METEOROLOGY
AND CLIMATOLOGY

NATIONWIDE METEOROLOGICAL NETWORK

Automatic Weather Station

Automatic Hydrological Station
(incl. underground water and water quality)

Road Weather Station

Aviation Weather Station

Meteorological Radar

Automatic Marine Station (buoy)

Automatic Marine Station (coastal)

Automatic Radiation Station (inland)

Automatic Radiation Station (sea)

**METEOROLOGICAL AND ENVIRONMENTAL
MODELING AND FORECASTING**

IMS4 Model Suite

REMOTE SENSING

CENTRAL SYSTEM

Forecasting and Warning

Visualization

System Monitoring and Maintenance

**All sensor's
data to media
converter**

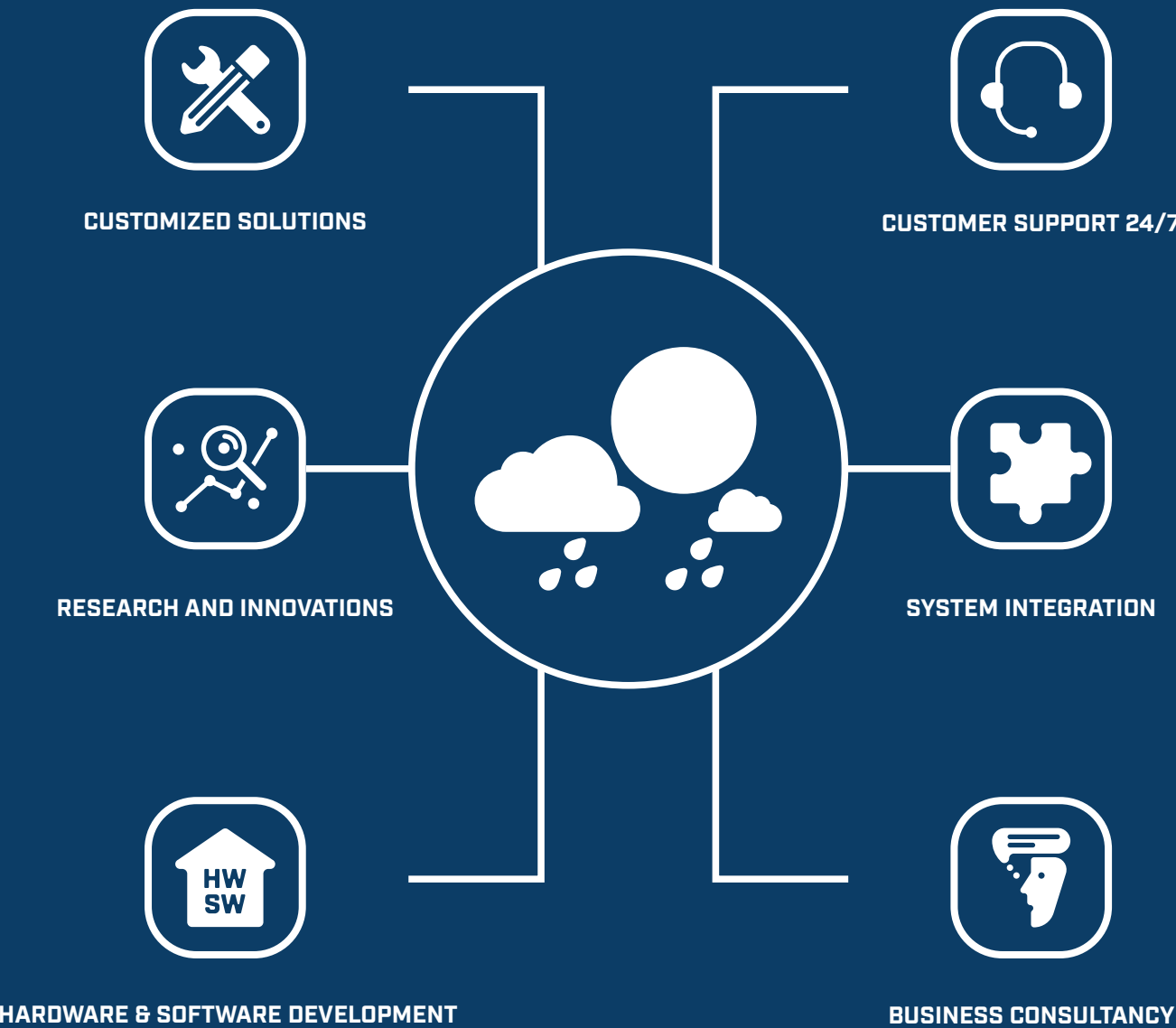# EXPERTS IN MONITORING AND INFORMATION SYSTEMS

Company MicroStep-MIS operates worldwide and specializes in the development and manufacture of monitoring and information systems, processing of acquired data, research, and numerical modeling covering the complete process of software and hardware development and integration.

System integration is an indispensable part of the company's activities. We add value to the already existing systems by integrating them together into one unified, centralized, easily accessible, and user-friendly structure.

Over the past 30 years, we have established ourselves as a recognized and respected provider of quality solutions in many regions around the world. Our products and comprehensive services fully comply with the technical and quality standards (ISO, ICAO, WMO, EUROCAE), and are supplied under very competitive financial and trade conditions. Our core customer groups include, but are not limited to airports, port authorities, meteorological and hydrological institutes, environmental agencies, offices of civil protection, and municipalities.

Our highly qualified staff of developers and experienced researchers, dynamic product development process, and close cooperation with our customers guarantee the development and delivery of the most progressive and outstanding solutions.

CUSTOMIZED SOLUTIONS

CUSTOMER SUPPORT 24/7

RESEARCH AND INNOVATIONS

SYSTEM INTEGRATION

HARDWARE & SOFTWARE DEVELOPMENT

BUSINESS CONSULTANCY

CONTENT

SYSTEMS YOU CAN TRUST

We cover the complete process from the initial consultation to the transfer of knowledge for the successful operation of the system.

4000+

professional weather stations

1100+

implemented projects around the world

80+

supplied countries worldwide

FIELD MEASUREMENT SYSTEM
Sensors and Monitoring Devices

SOLID-STATE TRANSDUCER

MSB780X

DIGITAL BAROMETER

The device is designed for professional meteorological and aviation applications. Highly accurate measurement, fast dynamic response, and stability rank it among the top barometers on the market. MSB780X is a robust product made of durable hardware components ensuring life-long resistance. A solid-state transducer, implemented in the barometer and operating on a principle of vibrating cylinder, offers the product of premium quality.

PRECISE **RELIABLE** **STABLE**
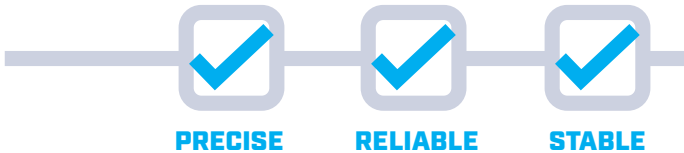
In-house Manufacture and Integration

Thanks to our own development and production of sensors and accessories, as well as long-term relationships with our suppliers, we are able to supply our clients with complete hardware solutions.

The broad spectrum of the product portfolio consists mainly of devices for measuring various meteorological or environmental parameters such as temperature, relative humidity, atmospheric pressure, cloud coverage, lightning, precipitation, solar radiation and others. Accessories menu covers communication equipment, special accessories for aviation or calibration systems, meteorological masts, and other mechanical components.

BIM205

BATTERY INTELLIGENT MANAGEMENT

BIM205 is a solar charger with MPPT function and also a power supply combined into one compact unit. It is suitable for the majority of powering systems where charging efficiency and battery backup are essential. The MicroStep-MIS flagship charger is one of the most versatile intelligent chargers on the market.

RHT175

RELATIVE HUMIDITY AND TEMPERATURE PROBE

The RHT175 probe, developed and manufactured by MicroStep-MIS, provides reliable and accurate relative humidity and temperature measurement. The sensor is designed for meteorological and airport weather stations, or any applications where precise humidity data are required.

MSB181

DIGITAL BAROMETER

This small, leightweight, and budgettary device is suitable for use in various environmental monitoring applications. High accuracy, long-term stability, variety of output options, temperature compensation determine the quality of the barometer MSB181. DIN verion is available per request.

Automatic Weather Station

The MicroStep-MIS AMS 111 IV system is designed for standard or mobile meteorological stations, as well as for applications in areas where commercial power or communication networks are limited or don't exist.

The AMS 111 IV Data Logger interfaces with various sensors and telecommunication devices. Embedded with state-of-the-art software, the AMS 111 IV is a reliable and cost-effective solution for meteorological and environmental monitoring.
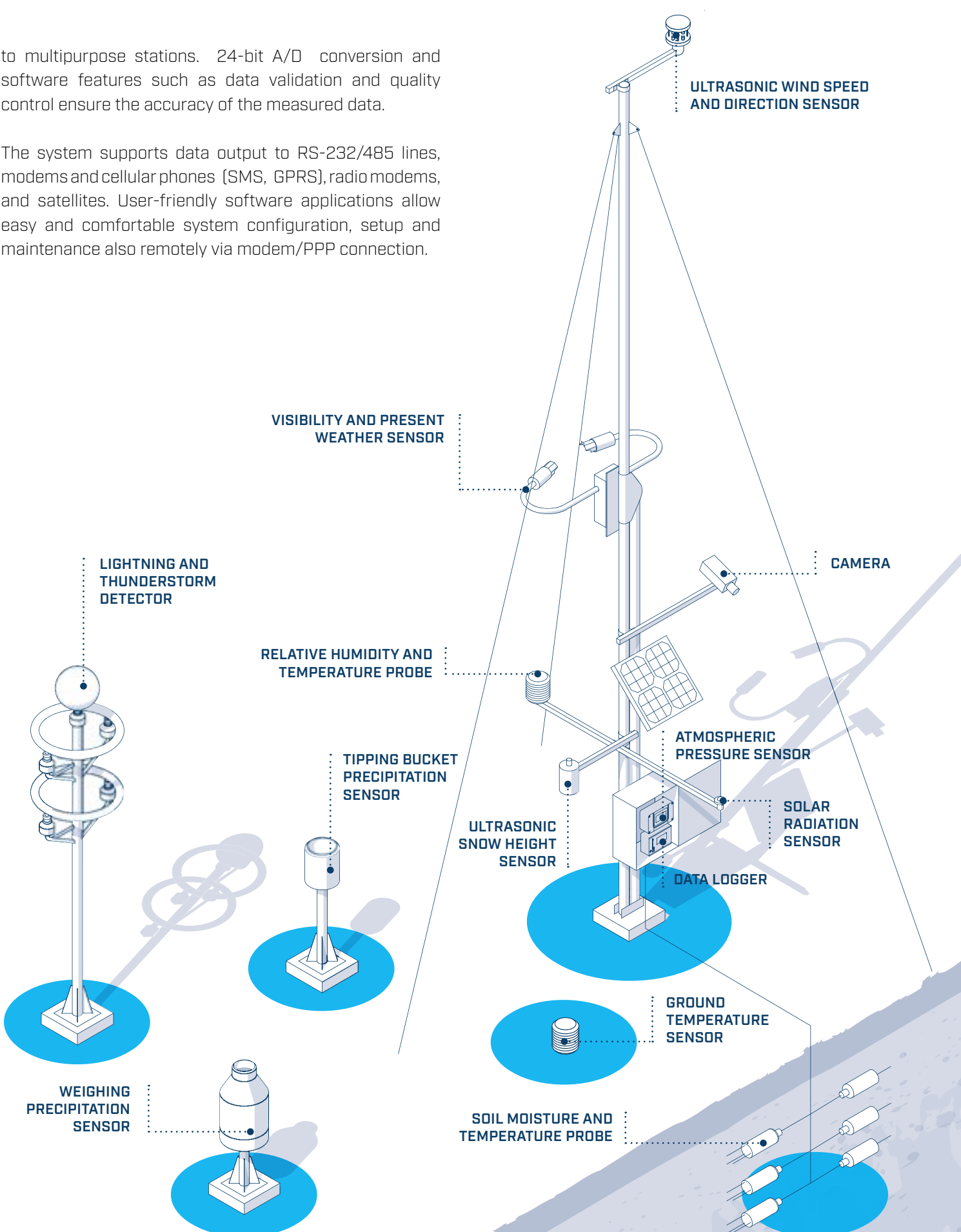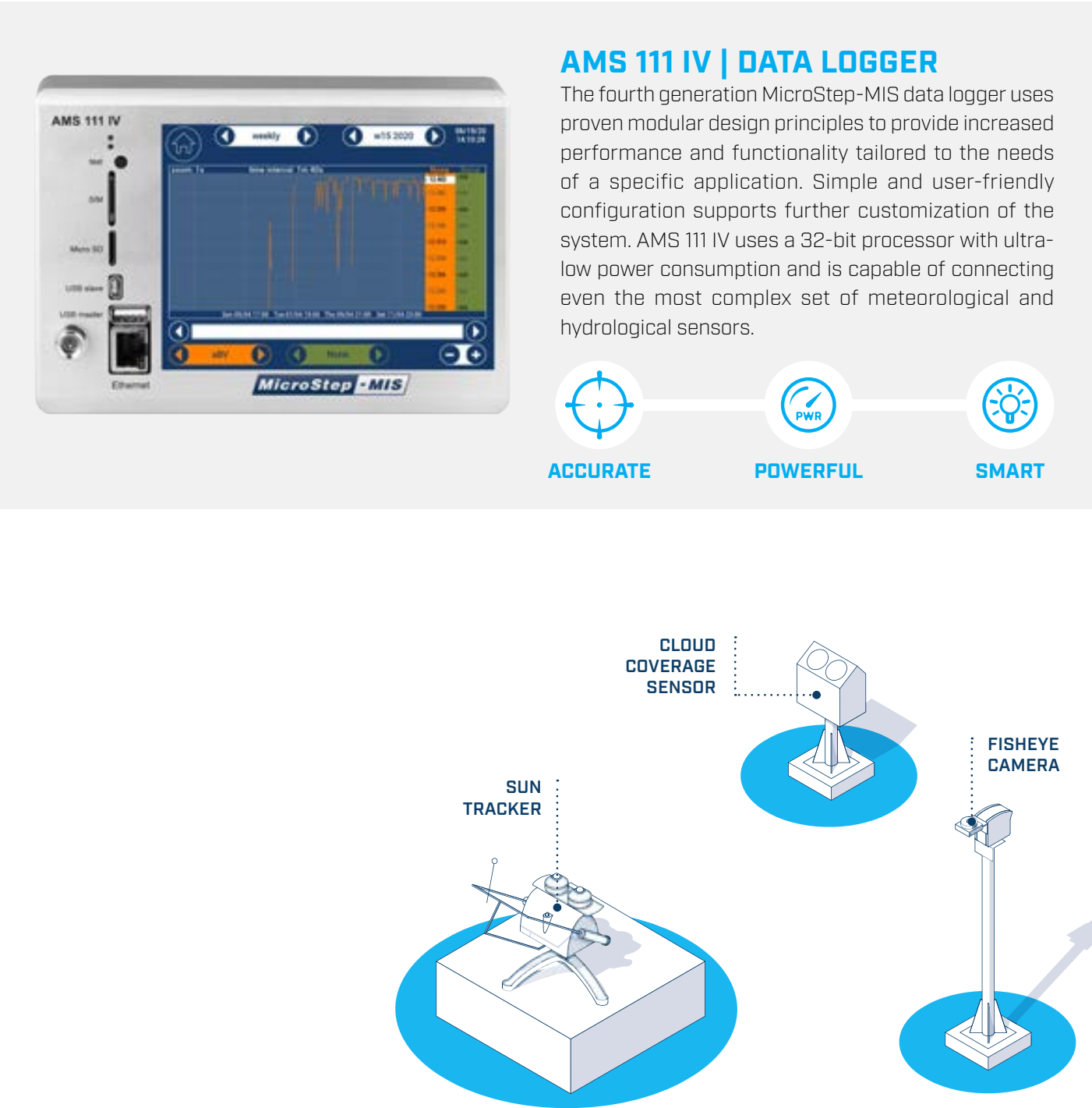
The AMS 111 IV serves as a modular and flexible platform for the construction of a variety of measuring and logging systems, which include AMS 111 IV modules, intelligent sensors, displays, and PCs. System flexibility allows a wide application range from simple compact systems to multipurpose stations. 24-bit A/D conversion and software features such as data validation and quality control ensure the accuracy of the measured data.

The system supports data output to RS-232/485 lines, modems and cellular phones (SMS, GPRS), radio modems, and satellites. User-friendly software applications allow easy and comfortable system configuration, setup and maintenance also remotely via modem/PPP connection.

AMS 111 IV | DATA LOGGER

The fourth generation MicroStep-MIS data logger uses proven modular design principles to provide increased performance and functionality tailored to the needs of a specific application. Simple and user-friendly configuration supports further customization of the system. AMS 111 IV uses a 32-bit processor with ultra-low power consumption and is capable of connecting even the most complex set of meteorological and hydrological sensors.

ACCURATE   **POWERFUL**   **SMART**

CLOUD COVERAGE SENSOR

FISHEYE CAMERA

SUN TRACKER

WEIGHING PRECIPITATION SENSOR

LIGHTNING AND THUNDERSTORM DETECTOR

RELATIVE HUMIDITY AND TEMPERATURE PROBE

TIPPING BUCKET PRECIPITATION SENSOR

ULTRASONIC SNOW HEIGHT SENSOR

VISIBILITY AND PRESENT WEATHER SENSOR

ULTRASONIC WIND SPEED AND DIRECTION SENSOR

CAMERA

ATMOSPHERIC PRESSURE SENSOR

SOLAR RADIATION SENSOR

DATA LOGGER

GROUND TEMPERATURE SENSOR

SOIL MOISTURE AND TEMPERATURE PROBE

Compact Automatic Weather Station

WIND SPEED AND DIRECTION, TEMPERATURE AND RELATIVE HUMIDITY, ATMOSPHERIC PRESSURE

DATA LOGGER

LIGHT PORTABLE METEOROLOGICAL MAST

EASILY DEPLOYABLE

TRAVEL BAG INCLUDED

SUITABLE FOR MOBILE STATIONS

MADE OF ALUMINUM ALLOY

AMS 111 COMPACT | DATA LOGGER

AMS 111 Compact is optimized for applications with a reduced set of sensors and applications where portability is important. It runs on a globally trusted multitasking operating system and provides a rich set of features. Despite its small size, it provides flexibility and performance comparable to the AMS 111 loggers. The most compact variant fits into a box with dimensions of 15 x 10 x 7 cm.

COMPACT   **AFFORDABLE**

Manned Weather Station

IMS4 Observer

IMS4 Observer Workstation is the application software designed to interface the MicroStep-MIS' Automatic Weather Station AMS 111 model or various types of 3rd party sensors and data loggers.

It performs continuous measurement and/or data collection from the connected automatic weather station, data processing (including quality control and recalculations), and archiving.

The IMS4 Observer sends, receives, and presents the data on the Internet/intranet in the form of meteorological messages via the GTS network.

Its user-friendly interface enables configuration of many different applications, ranging from simple synoptic stations to a research stations with dozens of sensors and communication lines. Remote data access is allowed, including maintenance options and upgrades.

AMS 111 IV
DATA LOGGER

IMS4 OBSERVER WORKSTATION

GTS/LAN

CLIENT SYSTEMS
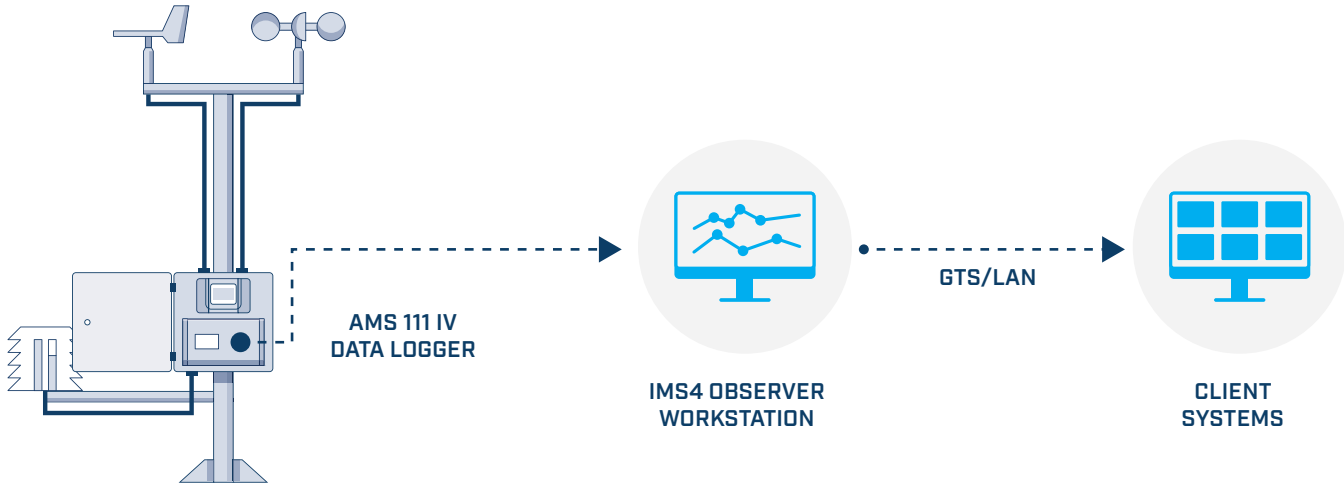
MMR-116

Mini Meteorological Radar

The X-band weather radar MMR-116 responds to the ever-increasing demand for water management tools and the detection of dangerous meteorological phenomena such as extreme precipitation or hail. The combination of its properties and competitive price assumes wide use in flood management and prevention, strategies for adaptation to global warming, operational weather forecasting, tourism, transport, civil defense, aviation, agriculture, and research.

POWERFUL AND COMPACT

By integrating the large amount of functionality into the compact and portable device, the MMR-116 is easily able to compete with the performance of large radars. The radar provides real-time weather reports and is capable of detecting precipitation from 10 dBZ up to 200 km.

The MMR-116 is supplied with in-house developed software that displays meteorological spatial data in a user-friendly graphic form. The radar provides programmable echo scanning from the radar range, transforms the data into a spatial matrix, processes the obtained data, and distributes it to the customer's graphic workplace.

LOW COST OF OWNERSHIP

Low installation and operating costs are one of the significant advantages of MMR-116 ownership. The manual movement of the crank folding up the radar dome requires minimal physical strength and provides the operator with greater comfort during maintenance work. Additionally, no costly installation infrastructure is required thanks to the possibility of the lift being built on site.

Together with low energy consumption, no need of AC (even at temperatures reaching 60 °C), or low frequency of replacement of consumable components, these technical improvements allow us to deliver a solution requiring minimal costs for installation, setup, configuration, and maintenance.

SOPHISTICATED NOWCASTING SOFTWARE

Nowcasting is one of the key products of the radar meteorological system. The software automatically identifies precipitation and matches it in-between radar measurements. Based on the extrapolation of the situation, it creates a short-term forecast. Algorithms deal with the position and size of the precipitation, as well as merging and splitting of storm cells.

Considering the application scenarios, the systems offers great flexibility. Storm discrimination takes into account many paramaters, the most common being reflectivity and area/volume. The output of the short-term forecast can be visualized or used for further applications, e.g. for early warning systems.

INTEGRATION CAPABILITIES

Thanks to its features, the Mini Meteorological Radar is ideal for integration with other monitoring systems, such as the airport Low Level Windshear Alert System (MMR-116 DP). The compact dimensions of the device allow it to be located and installed near the airport runway without the need to build complex and cumbersome structures or towers. This is how one of the MicroStep-MIS radars operates at Malta International Airport, where it has been integrated into the complex monitoring and forecasting system serving the Maltese Islands.

> "MicroStep-MIS' small and compact radar is designed for all weather phenomena. Its unique features make it suitable for assisting meteorologists in their day-to-day work. Distinctive as it has a user-friendly interface with other met-systems."
>
> *~ Joseph Schiavone ~*
> *Malta International Airport*

NETWORK WITH A MAXIMUM COVERAGE

The capabilities of the MMR-116 allow the implementation of small and effective radar networks, which have important advantages compared to a single long-range radar - economical approach improving the radar coverage of the country. Low radiated power allows the device to meet standards for operation in populated areas such as cities, airports, highways, ports, etc. The MMR-116 can also fill in "white spots" in an existing large radar network, or a complete MMR-s radar network can be established in areas without radar coverage. Small dimensions and low weight allow for easy installation and operation.
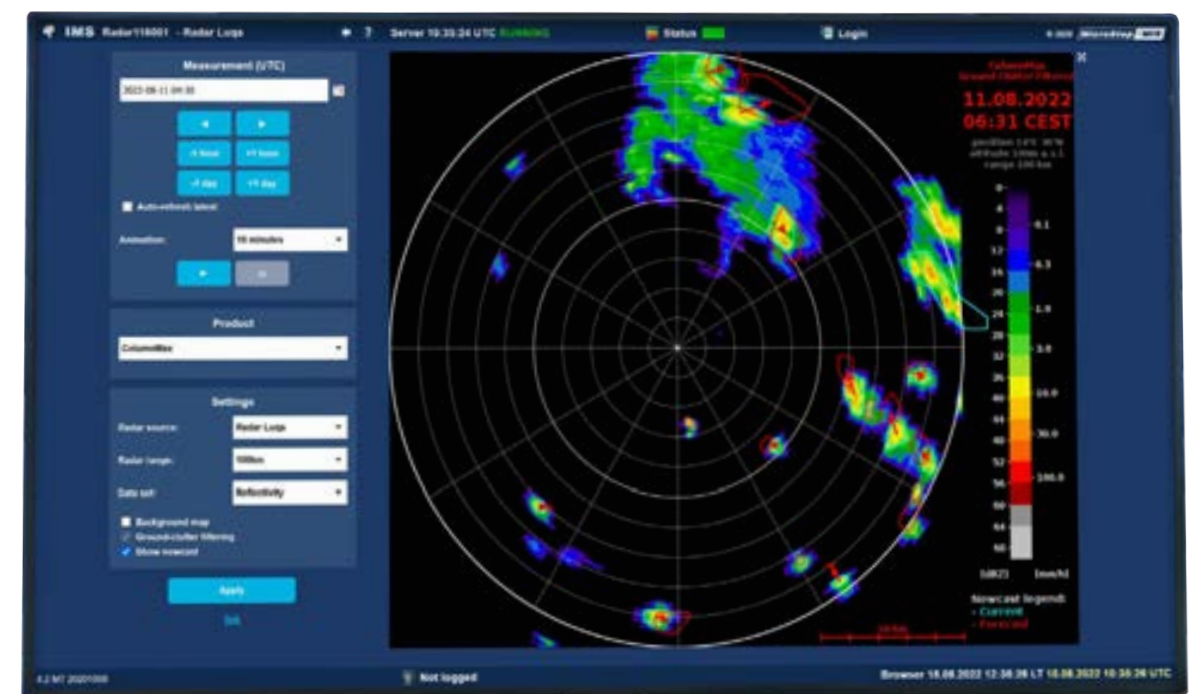
AREAS OF APPLICATION

Monitoring and information systems from MicroStep-MIS have been installed in many regions of the world over the last three decades. Customers in more than 80 countries of the globe confirm their reliable performance under all weather conditions, high accuracy of sensors when measuring weather and environmental parameters, and a wide range of data processing and management options.

METEOROLOGY AND CLIMATOLOGY

The design of the nationwide meteorological or climatological network takes into account the diversity of the landscape geography, the specificity of the regional climate and the individual needs of the users of the system. The result is a complex system consisting of a huge number of strategically located sensors and automatic stations and a sophisticated data collection and processing system.

AVIATION

Aviation weather solutions constitute the majority and the most remarkable part of MicroStep-MIS product portfolio. These systems provide weather information to airline operations, flight dispatchers, and pilots. They contribute to the protection of the people and the property at the airport and maintain the balance between safety and efficiency of the air traffic.

CITIES AND ROADS

Improved monitoring of visibility is applied in cities and areas with heavy traffic and at the same time frequent occurrence of dense fog, high concentration of smog, or sandstorms. Early warning systems serve the municipalities and general public to anticipate weather conditions, plan outdoor activities, and prevent accidents on roads.

AGRICULTURE

Weather plays a major role in determining the success of agricultural activities. By collecting, processing, and appropriately presenting weather and phenological data, agrometeorological systems serve farmers and gardeners as a support tool in the decision-making and management of agrotechnical processes.

HYDROLOGY AND FLOOD MANAGEMENT

The collection and analysis of data on water movement, distribution, and quality help to address water-related issues of environmental protection, natural disasters, and water management. Information on the water cycle and the spatio-temporal availability of water resources is crucial in regions with excessive rainfall or drought. The offered solutions for the field of hydrology also include dam monitoring and decision support systems.

MOUNTAINS

The weather in the mountains is often unpredictable and unstable. Mountain rescue services benefit from weather monitoring systems when making critical decisions in adverse weather, planning rescue operations, or issuing warnings for hikers, climbers, or visitors to a mountainous environment.

MARINE

Maritime industries such as shipping, fishing, oil and gas extraction, renewable energies, mariculture, and seabed mining play a key role in the economies of many countries. Integrated systems for marine environment monitoring systems support the efficient management of marine resources.
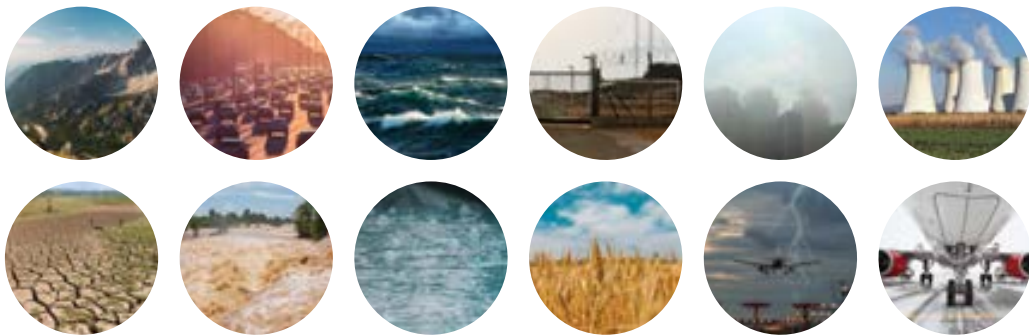
CAVE MICROCLIMATE

The processes determining the climate in the caves are dominated by the advection of heat and humidity leading to different spatial and temporal patterns of climate in the caves. Detailed monitoring of these parameters provides cave managers with important information about warming patterns in different areas of the cave.

MILITARY

Military land, sea, and air operations are highly dependent on weather conditions. Quality of applied technology and expertise are the key factors in processing and distributing weather data to commanders and pilots. Military weather systems are designed to meet the specific demands of the armed forces and military agencies.

RADIATION

Radiation monitoring system solutions can be used within national networks to monitor a potential danger from radioactive plume dispersion from unknown or unpredictable sources as well as in the vicinity of nuclear power plants or different facilities participating in the nuclear fuel cycle.

FROM COMPACT MICROCLIMATE SYSTEMS TO NATIONWIDE MONITORING NETWORKS

CALIBRATION LABORATORY

17.000+
calibrated sensors
since 2017

To achieve the most accurate and professional measurement, it is necessary to employ regular calibration and adjustment of the meteorological sensors. MicroStep-MIS offers comprehensive and tailor-made solutions for the needs of calibration laboratories for hydro-meteorological services.

HARDWARE MANUFACTURE

Long-term experience with product development, a wide and solid base of experienced technical workers, and developers have enabled us to direct our capacities to the manufacture of our own products.

Humiwell (temperature and relative humidity) and Pressurewell (atmospheric pressure) generators attack the parameters of the best calibrators in their classes. The combination of high performance, appealing design, and reasonable price represent attractive solutions for your laboratory. Both generators are compatible with third-party sensors and can be used as benchtop devices or taken to the field.

On request, in addition to the general offer in the portfolio of the calibration laboratory, we are open to the development and production of a prototype solution according to the customer's request.

AUTOMATED CALIBRATION SOFTWARE

IMS4 Caliblab is a complex, intuitive, easy-to-use, and flexible calibration laboratory software, which can be easily installed in a laboratory of any meteorological, aviation, meteorological, or industry institute.

The software brings the possibility to calibrate a wide range of sensors using a unified and modular architecture that supports multiple calibration chambers and devices, enables calibration of almost any sensor on the market, and provides the user with comfort, ease, and flexibility.

ALL-IN-ONE CALIBRATION SYSTEMS

We supply solutions for stationary laboratories as well as systems for field calibrations. A high level of customization and an individual approach allow us to provide our clients with tailor-made solutions adapted to their requirements and needs.

The complete package includes laboratory equipment, calibration software, system installation, staff training, and customer support. We deliver calibration systems for

- Atmospheric Pressure Sensors
- Distance Sensors
- Pressure-based Water Level Sensors
- Relative Humidity Sensors
- Thermo Hygrometers with Climatic Chamber
- (IR) Thermometers
- Tipping Bucket Rain Gauges
- Visibility Sensors
- Wind Speed and Direction Sensors
- Weighting Rain Gauges

ACCREDITED CALIBRATIONS

In addition to the development and production of complete calibration systems, accredited calibration services complement our portfolio in this area. Some industries or various uses of our devices require an accredited calibration certificate. Accreditation increases the quality of the provided calibration services and enables us to issue internationally recognized certificates.

Our laboratory is accredited according to the ISO/IEC 17025 standard. The quality of the services provided is key to us, and therefore we subject our processes to regular audits and quality controls. The scope of accreditation includes atmospheric pressure, temperature, relative humidity, precipitation, and dew point.

ACCREDITED
ISO / IEC 17025: 2017

ACCORDING TO STANDARD ISO / IEC 17025: 2017, SINCE FEBRUARY 2017

ENVIRONMENTAL DATA MANAGEMENT SYSTEM

Integrated Monitoring System

The IMS4 Integrated Monitoring System is an open MicroStep-MIS meteorological system suitable for building national meteorological networks, airport meteorological systems, or meteorological stations for commercial use.

This complex multipurpose software was designed for 24/7 unattended operation and has already undergone more than 400 installations in various countries in Europe, the Middle East, Asia, and Africa. Among other things, the system serves the purposes of hydrological monitoring, marine meteorology, synoptic and climatological monitoring, aviation meteorology, or gamma radiation monitoring.

IMS4 has been designed and developed in accordance with international regulations (ICAO / WMO / ISO / EUROCAE / NATO / EU) and is open to modifications for compatibility with national practices.

The IMS4 modular platform enables the integration of all measured meteorological data and metadata, their processing, management, visualization, distribution to end users or as inputs to modeling systems, and last but not least, their archiving.

2007 → 2020

Universal Data Collection System

Meteorological, hydrological, radiological, and other environmental data can only be useful after they reach the end users. Currently, the role of information and communication technologies in the world of meteorological monitoring is crucial.

IMS4 Universal Data Collection System (UDCS) is a data collection and switching system built on the proven IMS4 platform for meteorological, hydrological, radiation, and environmental data collection and remote system maintenance.
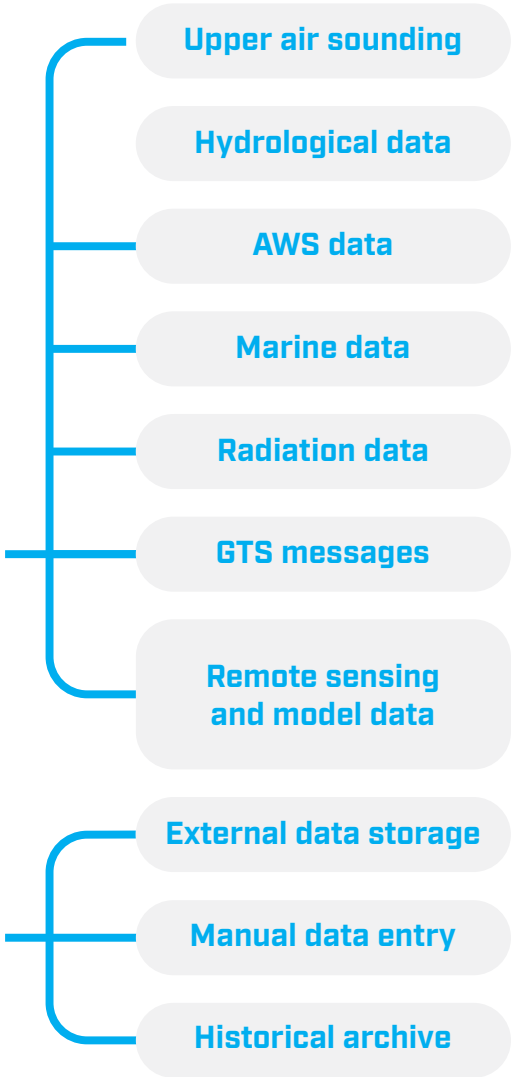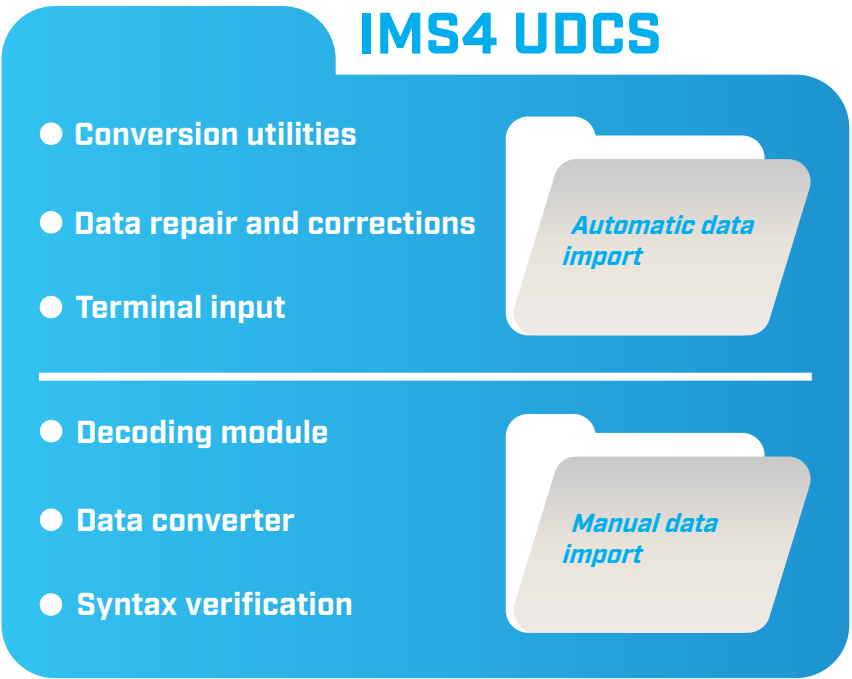
The main advantage of the system is its complexity. The full-duplex mode of operation enables not only the collection of data from the stations but also the distribution and switching of messages between/to the stations. The system supports a wide range of protocols defined by the WMO.

The IMS4 UDCS provides all the functionality required for the operation and maintenance of large meteorological networks of automatic as well as manned stations. The 3rd party stations are interfaced directly, or through the data collection system of the particular vendor. The number of stations that can be connected by a single UDCS is limited only by the communication infrastructure used.

Communication is carried through the GPRS service. In case of failure, the UDCS is able to dial the station using a GSM connection. UDCS is open to further extensions and has a wide range of available communication channels.

UDCS collects data from national networks of automatic and PC-equipped manual stations, SADIS, MSS, and others. The system can integrate existing as well as newly built parts of the networks and collects various types of data (see the scheme). The acquisition can be configured to be performed online (or in real-time) or on a daily or weekly basis depending on the capabilities of the automatic station in the field.

IMS4 UDCS

- Conversion utilities
- Data repair and corrections
- Terminal input

Automatic data import

- Decoding module
- Data converter
- Syntax verification

Manual data import

- Upper air sounding
- Hydrological data
- AWS data
- Marine data
- Radiation data
- GTS messages
- Remote sensing and model data
- External data storage
- Manual data entry
- Historical archive

Climatological and Integrated Environmental Database

Climatological Database (CLDB) is a critical part of every modern meteorological institute. The main use of the system is to store all collected meteorological data in a uniform structure to avoid data discrepancies and inconsistencies.

The database enables standard and comfortable data access for all users and other software systems. The system offers wide variety of benefits among which the main are

- Integration of data from the Collection System
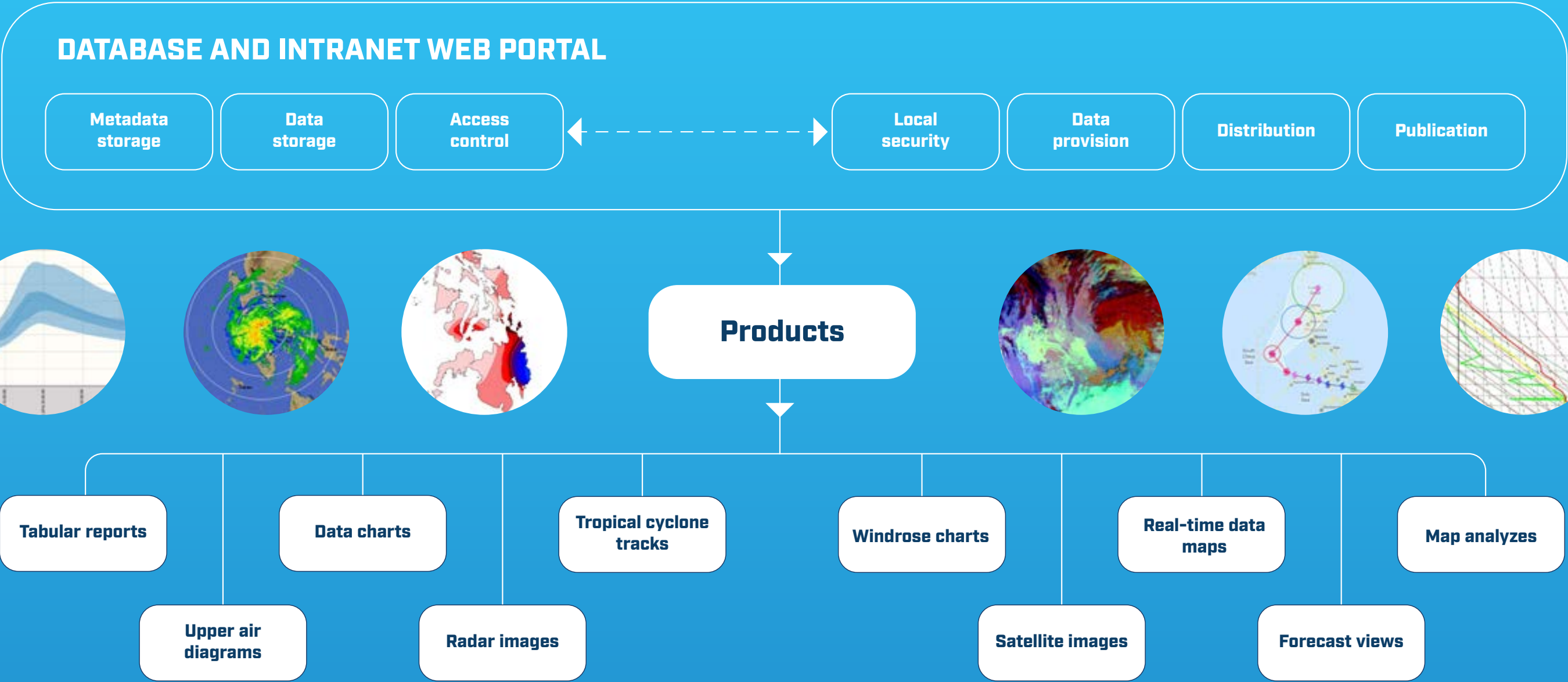- Integration of valuable historical archive of observed data

- Automation of data processing and management
- Provision of secure and safe storage for all collected data and metadata
- Performance of quality checks
- Single point of access for a client
- Rich spectrum of output modules presenting stored data
- Distribution of data for modeling and visualization purposes in real-time

A uniform structure of the CLDB is based on SQL Database Server accessing the data through the SQL language. The quality of data storage is guaranteed by the proven Oracle® database server, the world leader in database technologies. A great alternative is an open-source solution offered by PostgreSQL.

A big advantage of the Database is its modular architecture. It provides the end-user with the possibility of detailed customization. The user can specify additional non-standard input and output modules that can be easily implemented and added to any existing or future installation.

One of the most extensive expansions offered is an upgrade to Environmental Database that integrates data from other sources such as radars, satellites, profiles, historical observations, marine, and hydrological data, radiation data, air pollution monitoring, and more.

UNIVERSAL AND RELIABLE DATA MANAGEMENT SYSTEM

DATABASE AND INTRANET WEB PORTAL

| Metadata storage | Data storage | Access control | | Local security | Data provision | Distribution | Publication |

Products

- Tabular reports
- Data charts
- Tropical cyclone tracks
- Windrose charts
- Real-time data maps
- Map analyzes
- Upper air diagrams
- Radar images
- Satellite images
- Forecast views

MODELING, NOWCASTING, AND FORECASTING

MicroStep-MIS offers a wide variety of weather and environmental models and simulation technologies. The models run in both operational and research modes. We offer an integrated, easy-to-use, powerful system for modeling, processing, visualization, and validation of models that supports forecasters and crisis managers. Its application ranges from routine daily forecasts to decision support in emergency situations.

Our system is modular-based and enables the user to use one, or multiple platforms to perform the required outputs. Simulations are provided in the form of studies, or in the form of the forecasting and warning system working in real-time and providing forecasts to responsible institutions, decision-makers, and the public. In recent decades, the land, ocean, and atmosphere are traditionally considered as a single thermohydrodynamic system, because these environments, being in direct contact, continuously exchange energy and substance. Therefore, our company pays careful attention to the development of reliable and high-quality atmospheric, hydrological and marine forecasting systems, which can work as a unified complex.

ATMOSPHERIC MODELING

Numerical weather prediction is one of the fundamental aspects of numerical modeling. Depending on the task, the weather forecasting system developed in MicroStep-MIS can carry out ultrashort-, short-, medium- and long-range forecasts of meteorological characteristics for a region or the entire globe. Adaptation of the forecast system for particular consumer needs (aviation, agrometeorology, ecology, etc.) is carried out directly by our company's specialists. The results of numerical weather prediction are deeply involved in calculations of marine and hydrological forecasts.

HYDROLOGICAL MODELING

Our hydrological modeling systems cover a wide range of issues in hydrology - from the transformation of rainfall to runoff, attenuation of water in channels, spreading of pollution in channels, flood hazards, and risk mapping or drought modeling and forecasting. A number of models are used for the solution of main tasks in hydrology, civil protection, or land management.

MARINE MODELING

Hydrodynamic modeling makes it possible to predict and take into account changes in the variables of the aquatic environment. Aspects of marine modeling, such as wind wave forecasting, oil spill propagation, ice, and biospheric processes, and transport of sand and impurities in the marine environment, are implemented in MicroStep-MIS using modern numerical models and algorithms. Adaptation of numerical models to a certain region performed by the company's specialists guarantees the best forecast result. Marine modeling solutions can be presented both in the form of separate modules and as a coupled forecasting system "atmosphere-ocean-waves-land".
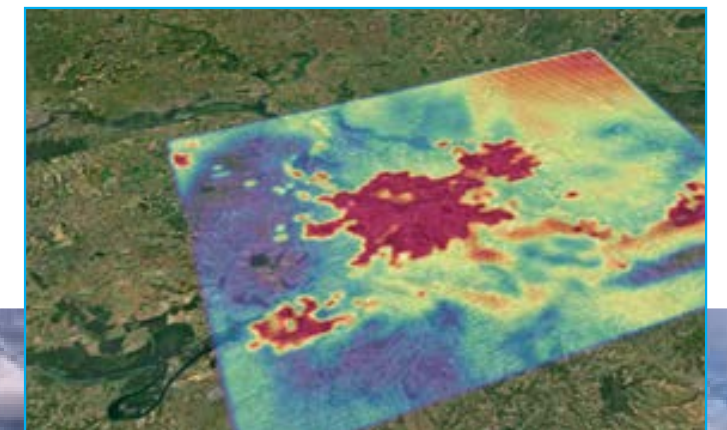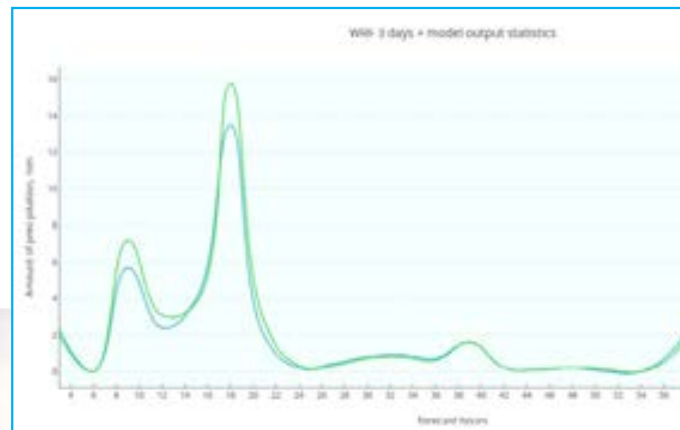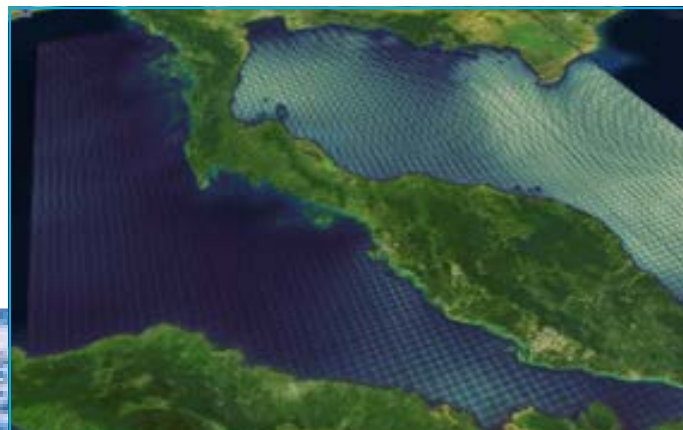
IMS4 Weather Studio
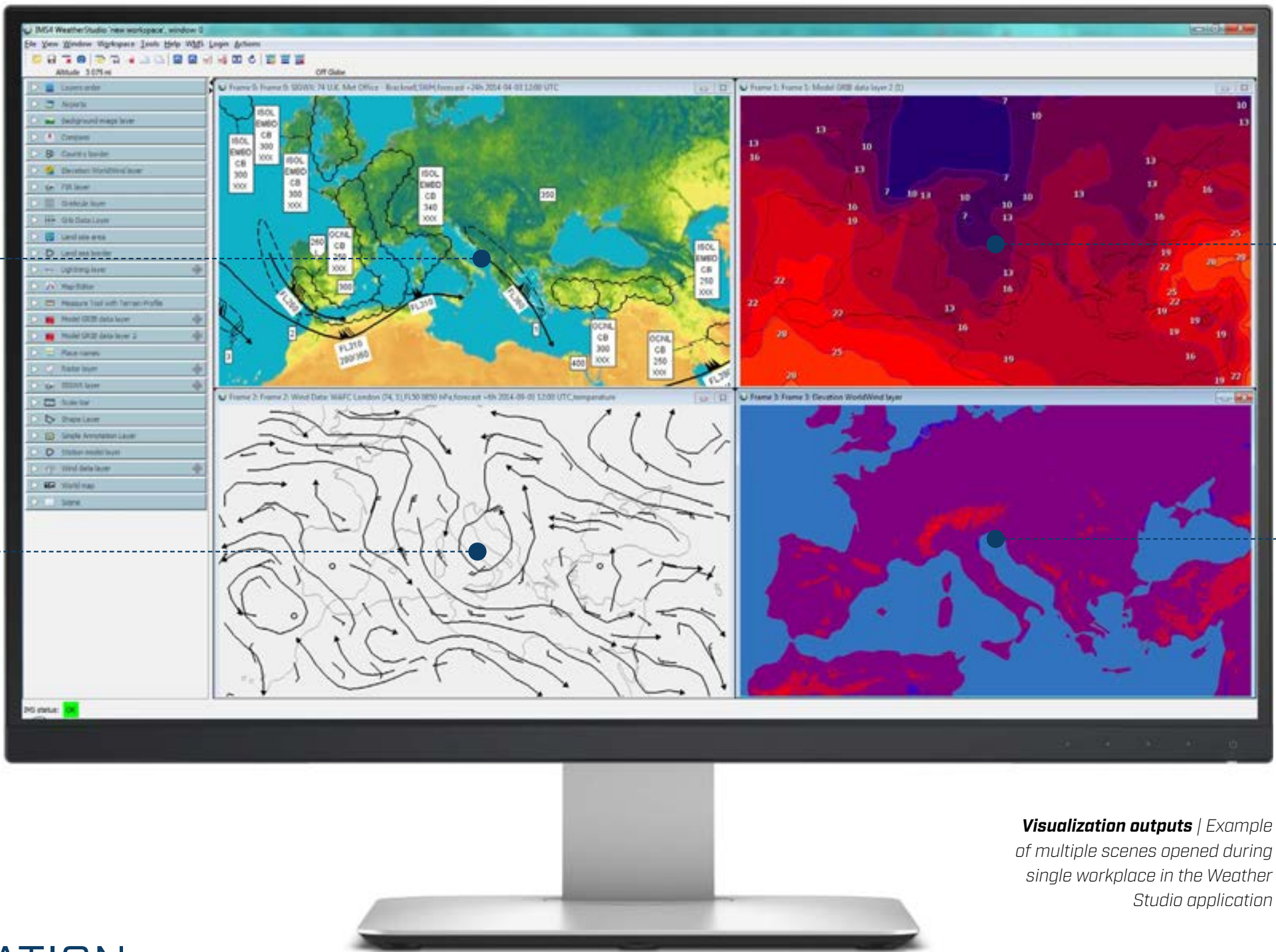
SIGWX chart (Significant Weather Chart) representing forecast of most important meteorological phenomena relevant for air traffic transport over Europe.

WAFC (World Area Forecast Center) forecast of wind at flight level FL50 for Europe presented in map form. Wind is represented by streamlines and wind barbs.

GFS (Global Forecast System) forecast of temperature for Mediterranean region presented in map form. Temperature values are represented using custom scale and corresponding isoterms.

Digital elevation model

Visualization outputs | *Example of multiple scenes opened during single workplace in the Weather Studio application*

DATA VISUALIZATION

IMS4 Weather Studio is a unique tool for processing, analyzing, and graphic presentation of surface and upper air meteorological, radiation, and climatological data.

This easy-to-use tool provides convenient way for objective analysis and displaying of complex data - real-time data distribution systems (GTS), SADIS, as well as data outputs from Numeric Weather Prediction models (NWPs).

IMS4 Weather Studio has wide use in meteorological institutions, forecasting services, crisis centers, airports, climatological research and dispersion modeling, and many other users.

The Studio allows easy creating, viewing, and printing of the various kinds of layered maps such as topography, actual or historical weather data from SYNOP and METAR bulletins, NWP model output in GRIB format, satellite and radar data, SIGWX charts in BUFR format, lightning locations, or Flight Information Region (FIR). Each layer allows customization by providing a wide choice of setting options. The stored customized layer configurations can be applicated easily over the maps.

The IMS4 Weather Studio is fully compatible and integrable with other MicroStep-MIS products. It easily displays the data from the AWOS system, RWIS, or IMS4 Briefing server via regular web service.

SERVICES

Improved Forecasting Solutions

Our company has extensive knowledge and experience in the area of Numerical Weather Prediction (NWP) and each new project is a combination of already proven solutions and constant innovation. The history of MicroStep-MIS covers various forecast-related solutions:

- ✓ **Operational provision of meteorological forecast information**
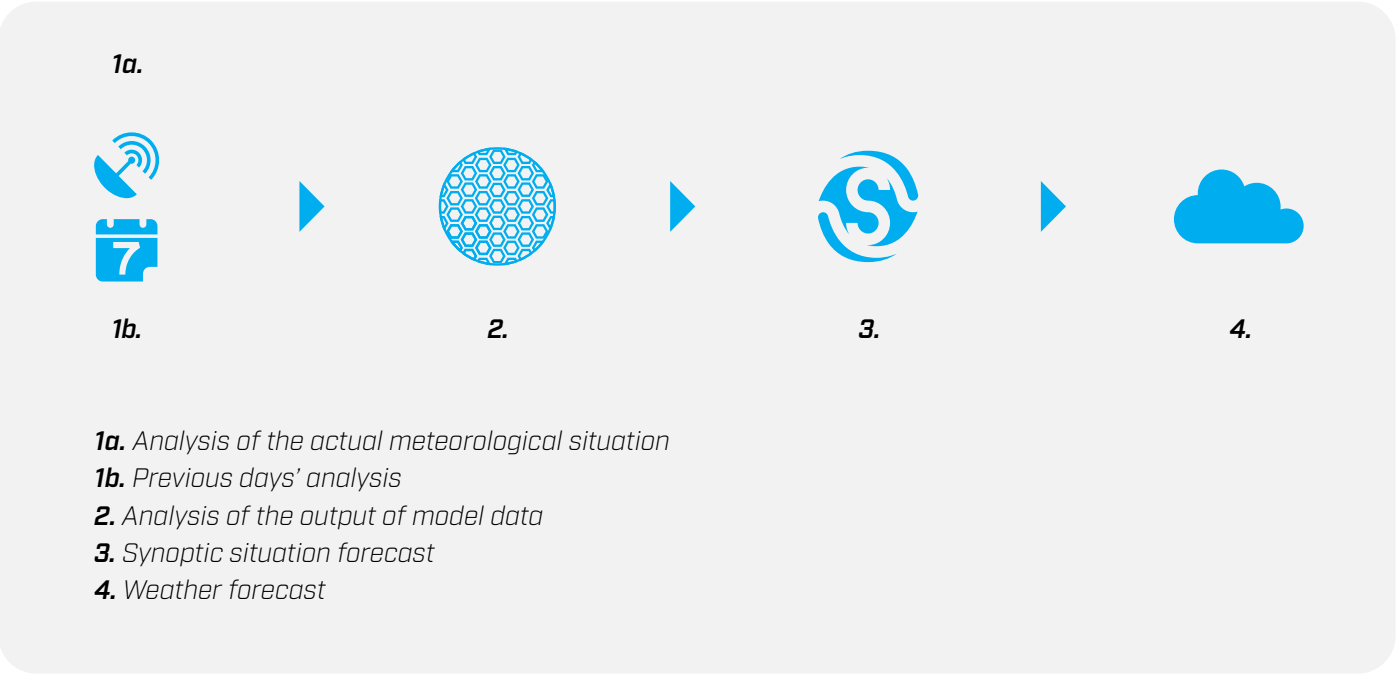- ✓ **Improving forecast quality by post-processing methods**
- ✓ **Specialized forecasts and expert evaluation for any territory and any purpose**
- ✓ **Ultra-short-term weather forecast (nowcasting)**
- ✓ **Severe weather warnings**

We operate a reliable and user-configurable system and make the forecast products cost-effective without safety compromises. Therefore, MicroStep-MIS's NWP forecasting services include a key phase in which forecasters interpret and modify NWP output fields.

The forecast correction by our meteorology experts is based on real-time observations (including data from meteorological stations, satellite and radar information) and their qualified interpretation of prognostic synoptic processes.

1a.

1b.   2.   3.   4.

1a. *Analysis of the actual meteorological situation*
1b. *Previous days' analysis*
2. *Analysis of the output of model data*
3. *Synoptic situation forecast*
4. *Weather forecast*

MODELS AND TECHNOLOGIES

A numerical model is at the core of every NWP product. It can be a model of the atmosphere that covers the entire globe and generates forecasts at any point. In this case, the best result is achieved by using statistical approaches and AI technologies to correct the output of the numerical models.

We use the regional atmospheric model WRF-ARW for the purpose of forecasting local weather features. Our specialists carefully select both, the optimal spatial resolution of the regional model and a set of physical parameterizations in order to make the computing resources cost-effective.

To improve the quality of the forecast based on a regional model, both approaches are applicable to global models, and more advanced techniques are used: methods of assimilation of observational data by the model itself and the use of an ensemble approach.

Ultimately, choosing a regional WRF-ARW mode as the core of the project offers more opportunities, since all stages of model tuning are under the control of our specialists.

Nowcasting is based on the usage of radar data and methods of the extrapolation of these data. The prediction of the movement of the precipitation zone and/or thunderstorm cells can be obtained with a high-detailed temporal and spatial resolution. It is especially important for airports and regions with unsteady weather.

We are confident that our experience in numerical modeling and the provision of forecasting services can be useful in various fields of activity and economy, and the results in the form of weather forecasts can prevent or reduce damage and increase economic efficiency, which is confirmed by our existing forecasting projects.

Weather forecast for the territory of Slovakia for the Internet portal www.aktuality.sk

Customer Support

MicroStep-MIS customer care goes beyond deploying a functional solution. Through a wide range of technical support and maintenance facilities, we can proactively support all customers with minimal effort on their part.

The Support Center is responsible for real-time monitoring of all customer systems deployed worldwide. To achieve the goal of detecting and fixing any potential issue immediately, a comprehensive monitoring system has been built. In addition, our support team receives a daily e-mail of all important issues from the logs and information about the current server status.

CENTRAL MONITORING

The map view serves as a global, but also a detailed overview of the current state of client systems. Once a problem occurs, the color of the system icon changes depending on the type of the issue. All details, including

project documentation, needed to solve a particular problem are immediately available.

We monitor every network service and every important resource of deployed servers. In order to track past issues, a status history for each operation and graphs of historical server resource values are being stored too (e.g. CPU, RAM, or disk usage).

No IT knowledge is required on the client's side to benefit from MicroStep-MIS monitoring services. We are able to publish relevant reports, open parts of our monitoring system to our customers or even build their own monitoring infrastructure.

LOCAL (ON-SITE) MONITORING

Our systems are deployed with extensible built-in tests, so any problem disrupting the normal operation of the

system can be immediately detected and resolved. Users can access BITE's comprehensive screens directly from a web browser, allowing them to have a clear overview of the current situation. External monitoring systems (such as OpenNMS, IBM Tivoli, HP OpenView, Icinga, Nagios, etc.) can be connected via the standard SNMP protocol.

In the case of a complex structure of the customer site, which consists of several systems, we deploy an additional layer of monitoring. In this way, we are able to monitor the current status of all systems from one point. There is also the possibility of connecting our system to the customer's existing monitoring solution.

By far the most popular and extensible solution is Icinga. - a modern open-source fork of the standard Nagios system monitoring solution. The key to Nagios' success is simplicity and extensibility. Virtually anything can be monitored as long as there is an option to "check" in a Linux or Windows environment.

SECURITY

With such extensive monitoring, several procedures had to be put in place to address security, confidentiality, scalability, stability, and performance.

In order to mitigate all possible threats, our monitoring is completely based on the modern Master-Satellite Agent architecture with the Icinga2 Agents daemon. It is deployed directly on the monitored server, which takes care of collecting information, running monitoring scripts, and their subsequent distribution to the Master Monitoring node via a secure encrypted connection. The agent is also able to monitor available hardware and other devices on the network. This, along with read-only SNMP access monitoring that cannot be used to remotely access a computer, spread unauthorized code (malware), or disrupt any of its functions, provides comprehensive monitoring capabilities for an excellent real-time monitoring system.
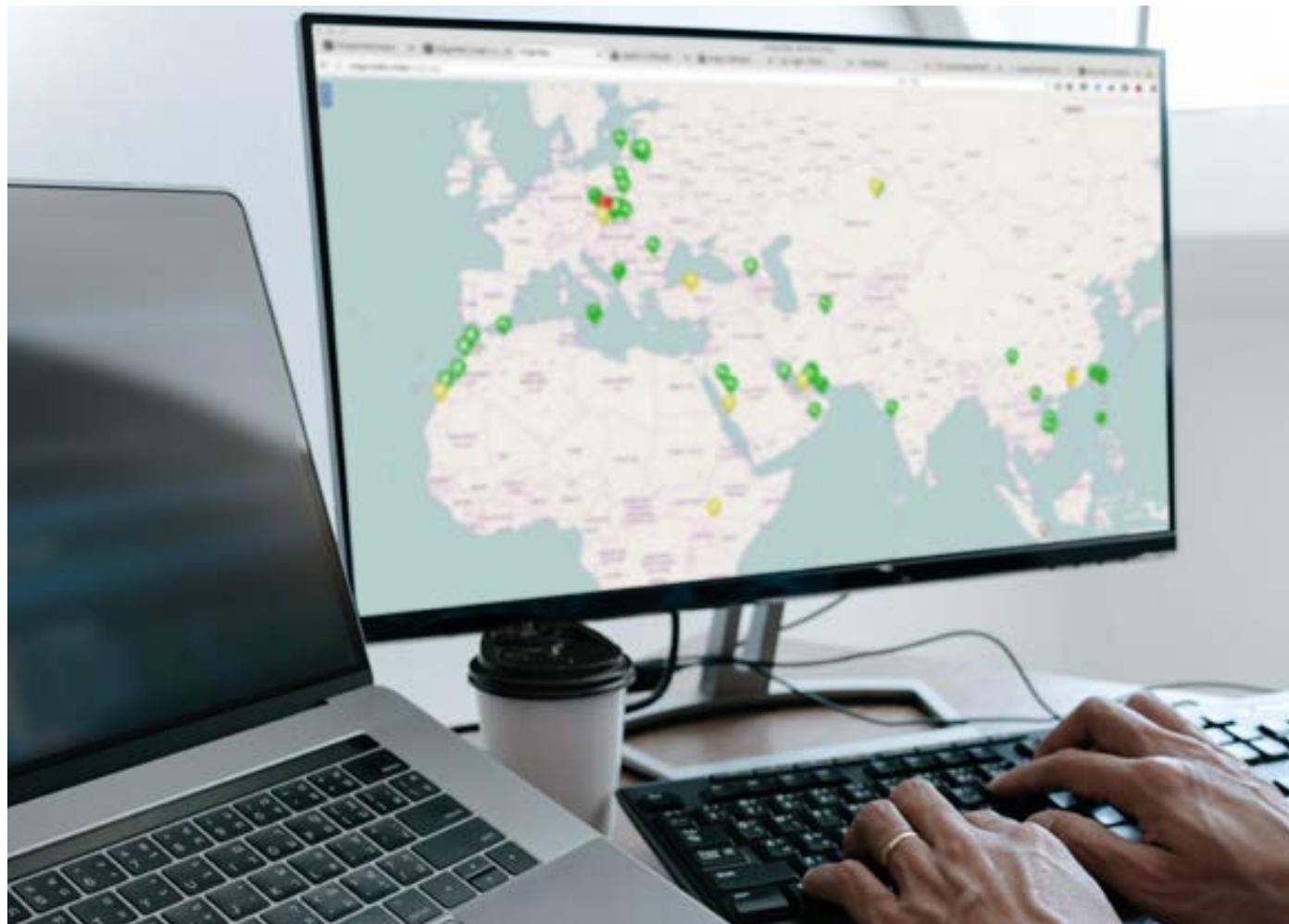
☑ **ISO 27001 INFORMATION SECURITY CERTIFICATION**

☑ **WIDE RANGE OF TECHNICAL SUPPORT AND MAINTENANCE OPTIONS**

☑ **SHORT RESPONSE TIME AND HIGH LEVEL OF SECURITY**

☑ **ICINGA CLASSIC WEB INTERFACE**

☑ **REAL-TIME MONITORING OVER VPN**

☑ **VARIOUS PLANS FOR CUSTOMERS SUCH AS 24/7 or 9/5**

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