MicroStep-MIS operates worldwide and it is specialised in development and manufacturing of monitoring and information systems, data acquisition and processing, research and numerical modeling.

The company’s key field activities cover:
• Meteorology and Climatology
• Aviation Systems
• Road Weather Information Systems
• Marine Systems
• Hydrology - Flood Warning systems
• Microclimate Cave Monitoring Systems
• Seismology
• Radiation Monitoring Systems
• Air Quality, Emission Monitoring
• Crisis Information Systems
• System Integration as well as Turnkey Projects

Our global operations include the following customer groups: airports, port authorities, meteorological and seismological institutes, hydrological institutes, environmental authorities, industry, and municipalities.

Activities of MicroStep-MIS cover the complete process of software and hardware systems development and integration. Our products and comprehensive services fully comply with the technical as well as quality standards (ISO 9001:2008, ICAO, WMO, EUROCAE), and are supplied under very competitive financial and trade conditions.

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.
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IMM4 AWOS
Automated Weather Observation System

- Integrates all airport weather data
- Scalable up to ICAO category CAT III
- Conforms to the ICAO and WMO regulations and recommendations
- Access to AWOS data from Net

The IMM4 Automated Weather Observation System is an airport weather observation system for regional, national and international airports.

The IMM4 AWOS measures, processes, stores, presents and communicates all meteorological data at the airport, including measurements produced by variety of meteorological sensors, manual observations and WMO codes received from GTS and AFTN. It provides weather data and reports to observers, air traffic controllers, pilots and other users. It generates real-time screens, graphs, WMO codes, alarms and voice reports. Moreover, it interfaces upper air systems, low level windshear alert system and radars.

The IMM4 AWOS conforms to all ICAO and WMO recommendations regarding the measurements and reporting. It calculates various derived meteorological data such as QNH, QFE and Runway Visual Range. It generates alarms, METAR, SPECI, SYNOP reports, as well as national codes if required.

Scalable and flexible
The configuration and structure of a respective Airport Weather System depends on the size and category of the individual airport up to ICAO category CAT III. The modular architecture allows the expansion from single Aviation Weather Display with basic set of sensors up to comprehensive systems for multirunway airport connected to GTS and AFTN networks including a dual hot fail-over Central System, several Observer’s Workstations, displays and terminals, briefings and ATIS / VOLMET services. The well-developed upgrade programs allow our systems to follow technology progress and adapt to airport expansion and changes in regulations during its lifetime.

Aviation Web Server
Within the same airport, or on another continent, IMM4 AWOS provides users with the powerful and efficient web interface. All the user needs in order to view the AWOS data is a standard web browser and Internet connection.

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IMS4 MetReporter

- Available 24 hours / 365 days a year
- Low power consumption
- Easy to deploy, use & maintain
- Compliance with the ICAO and WMO regulations and standards

Built on the modular and field proven IMS4 AWOS platform, IMS4 MetReporter is an ideal autonomous, easy-to-deploy and easy-to-maintain, fully automated weather observation system (AWOS), for the general aviation, non-ICAO categorized airports and heliports.

**The system consist of:**
- Embedded VHF Automated Terminal Information Service
- Embedded Automated Weather Observation Service:
  - Standard:
    - Wind speed, direction (gust, squall)
    - Temperature / dew point
    - Atmospheric pressure (QNH, QFE, tendency)
    - Visibility (MOR / VIS) / present weather
  - Optional:
    - Cloud base / vertical visibility / sky condition
    - Static view or 360° view camera
- METAR / SPECI (AUTO)
- MET REPORT / SPECIAL (AUTO)
- Remote telemetry and control from local workstation over WiFi or GPRS VPN
- Optional computer based IMS4 Aviation Weather Display or full featured IMS4 Observer Workstation
- Optional data reporting to the upper system for flight planning (i.e. via cloud computing provider)
- Meets or exceeds applicable ICAO, WMO, EASA, CAAC regulations and recommendations

**Sensors - typical configuration**
- Ultrasonic 2D
- First Class Wind Sensors
- RHT175 Humidity Probe
- MSB780 Digital Barometer
- VPF-700 Series Visibility and Present Weather Sensors
- Cloud Ceilometer CBME 80 (optional)
- Cameras (optional)
**IMS4 ATIS / VOLMET**

- Arrival, Departure or Combined ATIS and VOLMET broadcast and datalink services
- From regional up to major international airports
- Easy expansion from single up to the multi-channel ATIS / VOLMET system
- Open architecture and easy adaptation

The IMS4 ATIS / VOLMET system benefits from more than twenty years of MicroStep-MIS experience in the field of meteorological service for civil aviation. It provides Arrival, Departure or Combined ATIS and VOLMET broadcast and datalink services for airports from regional up to major international airports as well.

The IMS4 ATIS / VOLMET system can be installed as a standalone system or as an integrated part of the MicroStep-MIS IMS4 Automated Weather Observation System (AWOS) with permanent access to AWOS data.

The open architecture allows easy expansion from the basic single channel system (combined departure and arrival ATIS service) up to the multi-channel ATIS / VOLMET system (separate broadcasting channels for airport with multiple runways, multichannel service for group of airports etc.).

Software configuration allows easy adaptation to specific airport conditions, national rules, and voice report composition rules.

Variety of system options include but are not limited to:
- multiple channels and/or multiple languages
- dual hot-failover configuration and/or redundant transmitter equipment as a guaranty of the highest possible system reliability
- remote operator and control positions for convenient authorized access to the system
- telephone interface for the preview of current broadcasted reports

The IMS4 ATIS / VOLMET user interface is intuitive and easily operated. The fully automated mode allows cost effective operation without human intervention. The semi automated or manual mode can be also configured for specific channels, if required, with visual and audible warnings announcing new data availability and new report compilation.
IMS4 Briefing supplies meteorological information to aviation users in order to ensure the safety and regularity of air navigation.

IMS4 Briefing workstation, either standalone or fully integrated within IMS AWOS, facilitates collecting and printing of flight documentation for pilots based on the local meteorological data and messages received from the GTS or AFTN networks. The IMS Briefing integrates automatic handling of data validation.

Users can easily collect and print all necessary flight documentation containing weather conditions locally, at the destination, and along the flight route. A single definition of the flight-route into the system is sufficient for the IMS Briefing to master this task in a few seconds time.

Flight-route definition can be performed by the selection of a station list on the basis of ICAO indicators or station names. The stations included in the flight route provide the basis for the generation of the PIB (pre-flight information bulletin).

Besides standard PIB information such as OPMET data, SIGWX, and Upper wind-temperature charts, the PIB can contain a cross-section of the temperature and wind conditions along the flight route that also perfectly describe the takeoff and landing conditions.

The system warns users about all received meteorological or operational conditions like volcanic ash or tropical cyclone advisories, SIGMETs, AIRMETs, as well as many other warnings and administrative messages.

IMS4 Briefing and Forecasting Workstation

The software aids meteorological forecaster by visualizing meteorological information and providing templates for standard and local forecasts.

Visualization of meteorological information for forecaster:
- OPMET
- SADIS
- GRIB
- BUFR
- Soundings
- Radar
- Satellite
- Lightning
- VAAC and TCAC information
- other

Templates for creation of forecasts and warnings:
- AIREP
- AIRMET
- GAMET
- Aerodrome Warning
- SIGMET
- TAF
- TREND
- Wind Shear Warning
- other (e.g. warnings according to regional agreements)

Messages are checked for errors before compilation. GTS / AFTN headers and other automatically available information is filled in by the system.

Besides Radar
Satellite
Lightning
VAAC and TCAC information
other

TREND
Wind Shear Warning
other (e.g. warnings according to regional agreements)
IMS4 RVR
Runway Visual Range System

- Forward scatter technology
- ICAO compliance with CAT I, II and CAT III
- Real time data processing / visibility forecasts
- Multiple sensor interfaces (modem, fiber optic, wireless)
- Standalone system or integrated within AWOS / AWDSS
- RVR data on the Net

The IMS4 Runway Visual Range system performs the automated runway visual range assessment and reporting for the airports.

Field sensors
The typical set of IMS4 RVR field measurement system consists of forward scatters, background luminance sensors as well as interfaces to runway lights systems. Multiple types of sensors and communication interfaces are supported. The data processing software enables any standard or non standard combination of sensor positions along the runways, hot backup of the sensor values and manual data entry. For each sensor type, the evaluation and visualization of the sensor status as well as remote maintenance is provided.

IMS RVR Server
Whether a standard COTS Intel based server or a dual hot failover Cluster, the IMS RVR server collects the visibility, background luminance and runway lights intensity data from the field measurement system, calculates the RVR, distributes the data to displays as well as 3rd party systems. It also provides operators with alerts related to the significant thresholds of the visibility and/or RVR. In case of the integration of the RVR system into AWOS, the RVR values are displayed on the local as well as remote AWOS screens, are imported into METAR/SPECI and local routine or special reports, may trigger AUTOSPECI or serve as a basis of the airport operation category assessment.

Controller Displays
Customizable displays report touchdown, midpoint and rollout RVR and/or MOR current values or trends, in accordance both with the ICAO regulations as well as respective ATC authority requirements. The built-in aviation web server provides the local airport controllers as well as remote users with the powerful and efficient web interface.
IMS4 ARWIS
Airport Runway Weather Information System

- Detection and prediction of runway conditions
- Alarms on hazardous phenomena detected or forecast
- Effective de-icing
- Intrusive as well as non-intrusive sensors
- Multiple sensor interfaces (modem, fiber optic, wireless)
- Standalone system or integrated within AWOS /AWDSS
- Runway condition data on the Net

IMS4 ARWIS provides the airport authorities with the essential runway surface condition data. Using real-time collected measurements from the field sensors, as well as forecasts from the integrated model, the system detects and predicts the runway conditions: ice (black ice), freezing rain, accumulation of snow and thaw.

The measurements and forecasts-based early warnings contribute to air traffic safety and help in planning the runway maintenance activities.

The system can be installed as standalone with options of upgrades during the system lifetime or can be fully integrated within the IMS4 Automated Weather Observation System.
Answering customers’ needs, MicroStep-MIS presents top-quality Low Level Windshear Alert System. The system is state of the art technology, mightily decreasing the riskiness of crucial flight phases, namely, takeoff and landing procedures.

The low level windshears with a gain or a loss & microbursts have become a highly considered threat for CAT III International Airport Hubs as well as non-CAT local airfields. All of these factors are targeted by the automatic, durable & reliable MicroStep-MIS LLWAS system.

Field measurement system
IMS4 LLWAS contains multiple – at least 6 wind stations - installed near the airport. As the windshear phenomenon requires unique measurement techniques across different airports, selection of proper sites and optimization of the algorithm are a crucial issue for the site surveying teams. Therefore, MicroStep-MIS avails its most experienced teams to provide turn-key solution proposals built specially to fit customers’ needs and expectations.

IMS4 LLWAS Server
Standard COTS server or a dual hot failover cluster, the IMS4 LLWAS server collects measurements, performs the validations and recalculations, runs the algorithm to detect the windshear, generates the alerts and distributes data and alerts to displays and 3rd party systems. Additionally, a more complex integration of LLWAS with IMS4 AWOS system is available bringing even more comprehensive, relevant, and highly useful data to the airport team allowing them to significantly decrease the risk of a sudden disaster.

LLWAS Displays
The displays of LLWAS are modified to provide optimal ergonomic view of all relevant alerts and data and to provide all necessary functionality in the most convenient way.

Site survey
We provide site survey and design of the LLWAS system with respect to the:

- UCAR Phase III LLWAS methodology
- Local regulations
IMS4 Fog Prediction

Fog Monitoring

Measuring stations are of great importance: firstly, they provide real-time data for operative modeling, secondly, they are used in machine learning of data mining models, and finally, they provide instant data for decision-making. In addition to airport meteorological station, there can be one or more local stations, which cover the area around airport and can serve for other purposes also (e.g. road service). The measured parameters are:

- Temperature at a height of 2 m
- Humidity at a height of 2 m
- Wind at a height of 4 m
- Pressure
- Horizontal visibility at a height of 2.5 m (forward scatter)
- Camera
- Additional soil moisture in 3 depths of 5, 10 and 20 cm
- Soil temperature in 3 depths of 5, 10 and 20 cm

All the data are available frequently, every 2 minutes, except of the data from camera. Images from the camera provide additional visual information for users of sensor data. It is proven useful for the verification of visibility conditions.

Fog Forecasting

The IMS4 Model Suite is a composition of the modern models and technologies which run in both operative and research modes.

The fog prediction is the product of the IMS4 Model Suite models and tools:

- **3D regional weather prediction model (NWP: LAM)** produces high resolution weather data (~1 km)
- **1D fog prediction model** calculates the fog forecast based on high resolution weather data (nowcasting and short term forecasting)
- **Data mining models** option adaptively improves results by “learning” from previous situations (advanced statistical post processing)

Satellite images are helpful for our manned fog nowcasting service.
Weather Prediction

The IMS Model Suite is a composition of modern models and technologies developed by MicroStep-MIS and other reputable vendors, tuned to run together flawlessly in both operative and research modes. IMS Model Suite is an integrated, easy to use, yet powerful, system of modeling that runs on high performance hardware. The suite includes both processing and visualization tools.

Models

• Regional weather prediction model
• Fog prediction model (nowcasting and short term forecasting)
• Lagrangian trajectory model
• Dust dispersion module
• Radioactivity dispersion module
• Nuclear Accident Consequence Assessment Module
• Volcanic ash and gases dispersion module
• Statistical and neural networks models (data mining)

• Wave model
• Road and runway condition model
• Nowcasting model
• Operative and research verification module

Services

• Installation of full system at customer premises
• Running at MicroStep-MIS, with output delivery to customer
• Consultancy and studies (climate downscaling)
• Training

Highlights

We offer complete customer services, including long-term verification and customization of the model for local conditions, on-line support and training. Our system is already used within complex warning systems.
Aero CLDB
Aeronautical Climatological Database

- Based on cutting edge technologies
- Scalability up to thousands of stations and variables
- Component-based software design
- Extensible to dual architecture with replicated server or cluster
- Compatible with MS Office, Windows, Linux
- Using ODBC interface
- CLDB fulfills WMO outlined criteria for new climatological RDBMS (new generation of Relational Database Management Systems)

Aerodrome climatological summaries:
- For planning of aerodrome operations
- Indicate probability of occurrence of low visibility, low cloud base etc. throughout the year and for a specific hours of a day

Basic ICAO/WMO prescribed forms:
- Frequencies of the occurrence of RVR/visibility and/or height of lowest cloud base of BKN or OVC extent below specified values at specified times
- Frequencies of visibility below specified values at specified times
- Frequencies of the height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times
- Frequencies of occurrence of concurrent wind direction (in 30 degrees sectors) and speed within specified ranges
- Frequencies of surface temperature (screen) in specified ranges of 5 degrees Celsius at specified times

Applications
- Select
- Reports
- Manual Data Entry
- Thermodynamical diagram
  - Wind Rose
  - DB Manager
  - Web Interface
  - Image Viewer
  - Import of historical data

Aerodrome Climatological Summary

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<th>Temperature</th>
<th>Frequency (in %)</th>
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<td>95 to 100</td>
<td>250</td>
</tr>
</tbody>
</table>

Mean temperature: 23°C

Wind Rose
- Al Dhafra
- January 2012

Data Source: GTI SYNOP data
MMR Mini Meteorological Radar

- Unique and portable
- Large amount of functionality integrated in a small device
- Real time insight to weather situation
- Up to 200 km range

MMR answers the increasing demand for water management tools and hazardous meteorological phenomena detection.

Watersheds management, global warming adaptation strategies, flood protection, operative weather forecast, military and civil defense actions or aviation safety are supported by this radar. Moreover, tourism, media, transport and agriculture also benefit from MMR product.
IMS4 AWDSS
Aviation Weather Decision Support System

- Detection, nowcast and forecast of phenomena affecting the airport operation
- Data integration from multiple sources
- Detection and nowcasting algorithms and forecasting models:
  - Thunderstorm
  - Low level windshear and microburst
  - Gust fronts
  - Turbulence
  - Fog
  - NWP models

In order to provide the air traffic controllers and meteorologists with accurate operational information, IMS4 AWDSS processes the real-time data from various sources: local AWOS, ARWIS and LLWAS systems, weather radars, surface observations from the WMO / ICAO exchange networks, meteorological satellites, profiles and others.

Having employed the state-of-the-art algorithms and models, the system evaluates the general situation, airport specific and runway oriented alerts, using the color status signalization to visualize the hazards, if any.

The combined information will enable various users at the airport to have access to all relevant information needed for tactical decision support during the flight phases:
- Take off
- Departure
- Metering/descent
- Final approach
- Landing

IMS4 AWDSS IT Infrastructure

Depending on the system configuration, the IMS4 AWDSS could run on several Linux duplicated servers dedicated to data acquisition and communication, servers running the models and algorithms and web/presentation, or installed in a private cloud environment.