

# GIS and real-time systems for Utilities Networks Facility Repository, Control, Integrity and Risk Management

## GLOBAL APPROACH TO OPERATION & MAINTENANCE

Complying with international standards and regulations, in addition to improving performance in order to satisfying the development requirements and improving network operations. Transmission and distribution companies (gas, oil and electricity...) are looking for solutions and tools to support the management and decision making.

**Geographical Information Systems (GIS) ,Integrity Management System and geospatial web-based solutions** for the management of geo-spatial data are able to answer for expectations of managers and decision makers.

Maintaining the networks, preserving the integrity, ensuring safety and security - not only for workers but also ordinary citizens - as well as the environment, require a systematic and scientific approaches.

Geographical Information System, involves the gathering and provision of access to all key company data and organization through a precise and efficient data model.

Data collection (on occasions in near-real time), precise location (e.g. 3D location of corrossions or leakages) are examples of information keys provided by GIS to support the decision making process.



### What can AETS experts bring to you?

The optimization of control, inspections and maintenance is becoming a key issue for the utility sector (Oil, Gas , electricity, water.....) given its direct impact on costs and revenues. **AETS** is able to mobilize high level of expertise to provide customers with highly specific and valuable assistance throughout the overall decision making process:

- **Analyses of current situations** (in line with national and international regulations) facilitate the introduction of merging technologies (GIS, telecom solutions, etc.).
- **Feasibility studies** with concrete recommendations and action plans, including:
  - Feasibility assessment on the basis of the identification of options that more efficiently and effectively cover the requirements
  - Technical and economic evidence to support the decision to upgrade or implement management platforms.



- **Cost-benefit analyses** ensure that potential costs, benefits and risks have been thoroughly evaluated; assess different options and proposed staged implementation, according to various technical, financial and regulatory criteria
- Support to **define the most appropriate data model** (compatible with international data models standard such as PODS, APDM ...).
- **GIS & geospatial web-based solutions** : analysis of the exact requirements, support for the selection of the most appropriate tools and design specifications
- **Drafting technical specifications** in order to:
  - Minimize incidents and increase reliability
  - Optimize maintenance
  - Perform geospatial asset management
  - Make cross-border system interconnectivity possible - ensuring easy access and interoperability for both data and services.
- **Preparing terms of reference** and tenders in line with national and international standards
- **Support to the evaluation process**
- Assistance during **procurement follow-up** and implementation
- **Training** and documentation preparation.



In order to offer this large portfolio of services and expertise, **AETS** relies on senior consultants and engineers with complementary expertise and skills, that are put together to form specific teams to meet the exact requirements of a given customer. Their analyses and recommendations are based on strong and practical knowledge of industry standards, data availability and most common solutions used by the industry worldwide.

Their advice and support are reinforced by the fact that **AETS** is fully independent from software developers. And they are able to push forward state-of-the-art GIS techniques and recommend tailor-made solutions.

Our experts are supported by proven, tried and tested project management approaches and methodologies used by **AETS** in the context of international projects.

## GIS AND REAL-TIME SYSTEM FOR OIL AND GAS PIPELINE INDUSTRY

As the primary interface of SCADA is a graphical display simulating the location of equipment, AETS adopted the integration between GIS and SCADA by offering different solutions to extend GIS databases depending on the availability of real-time systems and control systems. The rapid worldwide development of the SCADA market reflects the impact of new technologies on SCADA components, cost effective communications and capabilities and functionalities of utility networks.

Supported by Geographical Information System (GIS), expanded communication networks and improved compatibility with IT, SCADA systems can now provide a wealth of advanced applications encompassing both robust control and the automation of Gas and Petrol networks.

AETS has conducted several study programs providing a clear, comprehensive and informative view on control systems, applications and the integration of SCADA systems for electricity, gas and oil pipeline networks.

GIS functionalities **make it possible to better maintain and valorize a unique and centralized data set, reducing the errors of redundant and often poorly maintained data sets.** Costs associated with duplicated maintenance efforts are also reduced.

GIS and real-time system ensures better management of **pipeline integrity in High Consequence Areas (HCAs)**, such as populated areas, major transport infrastructures and areas particularly sensitive to environmental damage (drinking water, ecological resources...). GIS provides special tools to support assessments (e.g. identify all segments of a pipeline system having the potential to affect an HCA), perform complex analyses and reporting. Results obtained contribute to a better assessment and mitigation of risks and reduce the probability and consequences of incidents.

The GIS allows apprehending the spatial dimension of the asset management. Based on the integration of the international standards data models (PODS, APDM, PPDM ...), allows effective decision making and to plan the priority of future interventions and risk evaluation.



Effective information technology is an important success factor in the oil and gas sector. Applied modeling technology not only reduces costs, but position companies to become more productive, efficient and competitive.

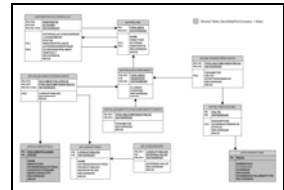
However, a novel approach is being implemented to have a comprehensive integrated **Pipeline Integrity Management System (PIMS)** in place: a PIMS is much more than a set of tools or an inspection and maintenance program; it is a management system encompassing engineering, operation, inspection, maintenance, HSE and Corporate communication.

Maintaining the pipelines requires identifying the pipelines locations to be repaired, replaced, protected, or reinforced in the field. "Instrumented pigs" or "smart pigs" generate data about suspected faults (corrosion, deformation, leakage) but it is not enough to give the exact geographic location of the points of concern. The **Geographical information system is developed to answer the required needs and to support the Pipeline Integrity Management System.**

Moreover, equipment necessary for operations in the field, which depends on the characteristics of the particular pipe (attributes from the weld book), can be developed to preserve the integrity of the pipeline need, therefore, to federate the data in an Enterprise System which integrates the spatial dimension.

As GIS became the milestone of advance technology, this approach is adopted to introduce Pipeline Integrity and Risk Management System, by integrating all the available pipeline data with GIS based data management system for simplifying conducting various functions such as risk assessment, risk based inspection program, Corrosion Rate Calculation and Estimated Repair Factor (ERF).

Adopting the GIS enhances the safety of live (population living in the vicinity of the pipeline corridor), the assets (Pipeline network), the safe operation and confirming the Pipeline ongoing fitness for service by using different types of data sources on in-line inspection such as intelligent surveys pigging integrity, direct current voltage gradient (DCVG) surveys, close interval potential surveys (CIPS), design and drawing information, project construction information, pre-commissioning and commissioning information, alignment drawing data, routine patrolling information and population density around the corridors.



Power distribution and transmission companies, increasingly adopted new concept of electronic surveillance to **control and management power networks** in order to reducing cost and providing customers with high quality services.

Therefore, based on the last developments in the fields of **Information Technology and data communication**, new approaches and solutions are now available to automate the control of power network (High voltage and Medium voltage).

Since, GIS information is the main source of electrical data network, the Regional Control Center **adopted the integration between GIS and real-time systems** such as SCADA to modernize and develop the surveillance operations, control and system design.

The benefit of the integration is that data has to be entered only once. This **reduces of time amount required to maintain the data and avoid the inconsistencies between different types of data.**

According to this approach in additional to the high level of GIS support and related fields, **AETS can provides advance solutions to re-use available data presented at power companies in one hand, and in the other hand can assure a smooth integration between GIS system and diverse other control systems (SCADA, DMS and EMS....).**

