

The Research of the Digital Environmental Protection Intellectualization Platform

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Abstract: In this study, using the advanced technology and the method such as the IT technology, the Earth remote sensing and the remote sensing technique, the digitization and the intellectualization of the environmental protection material were realized. Moreover, the three problems of the digital environmental protection intellectualization platform are demonstrated emphatically: the major function, the system network construction chart, the system overall construction chart. It supplied a feasible method for the establishment of the digital environmental protection intellectualization platform.

Keywords: Digital environmental protection, intellectualization

INTRODUCTION

With the increase of our country environmental product's fast development and the environmental management study, the information became the important technology basis of enhancing the environmental management and the level of decision. The digital environmental protection engineering construction has been listed as the key developmental item by the country 5 each kind of emerging information technology such as the data warehouse, the networking and the motion interconnection provides the new opportunity for the realizing of the leap frog development of our country environmental product and the IT industry, our country the digital environmental protection the systems engineering construction presents at the right moment.

“The digital environmental protection” is a rapid development large systems engineering of deriving from the digital world, GIS (Geographical Information System), GPS (Global Positioning System) technology in recent years. Mao *et al.* (2007) have a research of the research of the structure system and application framework about handong digital environmental projects (Yang *et al.*, 2007) analyse the digital environmental platform construction information integration. Fan (2007) study the application of the Geographic Information Systems (GIS) in environmental protection. Wu and Wu (2001) have a research of the design and implementation of urban environmental protection system based on GIS data. Qin (2007) study the GIS-based environmental protection in the decision support system. Mao (2010) analyse the Yunnan communication and informatization forum of environmental protection promote the digital

environment (Jia, 2006) study the digital environmental solution. As the combination of the information technology and environmental management, from an environmental point of view of information technology, the solution of the digital environmental protection is the intensive mining and consolidation of the environmental data and business requirements, realizes the close integration and depth support of the environmental protection business and maximum realizes digitization, network, intelligence and visualization of the environmental protection information, using of the advanced technologies and means such as IT technology, Earth remote sensing and telemetry.

In this study, we have a research of the digital environmental protection intellectualization platform and the framework and functionality of being provided by the platform was explored. Basing on national laws, decrees and regulations the national industry of environmental protection, we apply the latest environmental studies and research on information technology. Moreover, we discuss and explore the major features involved the intelligent platform, with a view to contributing to the rapid development of China's low-carbon economy and intelligent environmental technologies.

FUNCTION DESCRIPTION

This platform mainly included the environmental data acquisition and the supervisory system, the environmental information management system, the environment analysis system, 12369 environmental protection hot line system, the environment accident emergency processing system, the synthesis environmental protection service

platform (namely, the office automation system and the gateway website of the inner net), the environmental information service system (namely, the gateway website of the outer net).

The environmental data acquisition and the supervisory system: The data communication with the front online the observation system or equipment was realized through each kind of transmission medium such as ADSL, GSM, GPRS, CDMA, monitors the data acquisition and the monitoring instruction transmission and so on were realized also. The real-time monitoring was realized through the electronic map for all fixed or the migration online monitoring facilities in the area of jurisdiction, It included: the source of pollution (waste gas, sewage and noise), the environment quality (air, water quality) automatic observation system, the video frequency monitoring equipment and the environmental monitoring vehicles and so on. The warning prompt to the burst characteristics environmental pollution accident was given through sound, light, electricity and so on, it divided into the warning stage, the accident stage and the all clean stage. The video frequency real-time monitoring was accidentally implemented through the long-distance video frequency supervisory system to the priority industry source of pollution or the urgent accident. In order to real-time monitor the source of pollution production activity, the pollutant discharge and the environmental protection facility operational aspect and snapshot image promptly.

The environmental information management system: Combining the environmental Information System (MIS) with the Geographic Information Systems (GIS), it stored and managed a large number of environmental information and data generated by the various front-end systems (including acquisition and labor input, etc.,). The system included: the source statistics management, the emission data statistics, the treatment facilities, as well as the running record source distribution and electronic records management. The environmental quality statistics management, the environmental data statistics of the area, air, water, noise, the sub station environment quality, the pollutants change curve and a graphical and numerical form. Other environmental information and the electronic records management. Qin (2007) study the GIS-based environmental protection in the decision support system. The summary statistics was realized in accordance with the administrative division, the industry, the atmospheric pollution, the water pollution, the discharge of solid waste pollution sources and the dangerous pollution sources. A wide variety of graphic information of the pollution sources, enterprises and regional information was queried. In accordance with the subtotals, the distribution of pollution sources and related environmental information were showed in the map of the geographic.

The environment analysis system: The system realized the analysis of the source of pollution and pollutant discharge, the pollutant total quantity analysis, the region pollutant discharge analysis, the region pollutant total quantity analysis and so on. Combining GIS with MIS gave each kind of graphic information designed for the environment and the impact analysis. In the case of the environmental pollution factor set by the user, the system implemented the environmental dynamic simulation; by mathematical model parameter optimization improve the model versatility and analysis accuracy were improved by the mathematical model parameter optimization. The system supplied a comprehensive analysis of the concentration of pollutant monitoring of being measured the air and surface water monitoring device. It could analysis the different accident pollutant effects of space of key pollutants and emissions, simulate the pollutant concentrations and range in the electronic maps and display corresponding pollutants concentration curve.

The environmental protection hot line system: The environmental protection hot line system was a customer services center system of combining the environmental protection policy consultation, the environmental pollution complaint, the complaint result feedback, the information investigation, it used the CTI technology unified the advanced communication and the computer and the full used the network resource of the environmental protection information system, closely combined the automatic pronunciation inquiry, the manual service, the information study processing and provided all-weather 24 h uninterrupted services. The customers could request related services to EPA using telephone, fax, e-mail, Internet, mobile phone, SMS, etc. 12369 environmental hotline system could supply a relation of the external and user, the internal and the EPA. In this system, data obtaining from users of all kinds of information were stored in a huge data warehouse, in order to analysis and decision-making for all leader; It was a multimedia customer service center that combining the external services to customers, with the internal management, analysis, decision-making system. 12369 environmental hotline system could closely connect the access functionality, the navigation capabilities, the automatic voice inquiry capabilities, the session transfer, the information and the data processing. In the system, after dialing the phone number, the user could optionally select artificial services, automated voice queries, automatic message and switch back and forth in a service or transfer to other phone; the record of information could be disaggregated statistics and made reports for the related departments to retrieve inspection; after dealing with the opinions, the seats proactive called users, informed the disposal ideas and formed the closed-loop processes.

The environment accident emergency processing system: In the event of a pollution incident or complaint, by on-board GPS and wireless data transfer modules, the user could location and tracking monitor by using the environmental law enforcement or environmental monitoring vehicle, timely dispatch monitoring and supervisory personnel to the scene of the accident. In this system, the accident site monitoring data and graphic information were timely transferred to the monitoring center and at the same time, combined with historical information systems to determine the scope and pollution trends and accurately provided technical basis for decision-making. Occurrence of pollution accidents, the system could query the accident scene ambient conditions, the living conditions, timely auxiliary judgment the accident on the nature of the resulting pollutants, monitoring methods. Mao 2010) analyse the Yunnan communication and informatization forum of environmental protection promote the digital environment. It could auxiliary start emergency pollution accidents, prompt the relevant emergency procedures, methods and the measures to be taken. The expert library software could provide solutions for dealing with accidents, provide a basis for decision-making and auxiliary command emergency environmental pollution accidents.

The synthesis environmental protection service platform: The system integrated existing and future development of environmentally business system, involved OA, gauge, reporting, monitoring, billing, supervision, monitoring, environmental quality, environmental impact assessment, statistical analysis, decision support and other aspects of the business. In the system, each of the business system could not only independent of the system, but also to combine into a comprehensive application system.

Through the intranet portal, the business personnel from the interior of EPA (Environmental Protection Agency) and each environmental organization in all scale, could enter various Environmental Protection business systems, the office Automation, the external portals, the E-mail system and at the same time could use the internal information, the environmental information, the online office, the user login, the bulletin boards, the downloads, the Web site links and other types of functional service module.

The extranet portal, could realize the implementation of environmental monitoring information service platform and provide information services to the higher and lower related business department, pollutant-discharging enterprises and the public. It had a strong backstage management functions, mainly included the Web site information gathering, editing, distribution, retrieval, management, integrated with the past Environmental Protection business systems and realized the online office to provide services to the public.

The extranet portal and the internal office system was an organic whole, the information received from the extranet website could go directly to the work of a specific action (such as a personal inbox, etc.), the information in the internal office system (such as files, consultation responses and reporting the results and so on) could publish directly to the extranet portal.

SYSTEM NETWORK FRAMEWORK

Overview structure: According to the environmental information monitoring system overall business needs and the overall system requirements, the network, security and application of the three levels of features were realized in the technical realization of the system, from the perspective of business requirements, the real-time monitoring, the information management, the operations management and the information services in four areas of functional requirements must meet on the network, security, management and application of the three level. The network system provided the foundation for business hosting, the security system provided the foundation for business security and the management system provided the underlying business performance, the three systems formed the basis platform of the entire system, Whereas the application system in the underlying platform provided the ultimate business function and communicated between different levels of the system in accordance with the standards and open communication protocol, The different business functions component within the same business levels realized the information sharing through unified data storage platform and the business functions coordination enables through a unified messaging system.

Network hierarchy: The entire network system was divided into three different sections: the internal VPN network in the EPA, the online monitoring VPN network and the Internet access:

- **The internal VPN network in the EPA:** It realized the interconnection between the EPA room inner net and inner net of the each environmental organization in all scale, namely, formed an interchange multiple subnets communication links.
- **The online monitoring VPN network:** It realized the Interconnection between on-line monitoring substations system locating in the front and the monitoring/communication server in the EPA inner net, each substation constituted a peer-to-peer Virtual LAN (VLAN) separately with EPA's monitoring/communication server, namely, ensured the point-to-point communication of the substations and the monitoring/communications server, at the same time, the logical isolation formed and could not exchange visits between each substations.

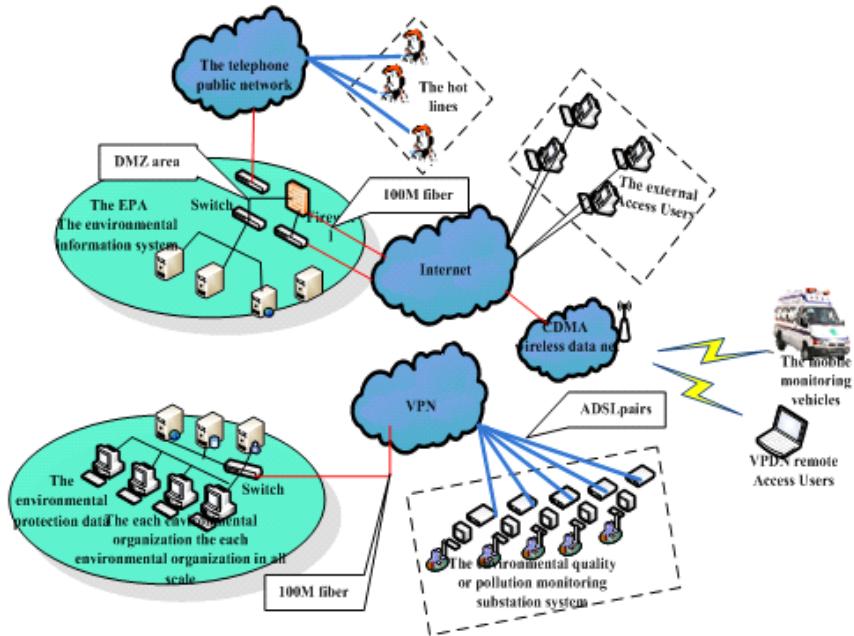


Fig. 1: The system network construction chart

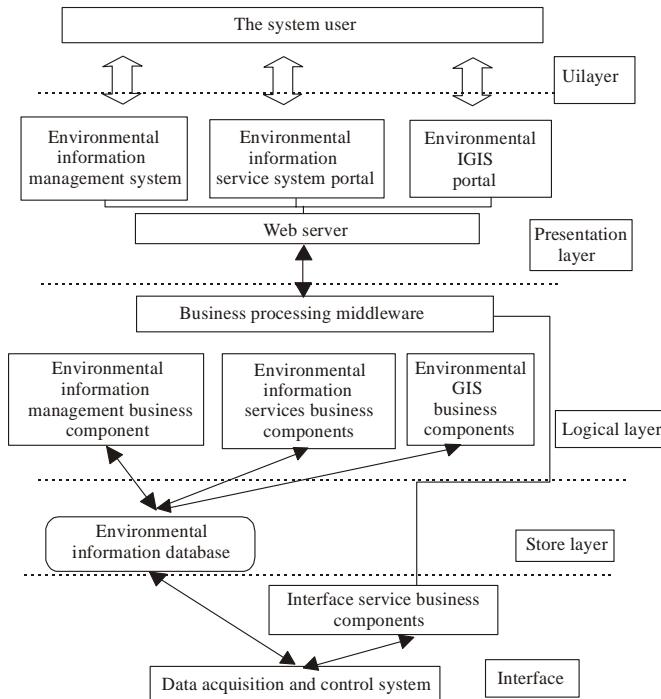


Fig. 2: The system overall construction chart

- **The internet access:** The mutual isolation between the internal VPN network in the EPA and the on-line monitoring VPN network should achieve, namely, in the case of not being provided the same substation networks environment between the internal VPN network and both sides of the special network, one

side of the special network computers and servers, could not send and receive packets from the other side of computers and servers each other.

The internal network and information security system was mainly formed with the firewall systems of

responsible for the internal network security, the Intrusion Detection System (IDS), the anti-virus system and the network switches, etc.

Among them, the firewall system divided the internal network into the DMZ and the intranet zone of separation, the Web server, the anti-virus systems and the IDS systems were placed in the DMZ, the database server, monitoring/communication server and GIS platform were placed in the intranet zone of separation and it realized the isolation between the monitoring intranet and extranet. The system network construction chart as shown in the following Fig. 1.

SYSTEM APPLICATION AND CONCLUSION

The application system of the environmental information monitoring system mainly included the application tier business systems, such as the environmental information management system, the environmental Geographic Information Systems (GIS), the environmental information service system. They used the distributed architecture based on the Browser/Server and met the needs of the cross-segment, the cross-domain, the different types of customer and the system management cheap requirements, the overall construction as shown in the following Fig. 2.

Based on the above research, the development and the initial period application were processed and made the good progress. In the further, the application speed and the scope of the development and application speed up, so that better realizes the digitization, network, intelligence and visualization of the environmental protection information and serves well the development of the environmental protection intellectualization.

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