INNOVINNPROM
Industrial Automation

✓ Asset Performance Management
✓ Increasing Production Efficiency
✓ Reduction of Energy Consumption
✓ Integrated Information Picture of the Grain Elevator
✓ Optimization of Logistics Routes

"SAKURA" Grain Elevator Digitization Project

Seed Stage

Vinnytsia - 2023

Using 33 years of experience in the automation and digitization of agricultural enterprises, the INNOVINNPROM LLC company offers to make a qualitative leap in the field of information technologies of the agrarian sector of the economy.

33 years of experience

The project is aimed at large grain elevators and agricultural holdings in general:

First of all, we plan to implement the project at enterprises where we have deployed INNOVINNPROM's production control systems. Among them are the two largest elevators of Ukraine in the Stepanivka and Zavodske of UkrLandFarming agricultural holding, 7 elevators of ASTARTA agricultural holding, a number of elevators and other agricultural enterprises of NIBULON, AGROPROSPERIS, KERNEL, MHP, ZahidBug agricultural holdings.

We made a presentation of the project and intentions for the head of the elevator sector of the majority of agricultural holdings and received high praise and interest

The main goal of the project is:

- to reduce energy costs when receiving, storing, drying and shipping grain crops, to reduce the level of harmful emissions into the environment
- to increase the efficiency of production at grain elevators
- to provide owners and top management with a complete and integrated information picture about operational and technological processes at enterprises/holdings
- ensure full control over the quality and quantity of grain products
- to displace Russian software from the sphere of control of agricultural enterprises

Reduction of energy consumption of technological equipment - up to 10%

Achieved by selecting and exploiting the most energy-efficient modes of operation of the equipment and optimization of technological delays

Reduction of technological losses - up to 15%

Made possible 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%

Attained through continuous monitoring and analysis of energy efficiency of production, control of accuracy and timeliness of completing technological tasks
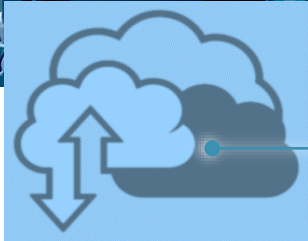
Extend equipment service life - up to 25%

As a result of planning and monitoring the maintenance and repair of equipment, quality control of spare parts from different manufacturers

The general concept of the SAKURA project

The SAKURA project is large-scale and includes the following levels:

Intellectual level
Deployment and training of AI and ML neural networks

Engineering level (SaaS)
Deployment of control, analytics and visualization services

Cloud service level (PaaS)
Deployment of cloud services and shared databases

IoT level
Installation of IoT consumption meters and gateways

Level of field equipment
Installation of modern energy-efficient electric motor controllers

SAKURA has a modular structure, each module of which is adapted to the needs of the customer.

INNOVATIONS

INNOVINNPROM

Operational Excellence

Reduction of air emissions

Energy efficiency

Digital product passport

Customer Intimacy

Innovations in better adaptation

30 years of experience

PaaS SAKURA-IIoT

Reasonable Simplification

Four systems into one

- ERP
- MES
- SCADA / PLC
- Machine / Sensors

SaaS

SACURA-APM
Asset Performance Management

ROUTE-ADC
Agro-Industrial Enterprises SCADA

Improving the system

Adding new features and capabilities

Automated Design System "ROUTE" for SCADA

SaaS

SACURA-EMS
Energy monitoring system

- Industrial Internet of Things
- Big Data & Data Sharing
- Augmented Reality
- Cloud Computing
- Autonomous Factories
- Digital Twins
- AI & ML

Flexible robotics Advanced robotics

Robotic grain sampling

SaaS

SACURA-M&R
Maintenance & Repair

SaaS

SACURA-TML
ERP/PLM/MES

Transfer to cloud services

Provision of services as SaaS
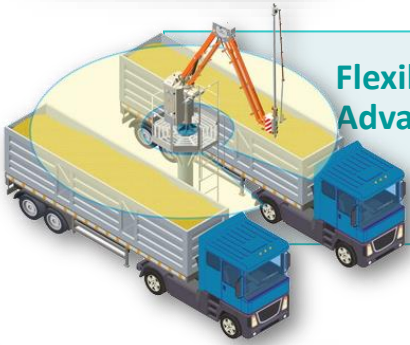
Environmental impact analysis

Round-the-clock control

SaaS

SACURA-ECO
Environmental control

Shared databases

Open Source
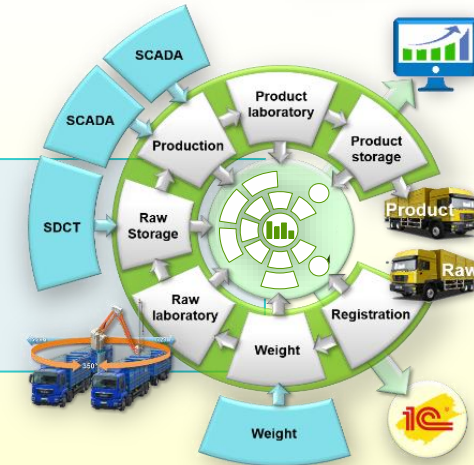
Quantitative and qualitative accounting system

The Best Industry Solutions

of INNOVINNPROM are adapted to the conditions of the region

Support for all OT and IT protocols

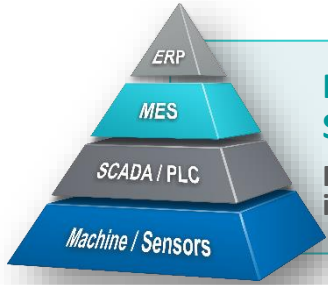**Application of modern IT technologies**

Ability to integrate cheaper IoT devices and sensors

Cooperation with DIH and universities

INDUSTRY 4.0

Competitive Advantage

INNOVINNPROM – Quality Leap

- Operational Excellence
- APM
- Maintenance & Repair
- IoT sensors
- Own SCADA
- Own PLC
- or
- Vendor PLC

PaaS SAKURA-IIoT

- Vendor ERP
- or
- Own ERP
- TML
- Own PLM
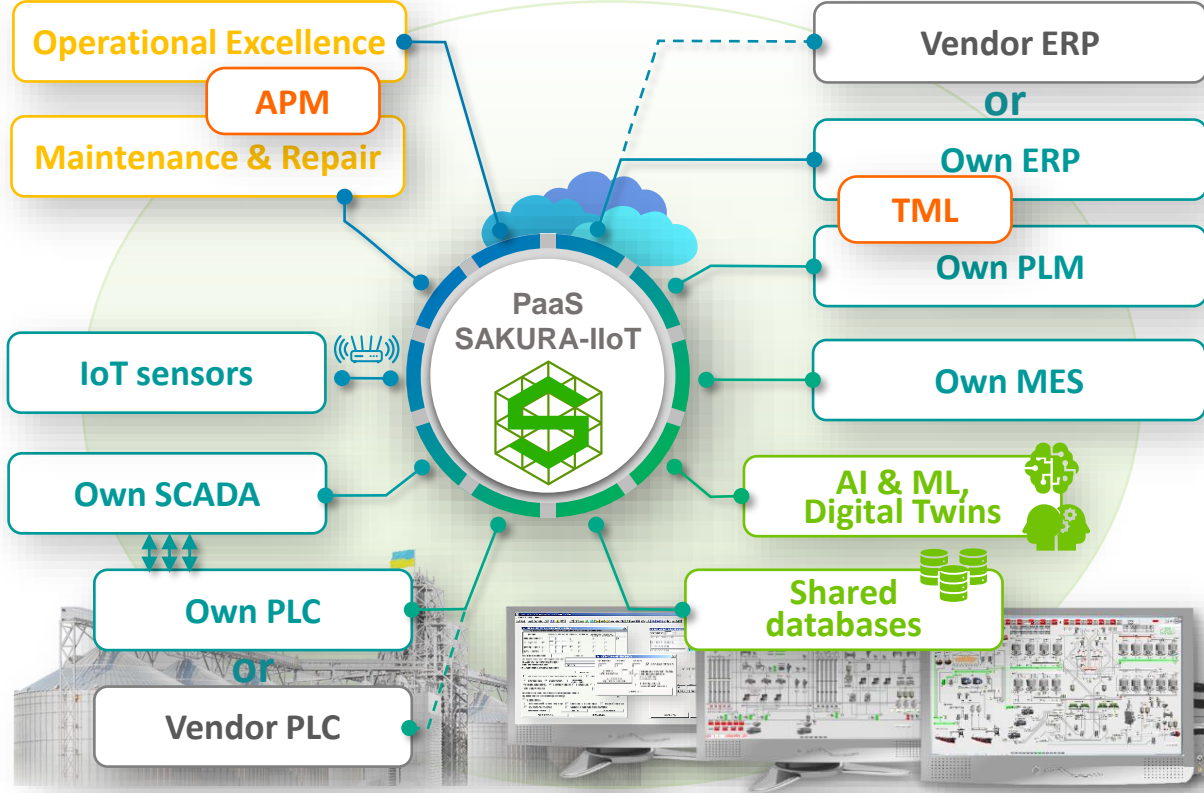- Own MES
- AI & ML, Digital Twins
- Shared databases

Competitors – Increased Complexity

- Vendor EAM
- or
- Own EAM
- IoT sensors
- Vendor SCADA
- PLC
- AI & ML Digital Twins
- Vendor ERP
- Vendor PLM
- Vendor MES

ERP / MES / SCADA / PLC / Machine / Sensors
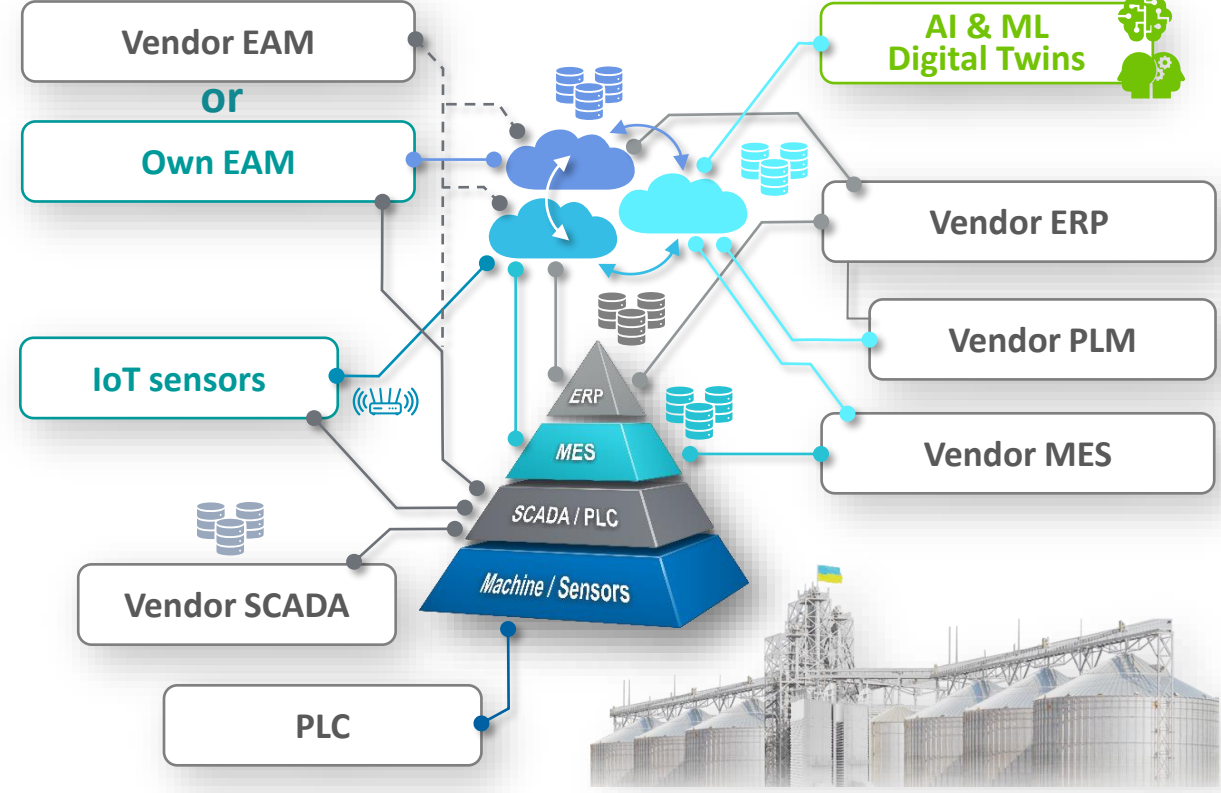
	INNOVINNPROM	Competitors
Architecture	Simplified: SCADA + Own Platform on a Cloud	Classic: SCADA + eclectically added ERP / PLM / AEM / MES
Industrial Internet of Things	As a component of the PaaS	Added solution
Data Sharing	Consolidated Enterprise Database	Disparate databases and systems
AI & ML, Digital Twins	As a component of the PaaS	Added solution
Technology ownership	Specialized PaaS, ADC SCADA, APM	Adaptation of vendor systems to customer requirements
Software implementation	SaaS	Hosted Software and applications

SAKURA Multi-Cloud Platform: From Chaos to System
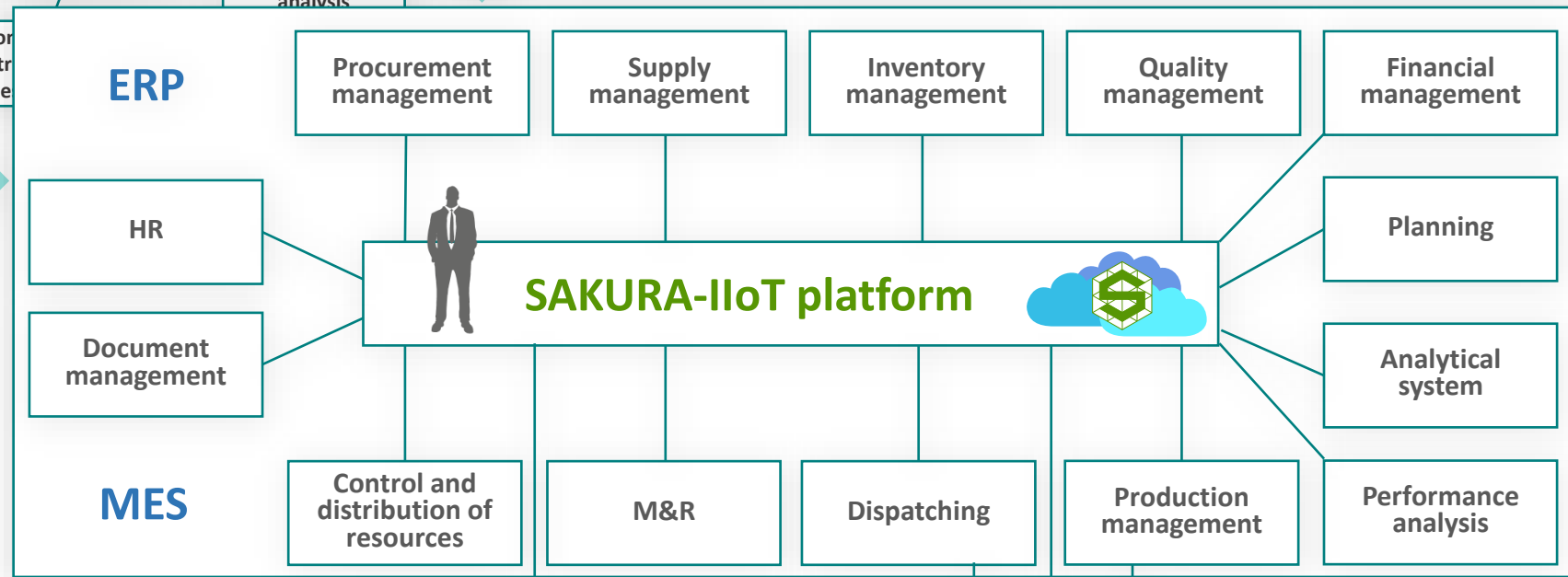

Reasonable reduction and simplification of production systems :

The SAKURA information platform unites all enterprise systems (operational, technological, logistical, financial, and others) into a single information space, thus providing the owner and responsible employees of the enterprise access to all data that circulates in the system to any point on the planet in the mode real time
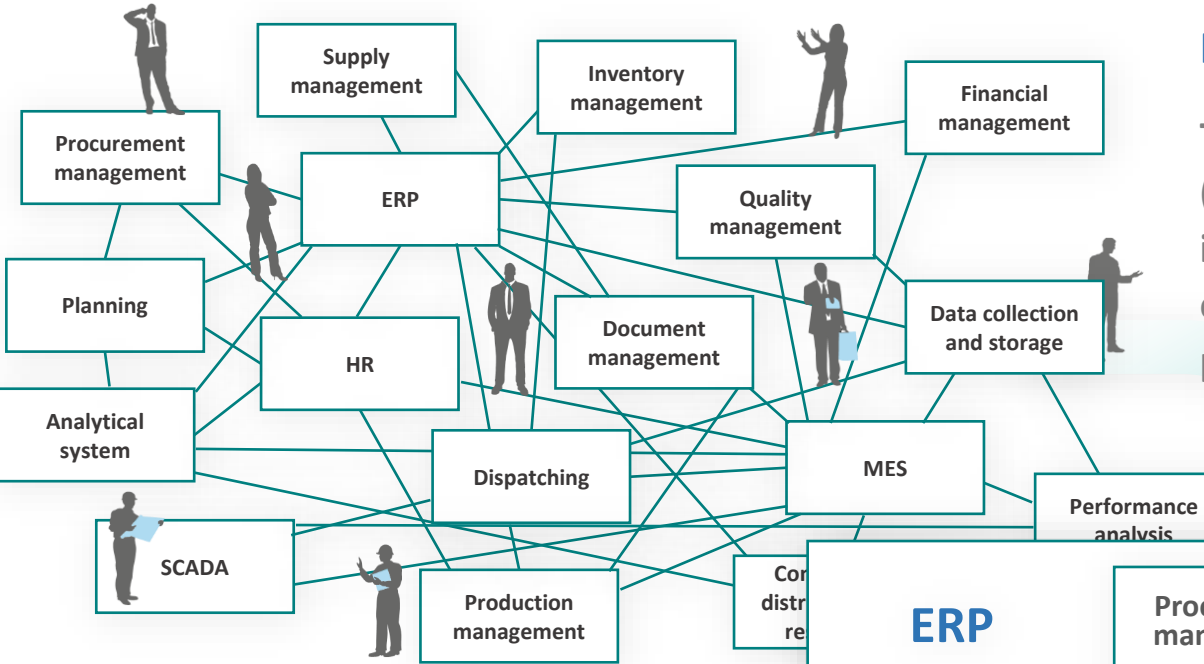
The unified information space based on the SAKURA platform provides comprehensive control of the company's operational and technological costs, guarantees a reduction in the impact of the human factor and an increase in production efficiency and productivity.

Diagram 1 (Chaos)

- Supply management
- Inventory management
- Financial management
- Procurement management
- ERP
- Quality management
- Planning
- Document management
- Data collection and storage
- HR
- Analytical system
- Dispatching
- MES
- Performance analysis
- SCADA
- Production management

Diagram 2 (System)

ERP

- Procurement management
- Supply management
- Inventory management
- Quality management
- Financial management
- HR
- Planning
- Document management
- Analytical system

SAKURA-IIoT platform

MES

- Control and distribution of resources
- M&R
- Dispatching
- Production management
- Performance analysis

Online services

SCADA

INNOVINNPROM

INDUSTRY 4.0

Stages of System Deployment

❖ **Services of quantitative and qualitative accounting of grain and grain products (product life cycle - PLC) to replace the "Elevator 1C" module**
SAKURA-TML module - 1 week for one enterprise

❖ **Energy monitoring services - 3 months**
significantly depends on the terms of manufacture and installation of energy monitoring equipment

❖ **Energy efficiency services - 6 months**
significantly delayed by the terms of algorithmization of business processes at a specific enterprise/holding

❖ **Predictive maintenance and repair services - 6 months**
significantly dependent on database filling

❖ **AI (artificial intelligence) and ML (machine learning) services - 1 year**
significantly dependent on neural network training taking into account seasonality of work

Search for Financing & Investments

INNOVINNPROM

We consider all possible financing options for the implementation of project tasks:

❖ **Development of project documentation**
  - Electrical projects of modernization of the control system of powerful electric motors;
  - Design of energy monitoring systems for each installation object

❖ **Modernization of energy-intensive equipment**
  - Purchase of modern PVC
  - Installation and adjustment of equipment

❖ **Deployment of the SAKURA-TML module (quantitative and qualitative accounting of grain products (MES/PLC)** to replace the Russian module "Elevator 1C"
  - SAKURA-TML requires minimal investment as it has a modular structure and is easy and quick to deploy.
  - The most expensive part is the import of databases and statistical information for the past period from existing systems

❖ **Deployment of the SAKURA-EMS energy monitoring and energy efficiency module**
  - Production and/or purchase of energy monitoring equipment and IoT gateways
  - Installation and adjustment of equipment
  - Deployment of SaaS for energy consumption control and energy efficiency analysis

❖ **Deployment of the SACURA-M&R maintenance and repair module, including augmented reality services**
  - The most time-consuming and expensive procedure is filling the databases of equipment and spare parts and the terms and order of their maintenance.

❖ **Deployment and training of a neural network**
  - Solving complex multi-component logistics problems of grain transportation between the holding's enterprises
  - Machine learning of energy efficiency, analysis of production, formation of forecasts and recommendations

First of all, we focus on **our customers.**

Our clients are the majority of Ukrainian agricultural holdings.

We conducted SAKURA presentations for elevator business management and received high praise and interest in implementation.

Our clients understands the necessity and necessity of deploying such projects, but in the conditions of aggression they do not have sufficient funds.

Investments can help solve the problem.

Exact amounts of investments can be calculated after understanding their permissible size and a detailed assessment together with the customers of the scale of project implementation (number of enterprises and volume of work).

SCADA
> 1000 I/O

Car Samplers

Railway Samplers

SAKURA-B
MES/ERP/PLM

SAKURA-T
Energy Efficiency

SAKURA-ECO
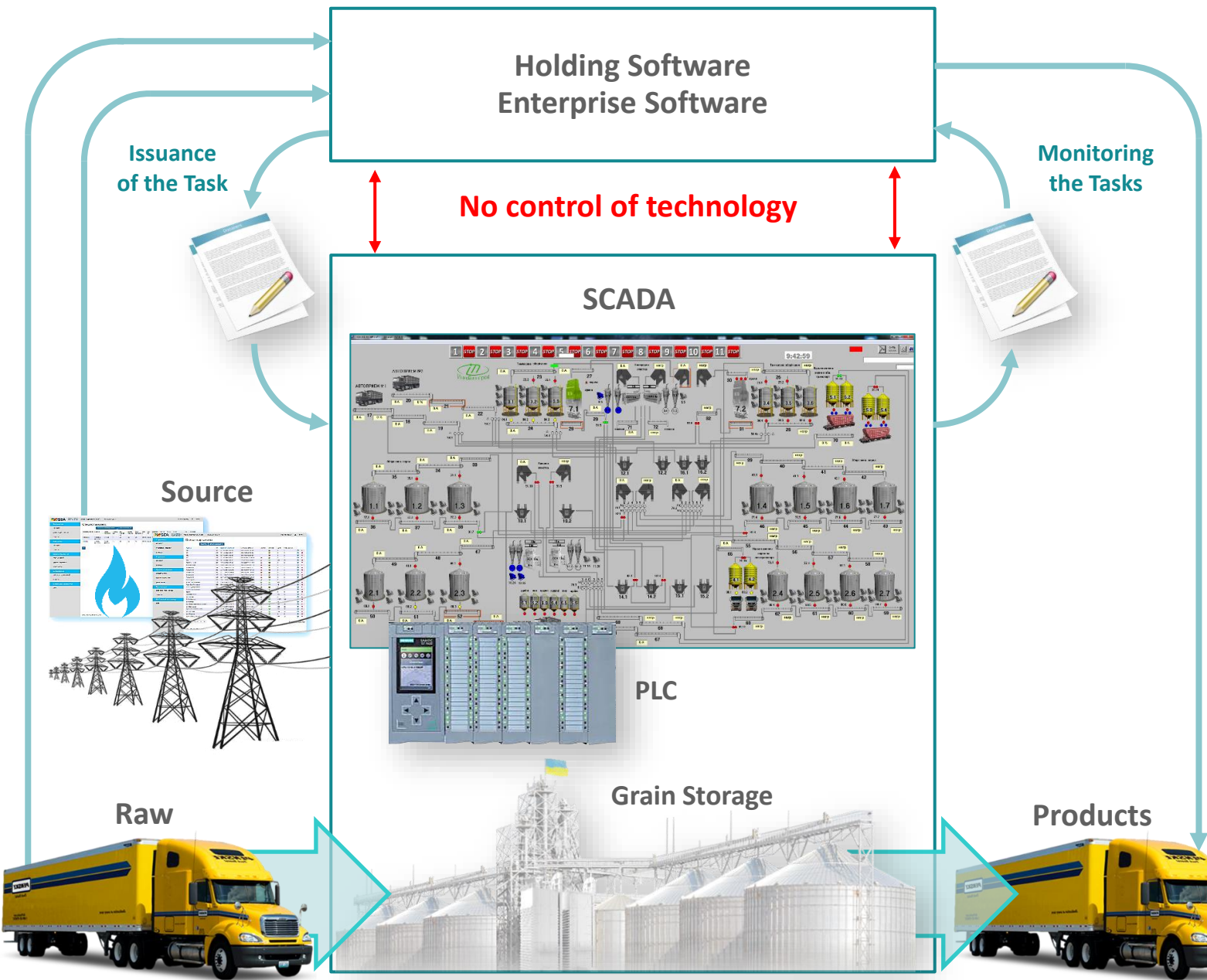Environmental monitoring

Detailing of the Project

Most elevators in Ukraine have typical problems:

❖ Lack of information exchange of MES/ERP/PLM systems with elevator equipment (SCADA)
   this leads to inconsistency and technological losses,
   none of the existing systems provides a complete and clear information picture about the availability of raw materials/products, the operating modes of the enterprise and the energy efficiency of technological processes.

❖ Excessive power of electric motors of transport equipment and lack of modern controllers
   this leads to excessive consumption of electricity.

❖ Formation of production tasks and their transfer to production without digital control
   this leads to desynchronization of accounting planning/accounting and the performance of production tasks, the equipment is turned on by the operator in manual or semi-automated mode, which often leads to suboptimal use of the equipment - in idle mode without load, errors when choosing product movement routes.

❖ Use of Russian software for accounting and product life cycle control (1С-Бухгалтерия)
   it is a significant security and political challenge against the backdrop of military aggression.

INNOVINNPROM

Holding Software Enterprise Software

Inefficient use of equipment

Issuance of the Task

Monitoring the Tasks

No control of technology

SCADA

Source

PLC

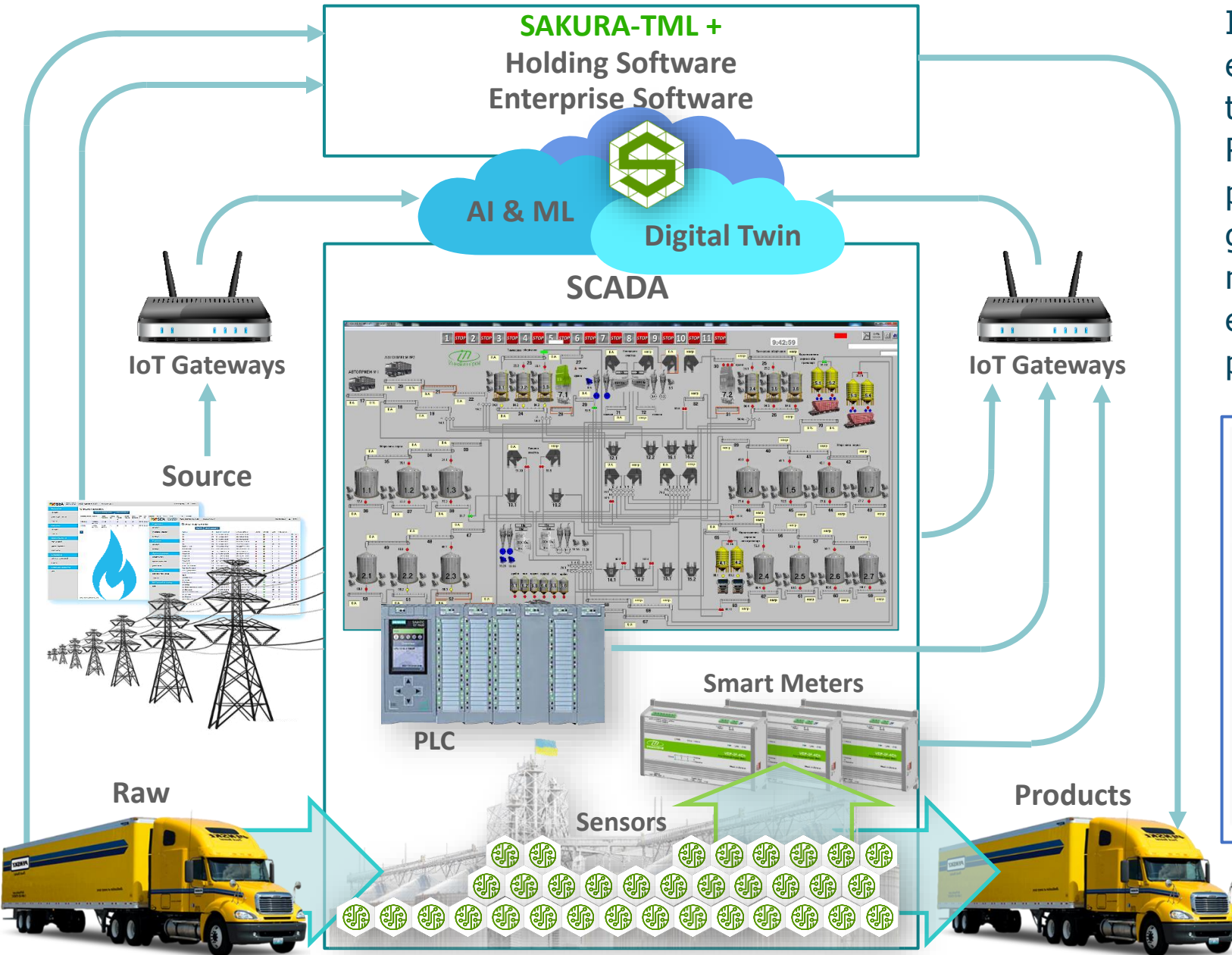Grain Storage

Raw

Products

Preliminary test results July 2020 to January 2022	Full energy Ws [kVAh]
Consumed during the trial operation	934 885
On average, daily	1 947,68
Inefficient operation at load <40%	158 930,45
Losses, Euros	**31 786,09**

INDUSTRY 4.0

We offer a ready-made integral complex solution:

❖ Combination of disparate information and operational systems of the holding company on the basis of a single cloud platform
such a combination does not require a complete replacement of the software, but involves obtaining data in a single database, using cloud SaaS services to collect, analyze and visualize all data available at the enterprise, about planning, the progress of technological processes, energy consumption, assets and resources.

❖ Modernization of hardware and installation of modern vector frequency converters for all electric motors
this will ensure a significant reduction in electricity costs and high controllability and manageability of production processes.

❖ Application of Internet of Things (IoT) technologies to collect the maximum amount of data necessary to create a complete digital picture of the enterprise
this task is implemented by deploying cloud services (PaaS), installing additional data transmission gateways and wire parameter meters (for example, for test we developed our own power meters and three-phase current transformers, which together with the gateways allowed us to create a digital duplicate of the object), using all information channels available at the enterprise.

❖ Deployment to replace the Russian software system of qualitative and quantitative accounting of grain and grain products SAKURA-TML
this software was developed on the basis of many years of experience in the automation of enterprises of the agrarian complex (grain elevators, mills, compound feed, oil plants)
SAKURA-TML was at one time the basis for the development of the Elevator 1С-Бухгалтерия software module by a partner company, which then breached its obligations.

INDUSTRY 4.0

INNOVINNPROM

SAKURA-TML +
Holding Software
Enterprise Software

AI & ML

Digital Twin

SCADA

IoT Gateways

IoT Gateways

Source

PLC

Smart Meters

Sensors

Raw

Products

In the course of cross-border experiments within the framework of the European Union Horizon 2020 Research and Innovation Program as part of the BOWI project, funded under grant agreement No. 873155, we managed to increase the efficiency of elevator equipment use and reduce the percentage of its inefficient use.

Period	Power factor cos φ	Inefficiency %
October 2020 - January 2021	0,45	30,8
October 2021 - January 2022	0,54	16,9
TTE: October 2022 - January 2023	0,59	9,2

INDUSTRY 4.0

SAKURA Components

Integrated MES/ERP/PLM System SAKURA-TML

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

SAKURA-TML integrates with all accounting services.

Asset Performance Management SAKURA-APM

SAKURA-APM provides vertical integration of production systems and is responsible for control of technological processes at enterprises, control and analysis of energy consumption, control and analysis of the efficiency of the use of equipment by enterprises, control of the productivity of production processes and control of maintenance and repairs.

Cloud

SAKURA-APM

SAKURA -TML

INDUSTRY 4.0

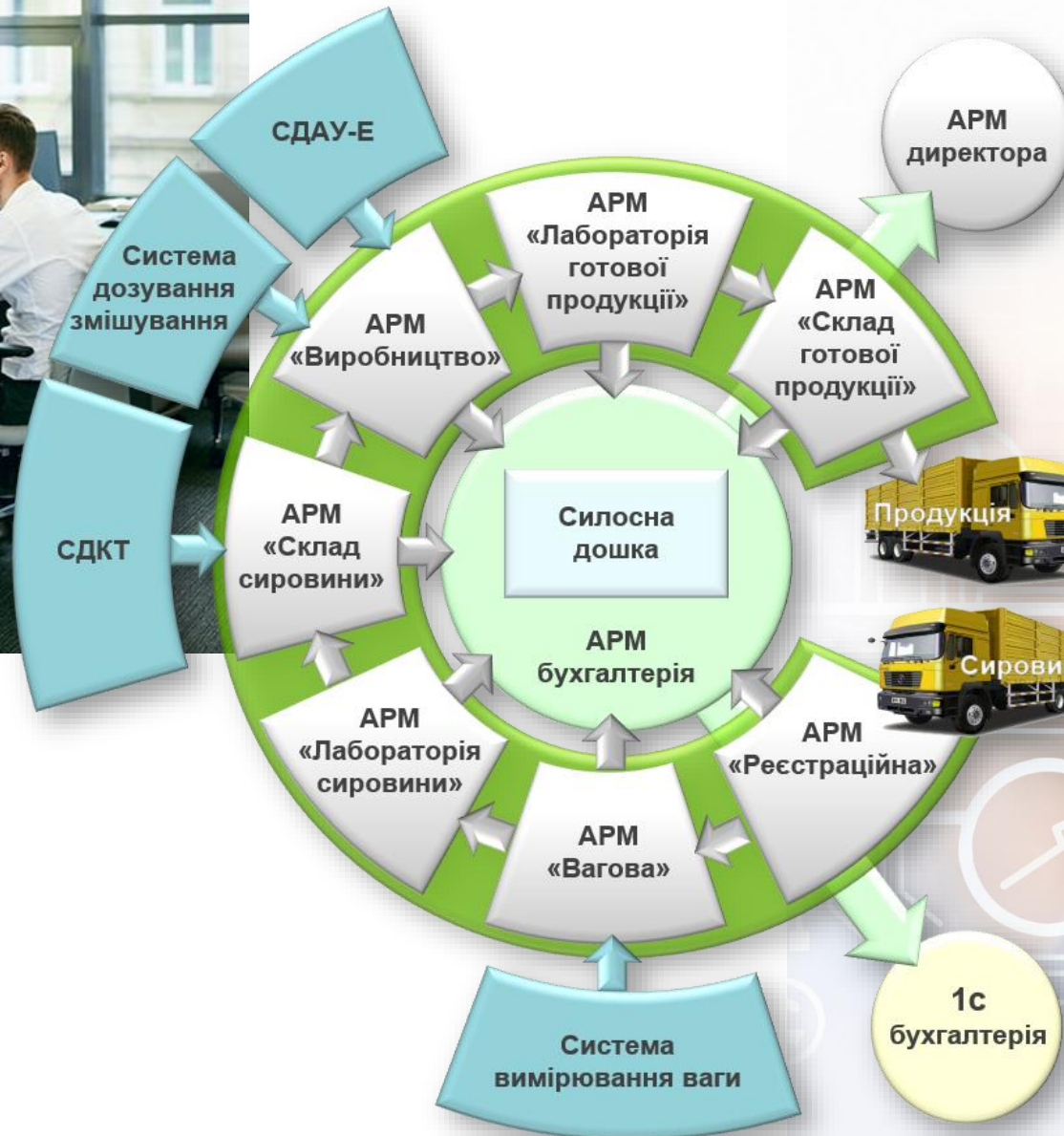# SAKURA-TML: Quantitative and Qualitative Accounting of Products

SAKURA-TML system :

ERP – enterprise resource planning

PLM – product life cycle management

MES – manufacturing execution system

✓ **Quality management**

✓ **Enterprise resource management**

✓ **Product life cycle management**

✓ **Production management**

✓ **Formation of accounting documents**

✓ **Accounting**

INNOVINNPROM

INDUSTRY 4.0

SAKURA-APM: Asset Performance Management System

INNOVINNPROM

SAKURA-APM Asset Performance Management is a system for managing the efficiency of production assets based on the technologies of the fourth industrial revolution (INDUSTRY 4.0).

The term "assets" means any production equipment - both equipment that ensures the vital activity of enterprises (power grids, substations, boilers, compressors, ...) and that which carries out processing and production of products (furnaces, machines, dispensers, bottling or assembly lines , etc.).

Like any classic APM system, the SAKURA-APM contains **two main components**:

❖ Maintenance and Repair (M&R)
❖ Production management systems aimed at operational excellence (Operational Excellence).

Reduction of operating costs is achieved due to better reliability of assets, extension of their service life (life cycle), reduction of the cost of implementation and operation.
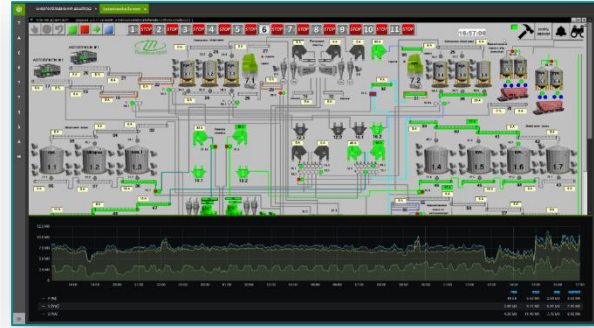
INDUSTRY 4.0

The Enterprise module

visualizes consolidated, comparative, detailed and analytical information coming from holding companies.

This information is focused on quantity and quality of products, energy consumption and energy efficiency of technological operations of a holding's enterprises.

The Operational Excellence module

provides similar metrics as The Enterprise module, but for a particular enterprise.

The Maintenance and repair module (M&R)

provides planning and control of maintenance and repairs at the holding companies.
The main types of information are information on the operation of equipment, energy consumption, use of spare parts and materials during maintenance and repairs.

The Energy Efficiency module

provides low level metrics and analytical information on the consumption of the main types of energy by each unit of equipment, technological group and enterprise as a whole. Based on the obtained data, the calculation of energy efficiency of equipment and technological operations is performed.

INDUSTRY 4.0

SAKURA-EMS: Energy monitoring system
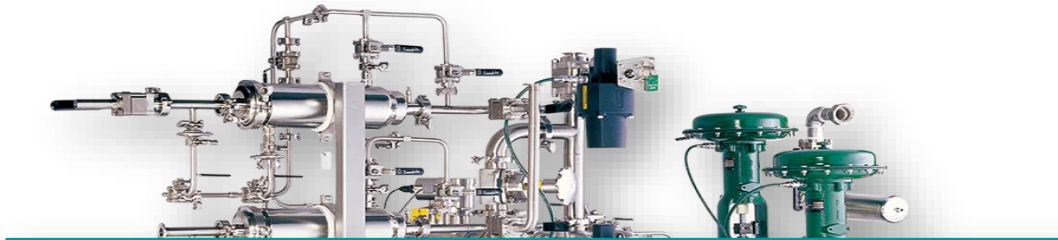
- ✓ Total control of equipment operation
- ✓ Intelligent adjustment of technology
- ✓ A significant reduction in the impact of the human factor
- ✓ Increasing the efficiency of equipment use
- ✓ Increasing the energy efficiency of technology
- ✓ Significant increase in the efficiency of business processes

Internet of Things
Інтернет речей

Artificial Intelligence
Штучний інтелект

Machine Learning
Машинне навчання

Digital Twin
Цифровий двійник

Big Data
Великі дані

Cyber Security
Кібербезпека

INDUSTRY 4.0

SAKURA-ECO: Environmental Monitoring

INNOVINNPROM

Air Quality Monitoring

Watercourse Monitoring and Tracking Water Consumption

Cloud platform SAKURA- IIoT

Exchange of Information with the State and Public Networks

Receiving Information From Satellite Networks

Visualization and Analytical Processing of Data

Analysis of the impact of production on the environment

Adjustment of production to reduce harmful emissions

INDUSTRY 4.0

Application of AI&ML

Installation of Energy Monitoring Equipment Without Reassembly

4 Channel Smart Power Meters
INNOVINNPROM
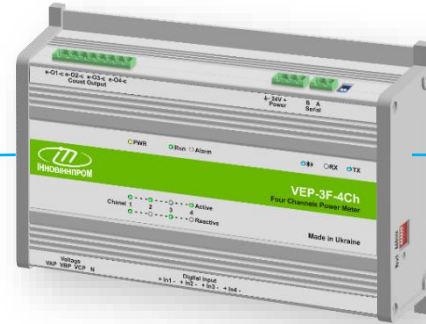
Innovative 3 Phase
Transformers INNOVINNPROM

INDUSTRY 4.0

About the Company

INNOVINNPROM: Products & Solutions

APM/MES/ERP/PLM

8 sites
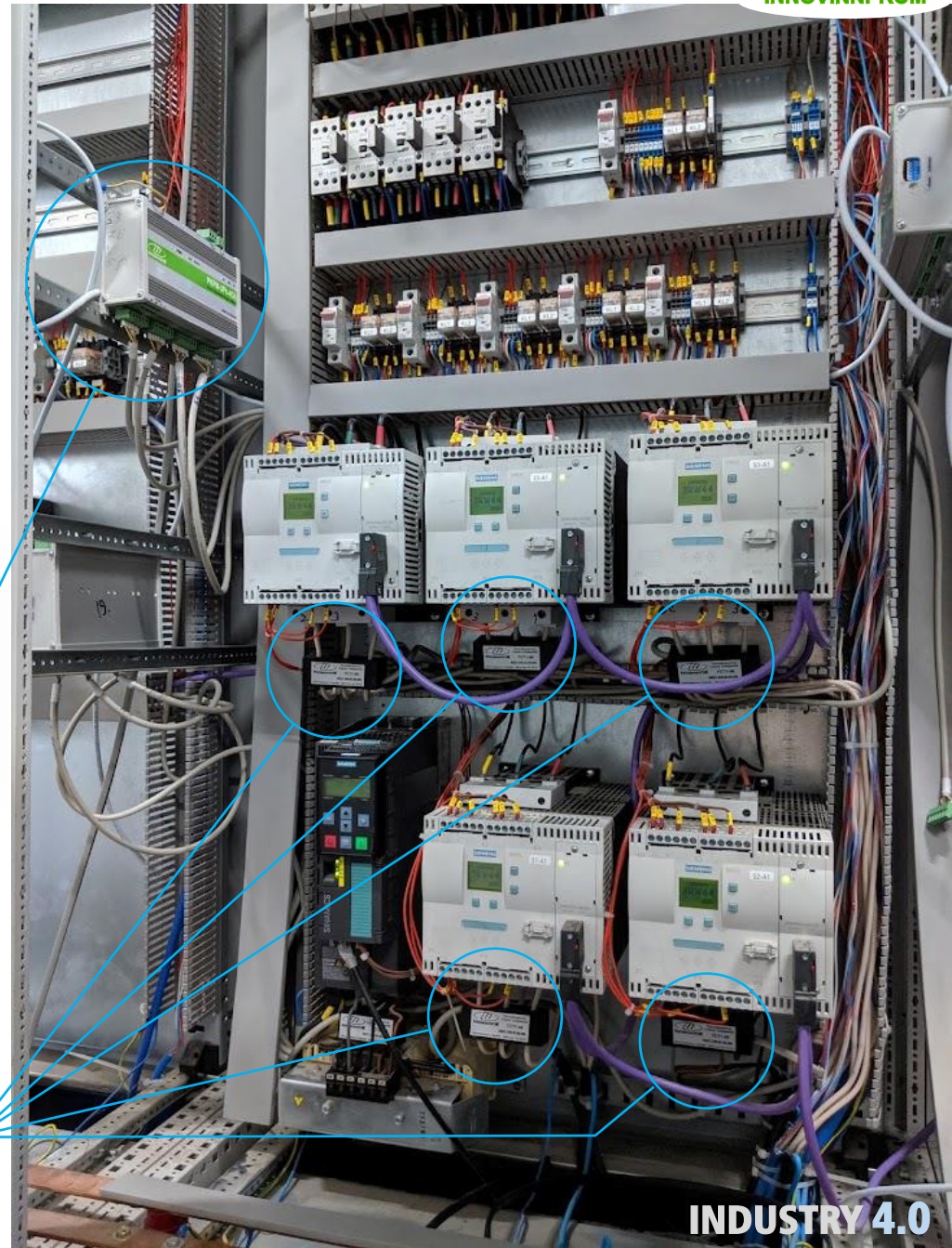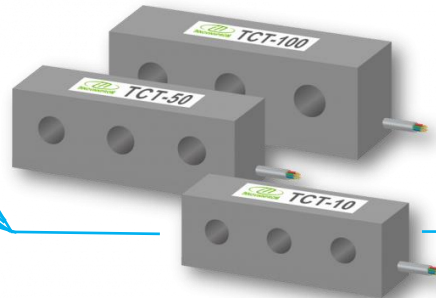
Automated Design System "Route" / SCADA

100+ sites
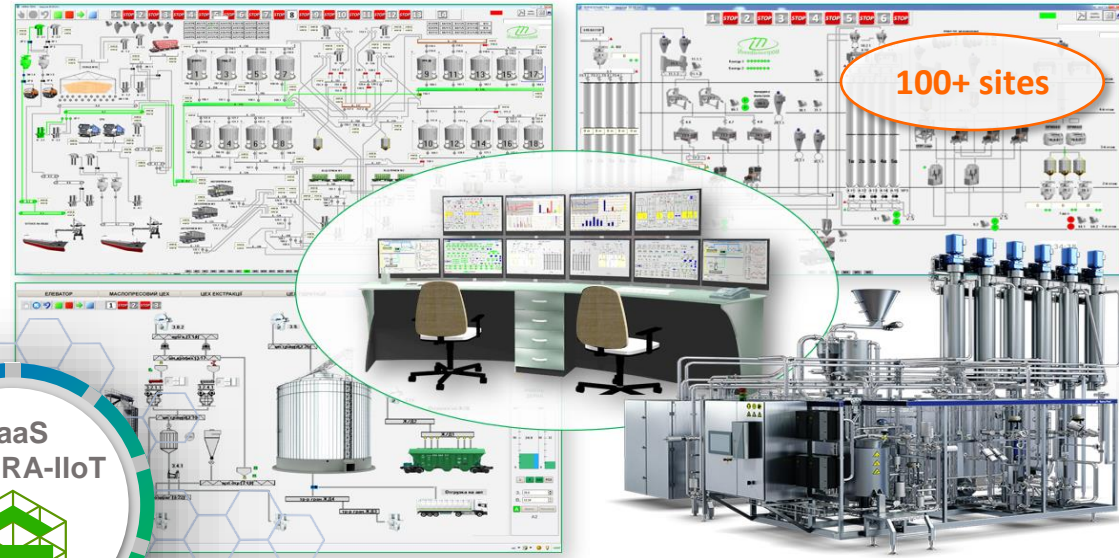
Crystal Growing Systems

3 lines

PaaS
SAKURA-IIoT

Car Sampling Systems

45 sites

Hopper Railway Car Robotic Sampling Systems

4 sites

Monitoring Systems

50+ sites

Company Landscape

INNOVINNPROM

Vendors

SIEMENS
Schneider Electric
RITTAL
WAGO
CISCO
ZEMIC
CAMOZZI
ifm
PF ПРОМФАКТОР
Одескабель
TELTONIKA
Klemsan
LAUMAS
FESTO
OMRON
MOXA
ETI
HYDRAULIC LINE ГИДРАВЛИКА ИЗ ПЕРВЫХ РУК
ОВЕН оборудование для автоматизации
electro cable group
Weidmüller
DKC
PHOENIX CONTACT INSPIRING INNOVATIONS
УКРАЇНСЬКА ЕЛЕКТРОТЕХНІЧНА КОРПОРАЦІЯ АСКО УКРЕМ
EATON
MOELLER
IOT Solutions
LAPP GROUP
VIPA A YASKAWA COMPANY
DEGSON
OBO BETTERMANN
ABB
БКЗ БЕРДЯНСЬКИЙ КАБЕЛЬНИЙ ЗАВОД
Develiot

Suppliers

SV СВ АЛЬТЕРА
galantpol
ALT UKRAINE

Designers

ПОЛТАВАГРОПРОЕКТ

IT

Google Cloud
Microsoft Azure
amazon web services
Grafana Labs
kubernetes
HAULMONT
spring
IntelliJ IDEA
Java
influxdb
chronograf
HAPROXY
PostgreSQL
MESH
PATRONI
APACHE HTTP SERVER PROJECT
Apache Guacamole
UltraVNC
HETZNER ONLINE
docker

Main Clients

МХП АГРОІНДУСТРІАЛЬНИЙ ХОЛДИНГ
UkrLandFarming Public Limited Company
RIOLA CONSTRUCTION GROUP
KERNEL GROUP OF COMPANIES
АгроСпец Сервис
ЖКІСТЬ КОРОЛІВСЬКА, А ЦІНА НАРОДНА! КОРОЛІВСЬКИЙ СМАК
АСТАРТА-КИЇВ агропромхолдинг
AP
НОВІ ПРОДУКТИ
МИКОЛАЇВСЬКИЙ КОМБІНАТ ХЛІБОПРОДУКТІВ
ДЕРЖАВНА ПРОДОВОЛЬЧО-ЗЕРНОВА КОРПОРАЦІЯ УКРАЇНИ
cygnet AGROCOMPANY
агро1прайм ХОЛДИНГ
НТТ Новотех-термінал
agrotrade
НІБУЛОН

DIH

АППАУ Асоціація «підприємств промислової автоматизації України»
Vinnytsia cluster of instrument making and automation:
ПА ПРОМАВТОМАТИКА Our synergy is your energy
7 Med levels
ТЕРМІЯ
VTN Viasoft Web Mobile AI Electronics vtnled.com
Liana Company
ПОГ "Вінницьке УВП УТОС"
MAЙTEK
VINAERO
ГРЕМПІС НВП "ГРЕМПІС" автоматизація обліку енергоносіїв
TIRAS

Universities

Вінницький національний технічний університет ВНТУ VINNYTSIA NATIONAL TECHNICAL UNIVERSITY
ДонНУ
ALMA MATER ІМЕНІ ВАСИЛЯ СТУСА