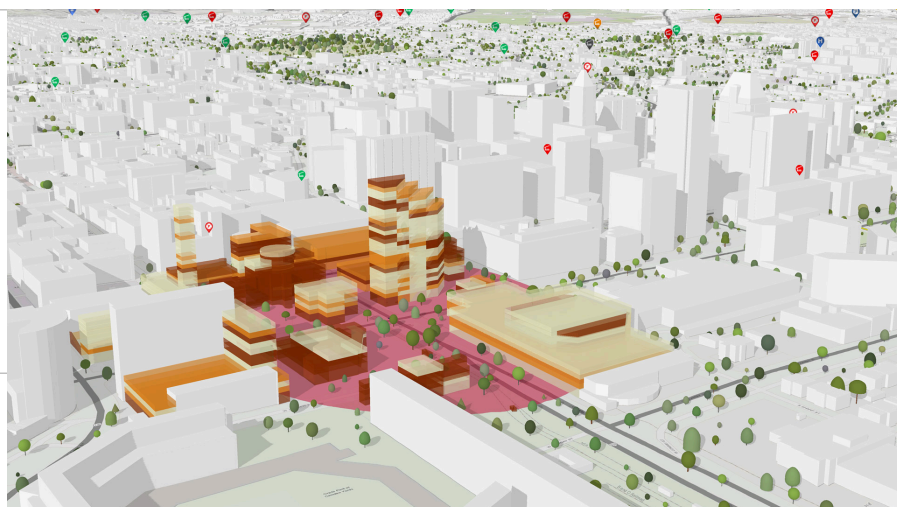ArcНовости

Цифровые Близнецы   Зима 2026

Создание геопространственной нервной системы

Взгляд Джека Дэнджермонда на будущее

Сотрудниками хуНt

xyHt staff

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Взгляд Джека Дэнджермонда на будущее

Геопространственная отрасль переживает период глубокой трансформации. Достижения в области захвата изображений, искусственного интеллекта и облачных технологий сочетаются с решением насущных глобальных проблем — от обеспечения устойчивости к изменению климата до урбанизации. В этот момент мало кто может сравниться по влиянию с

Джеком Данджермондом, основателем и президентом компании Esri. Более 50 лет он руководил развитием географических информационных систем, превратив их из специализированного инструмента в глобальную платформу, влияющую на решения правительств, бизнеса и сообществ.

В продолжительной беседе с *xyHt* Данджермонд поделился не только техническими наблюдениями, но и масштабным видением будущего ГИС. Он говорил о цифровых двойниках как о живых системах, о распределенной геопространственной инфраструктуре, функционирующей подобно планетарной нервной системе, об интеллектуальных агентах, дополняющих профессиональные знания, и о культурной работе, необходимой для того, чтобы все это объединить. Картина, которую он нарисовал, касается не только программного обеспечения, но и того, как общество организует знания и использует их.

География как наука об интеграции

Данжермон снова и снова возвращался к самой географии, которую он называл наукой об интеграции. По его словам, география – это «все». Она объединяет геологию, социологию, климатологию, гидрологию и множество других дисциплин в единую систему для понимания мира.
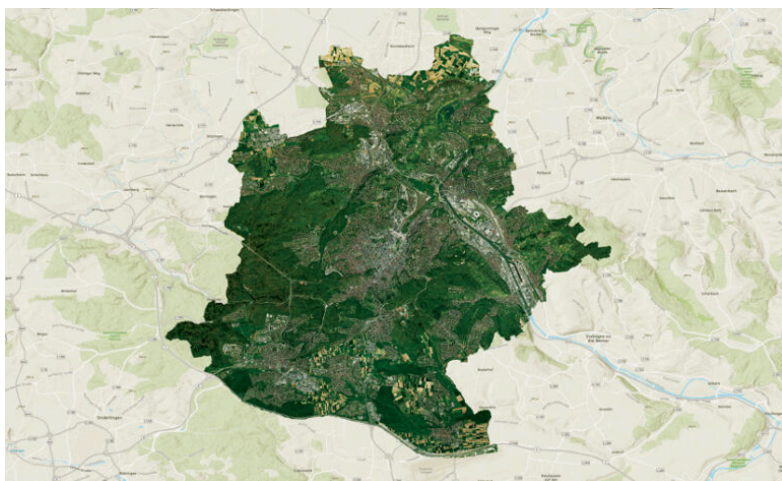
Карты создают общий язык для принятия решений. (Изображение предоставлено GeoFly GmbH.)

ГИС, по его словам, – это инструмент, который объединяет эти дисциплины в удобную для

использования форму. Благодаря разделению наблюдений и измерений на слои — кадастровые границы, карты почв, классификации землепользования, транспортные сети, спутниковые снимки — ГИС позволяет использовать географию в качестве вычислительного инструмента. Общим знаменателем является местоположение, которое он назвал «интегратором». Местоположение позволяет сопоставлять, сравнивать и анализировать данные из разных источников.

This integrative function is more than an academic exercise. It allows planners, scientists, and policymakers to see patterns that would otherwise remain invisible. When zoning maps are overlaid with floodplain data, risks emerge. When vegetation indexes are combined with soil and climate models, agricultural opportunities become clearer. Geography, mediated by GIS, becomes actionable knowledge.

Digital Twins as Living Systems

From this foundation, Dangermond turned to digital twins, one of the most rapidly advancing applications of GIS today. Reality capture technologies—lidar, photogrammetry, unpiloted aerial vehicle (UAV) point clouds—are producing unprecedented levels of detail. Building information models and meshes add another layer of fidelity. But for Dangermond, the real challenge is not capture but integration.

Digital twins, he argued, should not be treated as static deliverables. Too often they are created for a project, handed over, and left to gather digital dust. In his view, that misses the point. "Digital twins are the living synthesis of GIS layers," he explained. They should be maintained and continuously updated, ingesting sensor data and adapting as reality changes.

The implications are significant. A city that integrates building information modeling (BIM), traffic flows, environmental monitoring, and social data into a GIS-based digital twin can do more than document its infrastructure. It can simulate future conditions, model the impact of policies, and guide decisions with an

unprecedented level of precision. A river basin twin that incorporates hydrology, land use, weather forecasts, and soil data becomes a dynamic tool for predicting floods and managing resources. The key is continuity—a twin that evolves as the world does.

A Global Geospatial Infrastructure

Perhaps the most ambitious element of Dangermond's vision is what he describes as a global geospatial infrastructure—a distributed system he likens to the internet. Just as the internet began as isolated networks before coalescing into a connected framework that underpins modern life, geospatial is moving in the same direction.

The outlines are already visible. National efforts like the US National Spatial Data Infrastructure and Europe's INSPIRE program laid early foundations. Statewide platforms in Alaska and national portals in Australia demonstrate the model at different scales. ArcGIS Online alone now connects millions of maps and datasets.

Reality capture technologies are producing unprecedented levels of detail. (Images courtesy of VCTO Labs.)

Yet Dangermond sees this as only the beginning. He imagines a leap from today's 4 or 5 billion maps to 50 billion, all interconnected, interoperable, and searchable. In this vision, a planetary nervous system emerges—not replacing local datasets but connecting them, allowing

distributed content to be discovered and integrated. APIs, metadata standards, and governance frameworks form the scaffolding, but the real power lies in the ability to align data globally.

The urgency is clear. Climate adaptation, urban growth, supply chain resilience—all depend on cross-border, cross-domain geospatial intelligence. No single agency or nation can achieve this alone. Only a connected infrastructure can deliver the insights needed at the scale of today's challenges.

The Challenge of Sharing

For all the promise, Dangermond was candid about the obstacles. The greatest barrier is not technology but culture. "The willingness to share is the key component," he said. Agencies and organizations withhold data for reasons ranging from national security to privacy concerns to institutional inertia. Without trust and openness, the nervous system cannot function.

Esri has sought to make sharing easier through platforms like ArcGIS Online and ArcGIS Enterprise, which provide metadata management, controlled access, and selective sharing. But Dangermond stressed that tools alone are insufficient. What matters most is building trust and shifting organizational culture. Sharing is not about giving up control; it is about enabling collaboration. Unless that shift happens, the broader vision will remain out of reach.

Artificial Intelligence and Intelligent Agents

Artificial intelligence is another force reshaping geospatial, and Dangermond offered a nuanced view. Esri has already deployed neural networks for feature extraction, teaching machines to recognize roads, buildings, and vegetation in imagery. That work, though valuable, is just the beginning.

Digital twins are one of the most rapidly advancing applications of GIS today. (Image courtesy of GeoFly GmbH.)

The next stage, he explained, involves intelligent agents embedded in GIS. These agents could guide professionals through workflows, assist with documentation, or suggest new datasets to consider. They would augment, not replace, human expertise. By mining geographic data for patterns across time and space, agents could surface insights that even experienced analysts might overlook.

The distinction matters. In a field where professionals may fear being displaced by automation, Dangermond emphasized that AI is best understood as a companion—a way to make human work more effective and insightful.

Esri and the Ecosystem

Although Esri plays a central role in this vision, Dangermond positioned the company as a facilitator rather than a monopolist. Esri's philosophy, he said, is to build generic software guided by customer feedback, while leaving room for partners to specialize and extend. The result is an ecosystem that includes global giants like Microsoft and Amazon as well as countless smaller firms innovating in their own niches.

The nervous system, in his view, can only succeed if it is open. Proprietary lock-in would undermine the very goal of interoperability. For Esri, the path forward lies in partnership and collaboration rather than control.

The Historical Arc

Throughout the conversation, Dangermond placed today's developments in a longer historical arc.

Geography and mapping, he reminded us, have always been central to civilization, from the cadastral surveys of ancient empires to the charts of explorers. GIS, in his view, is simply the continuation of that legacy—a way to see, understand, and act at scales unimagined in previous centuries.

What distinguishes this era is the possibility of creating a common language for decision-making. By integrating layers of data into shared systems, GIS provides the framework for governments, companies, and communities to act with greater intelligence. In the nervous system Dangermond envisions, society itself becomes more resilient, capable of responding to crises and planning for the future with clarity.

Digital twins should be maintained and updated as reality changes.

Systematic, Long-Term Work

Despite his optimism, Dangermond warned against the allure of quick fixes. Building the geospatial nervous system will not be achieved overnight. It requires consistent, systematic work: policies, standards, governance, and investment sustained over decades.

The temptation to chase hype must be resisted. The progress that matters will come from steady, collaborative effort. For Dangermond, this patience is not a call for delay but a recognition that lasting infrastructure is built layer by layer, through persistent commitment.

A Shared Responsibility

What made this conversation distinctive was not only the scope of Dangermond's vision but also his acknowledgment that Esri cannot achieve it alone. At several moments, he paused and noted that help is needed—help from the community, from organizations, from thought leaders and practitioners alike.

That acknowledgment reframes the conversation. The geospatial nervous system is not an Esri project; it is a collective endeavor. The living digital twins he describes will only function if organizations commit to maintaining them. The AI agents he anticipates will only be useful if professionals adopt and adapt them responsibly. The global infrastructure he imagines will only take shape if agencies and institutions are willing to share.

Jack Dangermond has been many things: entrepreneur, innovator, thought leader. But in this conversation, he emerged most clearly as a guide. His vision is both inspiring and demanding. It calls not only for technological progress but for cultural change, patient investment, and a willingness to see beyond organizational boundaries. The nervous system he describes is ambitious, but it is also essential. It is up to the geospatial community to bring it to life.

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