Crisis Information System

FEATURES:

- Real-time Monitoring
- Intelligent Decision-making System
- Highly Customizable Solution
- Proven Technology, Exceptional Reliability
- Secure & Web-enabled

The MicroStep-MIS Crisis Information System is a complex crisis management and decision support system for the radiological, environmental, hydrological, as well as seismological emergence.

The system is a result of the MicroStep-MIS long time experience in the field of the monitoring and information systems.

The Crisis system interfaces the real-time data including:

- **Meteorological data**
- **Seismological data**
- **Hydrological data**
- **Radiation data**
- **Marine data**
- **Air quality monitoring subsystems**

Thus enabling the online data collection and processing.

MicroStep-MIS Crisis Information System incorporates the dispersion models for modeling of short time or continuous release and dispersion of pollutant (radioactive or non-radioactive), short or long range atmospheric transport and diffusion under changing weather conditions, wet and dry deposition and radioactive decay, as well as seismological data analysis module.

The Crisis system can be used for simulation of the fictive emergency scenarios, at the moment of the accident or during the long-term actions implemented months or years after an accident.
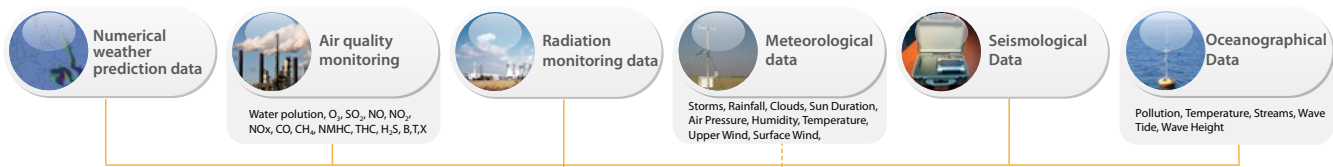
The main users of the system are usually the authorities responsible for the crisis management at local, regional, or national levels. The optional subsystems include but are not restricted to call center with digital recording systems, GIS and warning and notification systems.

The models and data bases comply with the international standards in the respective areas, however can be customized to meet the geographical, climatic, and environmental, as well as organizational specifics of the customer.
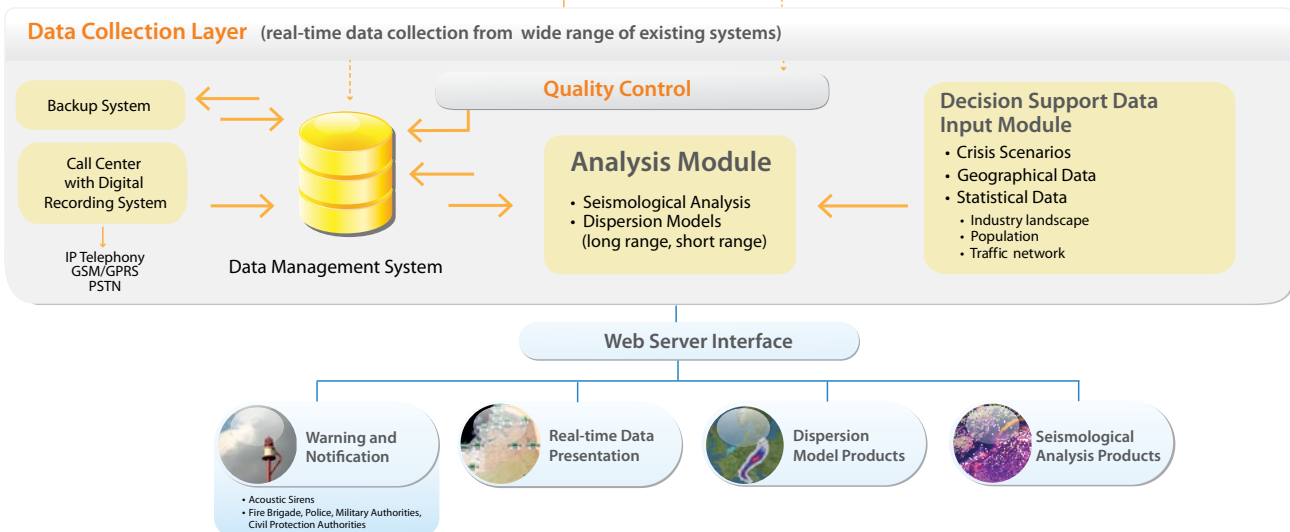
Crisis Information System
Design of the System

Field Monitoring Systems

Numerical weather prediction data

Air quality monitoring
Water polution, O_3, SO_2, NO, NO_2, NOx, CO, CH_4, NMHC, THC, H_2S, B,T,X

Radiation monitoring data

Meteorological data
Storms, Rainfall, Clouds, Sun Duration, Air Pressure, Humidity, Temperature, Upper Wind, Surface Wind,

Seismological Data

Oceanographical Data
Pollution, Temperature, Streams, Wave Tide, Wave Height

Crisis Information Systems

Data Collection Layer (real-time data collection from wide range of existing systems)

Backup System

Call Center with Digital Recording System

IP Telephony GSM/GPRS PSTN

Data Management System

Quality Control

Analysis Module
- Seismological Analysis
- Dispersion Models (long range, short range)

Decision Support Data Input Module
- Crisis Scenarios
- Geographical Data
- Statistical Data
  - Industry landscape
  - Population
  - Traffic network

Web Server Interface

Warning and Notification
- Acoustic Sirens
- Fire Brigade, Police, Military Authorities, Civil Protection Authorities

Real-time Data Presentation

Dispersion Model Products

Seismological Analysis Products

MicroStep-MIS Crisis Information System incorporates the following modules:

Data Collection Layer

Data Collection Layer interfaces the real-time meteorological, seismological, radiation, marine, and air quality monitoring subsystems, as well as numeric weather prediction models. Multiple protocols, communication lines, and physical devices are supported. The layer includes the quality control and data verification.

Data Management System

Data Management System integrates and manages the data from (not limited to):

- Meteorological Measurement (surface, upper air, marine)
- Radiation Monitoring (surface, upper air)
- Environment Monitoring (ambient air as well as continuous emissions monitoring)
- Seismic Data
- Hydrology

Decision Support Data Input Module

The decision support brings the crisis scenarios definitions (e.g. pollutant source term inputs), as well as the geographical and statistical data necessary for the decision support (geographical data, population / civil engineering statistics, traffic network).

Analysis Module

The analysis module incorporates the data analysis and prediction tools for the respective areas:

- IMS Model Suite dispersion models (short range, long range, street canyon) for:
- modeling of radioactive/non-radioactive pollutant dispersion
- calculation of the dose rates, the effective and equivalent doses (external exposure from the radioactive airborne plume, inhalation from the plume and resuspended radioactivity, and external exposure from deposits from the plume) using ICRP* recommendations and/or the national methodology
- concentration and/or dose rate time dependence outputs in tables & graphs for selected localities and map-form outputs
- evaluation and displaying of the affected zones,

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- evaluation of the effectiveness of the protective measures and efficient data displaying in an emergency response facility
- calculation of the risk of early health effects to humans resulting from the exposure with respect to the human physiological parameters, as well as to the inhalation and external dose coefficients applied by the national methodology. Simulation of the protective measures (sheltering, iodine).
- SEMS Seismological Data Analysis and Processing module for evaluation of the earthquake consequences (assessment of the earthquake magnitude, assessment of the damages)
- IMS HydroMIS hydrological information module for automatic water discharge computation (both direct and indirect methods are used), flood risk assessment
- Countermeasure evaluation subsystem evaluating the countermeasure options.

* ICRP - International Commission on Radiological Protection
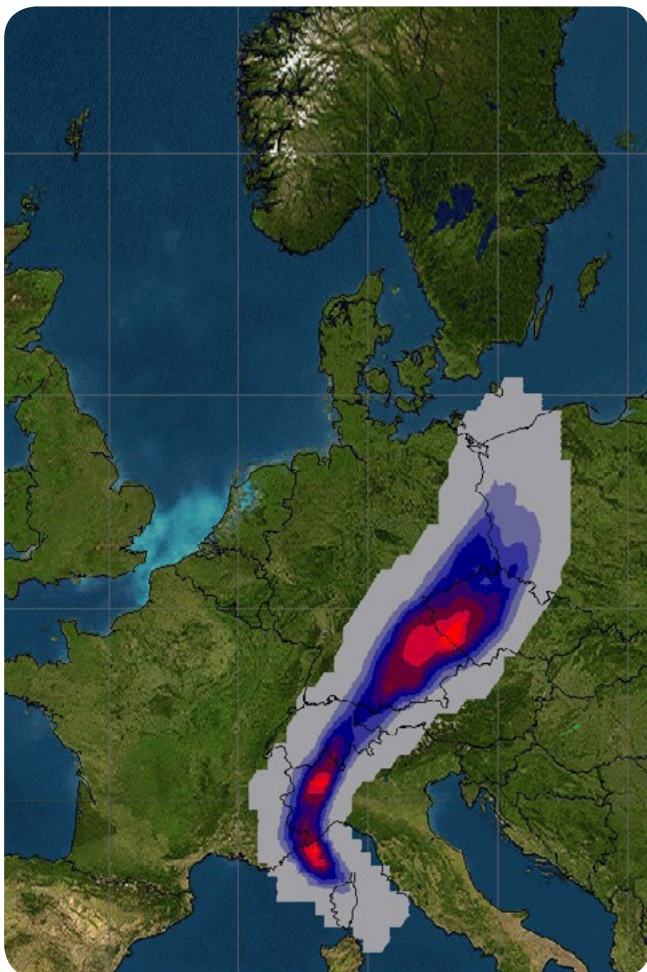
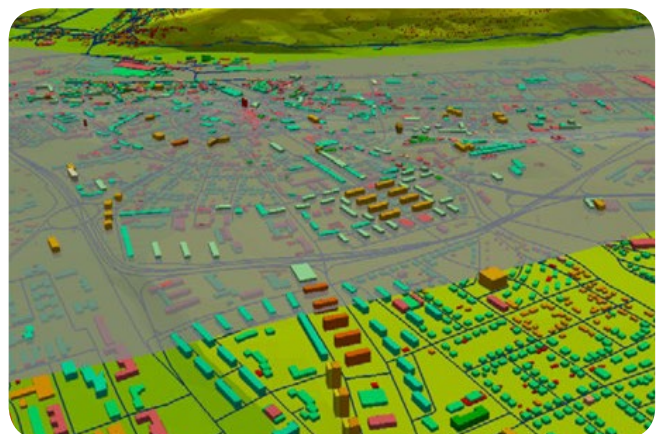## Geographical Information System Module

The optional GIS module is based on the leading ESRI ArcGIS products. The subsystem incorporates both vector and raster data (traffic network, street systems, city ortophoto maps, digital terrain data) and is open for additional data, layers (hospitals, schools, frontier crossings) and software extensions. The GIS module is integrated with the data management system, which allows to process and display measured as well as modeled data. The basic functionality assists call center operator to locate the caller/event and to identify the local authority or equipment necessary to solve the situation.

The 2D and 3D visualization tools that enrich the analysis modules provide the following services:
- spatial and 2D analysis of the over flooded areas in case of hydrological emergency (e.g. dam destroy)
- spatial analysis of gas targeted territory (gas progress visualization)
- spatial analysis of visible areas from the observation points
- analysis of road network and build-up areas after an earthquake
- finding and evaluation of routes for rescue vehicles, evacuation routes
- monitoring of position and movement of various object (e.g. rescue vehicles)
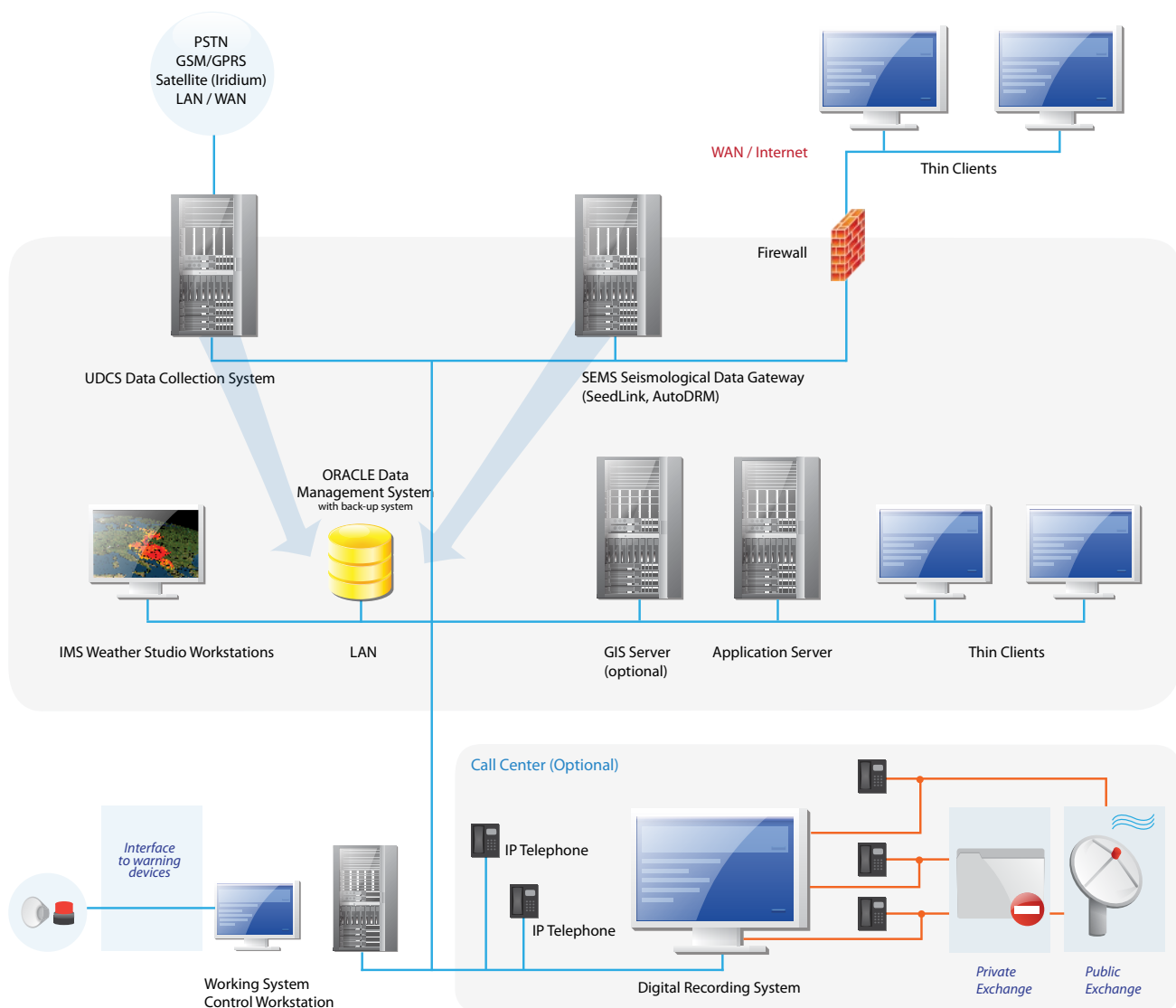
Output layer

The system provides outputs ranging from the direct presentation of the measured online data and meteorological forecasts, through the analysis of the current radiological / seismological data and prediction of the situation based upon information on the source term, monitoring data, meteorological / seismological, data and models up to the notifications and warnings distributed to the authorized personnel.

Crisis Information System

Infrastucture Deployment

PSTN
GSM/GPRS
Satellite (Iridium)
LAN / WAN

WAN / Internet

Thin Clients

Firewall

UDCS Data Collection System

SEMS Seismological Data Gateway
(SeedLink, AutoDRM)

ORACLE Data
Management System
with back-up system

IMS Weather Studio Workstations

LAN

GIS Server
(optional)

Application Server

Thin Clients

Call Center (Optional)

IP Telephone

IP Telephone

Interface
to warning
devices

Working System
Control Workstation

Digital Recording System

Private
Exchange

Public
Exchange

User interface

The fully web-based user interface brings a comfortable access to the system from any web-enabled workstation anywhere over the world.

The system allows definition of multiple user categories with the different user rights and responsibilities, from administrators with full access to the modules, scenario definitions and functionality, up to the passive users accessing the products through web browsers or receiving the notifications.

Technology

The MicroStep-MIS Crisis Information System is based on the modern leading edge technologies:

- Wide scalability in server hardware and operating systems support (Windows Server 2003/2008/2012, Linux servers)
- Industry proven Oracle Database
- ArcGIS Geographical Information Server
- Web applications based on DHTML, XML, Java /Java Server Pages
- compatible with J2EE standards

Contact us for more information

Cavojskeho 1, 841 04 Bratislava, Slovakia
tel.: +421 2 602 00 100 fax: +421 2 602 00 180
www.microstep-mis.com, info@microstep-mis.com

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Monitoring and Information Systems