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GIS AND UKRAINE

UKRAINE CREATED SOME OF THE FIRST GIS PRINCIPLES AND SYSTEMS IN THE 1980S AND THE COUNTRY CONTINUES TO USE GEOSPATIAL TECHNOLOGIES. PAVEL YALOVOL LOOKS AT THE CURRENT STATE OF GIS IN UKRAINE AND WHAT THE FUTURE HOLDS FOR THE COUNTRY

Ukraine has a long history of contributing to innovations in GIS technology. In fact, initial GIS methodological principles and the first applied fully functional GIS were created in Ukraine in the mid-1980s. Today, a large number of governmental and commercial organisations in Ukraine actively use GIS technology. Their activities are fully based on GIS and the success of their work depends heavily on the competent application of GIS technologies.

Thematic mapping is undoubtedly the most popular and enduring area in which GIS is applied. GIS helps to fuel Ukraine's economy by producing maps for tourism, land tenure and cadastre, geological exploration and mining operations, agriculture and melioration, and protecting the environment. The country's local, regional and national landscape maps are all based on GIS, as well as maps of soils, demographics, water resources, highways, industry, agriculture, climate, topographic and many others.

When Ukraine needed to create accurate radiation contamination maps of the country, these were prepared in a GIS. GIS technology also helped trace current radioactive levels to help solve some of the issues related to the Chernobyl nuclear disaster. Large cities in Ukraine continue to receive electronic information and referral maps under the "Yellow Pages" project annually. Additionally, numerous interactive electronic maps and atlases for professional, educational and general directions were created for Ukraine in GIS environments.

GIS and navigation

Navigational mapping has recently made a sharp jump in usage and development. In today's world, it is hard to imagine a taxi, courier, ambulance service or even the car of an average citizen without a navigation system helping it to navigate unknown roads. Over the past few years, several large companies have emerged to provide navigation services, increasing competition in the market.

This heightened competition is partly due to the explosion in mobile phones, as consumers demand GPS and access to the latest information on traffic conditions, and optimal and safe routes to destinations such as nearby restaurants, car service centres, theatres and other places of interest. As a result, companies developing GIS for mobile are constantly striving to improve their products and services, searching for better solutions for customers and technological innovations that deliver a competitive advantage. Competing in the market is impossible without the ability to apply and innovate with GIS technologies.

GIS and monitoring

GIS is an extremely easy tool for observing and recording environmental changes. GIS offers all the tools necessary to work with remote-sensing environmental data. Thus, remote monitoring is a very important target area for the application of GIS. The entire Ukrainian soil-monitoring system operates using GIS. Observational data are collected on macro-and micro-elements, humus and the agro-physical soil index and are recorded in a GIS for further processing. All data obtained is analysed using mathematical operations that calculate changes in soil characteristics. The maps of soil indicators are created in a GIS and soil parameters are extrapolated in time for prognostic purposes. GISs are also used in forest and air-quality monitoring.

GIS and management

Recently, state power organisations, local government, and public and community services have begun incorporating GIS into their systems. They use GIS to control the key support systems for population centres and enterprises, as well as for space planning and monitoring emergency situations and illegal activities targeting land such as deforestation, land rejection and land-use violations.

The most important step in the development of GIS in Ukraine was the creation of the Ukrainian Government client-server information and analytical system for emergency situations. This resulted in a single information environment for sharing geospatial data between concerned ministries and departments. A GIS client-server also serves one of the leading Ukrainian energy companies, helping it solve control problems related to the operation of power lines.

In recent years, municipal GIS has been developed for various cities in Ukraine. Master plans for large population centres have long made use of GIS. The technology has also helped collect and provide information and analytical support about protecting and using plant resources in accord with Ukrainian law. The Natural Resources and Ecology Department of Ukraine has developed – and partially implemented – an automated system for tracing unauthorised dumps, illegal deforestations, artificial burnout of rubbish, illegal use of reserved areas and other unlawful acts. The GIS 'Ukraine Elections' was created to collect and provide information on stages of the electoral process in different territorial areas of Ukraine. The system was tested during the recent presidential elections, and in the parliamentary elections in Ukraine.

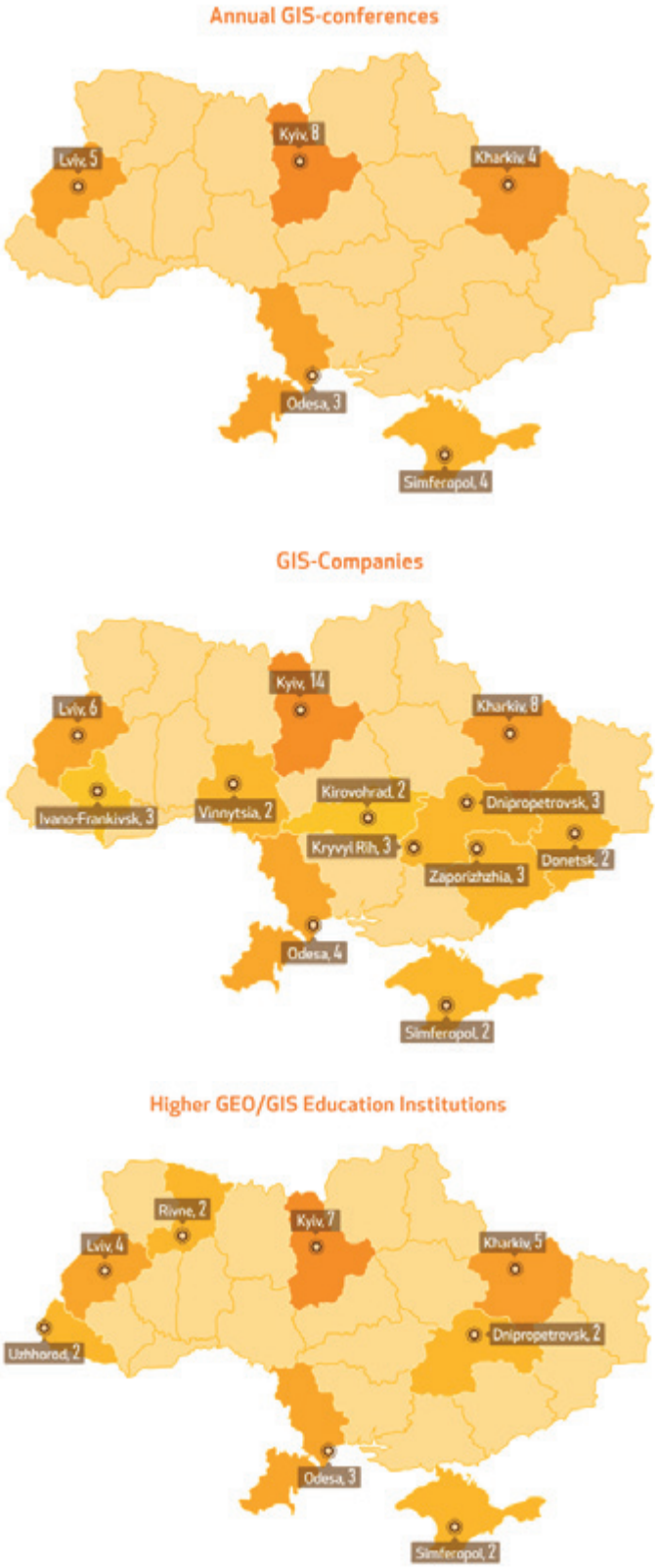
One of the leading Ukrainian GIS-companies developed the database and cartographical basis for voter and political representation in Kharkiv city and in the Kharkiv region, in accordance with an order from the Kharkiv Ministry of Internal Affairs. The same company developed a system of 'optimum path definition' for Ukraine's main department of the Ministry of Emergency Situations in Kharkiv. The system manages information related to fires in the region, registers valid emergency signals, filters out false signals, and locates and evaluates special characteristics of objects related to emergencies.

In addition to government institutions, private companies are very important consumers of GIS services for management, dispatching and control. For example, one GIS company works with private transport companies, providing them with car tracking systems to ensure its drivers do not deviate from their routes or ignore standard operation procedures, and that solutions to problems are timely. Another GIS company has developed the GIS certification of fibre-optic networks and offered it to telecommunications operators. This system enables the comprehensive automation of technical services' and company managers' daily production activity.

GIS and design

The design industry relies heavily on GIS. It's used in industrial production to design enterprises, in construction to design communications, and in municipal design to develop planning territory schemes. Today, all Ukrainian municipal projects are supported by GIS, which makes it possible to create thematic and integrated maps. The design of shafts, dikes and industrial zones employ GIS.

GIS offers all of the tools necessary for every stage of design and construction, and for making key decisions on constructible surfaces, placing and planning infrastructure, engineering and energy networks, transport network planning, calculating optimal delivery routes for construction materials and much more.



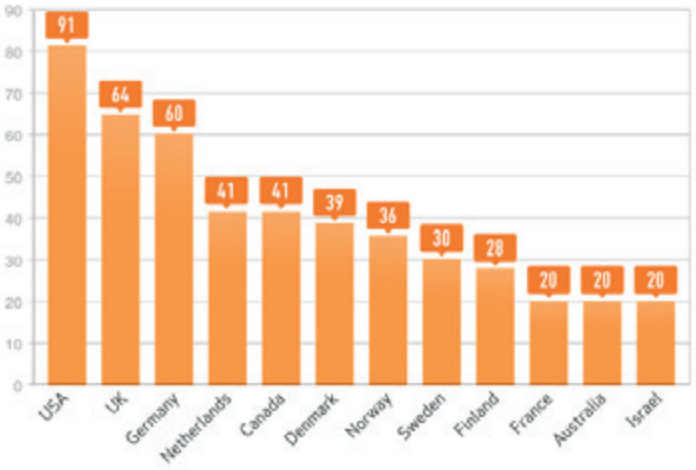
GIS in science and education

A significant number of organisations involved in educational and scientific research in geography, cartography, dendrology, nature conservation, geology, land management, engineering construction, geodesy and others use GIS.

For scientific institutions, GIS is a powerful way to solve space-oriented tasks, plan fieldwork, construct intermediate and final maps, and

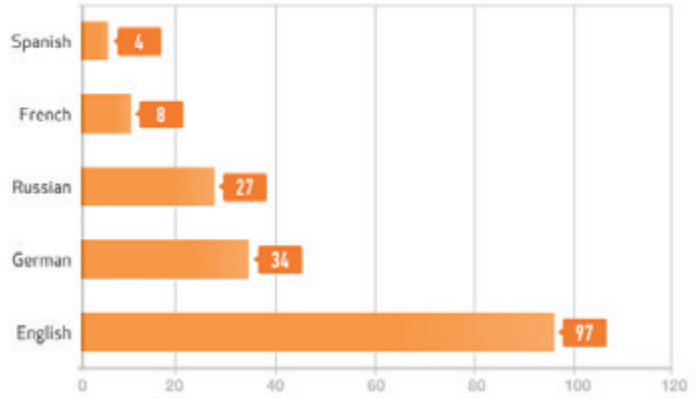
Key Regions for IT-Services Export

Company survey: What are your main markets?



Language Use

Company survey: What languages do you provide services in?



build and operate geographically referenced databases. Some scientific GIS projects are well known outside Ukraine, which helps to further integrate it into the world's scientific community.

GIS is widely used in the humanities as well. GIS technology provides spatial analysis on preferences in election results, and to assess spatial regularity in socio-economic and demographic dynamics.

But it would be inaccurate to conclude that GIS only contributes to science. Science is also contributing to major advances in GIS. Research organisations and innovative companies are currently spending lots of resources investigating the geo-informatics field, seeking ways to further develop GIS technology and design advanced methods to apply the benefits of GIS to even more economic sectors.

The ubiquitous spread of and demand for GIS specialists has led to GIS departments forming in higher educational institution, and to the development of GIS disciplines in educational departments. Today, more than 10 universities are preparing specialists in 'GIS and technology' and over 50 universities teach GIS disciplines.

GIS developers in Ukraine

Several offices of big software GIS developers, such as ESRI, Intergraph and CB Panorama, have opened in Ukraine in the past 15-20 years. In addition, the market for GIS services was further strengthened when several domestic developers successfully created software products and solutions based on the technologies of the world's leading companies.

GIS Services Rates

Position	USD/hour
GIS Project Manager	26-30
GIS Architect	28-32
GIS Developer	24-30
GIS Analyst	16-25
GIS Technician	12-18

There is also vibrant, robust and purely GIS-product development. For example, a mine surveying GIS was developed in Ukraine. It automates all the calculations of district mine surveyors, including the design of drilling and blasting operations, and creates systems for the operational dispatch and control of equipment.

Exchange of experience and communication in GIS

The widespread usage of GIS, and the involvement of large numbers of Ukrainian specialists in the industry, led many different industries and organisations to seek a forum for exchanging experiences and ideas. The Ukrainian GIS Association, formed in the late 1990s, was the first public organisation to bring together GIS specialists.

In addition, several conferences, seminars and symposiums on the development, practical application and prospects for GIS are held every year at higher education and scientific institutions. The annual GIS Forum attracts leading developers and users from around the world, as well as representatives from organisations interested in cooperating with them.

Of course, the development of GIS in Ukraine isn't completely smooth. An absence of common standards and unified norms in the field of storage, transmission, processing and presentation of spatial data are issues. As a result, there is no single national spatial data infrastructure in Ukraine. Developers and experts are guided by their personal ideology and standards of geodata information models when implementing major GIS projects. However, the first steps to a solution are underway.

What next?

An extensive and rich market for GIS services, combined with powerful GIS players, has coalesced in Ukraine. The components of a fully functioning GIS industry are evident in education, science and communication.

But as always, the industry must move forward. Progress will be implemented in two ways: organisational and scientific-technical. In the organisational realm, the establishment of common standards and unified norms is a must in the storage, transmission, processing and presentation of geodata, and to strengthen relations between actual and potential players in the GIS industry. This is also essential to securing legislative support in the geospatial field.

From the scientific-technical viewpoint, it is critical to continue to improve GIS technology, as well as the applications based on it. This should be done in an extensive-territorial manner to keep accumulating and consolidating geospatial information and in an actively-analytical way to keep developing new GIS tools, to improve the existing tools, and to find new applications for GIS.

The biggest part of the responsibility for further developing Ukraine's leadership role in GIS falls on large innovative companies in the field. Today, almost everyone can use free geographic information web services skilfully. Thus, the professional qualifications of GIS companies are sharply rising.

Some facts about the early history of computing in Ukraine

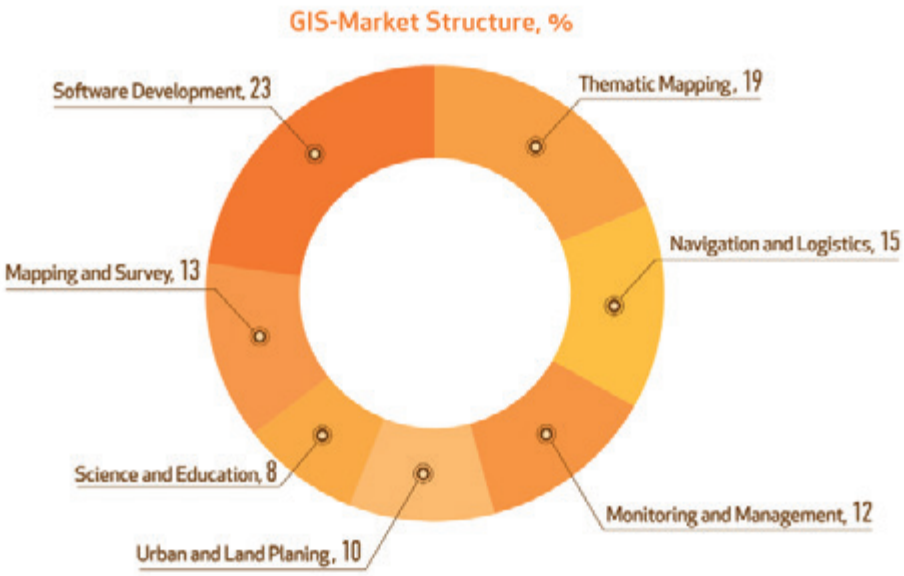
1914 The idea of logical operations automation was first presented in Kharkiv.

1941 The p-n transition was discovered at Academy of Sciences of the Ukrainian SSR

1951 First digital electronic computer in the Continental Europe was constructed

1971-1972 Specialized unique computers for navigation, weapons and control systems in navy ships, submarines and strategic rocket-space systems were developed

1989 The first neurocomputer in the USSR was constructed in Ukraine



Size of the country	603,700 sq. kms.
Population	45,706 million
Capital	Kyiv, or Kiev
Currency	Hryvnia (UAH)
1 USD=UAH (average)	8
1 Euro=UAH (average)	11
GDP in PPP	US$ 344.7 billion
GDP per capita in PPP	US$ 7,600
CPI	8,2
Unemployment rate	8,1
Inflation rate	0,5
Time Zone	EET (UTC +2)
Literacy Rate	99,40%
Labor Force	22.19 M

No longer are employees given simple tasks to solve. They are expected to analyse and address extremely complex, advanced, technology-based goals that take into account all factors and the interests of stakeholders. In these conditions, leading companies and specialists must better prepare and use past lessons to meet demand from consumers and employers alike.

Time doesn't stand still. The accelerating world sends us new and more challenges every day. We can accept these challenges by using the most modern and powerful tools available to us. Being GIS specialists, we must put forth the effort to improve GIS and further its integration into all areas of society. The future promises a lot of work, new challenges, important decisions and many rewards for consumers and those in the GIS industry alike.

Ukraine will continue to play a leading role in realising the full value of GIS, and innovating to bring new value to the world. And as Ukraine brings GIS to the world, we expose the country's rich, deep technical talents at the very same time.

UKRAINE WILL CONTINUE TO PLAY A LEADING ROLE IN REALISING THE FULL VALUE OF GIS

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