3 Tong Jing, Zhang Luosheng, Hou Songlin, Fan Yuhang and Li Tianqun, Low-Cost Personalized Chocolate 3D / Printing Platform [J] // Journal of Computer-Aided Design /& Computer Graphics. – 2015. – p. 6.

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DEVELOPMENT CONTROL AND ACCOUNT SYSTEM OF ENTERPRISE EMPLOYEES

Abstract. This paper focuses on theapplication of thesystem in mining, oil, chemical industry to control, anaccount of employees for increase the company's competitiveness, excludes the human factor, provide control over the efficiency of the work and will increase the level of safety with a large number of employees. The architecture of controlling, accounting system it helps to addresses system qualities, supports the planning process, drives architectural integrity, helps manage complexity, provides a basis for reuse, reduces maintenance costs, supports impact analysis. Development of system, that will get data from identifier like Bluetooth Low Energy beacon, gateway sensors and the help of these data identify and solve business problems.

Key words. Management Information Systems, Strategic Planning, Tactical Planning, Decision Making Process, Bluetooth Low Energy.

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Аңдатпа. Бұл мақалада осы жүйені тау-кен, мұнай, химия өнеркәсібінде енгізуге көп мән беріледі, бұл компанияның бәсекеге қабілеттілігін арттыруға, қызметкерлерді есепке алуға, адам факторын болдырмауға, жұмыстың тиімділігін бақылауды қамтамасыз етуге және қауіпсіздіктің деңгейін арттыруға бағытталған. Жүйенің архитектурасы, компанияның жүйелік сапасын арттырады, жоспарлау үдерісін қолдайды, архитектуралық тұтастықты қамтамасыз етеді, күрделілікті жеңілдетеді, қайта пайдалану үшін негіз береді, қызмет көрсету шығындарын азайтады, компанияға тиген әсерді талдауға көмектеседі. Bluetooth Low Energy таңбасы, шлюз сенсорлары, т.б. арқылы жинақталған нақты деректерді талдау арқылы әртүрлі мәселелерді талдауға және шешуге комектеседі.

Кілт сөздер: санақ жүйесі, орналасу жүйесі, басқарудың ақпараттық жүйелері, стратегиялық жоспарлау, тактикалық жоспарлау, шешімдерді қабылдау процесі, төмен энергиялы Bluetooth.

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Аннотация. В этом статье основное внимание уделяется применению системы управления и учета в горнодобывающей, нефтяной, химической промышленности для контроля и учета сотрудников, повышения конкурентоспособности компании с учетом человеческого фактора, обеспечения контроля за эффективностью работы и повышения уровня безопасности сотрудников. Архитектура системы управления и учета, которая помогает повышать системные качества, поддерживает процесс планирования, управляет целостностью архитектуры, помогает управлять сложностью, обеспечивает основу для повторного использования, снижает затраты на обслуживание, поддерживает анализ воздействия. Разработка системы, которая получит данные от идентификатора, такие как BluetoothLowEnergy (BLE) маячки, датчики шлюза, и с помощью этих идентифицированных данных, анализируются и решаются различные проблемы.

Ключевые слова: система подсчета людей, система определения местоположения, информационные системы управления, стратегическое планирование, тактическое планирование, процесс принятия решений, низкая энергия Bluetooth.

Introduction

At the moment, organizations are in the race for improving their capabilities in order to survive in the competitions of the new century global market. Accordingly, organizations are attempting to advance their IT-infrastructure level by improving the automation process to be more highly effective and efficient to meet the successive wobbles of the market. In an effort to reach this, many modern organizations, large or middle-sized, have concerned with a cycle of progressive investments in and adopted new controlling and accounting systems. During the past decade, a high percentage of organizations often used controlling and accounting systems to solve many problems; and that the speed of the adoption is expected to grow in the future as the technology expands.

Information is an arrangement of people, data, process, and information technology that interact to collect, process, store and provide as output the information needed to support an organization, which indicates that information system is an arrangement of groups, data, processes and technology that act together to accumulate, process, store and provide information output needed to enhance the company's competitiveness with a large number of employees. In an enterprise's information system, there is

always a potential crisis which makes the enterprise endure an insufficiency; thus, an advanced information system supported by a superior mechanism control is required to make certain that an information system has achieved the required processes. The nature of globalization and competitiveness in the market stress on the importance of developing an IT-infrastructure through development controlling and accounting system [1].

Accordingly, the stored information must then be recalled and distributed for the use of an organizational leadership and top management as well as mid-level managers to take an effective long-term (strategic) and short-term (tactical) decision-making. Controlling and accounting system is deemed to be a system which provides organizations top management and, even lower level management, with appropriate information based on data from both internal and external sources, to allow them to make effective and timely decisions that best achieve their organizational goals and satisfy stakeholder requirements [2].

Application of control and account system

In the modern market, the problem of control and accounting of employees of the enterprise and automation of processes becomes one of the most important factors that increase the company's competitiveness with a large number of employees.

An enterprise system is an integrated information system that is made to support business processes, information flows, reporting, and data analytics in complex organizations. Its main function is to coordinate all of the major processes of an organization and integrate those processes into the different departments of the organization. Some of these application processes may include sales and distribution, financial accounting, investment management, materials management, production planning, maintenance, and human resources. Because it is integrated, it allows data to be used for several purposes [3]. There is a central database that collects all the data from all of the applications, and then in return, it feeds out the data as output to all of the processes of the organization. So, once data is given by one processes, then all the processes have access to that data. An example would be a university or college that uses an enterprise system to manage all student records, enrollment applications and acceptance, finances, human resources, etc [4]. Many companies are starting to implement enterprise systems because it is an easy way to combine the core functions of the company with technological advancements. It is an easy way because the enterprise system is a single software architecture that fuses all the core processes of a business to function as one unit. The synchronized functioning of the processes makes it easier and more efficient to for multiple departments to work together and it is also helpful for managers as they can better oversee multiple tasks and project at one time [5].

Enterprise systems were created to eliminate the problem of the shattering of important information in large businesses. Most companies have so much information stored in so many different areas that when information needs to be retrieved, it becomes a hassle. If a company's information is shattered and cannot be retrieved when needed if retrieved at all, it will eventually reflect into their sales. An enterprise system is a single database which gets information from all of a company's activities. Whenever someone changes information in any area, the system will then update it throughout and make the information up to date. The amount of productivity and speed can really increase when a company begins using this system. This also gives them the ability to be organized and function on a larger level. Inside of an enterprise system, there are modules. Some modules are used universally by all companies and other (such as human resources) are specific to each company. Configuration tables are also part of what makes an enterprise system. These are how a company can make their system unique to their business. They can change certain parts of the system such as not only having an inventorybut instead having inventory accounting. Enterprise systems help with logic and organization in companies and provide a better «flow» in how things are run [6].

Application of system in mining, oil, chemical industry

Mining is one of the oldest and most important industries. Minerals and products derived from their refinement or processing play an important role in driving growth and steering progress across various facets of the economy. Minerals are essential inputs for the production of metals, ceramics, fertilizers, pharmaceuticals, chemicals, electronic items and a wide variety of other industries and products. Minerals such as coal, lignite, oil and natural gas constitute fuel and vital energy resources.

As is the case with every other sector, the mining industry is also faced with challenges stemming from globalization. Although demand for minerals and allied products is steadily increasing owing to population growth, the dynamic nature of the international economy, volatility of prices, environmental concerns and it important for mining organizations to make the transition from traditional methods to technology enabled business processes.

Some focus areas: knowledge sharing; safety; process improvement; remote operations; exploration and production techniques; asset management; mine automation

Typically, mining operations are spread across diverse locations and employ a large number of temporary workers. There is also a lot of on-the-job learning that happens at various mining sites. High employee turnover can result in a loss of this collective learning if there are no mechanisms to capture, store and share knowledge across the workforce.

Knowledge Management (KM) systems are crucial to create and manage repositories for the storage and distribution of information in a secure

and systematic manner.This eliminates multiple information silos, associated redundancies and maintenance overheads. Effective implementation of a KM system ensures that knowledge and best practices are fed constantly into the repository to enable easy access across the organization.This will promote continuous innovation,help improve processes by learning hot., past experience, enhance efficiency and increase productivity. This will also have a calming effect on workforce attrition. Since mining organizations generally work in groups of small companies base out of regions where mining operations are located, a KM system will promote collaboration and create a positive work environment across the organization.

Safety

The high risk associated with mining operations makes safety a priority area, more so, against the backdrop of various mishaps in recent years. However, safety is not just about preventing casualties or limiting fiscal loss. From scrutiny by potential investors and the process of awarding contracts to attracting and retaining talent, the safety track record of a mining company can impact its financial performance on many fronts. Improvement in safety measures also helps save costs arising from litigation, insurance claims, accident damages and production delays. Although targeting zero accident mandates is a given, a well-orchestrated management system helps improve safety performance and can actually drive financial benefits for this industry.

Mining organizations can benefit from the implementation of a Content Management System (CMS), resulting in the effective management of unstructured content and the creation of a single information repository. CMS provides the ability to add, assign appropriate permissions and approvals, and locate safety-related documents and Standard Operating Procedures (SOPs).The CMS also manages title block information or PDF rendition of engineering drawing documents, which in turn enables effective maintenance activities at the mining site. A Web Content Management (WCM) system provides intranet sites where information related to safety can be shared and accessed within the organization in an easy and secure manner.

Process improvement

From mining to material extraction and processing, and from marketing to sales and shipping - mining organizations need to ensure process improvements across all facets, to remain competitive and cost-efficient.

Business Process Management (BPM) helps analyze and optimize organizational processes, promotes better collaboration and coordination between various departments to improve efficiencies and ensure best results. BPM can automate field-reporting systems to improve operations and maintenance by providing managers with up-to-date operational information.

Marketers can automate the sales lead development process and use BPM to track and monitor the contacts made with prospects and customers. BPM can provide a relatively inexpensive solution to ensure relevant and

accurate information to sales and marketing personnel on production schedules, output and inventory across a wide variety of product specifications.

Remote operations

Connectivity is a challenge that is inherent in mining operations as most sites are located in far flung areas. This makes it important to ensure remote controlled operations of the various mining sites through an effective centralized management structure. Remote operations also translate into lesser on-site team deployment, helping reduce costs and improve employee safety and productivity.

At the core of the remote operation is an efficient and reliable communication system - one that ensures seamless channels for interaction between the control hub and various mining sites and enables collaboration between teams at each of these locations. This should also facilitate access to safety and Standard Operating Procedures (SOP) documents stored in the central CMS system, portal sites to log in safety incidents and the KM site to share knowledge.

Since laying network cables at these sites is prohibitive both in terms of cost and feasibility, it is critical for the mining organization to define an appropriate Infrastructure Architecture for ECM, Portal or KM applications. The architecture should enable easy access for teams across diverse locations and have optimal response speeds. Products chosen for defining Information Management (IM) applications should support the global architecture. Most CMS products offer caching features to enable information storage at locations in the vicinity of the user. This is important since the workforce will need access to large documents such as operationmanuals and drawings. Providing read and write caching prevents frequent content transfers from server to theclient. Some IM products have offline capabilities which can be extended through custom development. While this will enable the workforce to access and create new documents on-site despite lack of network connectivity, these documents will get automatically synchronized to the central repository on connecting to the network. With an increase in the usage of mobile phones and tablets, it's important that the infrastructure architecture supports rendering of content across various mobile devices.

Exploration and production techniques

Mineral exploration, the search for metal or mineral deposits is the first phase of the mining cycle. However, most exploration projects will not progress to become mines. The success rate for grassroots' exploration is extremely low, with less than 1 out of 10,000 mineral discoveries actually going ahead to become a mining site.

Geographic Information System (GIS) helps in managing data related to geographic locations and forms the basis for several location-enabled services that rely on analysis, visualization and dissemination of results for collaborative decision making. Mining organizations can use GIS to target

mineral exploration, evaluate mining conditions, model mine construction and display geochemical or hydrological data.

Implementation of GIS applications helps mining professionals perform in-depth analyses, get insights into the data and make well informed high-level decisions. Integration of GIS with CMS provides the ability to blend non-structured documents with maps in heterogeneous and geographically distributed locations and to analyze surveys and reports while studying maps of potential sites. The facility to view the integrated GIS information through a portal application helps to improve the decision making process across various aspects related to mining.

Asset management

Mining organizations rely heavily on a large battery of equipment and vehicles for operations and transportation. With activities spread across diverse locations, organizations have to handle huge tasks related to the operation, maintenance and repair of these assets on a daily basis. An effective asset management will ensure smooth operations, improve productivity and enhance savings. Records Management (RM) ensures effective asset management across the organization. All assets can be assembled into the database with user-defined metadata to cover information such as tag number, description, model, date of purchase, date of servicing, and so on. This can be implemented through a barcode mechanism that is compatible with leading physical records management products. The records management application can be easily integrated with the document management system to provide a single interface for electronic and physical records management.

Remote Audit through barcoding enables inventory checks to be conducted for any location and the results can be uploaded to the database, significantly saving cost and time. The asset management system automates record keeping for every vehicle and each piece of equipment, keeps track of warranties and planned maintenance schedules. This helps to monitor breakdowns and unplanned repairs and establish best practices. Asset management plays a key role in streamlining operational and maintenance efforts and ensures maximum uptime of machinery and vehicles used in mining, handling and storage.

Mineautomation

Mining organizations are realizing the benefits of automation in terms of improved productivity, enhanced efficiency and better safety. This translates into greater reliance on technology through remote controlled equipment and management of mining operations across diverse locations from a central hub. Mining organizations typically have various systems to manage different sets of data. For mine automation to be effective, it is crucial to ensure systems integration so that all systems work in a synchronous manner to enable seamless data exchange. Since human intervention is minimal, the system should provide automatic alerts and initiate corrective action.

The integration framework should link various systems that reside on different operating systems, using different languages. An efficient integration plan will ensure information consistency across multiple systems and provide a common interface for users to interact with various applications. This enables implementation of business rules and policies within a common framework and minimizes vendor dependency for a particular application.

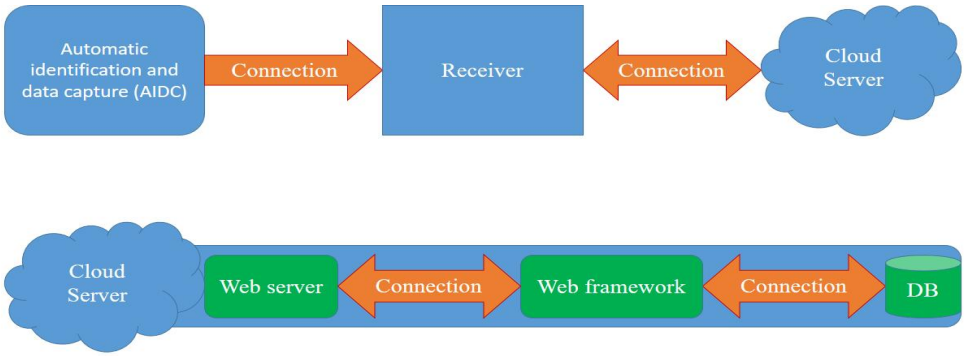

Fig. 1.1. General system architecture of control and account system

Automatic identification and data capture (AIDC).

Automatic identification and data capture (AIDC) refers to the methods of automatically identifying objects, collecting data about them, and entering them directly into computer systems, without human involvement. Technologies typically considered as part of AIDC include bar codes, Radio Frequency Identification (RFID), biometrics (like iris and facial recognition system), magnetic stripes, Optical character recognition (OCR), smart cards, and voice recognition. AIDC is also commonly referred to as «Automatic Identification", "Auto-ID" and "Automatic Data Capture».

AIDC is the process or means of obtaining external data, particularly through analysis of images, sounds or videos. To capture data, a transducer is employed which converts the actual image or a sound into a digital file. The file is then stored and at a later time it can be analyzed by a computer, or compared with other files in a database to verify identity or to provide authorization to enter a secured system. Capturing of data can be done in various ways; the best method depends on application.

In biometric security systems, capture is the acquisition of or the process of acquiring and identifying characteristics such as finger image, palm image, facial image, iris print or voice print which involves audio data and the rest all involves video data.

Radio-frequency identification is relatively a new AIDC technology which was first developed in 1980s. The technology acts as a base in automated data collection, identification and analysis systems worldwide. RFID has found its importance in a wide range of markets, including livestock identification and Automated Vehicle Identification (AVI) systems because of

its capability to track moving objects. These automated wireless AIDC systems are effective in manufacturing environments where barcode labels could not survive.

Nearly all of the automatic identification technologies consist of three principal components, which also comprise the sequential steps in AIDC- 1 Data encoder . A code is a set of symbols or signals that usually represent alphanumeric characters. When data are encoded, the characters are translated into a machine readable code. A label or tag containing the encoded data is attached to the item that is to be identified. 2 Machine reader or scanner. This device reads the encoded data, converting them to alternative form, usually an electrical analog signal. 3 Data decoder. This component transforms the electrical signal into digital data and finally back into the original alphanumeric characters [7].

Receiver

The receiver in information theory is the receiving end of a communication channel. It receives decoded messages/information from the sender, who first encoded them. Sometimes the receiver is modeled so as to include the decoder. Real-world receivers like radio receivers or telephones cannot be expected to receive as much information as predicted by the noisy channel coding theorem [8].

Some receivers: Barcode and QR code reader (or barcode scanner); Bluetooth scanner; Gateway; Mobile phone; RFID Reader.

Receiver

A barcode reader (or barcode scanner) is an electronic device that can read and output printed barcodes to a computer. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. Additionally, nearly all barcode readers contain decoder circuitry analyzing the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port [9].

Cloud server

Cloud computing is an information technology (IT) paradigm that enables ubiquitous access to shared pools of configurable system resources and higher-level services that can be rapidly provisioned with minimal management effort, often over the Internet. Cloud computing relies on sharing of resources to achieve coherence and economies of scale, similar to a public utility.

Third-party clouds enable organizations to focus on their core businesses instead of expending resources on computer infrastructure and maintenance. Advocates note that cloud computing allows companies to avoid or minimize up-front IT infrastructure costs. Proponents also claim that cloud computing allows enterprises to get their applications up and running faster, with improved manageability and less maintenance, and that it enables IT teams to more rapidly adjust resources to meet fluctuating and unpredictable

demand. Cloud providers typically use a "pay-as-you-go" model, which can lead to unexpected operating expenses if administrators are not familiarized with cloud-pricing models [10].

Web server

A web server is a computer system that processes requests via HTTP, the basic network protocol used to distribute information on the World Wide Web. The term can refer to the entire system, or specifically to the software that accepts and supervises the HTTP requests.

The primary function of web server is to store, process and deliver web pages to clients. The communication between client and server takes place using the HTTP, HTTPS. Pages delivered are most frequently HTML documents, which may include images, style sheets and scripts in addition to the text content [11].

Web framework

A web framework (WF) or web application framework (WAF) is a software framework that is designed to support the development of web applications including web services, web resources, and web APIs. Web frameworks provide a standard way to build and deploy web applications. Web frameworks aim to automate the overhead associated with common activities performed in web development. For example, many web frameworks provide libraries for database access, templating frameworks, and session management, and they often promote code reuse. Although they often target development of dynamic web sites, they are also applicable to static websites [12].

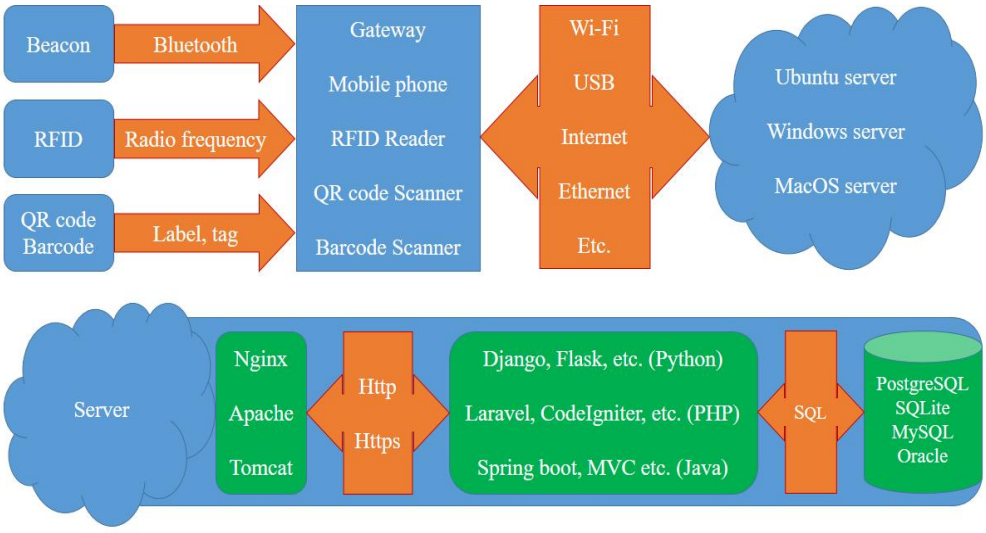

Fig. 1.2. Example

Database

A database is an organized collection of data. A relational database, more restrictively, is a collection of schemas, tables, queries, reports, views,

and other elements. Database designers typically organize the data to model aspects of reality in a way that supports processes requiring information, such as (for example) modeling the availability of rooms in hotels in a way that supports finding a hotel with vacancies.

A database-management system (DBMS) is a computer-software application that interacts with end-users, other applications, and the database itself to capture and analyze data. A general-purpose DBMS allows the definition, creation, querying, update, and administration of databases.

A database is not generally portable across different DBMSs, but different DBMSs can interoperate by using standards such as SQL and ODBC or JDBC to allow a single application to work with more than one DBMS [13].

References:

1 Akram Jalal K. The Significance of Management Information Systems for Enhancing Strategic and Tactical Planning // Journal of Information Systems and Technology Management. – 2011.- № 8 (2).- P. 459-470.

2 Argyris C. Management information systems: the challenge to rationality and emotionality // Management Science. – 1971. – №17(6). – P. 275-292.

3 What is an enterprise system how does enterprise software work [internet resourse. – URL: http://rashedchowdhury.com/2012/11/12/what-is-an-enterprise-system-how-does-enterprise-software-work/

4 URL: http://it.emerson.edu/department/erp/

5 Benefits challenges enterprise systems [internet resourse. – URL: http://www.ehow.com/facts_7584818_benefits-challenges-enterprise-systems.html

6 URL: http://www.im.ethz.ch/education/HS08/davenport_hbr_98.pdf

7 Automatic identification and data capture [internet resourse. – URL: https://en.wikipedia.org/wiki/Automatic_identification_and_data_capture (retrieved 12/12/ 2017).

8 Receiver [internet resourse. – URL: https://en.wikipedia.org/wiki/Receiver_(information_theory)

9 Barcode_reader [internet resourse. – URL: https://en.wikipedia.org/wiki/Barcode_reader

10 Cloud computing, https://en.wikipedia.org/wiki/Cloud_computing, (retrieved 12/12/ 2017).

11 Web server [internet resourse. – URL: https://en.wikipedia.org/wiki/Web_server (retrieved 12/12/ 2017).

12 Web framework [internet resourse. – URL: https://en.wikipedia.org/wiki/Web_framework (retrieved 12/12/ 2017).

13 Database [internet resourse. – URL: https://en.wikipedia.org/wiki/Database (retrieved 12/12/ 2017).