As man is now changing the composition of the atmosphere at a rate which must be very exceptional on the geological time scale, it is natural to seek for the probable effects of such a change. (The composition of the atmosphere through the ages, Meteorological Magazine, 1939)

Guy Stewart Callendar | British steam engineer and meteorologist
A comprehensive software package for air quality monitoring

AquisNet (Air Quality Information System and Network) is a time series management system. AquisNet allows an efficient management of large volumes of data. The software provides a comprehensive set of proven, and efficient functions for data evaluation right down to the final reporting stage. The highly innovative, modular, multi-tier AquisNet technology allows adjustments in response to the ever-changing market requirements at any time.

Scrutinising time series data

Guy Stewart Callendar, a renowned British steam engineer and meteorologist, studied the relationship between tropospheric CO₂ concentration and temperature. Disciplined and perseverant, Callendar scanned through CO₂ records reaching back to the late 19th century, rejected foul data using his quality assurance method, produced comparable aggregated CO₂ data, and correlated them with temperature time series and statistical information on fossil fuel consumption. In 1938, after thought-ful study and calculation, he published his thesis of a significant temperature increase linked to fossil fuel consumption at industrial scales. Today, this effect is known as the Callendar or Greenhouse Effect.

Intelligent - flexible - future-proof.
Air Quality Monitoring needs AquisNet.

Air quality is determined by a complex combination of factors: emission sources release harmful substances into the air. They are transported by the wind, condensed in temperature inversions, and undergo (photo-) chemical processes on their way to the receiver. Elaborate monitoring systems are implemented to determine concentrations and meteorological conditions at both the emitter and the receiver sites. The resulting data is validated extensive quality assurance processes, is then aggregated, condensed into indicators and parameters, and finally output in graph or table format. The individual work steps are governed by legal requirements, standards and guidelines, and require utmost concentration.

This is where AquisNet comes to the fore, offering industry and government experts a high performance work environment based on state-of-the-art software architectures and +15 years of field experience. AquisNet combines all functions from data acquisition to their transmission to the data center, their validation, aggregation, evaluation and finally their reporting and publication.
AquisNet Overview

AquisNet (Air Quality Information System and Network) is a software product family consisting of several individual products. Each product assures a well-defined set of functions in either the data acquisition system or in the data center where both telemetry units and database applications are deployed. Each of the individual products from the AquisNet product family can be run separately. A complete AquisNet installation offers all functions for data acquisition, storage, management, numerical and graphic analysis, and reporting.

The central function of AquisNet lies in the management of time series in scalable relational database management systems. KISTERS’ time series technology has been successfully implemented by 500 customers worldwide. Even when data records grow very large and evaluations are increasingly complex you will keep everything under control with AquisNet, and all data and results are easily and clearly visualised.

AquisNet is a modular software package. The various software modules

- can be flexibly configured by the user,
- scaled to match data volumes (number of monitoring stations, archiving period),
- adapted to conform with application-specific internal or statutory requirements,
- and are easily maintained, as maintenance work on individual modules will not affect the overall system operation.
AquisNet Functions

General functions
Station management & data management
- flexible metadata: user-defined combination of attributes
- station data and station groups
- original time series and production time series
- measurement and calibration data
- aggregation templates

Automation
- time-table controlled polling of measurement stations
- automatic execution of aggregations
- automatic execution of user defined reports

Calculation
- arbitrarily cascadelable aggregations (min/max, sum, percentile, mean value, exceedance frequencies, ...)
- plausibility checks (relative/absolute standard deviation, 2-way plausibility check, ...)
- correction (interpolation)
- free and predefined evaluations

Time series management
- graph and table time series editor
- interactive processing of one or several time series
- time series browser and history

Reports
- predefined and user-defined reports
- basic data reports
- measuring data reports
- report storage
- report scheduler
- report formats: HTML, PDF, CSV, XLS

Display
- configurable numeric tables and line graphs, polar graphs, bar graphs
- time series, aggregations, etc.
- wind and pollutant concentration roses
- advanced ‘openair project’ graphics types

Data import, export and forwarding
- import from a range of sources (stations, laboratories, other measuring networks, interval measurements)
- export of time series and basic data
- report forwarding by ftp, email, fax, sms or printer
- web publishing

Data acquisition
- highly configurable individual input channel drivers
- support for intelligent serial analysers and scanning of analogue inputs
- individualised scan rates
- individualised integration cycles

Local data handling
- data validation and plausibility tests
- functional tests of intelligent sensors
- control of calibration cycles (including appropriate data flagging)
- configurable ring buffer for continuous loss-free storage of input signals
- data storage autonomy depends on available disk memory only
- versatile and comprehensive data flagging

Interactive station software
- set up and configuration
- several tabular and graphical views of locally stored data
- web application

Special functions for the data acquisition system AquisNet DAS

Alarm function
- analyser/sensor malfunction
- intrusion into shelter
- peripheral malfunction (air conditioning, suction, etc.)
- calibration or function check failure
- alarm messages forwarded by ftp, email, fax, sms
Its multi-tier architecture, modularity, and customising options (i.e. customer-specific configurations and scripting) make AquisNet a universally deployable software application for all areas of emission monitoring, ambient air quality monitoring and meteorology. Typical applications are:

**Regulatory ambient air quality monitoring networks**
AquisNet provides the full functionality to make regulatory monitoring networks compliant with legal requirements and technical standard. AquisNet does it all starting with the (optional) data acquisition in the monitoring station up to the standardised data exchange with national or international bodies at the end of the processes in the data center. The AquisNet Data Center provides all the functionality needed to meet the particularly high requirements on data validation. Mathematical functions enable the user to do the typical statistical analysis and to calculate more intricate indices such as AOT-40 or air quality indicators.

**Industry – emission monitoring & air quality monitoring**
AquisNet is a generic software solution to collect and manage typically continuously measured data identified by a time and location stamp. The software is optimised towards air quality applications. It’s comprehensive set of functions qualifies it for use in both emission and ambient air quality monitoring. The differences in data-acquisition cycles and data processing algorithms can be easily managed with AquisNet. The return on the investment in software and training is reached faster as both emission and air quality can be assessed either individually or coupled using a single software package.

**Meteorological monitoring networks**
AquisNet provides all the functionality needed to manage and assess time series data. The multi-tier data-base application is the perfect choice for long-time data archiving. High resolution data aggregated into indicators and statistical values will reveal long-term trends in the data. AquisNet has been designed with data aggregation, processing and analysis in mind. AquisNet calculates statistical parameters (mean, max/min, percentiles, etc.), determines deviations, and centrally manages huge amounts of data from spatially distributed measurement networks.

**Research and education**
AquisNet is a powerful multi-user application that will ease the process of managing the data produced over the years either in numerous individual projects or collected in measurement stations run by the institute. Both research and training activities can be operated simultaneously without interference. User rights and roles can be assigned to individual users or to user groups. The centralisation of all data in a single database simplifies the process of finding and using the data. It is possible to exchange data with third-party applications or with programs developed by the institute itself.
The AquisNet Team - dedicated to the customer and to continuity

AquisNet is more than just a mature and capable software solution; it is contemporary, state-of-the-art software constantly evolving by means of a continuous development effort. Actually, the broad range of functions is frequently adapted to keep suit with both changing regulatory requirements and practically orientated demands from the customer base.

Your advantages are manifold as the larger customer base bears part of the continuous improvements of the portfolio as a whole, thereby increasing market relevance, future performance and quality.

KISTERS’ in-house developers and experts from the AquisNet Team carry out the continuous development of AquisNet. The team features members with academic training and practical experience in IT, software development (database, application and web) and environmental sciences. Continued care is brought to you by the AquisNet Team from pre-sales contacts to ongoing after-sales maintenance and development. For more than 15 years, customers from both public institutions and private companies actively using AquisNet cherish this unique consistency in dealing with KISTERS AG.

The long-standing and continued existence and development of AquisNet has helped to build solid software that has proven its worth many times over. The AquisNet team would be pleased to help you choose the optimal software solution for your requirements. The KISTERS portfolio ranges from consultation and planning, to full operation and maintenance of air quality monitoring networks including end-user support and training.
AquisNet - Architecture & Modules

AquisNet multi-tier architecture
Architecture combines form and function, aesthetics and functionality. The same applies for AquisNet. Its multi-tier architecture isolates functional units and facilitates operation, maintenance, and future extension.

Modularity increases the flexibility, stability, and future viability of AquisNet even further. Depending on system size and required functionality, modules can be added or omitted - and the system even allows the development of new modules to add extensions at a later time without affecting the existing system. That will allow us to deliver customised system solutions to suit your particular needs. The result: you will be able to complete your tasks quickly and reliably.

AquisNet is rigorously built on a 4-tier architecture. The concept isolates data storage from the application, and thus ensures scalability and optimised performance – for example by means of using separate database and application servers.

The system relies on an application layer that provides all data access, calculation, evaluation, and reporting functions centrally for all users - which in turn ensures that different users will always be guaranteed the same results when editing the same data with the same functions. On the top layer, the user operates AquisNet via user interfaces, which can - depending on customer preference - be implemented as locally installed rich clients or as browser applications hosted on a central web server. Browser apps allow access via intranet and even the internet - respecting security policies and user authorisation schemes.

AquisNet packages and add-on modules

AquisNet Data Center
The data center centralises all data from the monitoring network. New data and legacy data form an ever increasing data pool. Data analyses and reports are generated manually or automatically for user-defined time periods by way of aggregations and statistical evaluations, which then form the basis for an assessment of the actual air quality. Evaluations are visualised numerically or graphically.

The basic package includes alarm functions and messaging services. The system supports standardised data formats for data forwarding.


AquisNet DAS
Data acquisition software for the station computer, incl. all specific special functions (e.g. functional tests and calibration cycles) of a data acquisition system designed for air quality monitoring applications.

Modular Package: ■ Standard modules: Data acquisition, intelligent analyser control, data plausibility checks, aggregation, data storage and management, alarm functions, data forwarding, user interface (browser application).
■ Optional expansions: Computers, data capture hardware, etc. A detailed description of the scope of service is provided in the brochure: Order your copy today!

AquisNet SODA
A telemetric unit consisting of hardware and software for data requests from the individual stations within the monitoring network via a multitude of communication channels (telephone modem, TCP/IP, GPRS, G3, satellite, etc.) in push and pull mode.

Modular Package:
■ Integrated system of perfectly coordinated hardware and software components.
■ Options: SODA Compact for smaller networks and SODA Modular for large networks; optional implementation of several SODA units to ensure redundancy or load distribution within one data center.

A detailed description of the scope of service is provided in the brochure: AquisNet SODA. Order your copy today!

System and software requirements
AquisNet Data Data Center: all server modules can be run on Windows 2008 or Linux. DMO is a rich client for Windows XP, Windows 7 and Windows 2008 Server. Browser applications require the installation of a current web browser. Relational database management system ORACLE or MS SQL
AquisNet DAS: Windows XP and Windows 7
Why AquisNet?

Monitoring air quality either in ambient air or right at the emitting source is a challenging task that produces huge amounts of data to be delivered in time and in compliance with severe quality standards. Developing reliable, powerful yet convenient software for this task requires in-depth practical experience in time series data management. KISTERS has cast this experience into AquisNet. Effectively, AquisNet makes air quality monitoring more convenient and unburdens the user from all the routine tasks linked to the management of long time series.

This leaves more room for your scientific analysis, which results in a better understanding of effects and causes and therefore leads to better action plans. Furthermore, your investments are protected due to the continuity of KISTERS’ development efforts, the scalability of the offered time series management solution, the highly flexible client-server architecture, and last but not least! – the significantly lower system administration costs thanks to the upcoming sharing of a core time series engine between all KISTERS applications. Considering KISTERS long-term presence in the air quality monitoring market, AquisNet is a field-proven software product. Nevertheless, AquisNet does not suffer from the superficiality of off-the-shelf software. At KISTERS we care for our customers and are happy to individually configure AquisNet into a tailored customer solution.

AquisNet Advantages in a Nutshell
- field-proven time series management technology ensures data integrity and fast processing/calculation
- data acquisition and validation in realtime fully automated processes to acquire, validate, collect, centralise, store, manage, evaluate and aggregate data
- numerical statistical analysis and powerful graphics
- advanced reporting and dissemination
- schemes including web publishing
- flexibility due to modular concept to suit your needs now and stay open for upgrades in the future
- no requirements to use proprietary technology
- reliable TCP/IP communication on many different types of communication links
- choice of operating environment and relational database management system
- scalability to meet data needs and budget constraints
- consequent use of technical standards, thus easy integration of AquisNet into existing IT platforms
- compliance with major air pollution regulations
- support for individual language versions, continued development keeps software up-to-date and additionally constitutes a solid base for both individual adaptation and project work
- software solution + reliable services by a competent team of KISTERS experts
- the complete monitoring chain covered by a single software solution from one supplier

And don’t take our word for it: Ask for AquisNet product demonstrations and reference customers. We at KISTERS are looking forward to your call!