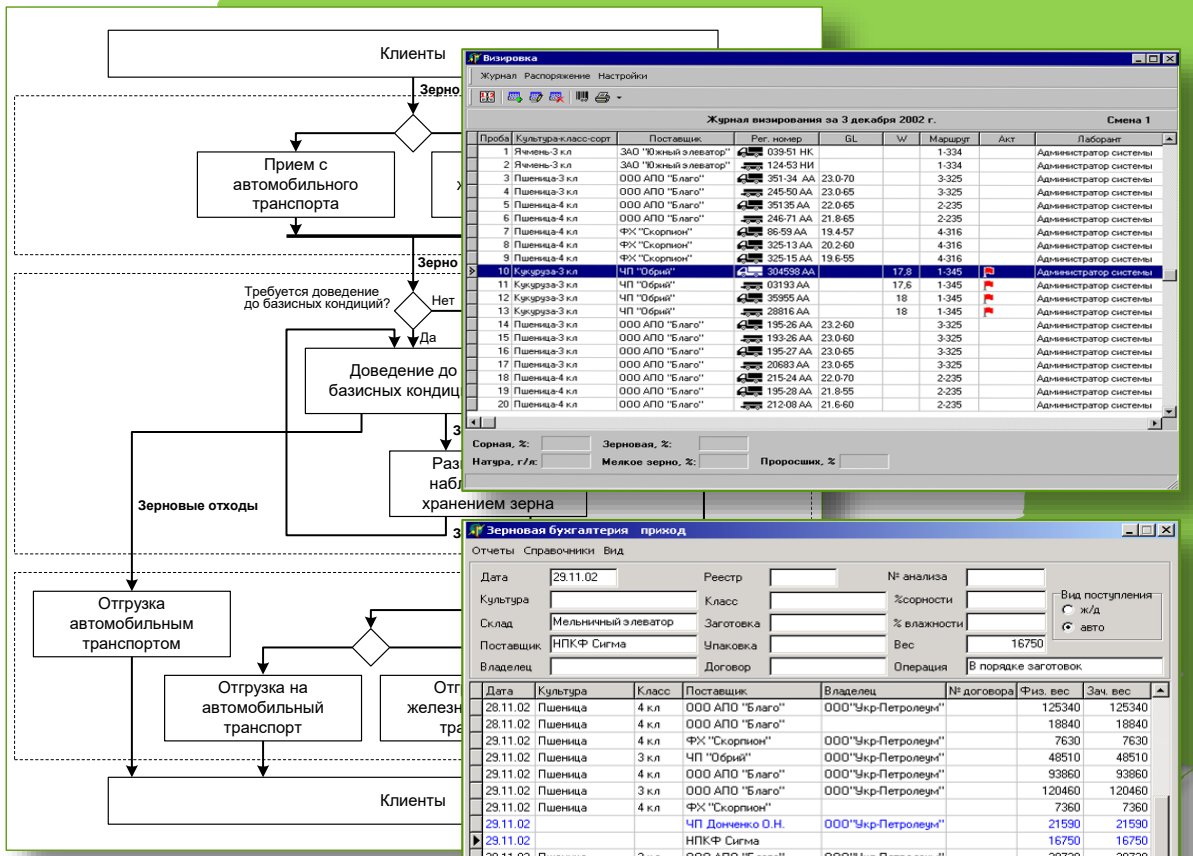
- ✓ Obtaining and analyzing information about the work of the enterprise
- ✓ Formation and control of processed plans based on the analysis of data on available resources
- ✓ Operational control and material resources management
- ✓ Production management
- ✓ Product life cycle management
- ✓ Reducing the impact of the human factor on production processes
- ✓ Improving production productivity
- ✓ Analysis of the enterprise results and formation of the optimal labor organization and production processes
- ✓ Increasing labor productivity through the redistribution of functions, rights and responsibilities of working staff and administration

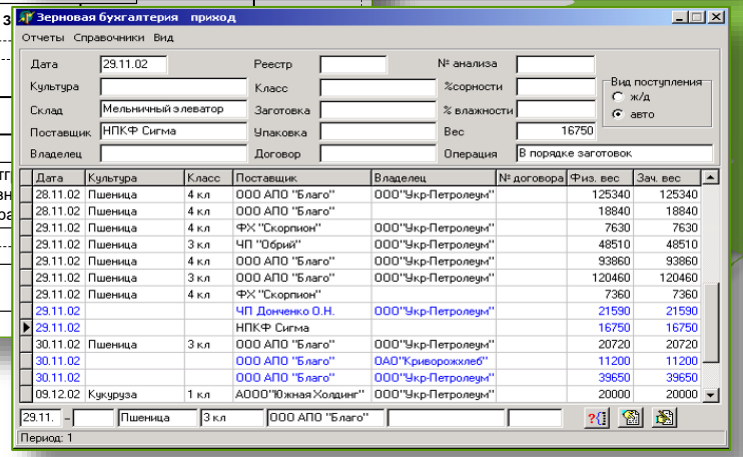


IMPLEMENTATION SAKURA-P

For each enterprise, the installation package is determined based on the scale of the enterprise and the tasks it performs. As a rule, the following modules are installed:

- **Manufacturing Execution Modules**
- **Product Lifecycle Management Modules**
- **Enterprise Resource Planning Modules**





ECONOMIC ADVANTAGES

Reduction of energy consumption of technological equipment - up to 10%
Achieved by selecting and controlling the most energy-efficient modes of operation of the equipment and optimization of technological delays

Reduction of technological losses - up to 15%
Achieved by preventing violations of established algorithms and standards at all stages of production, continuous monitoring of technological operations and personnel actions

Improving energy efficiency of production - up to 20%
Achieved through continuous monitoring and analysis of energy efficiency of production, control of accuracy and timeliness of completing technological tasks

Increase of the equipment service life - up to 25%
Achieved by planning and monitoring the maintenance and repair of equipment, quality control of spare parts from different manufacturers

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