



SIGHT POWER

WHAT IS DIGITALIZATION

Nowadays, everyone has already become accustomed with the word “digitalization,” and the combinations “digital twin” and “digital model” have become memes of sorts. Digital transformation in both economic and production activities is quietly but steadily happening all over the world.

However, if you ask people from different social and educational groups (including engineers) today what they understand by digitalization, the answers are unlikely to match each other. The fact is that digitalization can mean completely different things for different types of activities.

The most famous example of digitalization of the work process is the introduction of paperless document flow, when the creation, adjustment, multi-stage approval and distribution of engineering and / or contemporary documents occurs entirely in electronic form, without turning on the printer and using a pen or print. This form of digitalization began to develop quite a long time ago and today has become widespread, for example, in the banking sector.

The further development of various modern technologies gradually makes it possible to expand the concept of digitalization into many areas of our lives and daily activities. Cars without drivers, delivery of mail and goods using drones, and virtual reality systems have partially moved from the realm of science fiction to everyday life.



DIGITAL CITY

About 15 years ago, in the context of the general global trend of digitalization, the topic of the Digital or Smart City arose. Wikipedia defines the Digital City as “the integration of multiple information and communication technologies and the Internet of Things (IoT solutions) for the management of city assets....in particular the management of... schools, libraries, transport, hospitals, power plants, water supply systems.... waste disposal... other public services.

Indeed, the implementation of the Digital City concept is impossible both without powerful means of communication and without the Internet of Things, which uses communication networks as the basic technology.

The Internet of Things makes it possible to assign an Internet address to every object - from a faucet to a kettle, from a car to an airplane, from a complex machine tool to a simple drill. Accordingly, it becomes possible to access these objects from a computer, phone, or other remote smart device, send commands to them and receive feedback. Thus, in principle, it is possible to remotely control any systems or objects, almost regardless of their location and the complexity of the system.

In addition to the above components, the possibility of transition to the practical implementation of the Digital City is also associated with the rapid development of two more areas: laser scanning technologies and augmented and mixed reality technologies.

Although the infrastructural part of the urban economy plays a decisive role in the life of the city, each city is still inseparable from its external appearance. The largest software developers were the first to implement successful projects to create visual city models. For example, Google released Google Maps back in the early 2000s with 3D models of streets and buildings, based on panoramic photography and photogrammetric representation of 3D scenes. Google Maps models provide good visual representation, but it is of limited use for engineering applications.

At the same time, the combination of laser scans taken from airplanes and cars, already about 15 years ago, made it possible to create, albeit limited in area, but very realistic models of the most outstanding architectural monuments and even entire urban areas.

Today it is already unthinkable to imagine a digital model of a city without the ability to reproduce its architectural components, detailed models of buildings, streets, parks, and squares, i.e. its detailed visual appearance. Laser scanning is the only technology that allows you to create highly accurate 3D models without distortion, while maintaining colors and proportions.

Any design of new construction projects in our time involves the creation of computer models, i.e., their digital prototype.

Augmented reality tools make it possible to place a computer (virtual) model of an object in the required place in the real world and see it in this place with the help of special glasses as if it were really created from iron, wood, plastic and concrete.

This provides special opportunities for the reconstruction and restoration of old buildings, for the creation of new objects in densely built-up areas, etc. So, only the combination of at least four technologies - information and communication technologies, the Internet of things, laser scanning and augmented and mixed reality - provides a unique opportunity to create effective Digital Twin of the city.

There is another important aspect that is often omitted when discussing the topic of the Digital City. It is generally accepted that the Digital City is the combination of a model of the surface part of the city with models of underground infrastructure, such as the metro, gas and water supply systems, electrical and telephone network systems, etc.

In turn, a full representation of both the surface and underground infrastructure of the city is impossible without including geoinformation and hydrogeological components in the data model, respectively. The geographic information system includes data on topography, rivers, roads and railways, ground infrastructure facilities, etc. The hydrogeological component is based on many hydrological and other engineering wells, which make it possible to construct the necessary models of the underground part of the city.

Thus, we can conclude that the construction of a Digital Twin of a city requires combination of all aforementioned technologies and properly organized databases containing a variety of information about above ground and underground urban infrastructure, architecture, topography, and hydrogeological features of the area.



DIGITAL LiDAR MODEL OF MELBOURNE



DIGITAL LiDAR MODEL OF DUBLIN

WHAT DOES CREATION OF A DIGITAL TWIN OF A CITY GIVE?

The Digital Twin of the city is not a product that can be bought somewhere like a car or a payroll system.

The creation of a Digital City is a process that takes place in many stages, the sequence of which may be different for different cities and is determined to a large extent by both the practical needs of a particular city and the strategic plan for the development of a specific urban economy, the state of infrastructure facilities and the readiness of the city leadership to make the transition on modern management methods.

However, despite the significant differences in priorities and needs for different cities, it is possible to formulate a number of general benefits that a city receives by gradually switching to digital principles of economic management, for example:

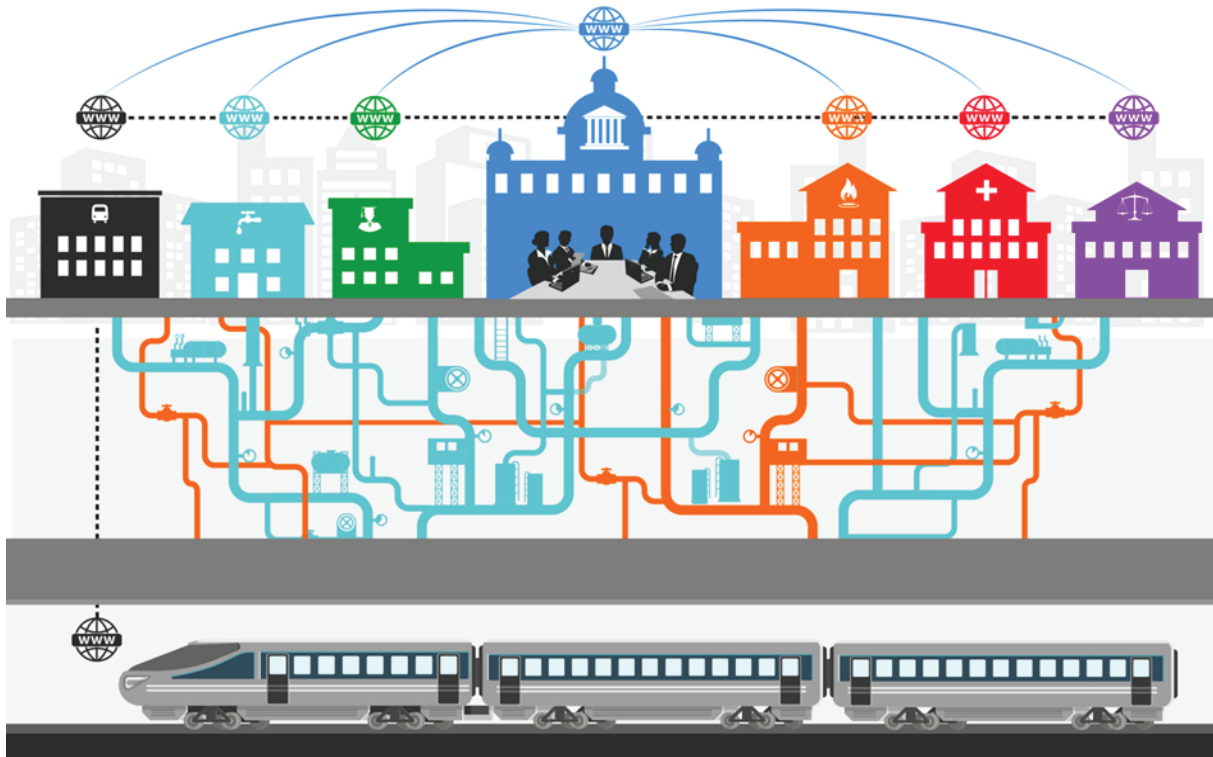
- Improving the quality, efficiency, and speed of response of city services to any emergency situations.
- Full control over the use of management tools and resources, transparency in the decision-making process.
- Improving security and control systems at sensitive facilities and during public events.
- Reducing costs for solving specific urban problems through better planning.
- Improving communication between city residents and the government.
- General optimization of urban infrastructure management.
- Using option modeling tools to assess the consequences of implementing certain long-term strategic projects for city development.
- Possibility of attracting external investment by creating the image of a modern, advanced city.

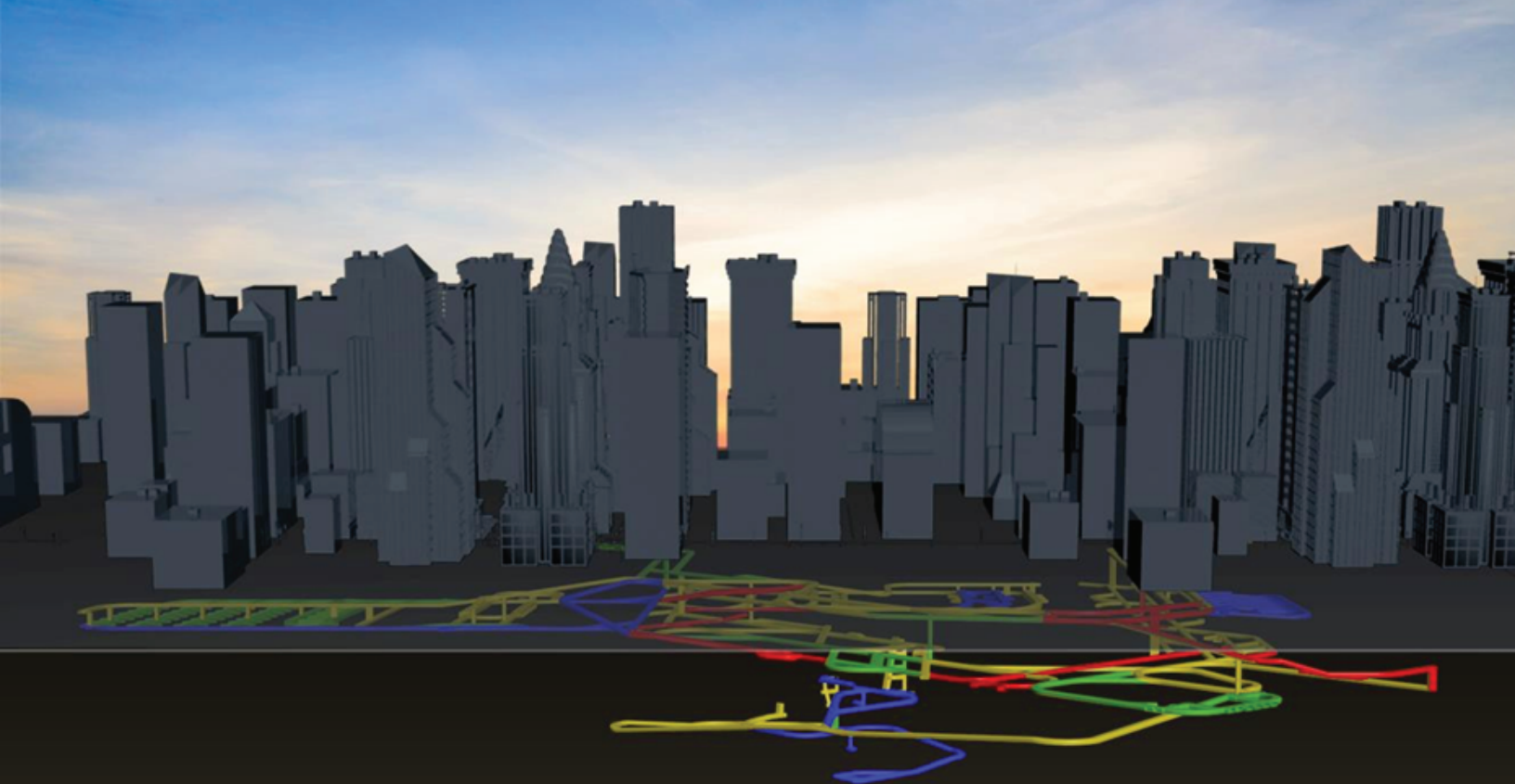
PRACTICAL IMPLEMENTATION OF THE DIGITAL CITY CONCEPT

As of 2018, Barcelona is considered the formal leader in implementing the digital city concept. Barcelona hosts the annual Smart City Expo World Congress, where the world's leading technology companies present their solutions and ideas.

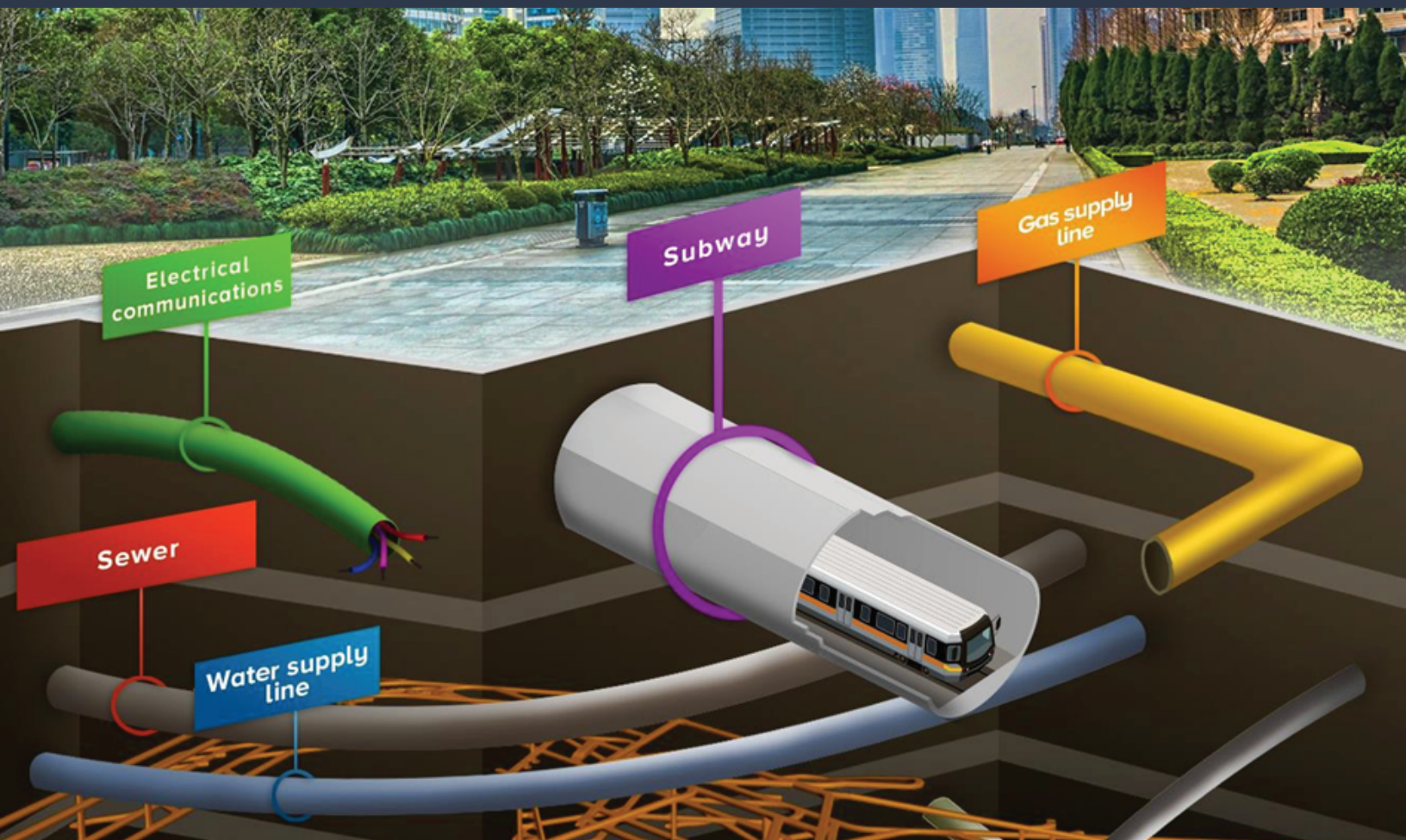
According to information from Wikipedia, among the cities that have achieved serious success in creating Digital Twins are Suwon (South Korea), Stockholm (Sweden), the Gangnam district in Seoul (South Korea), Waterloo, Ontario (Canada), Taipei (Taiwan), Kobe (Japan), Glasgow (Scotland, UK), Calgary (Alberta, Canada), Seoul (South Korea), New York (USA), LaGrange, Georgia (USA) and Singapore.

A number of cities in Europe, North America and Asia have implemented various private components of the Digital City concept.

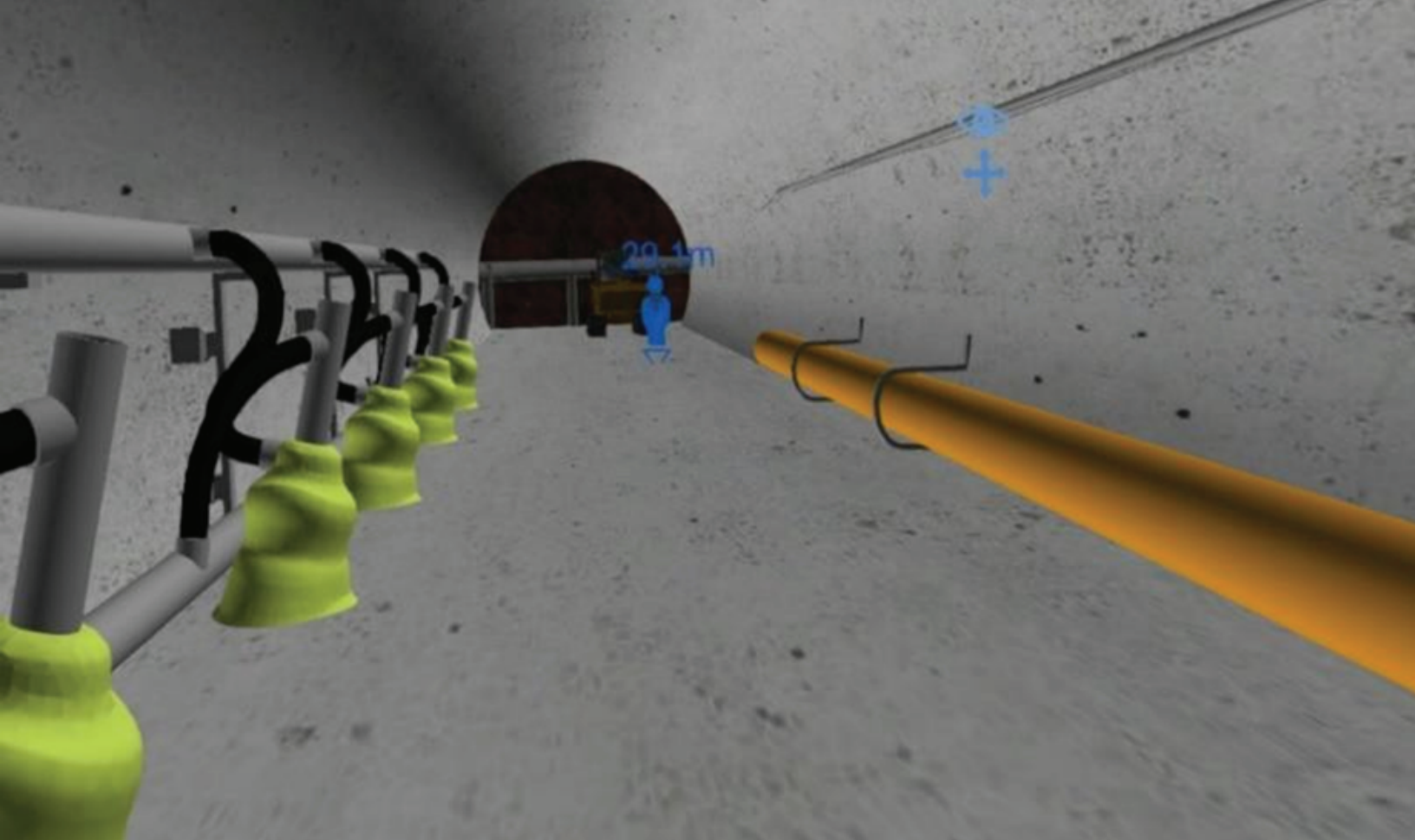




CLASSIFICATION OF UNDERGROUND ENGINEERING OBJECTS AND SERVICES



SMART CITY: DETAILED UNDERGROUND INFRASTRUCTURE



DIGITAL TWIN OF AN ENGINEERING OBJECT AND ASSESSMENT OF ITS CONDITIONS



SMART CITY VISUAL INSPECTION THROUGH HOLOGRAPHIC MODEL OF ITS INFRASTRUCTURE

OUR VALUE PROPOSITION

The information required to create a Digital Twin is very diverse, and the list of required technologies seems dauntingly complex. It is required to combine within the framework of a single digital model of the city such different components as systems for collecting and processing laser data, models of underground hydrogeological structure, communication, and transport networks, all this must be connected through a system of modern sensors and brought to the Internet. And in addition, it is equipped with the most modern visualization mechanisms...

However, this task is feasible, and we are happy to offer our services to solve it.

A technique developed by SightPower Inc. in collaboration with Arvizio Inc. (www.arvizio.io) allows for the comprehensive creation of a Digital Twin of a city at a level that is at the forefront of world achievements in this field.

SightPower has many years of experience in creating Digital Twins of complex industrial facilities, primarily in the mining industry. The digital model of any mining enterprise requires combining surface infrastructure objects and constantly changing underground infrastructure objects into a single coherent system, monitoring the status of resources (people and equipment) underground, and organizing continuous communication with these resources.

- SightPower is the developer of a unique client-server system for the integration and visualization of spatial, infrastructure and engineering data.
- SightPower has many years of experience in creating geological and hydrological models of underground structures based on data from geological and hydrogeological wells.
- SightPower has extensive practical experience in organizing laser scanning of ground- and underground-based objects.
- SightPower has the world's best laser data processing and visualization capabilities.
- Technology SightPower is fully compatible with Arvizio Inc.'s high-performance client/server mixed reality platform.
- We guarantee our clients obtaining real and concrete results in the shortest possible time.

ABOUT SIGHTPOWER

SightPower Inc. is a company headquartered in Ottawa, Canada, with offices and development centers in the Republic of South Africa (Johannesburg) and Ukraine (Kharkov).

The company was founded by a group of businessmen, engineers and scientists who use their many years of successful experience in the practical development of information analytical systems and description of data models for infrastructure projects, the mining and oil and gas industries.

The founders and employees of SightPower have a long history of performing specialized consulting and custom development work. They provided services and consulting assistance to such major international companies as De Beers, Nexen, Husky, Autodesk, Huber Energy, Shaft Sinkers, Metso Minerals, Harmony Gold, Ukrgazvydobuvannya, DMT, Lycopodium, etc., for which unique technological solutions were developed.

The focus of SightPower's work is the implementation of the concept of digital twins of complex objects with combined above ground and underground infrastructure, in particular for mining industry. The most prominent example is DIGITAL MINE™ model, based on the idea of informatization of all operations and work processes at the mining enterprise, combining modeling, monitoring and distributed sensor system into a single corporate solution based on the original Mining and Geological Information System (MGIS) Mine Advisor™.

The implementation of GGIS Mine Advisor™ involves the adaptation of existing system tools to suit the enterprise processes, while the implementation of most existing boxed mining and geological packages involves training specialists to work with existing tools and adapting the workflow to the capabilities of these tools.

SightPower's latest developments expand the concept of creating a digital twin of a mine to the level of creating a complete digital model of a town, a district, or a large city with all underground and surface infrastructure.

www.sight-power.com

ABOUT ARVIZIO

Arvizio Inc. was founded in 2016 in Ottawa, Canada. The company develops client-server systems for extended and augmented reality technologies with the ability to connect participants simultaneously remotely to distributed resources. The company focuses on developing products for many industrial markets, but primarily for the construction and architecture, engineering, mining, and energy industries as well as for AR-training, quality assurance and remote collaboration. Arvizio offers the world's first server-based mixed reality platform real-time model visualization and analysis, both within and across offices. Efficient remote exchange of holographic models, supported by live audio and video communication mechanisms, creates a unique experience for the exchange of factual visual information combined with augmented reality data.

www.arvizio.io



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