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HISTORY OF GEOGRAPHIC INFORMATION SYSTEMS AND THEIR IMPORTANCE IN CONTEMPORARY SPATIAL ANALYSIS

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ANNOTATION: *This article examines the historical development of Geographic Information Systems (GIS) and highlights their growing importance in the context of contemporary technological progress. The study analyzes the current applications of GIS, modern software tools used for land measurement and spatial analysis, and the integration of advanced technologies such as GPS, remote sensing, and digital cartography. Particular attention is paid to the practical use of GIS in land management, cadastre, environmental monitoring, and planning processes. In addition, the advantages and limitations of GIS technologies are critically evaluated, and practical recommendations are proposed in accordance with modern socio-economic and technological requirements.*

KEYWORDS: *technology; geoinformatics; spatial analysis; GPS; digital cartography; Geographic Information Systems (GIS)*

INTRODUCTION

In the 21st century, information technology has become one of the most rapidly developing sectors, fundamentally transforming almost all areas of human activity. Today, it is difficult to identify any field that operates independently of digital technologies. In this context, Geographic Information Systems (GIS) occupy a special place, as they enable the collection, storage, analysis, and visualization of spatial data for effective decision-making. Modern GIS technologies have evolved from simple mapping tools into complex analytical systems widely used in land management, urban planning, environmental protection, agriculture, and disaster risk management.

At present, digital maps and GIS-based spatial models play a crucial role in the creation of land-use plans and territorial development projects. A wide range of modern software products is used in GIS applications, including ArcGIS, Panorama, Oasis, AutoCAD, Global Mapper, and various satellite-based analytical platforms. These software tools allow the creation of maps at different scales, integration of spatial and attribute data, and real-time analysis of geographic phenomena. Their application significantly improves the accuracy and efficiency of spatial planning processes.

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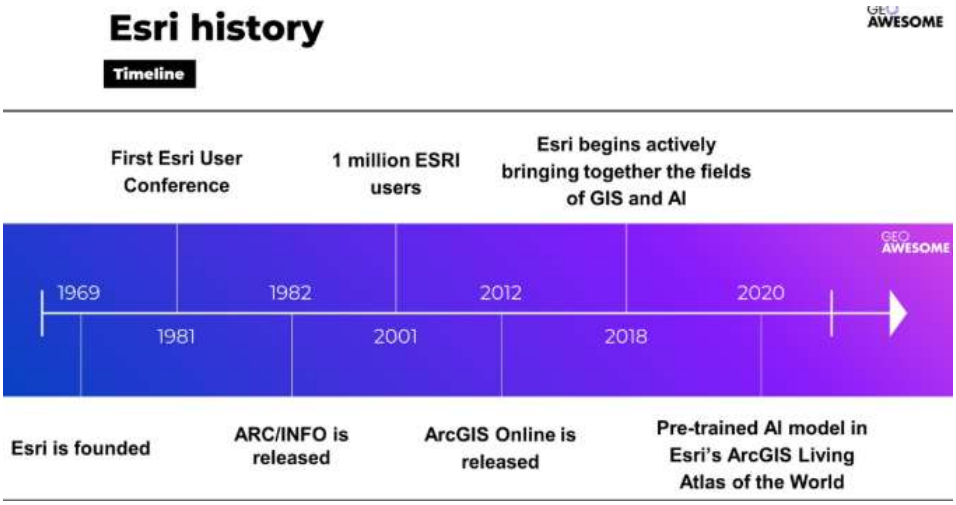

1-picture History and evolution of Esri GIS technologies

The concept of Geographic Information Systems first emerged in the mid-1960s in Canada with the development of the Canadian Geographic Information System (CGIS). The primary objective of CGIS was to inventory land resources and assess their current condition and future potential. Since then, GIS technology has undergone rapid development, driven by advances in computer science, geodesy, cartography, and satellite technologies. Today, GIS is extensively used in developed countries across economic, political, environmental, and scientific domains, serving as a key tool for sustainable resource management.

Developing countries, including the Republic of Uzbekistan, have also recognized the strategic importance of GIS technologies. In Uzbekistan, significant efforts are being made to modernize land administration systems through the implementation of GIS-based solutions. These technologies play a vital role in the rational use of land resources, state registration of land parcels, identification of unused and degraded lands, and monitoring of land-use changes. Furthermore, the integration of GIS into education and professional training is essential for preparing future specialists capable of addressing emerging spatial and environmental challenges.

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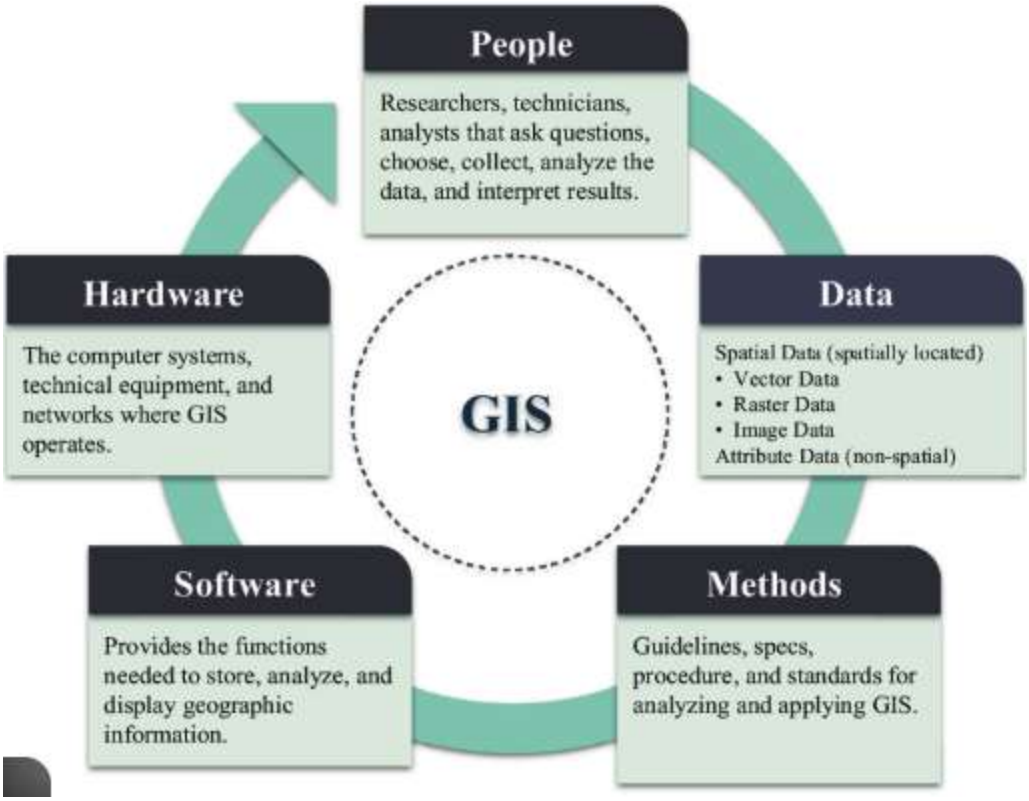
The development of GIS in Uzbekistan began in the early 1990s with the establishment of geoinformation databases by the Uzgeology Committee. Subsequent projects led to the creation of digital maps at various scales for Tashkent city, the Fergana Valley, and the entire country. International cooperation, particularly with organizations such as KOICA and the International Atomic Energy Agency (IAEA), has contributed to the establishment of national GIS infrastructures. Despite the significant financial and technical investments required, these initiatives have laid the foundation for a modern spatial data management system in Uzbekistan.



2-picture Main components of Geographic Information Systems

Among the various GIS software solutions, ArcGIS remains one of the most versatile and widely used platforms worldwide. Developed by Esri, ArcGIS offers powerful tools for spatial analysis, data visualization, and online data integration. Its advantages include user-friendly interfaces, flexible data formats, and compatibility with web-based services. However, the high cost of proprietary GIS software remains a major limitation, particularly for developing countries and educational institutions.

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The advantages of modern GIS technologies include the ability to frequently update digital spatial data, unlimited copying and scaling of maps, integration of historical cartographic materials through scanning, and direct data exchange via satellite systems. At the same time, GIS technologies face several challenges, such as high software and data acquisition costs, long training periods for specialists, potential errors in coordinate processing, and compatibility issues between different software formats.

3-picture Applications of Geographic Information Systems in the modern world

Despite these limitations, the continued development of GIS technologies offers significant opportunities for monitoring spatial changes, analyzing geodetic and geographic processes, and supporting evidence-based decision-making. In a rapidly developing country like Uzbekistan, the expansion of GIS applications—particularly in agriculture, land monitoring, and environmental management—represents a key factor in achieving sustainable development and technological progress.

REFERENCES:

1. Karimov, E., Akhrorov, A., & Tolibov, S. (2022). Natural geographical zoning of agricultural land. *European Journal of Business Startups and Open Society*, 2(2), 100–103.
2. Kodirivich, K. E. (2020). The condition and efficient use of agricultural land. *Agroprocessing*, Special Issue.
3. Karimov, E. K., Bobozhonov, S. U., & Mukhammadov, K. M. (2021). Influence of the properties of irrigated soils on the productivity of the Vobkent district. *Online Conferences Platform*, 59–61.
4. Karimov, E. K., Asadov, T. A., Kodirov, M. I., & Soliev, A. A. (2017). Evaluation, preservation and improvement of soil fertility and organization of rational land utilization. In *European Conference on Innovations in Technical and Natural Sciences* (pp. 55–60).

Latin American Journal of Education
www.lajoe.org

5. Karimov, E. K. (2021). Changes in the properties of desert-sandy soils of the Vabkent district under the influence of irrigation. *Actual Problems of Modern Science*, 4, 101–103.

6. Karimov, E. Q. (2020). Improvement of soil quality assessment using information technologies. In *Efficiency of Application of Innovative Technologies and Equipment in Agriculture and Water Management* (pp. 321–324).

7. Karimov, E. K., & Ahmadov, S. O. (2021). Changes in the genesis of desert-sandy soils during land development. In *Generation of the Future: The View of Young Scientists–2021* (pp. 279–282).

8. Karimov, E. K., Bobozhonov, S. U., Mukhammadov, K. M., & Akhtamov, S. (2021). Position and effective use of land for agriculture of the Republic of Uzbekistan. In *E-Conference Globe* (pp. 50–53).

9. Karimov, E., Akhrorov, A., & Tolibov, S. (2022). Fundamentals of efficient use of land and water resources. *Euro-Asia Conferences*, 39–41.

10. Karimov, E., & Abdualiyeva, S. (2021). The importance of the ecological situation in the use of land resources. In *E-Conference Globe* (pp. 35–37).

11. Nuriddinov, O. X. (2021). Modern improved geodesical, geoinformatical and cartographic methods in the creation of the atlas of cultural heritage monuments in Bukhara region. *Sustainability and Leading Research Online Scientific Journal*, 1(1), 43–47.

12. Nuriddinov, O. X. (2021). Reconstruction of damaged land in farmers and agricultural farms. *Sustainability and Leading Research Online Scientific Journal*, 1(1), 48–53.

13. Imomov, S., Nuriddinov, K., & Nuriddinov, O. (2021). Thermal regime for convective drying products. *E3S Web of Conferences*, 264, 04055. https://doi.org/10.1051/e3sconf/202126404055

14. Nuriddinov, H., Kuchkorov, J. J., & Nuriddinov, O. X. (2019). Thermal balance of a combined solar dryer. *School of Science*, 4, 3–4.

15. Shuxrat, A., & Erkin, K. (2020). Ways to increase the effective use of lands of peasant and dehkan farms in the Bukhara region. *Agroprocessing*, 2(2).

16. Shuhrat, A., Behzod, A., Mironshoh, M., & Azizbek, A. (2021). Further development of the lemon industry in Uzbekistan and improvement of innovative technologies. In *E-Conference Globe* (pp. 261–263).

17. Adizov, S. B., Obidovich, A. B., & Maxmudov, M. M. (2021). Rights and responsibilities of spouses. *Academic Journal of Digital Economics and Stability*, 7, 14–17.

18. Khamidov, F. R., Adizov, S. B., Karimov, E. Q., & Maxmudov, M. M. (2021). The role of peasant farms and homestead lands in the development of agriculture. *Pindus Journal of Culture, Literature, and ELT*, 3, 5–8.

19. Pirimov, J. J., Khudoyberdiyev, F. S., Muhamadov, K. M., & Akhtamov, S. F. (2021). Modern geographic information systems in land resource management. *Academic Journal of Digital Economics and Stability*, 8, 66–69.

20. Adizov, S. B., Obidovich, A. B., & Maxmudov, M. M. (2021). The tragedy of the Aral Sea: The problem of the century. *Academic Journal of Digital Economics and Stability*, 7, 10–13.

Latin American Journal of Education
www.lajoe.org

21. Egamova, D. A., Shukurova, N. O., & Ahmadov, B. O. (2020). Efficient and rational use of land resources as a requirement of the time. In *Efficiency of Application of Innovative Technologies and Equipment in Agriculture and Water Management* (pp. 327–328).

22. Karimov, E. K. (2021). Change in the properties of desert-sandy soils of the Vabkent district under the influence of irrigation. *Actual Problems of Modern Science*, 4, 101–103.