



TUDO, EM TODO LUGAR, DE FORMA INTELIGENTE

A NOVA MISSÃO DAS SOLUÇÕES GEOESPACIAIS

Diogo Rosanelli



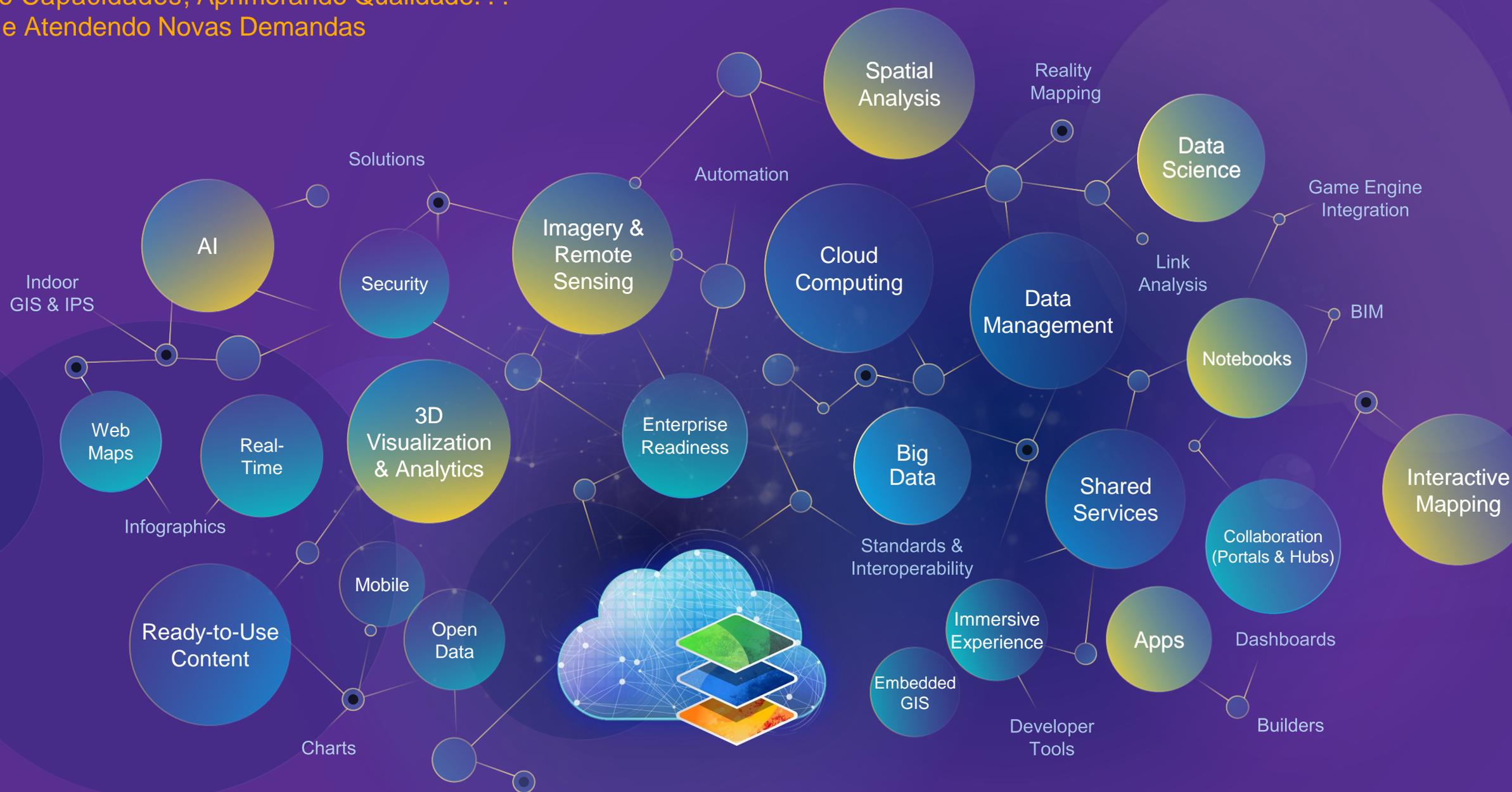
NOSSA JORNADA EVOLUTIVA

EVOLUÇÃO TECNOLÓGICA NA GESTÃO DE ATIVOS



O ARCGIS ESTÁ AVANÇANDO...

Evoluindo Capacidades, Aprimorando Qualidade...
e Atendendo Novas Demandas



A IA está se **integrando e evoluindo** com muitas outras inovações

...E SENDO APRIMORADO COM IA

ENTREGANDO VALOR TRANSFORMADOR



APRIMORANDO GIS COM IA

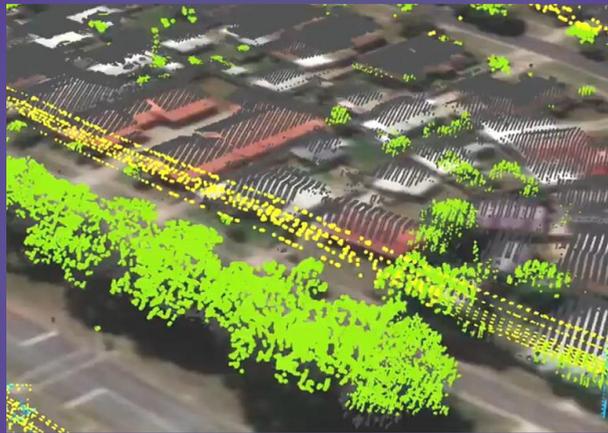
QUE VALORES A IA ESTÁ TRAZENDO PARA O GIS?

AUTOMAÇÃO



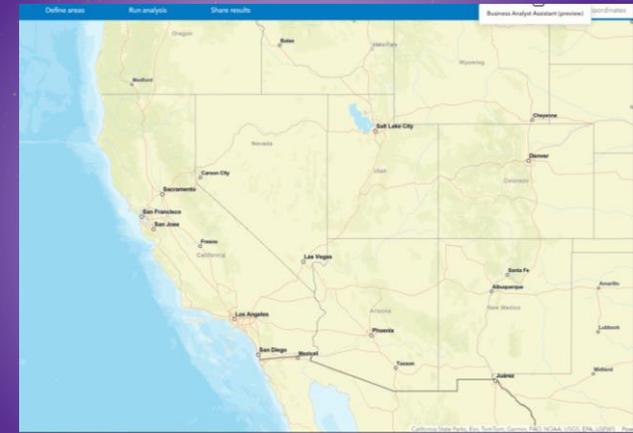
Criação de Dados

ANÁLISE



Insights + Profundos

PRODUTIVIDADE



Experiências Inteligentes

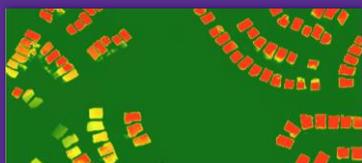
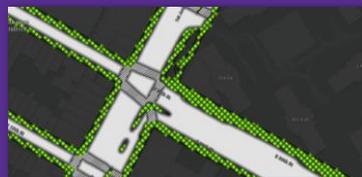
APRIMORANDO GIS COM IA

INTEGRANDO O PODER DO GIS E IA

CIÊNCIA AVANÇADA



GeoAI
(Ferramentas & Modelos)



100 Modelos
... Aberto e Extensível

PRODUTIVIDADE



Assistentes IA
(Melhorar Acesso & Eficiência)

Apoio

- Suporte Técnico
- Mapeamento & Análise
- Documentação
- Geração de Código
- Pesquisa
- Criação de Soluções & Apps
- Traduções
- ...

SEGURANÇA & CONFIABILIDADE



GEOAI
IA Científica

ASSISTENTES DE IA
IA Conversacional

AGENTES DE IA
IA Autônoma

*A IA se torna mais útil quando entende o “**onde**”*

GIS + IA

PORQUÊ ESTA COMBINAÇÃO É TÃO PODEROSA

CONTEXTO GEOESPACIAL + INTELIGÊNCIA

Insights a partir de grandes volumes de dados espaciais

ANÁLISES AVANÇADAS E INSIGHTS EM TEMPO REAL

Tendências, padrões e previsões

AUTOMAÇÃO, EFICIÊNCIA E PRECISÃO

Mapeamento, análise e fluxos de trabalho de gerenciamento de dados

ESCALABILIDADE E ACESSIBILIDADE

Expandindo o impacto do GIS, transformando organizações e permitindo acesso para todos

3 PILARES DA TRANSFORMAÇÃO GIS + IA

HIPERAUTOMAÇÃO & DADOS GEOESPACIAIS INTEGRADOS

Conectar e automatizar a coleta de dados de campo, sensores e sistemas em tempo real no contexto geográfico. Integrar sensores de pressão, hidrômetros telemétricos, dados de atendimento e sistemas legados numa plataforma GIS unificada. **Isso dá visão em tempo real da rede e acelera identificação de problemas, criando uma base sólida para a inteligência.**

INTELIGÊNCIA ARTIFICIAL PREDITIVA & ANALÍTICA

Aplicar modelos de IA/ML sobre esses dados integrados para identificar padrões, anomalias e previsões. Aqui entram os algoritmos de GeoAI que detectam comportamentos, preveem falhas, otimizam manutenção e priorizam investimentos com base em dados reais. **A IA analisa milhões de pontos de dados para fornecer insights que humanos levariam muito tempo para descobrir.**

DEMOCRATIZAÇÃO DA INTELIGÊNCIA

Assistentes de IA geoespaciais e interfaces intuitivas que levam esse poder analítico para as mãos de qualquer usuário, técnico ou gestor, em linguagem natural, utilizando chats, dashboards interativos e aplicações amigáveis para expandir o acesso à inteligência. **É tornar acessível a todos os níveis da empresa a capacidade de questionar dados e obter respostas inteligentes sem precisar ser um cientista de dados.**

DO MAPA



DECISÃO

DO DADO



SOLUÇÃO

DO ATENDIMENTO



TRANSFORMAÇÃO

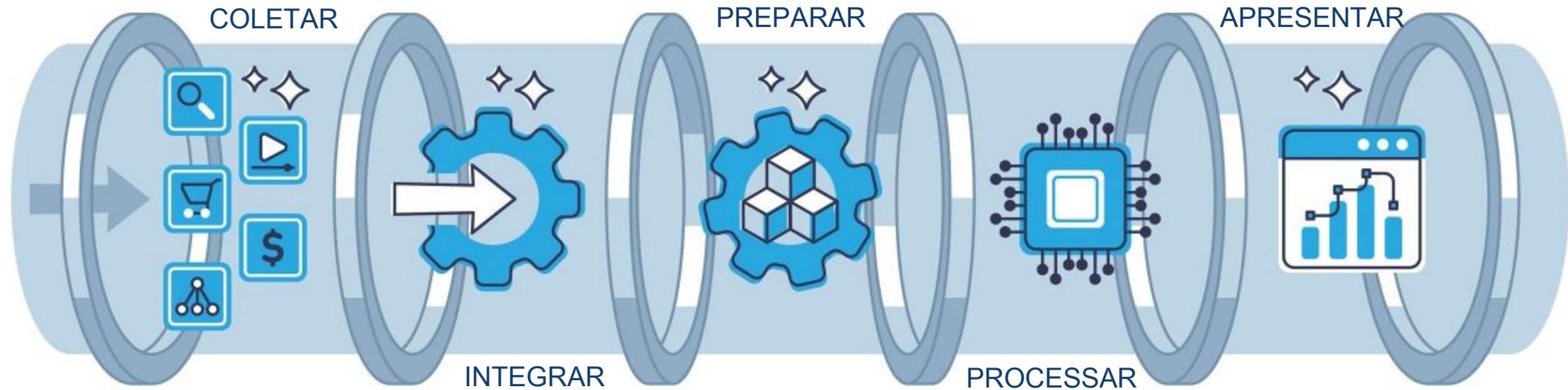


3 PILARES DA TRANSFORMAÇÃO GIS + IA

Capturar a realidade em diferentes formatos e frequências, construindo uma base ampla e representativa do território

Garantir que os dados estejam prontos para serem processados por algoritmos e modelos com segurança e precisão.

Entregar valor em tempo real com clareza, facilitando a tomada de decisão baseada em evidências.

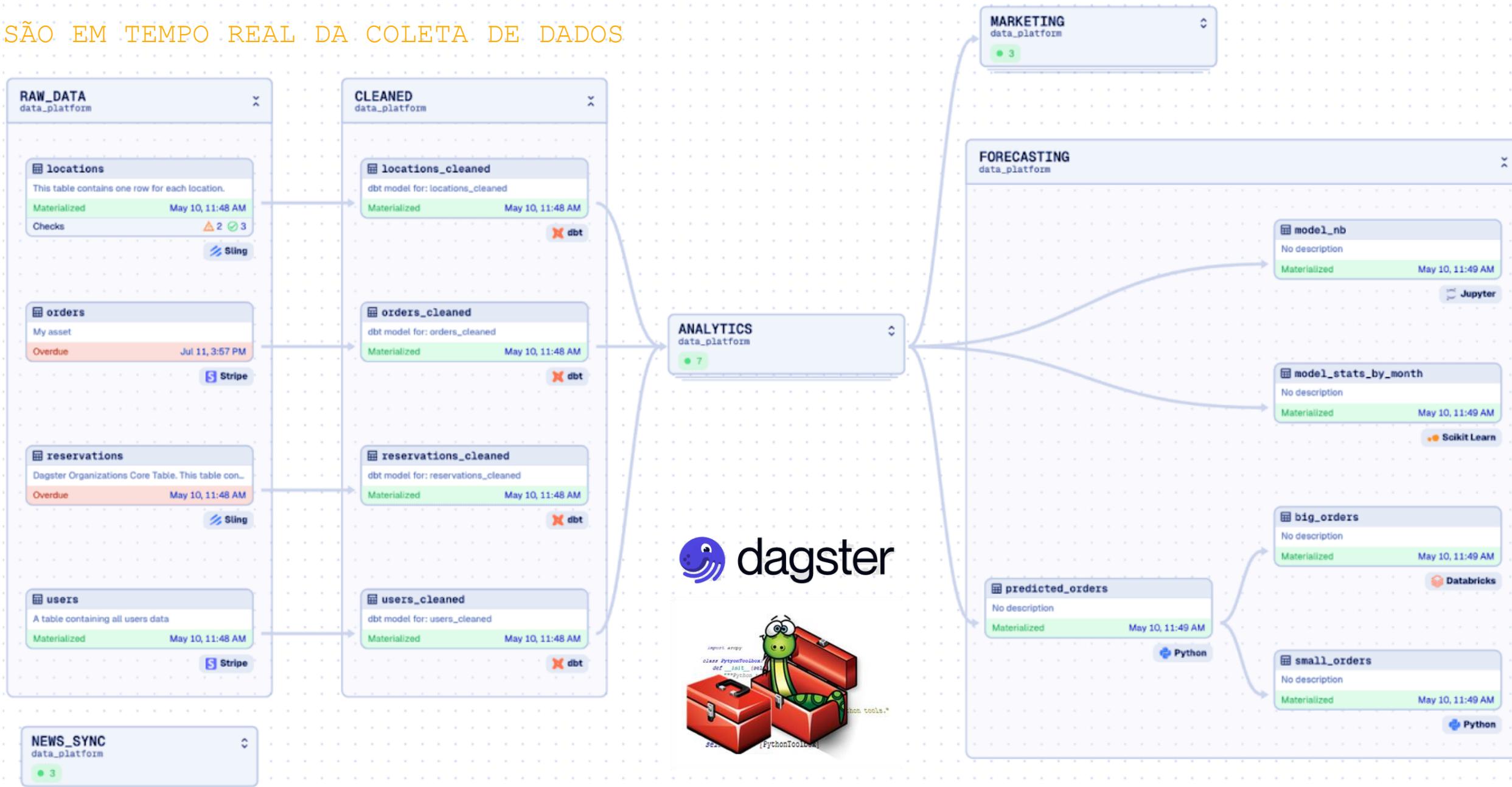


Tornar os dados disponíveis, estruturados e acessíveis para uso contínuo, eliminando silos de informação.

Gerar inteligência analítica, identificando padrões, anomalias e oportunidades.

1º AUTOMAÇÃO INTEGRAÇÃO DE DADOS

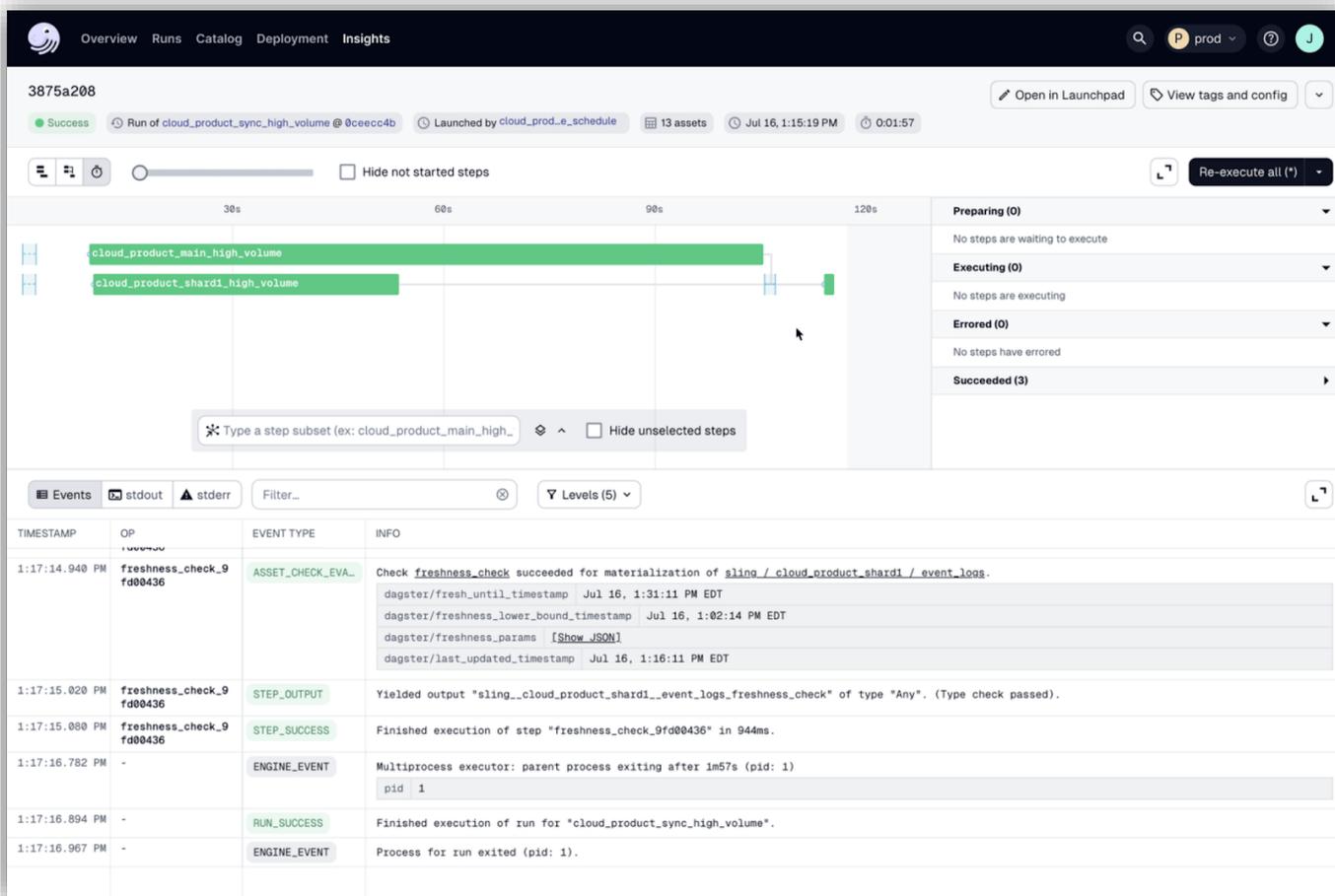
VISÃO EM TEMPO REAL DA COLETA DE DADOS



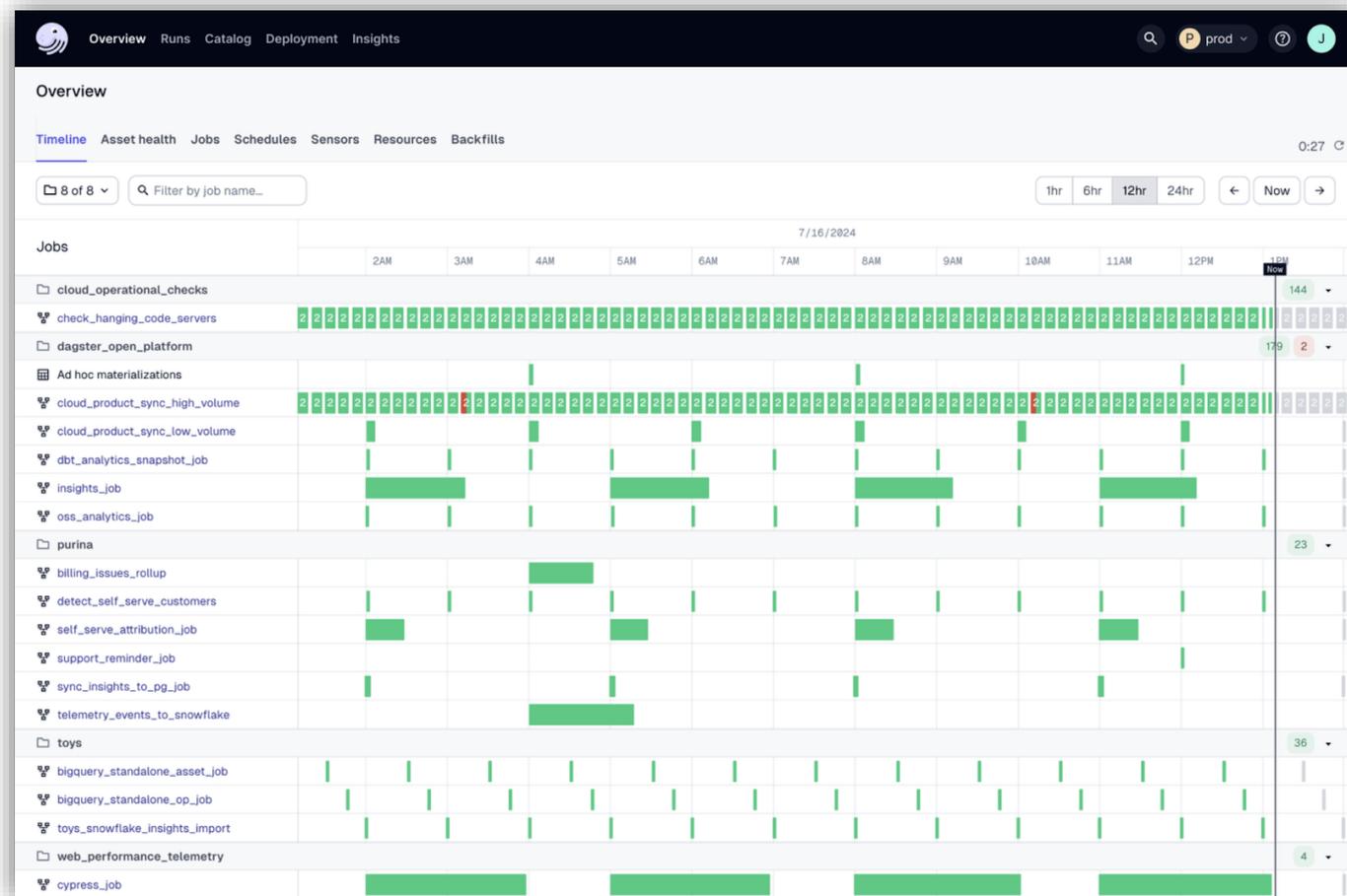
Transforme **dados** em **decisões** com **pipelines inteligentes** que conectam, monitoram e entregam valor em cada etapa do fluxo de informação

1º AUTOMAÇÃO INTEGRAÇÃO DE DADOS

VISÃO EM TEMPO REAL DA COLETA DE DADOS



Visão detalhada de um pipeline de dados permite acompanhar, passo a passo, o que está sendo processado em tempo real, mostrando exatamente como cada informação foi tratada aumentando a confiança nos resultados entregues. Transparência que traz identificação imediata de eventuais falhas ou atrasos e oferecendo clareza sobre o tempo necessário em cada etapa – elementos essenciais para



Visão geral dos pipelines de dados permitindo acompanhar, de forma consolidada, a execução de todas as rotinas críticas da organização. Um panorama que revela padrões de comportamento, frequência de atualizações e possíveis interrupções, promovendo previsibilidade e eficiência. Visibilidade contínua que assegura informações disponíveis no momento certo, fortalecendo a base para decisões

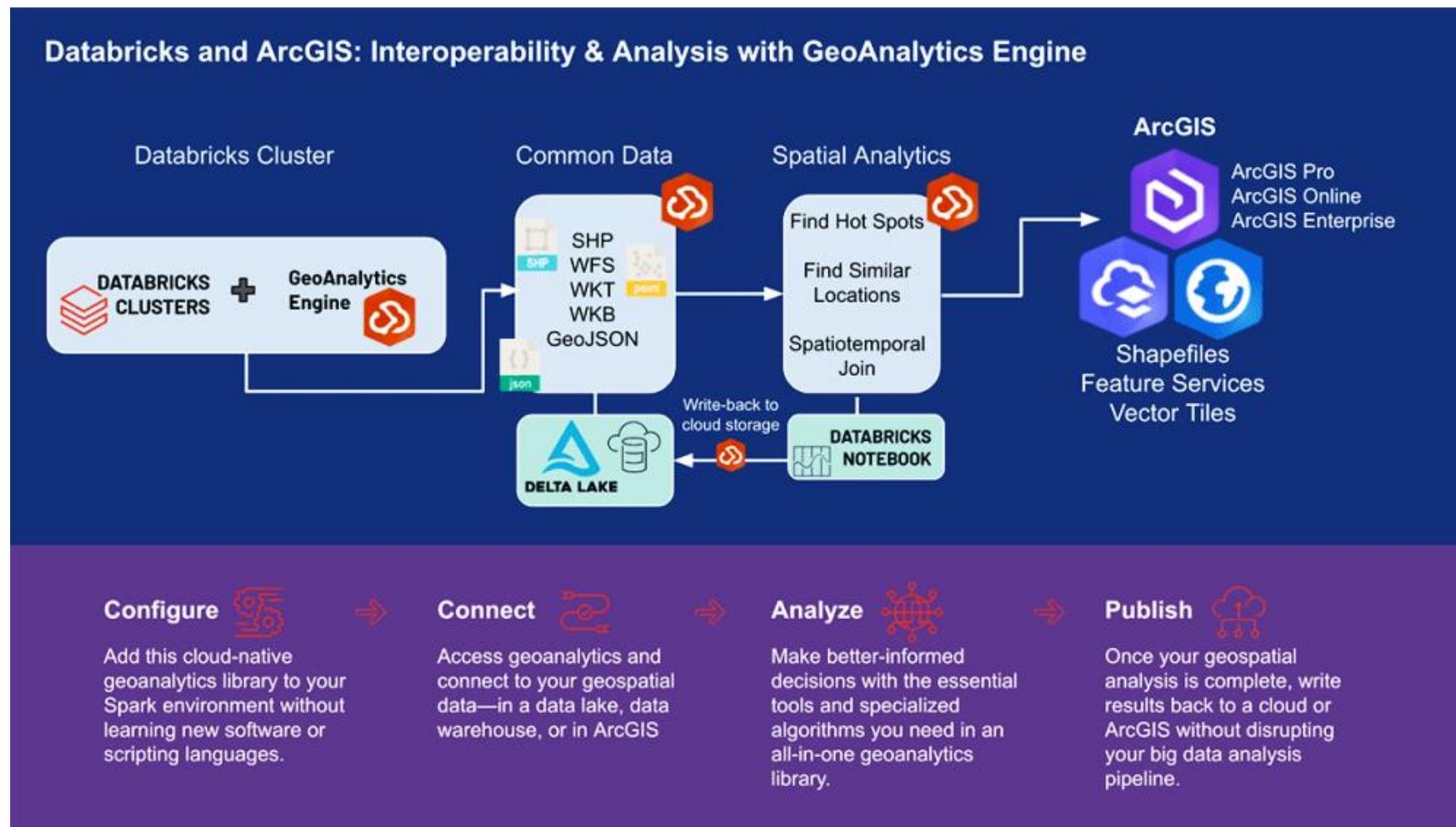
1º AUTOMAÇÃO INTEGRAÇÃO DE DADOS

VISÃO EM TEMPO REAL DA COLETA DE DADOS

ArcGIS GeoAnalytics Engine in Databricks: Scalable Geospatial Analysis in a Data Science Workflow

By [Arif Masrur, PhD](#) and [Corinne Walker](#)

Esri and Databricks collaborated on a blog that features advanced spatial capabilities of ArcGIS GeoAnalytics Engine in an Azure Databricks environment solving cross-industry use cases. Databricks provides an Apache Spark-based cloud platform to support big data analytics, data science and machine learning in a unified approach by combining data warehouses and data lakes into a lakehouse architecture. GeoAnalytics Engine brings geospatial analysis straight to your big data in the cloud wherever it lives—in a data warehouse, data lake, and more. The goal of this collaboration was to demonstrate how easily ArcGIS GeoAnalytics Engine can be plugged into Databricks architecture to extend cloud-based geospatial capabilities for organizations that need big data spatial solutions at speed and scale.

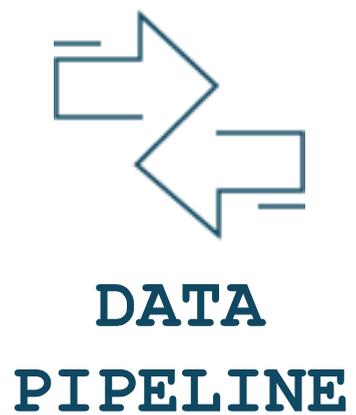


1º AUTOMAÇÃO INTEGRAÇÃO DE DADOS

VISÃO EM TEMPO REAL DA COLETA DE DADOS



FONTES DE DADOS
DIVERSAS



**DATA
PIPELINE**



DATABASE



GEODATABASE

BASE DE CONHECIMENTO

2° INTELIGÊNCIA ANALÍTICA

APLICANDO MODELOS DE GEOAI PARA RESOLVER PROBLEMAS DE NEGÓCIO

Imagens & 3D

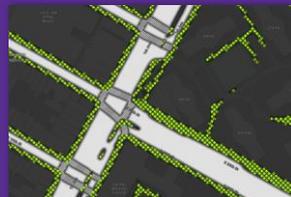
Extração de Feições 3D



Classificação de Objetos



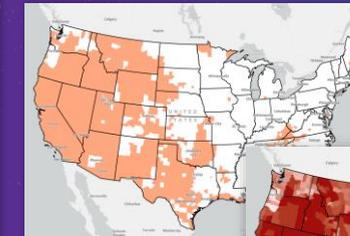
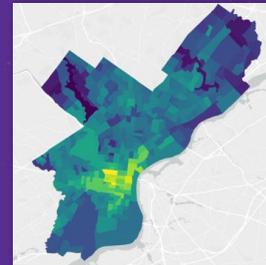
Pesquisa em Imagens



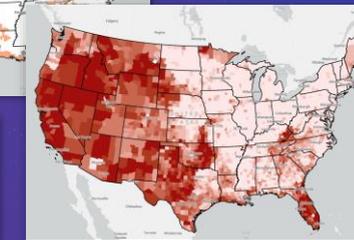
Classificação de Infraestrutura

Mapas Vetoriais & Séries Temporais

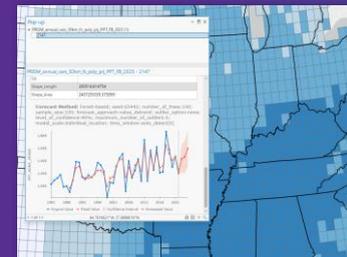
Predição



Classificação



Previsão de Séries Temporais



Texto

Extração de Elementos



Classificação de Texto

city	Philadelphia
grade	B
detrimental_influences	Some unimproved streets- no sewers.
roberta_base_label	Inadequate infrastructure
prediction_confidence	0.3



2° INTELIGÊNCIA ANALÍTICA

APLICANDO MODELOS DE GEOAI PARA RESOLVER PROBLEMAS DE NEGÓCIO

CASE STUDY

Enbridge Gas Unifies Transmission and Distribution Models with ArcGIS Utility Network

Enbridge Gas (Enbridge), formerly Dominion Energy, supplies natural gas to over one million customers in Utah, Wyoming, and Idaho. The company operates an intermediate-high-pressure gas distribution system and a high-pressure (transmission) system.

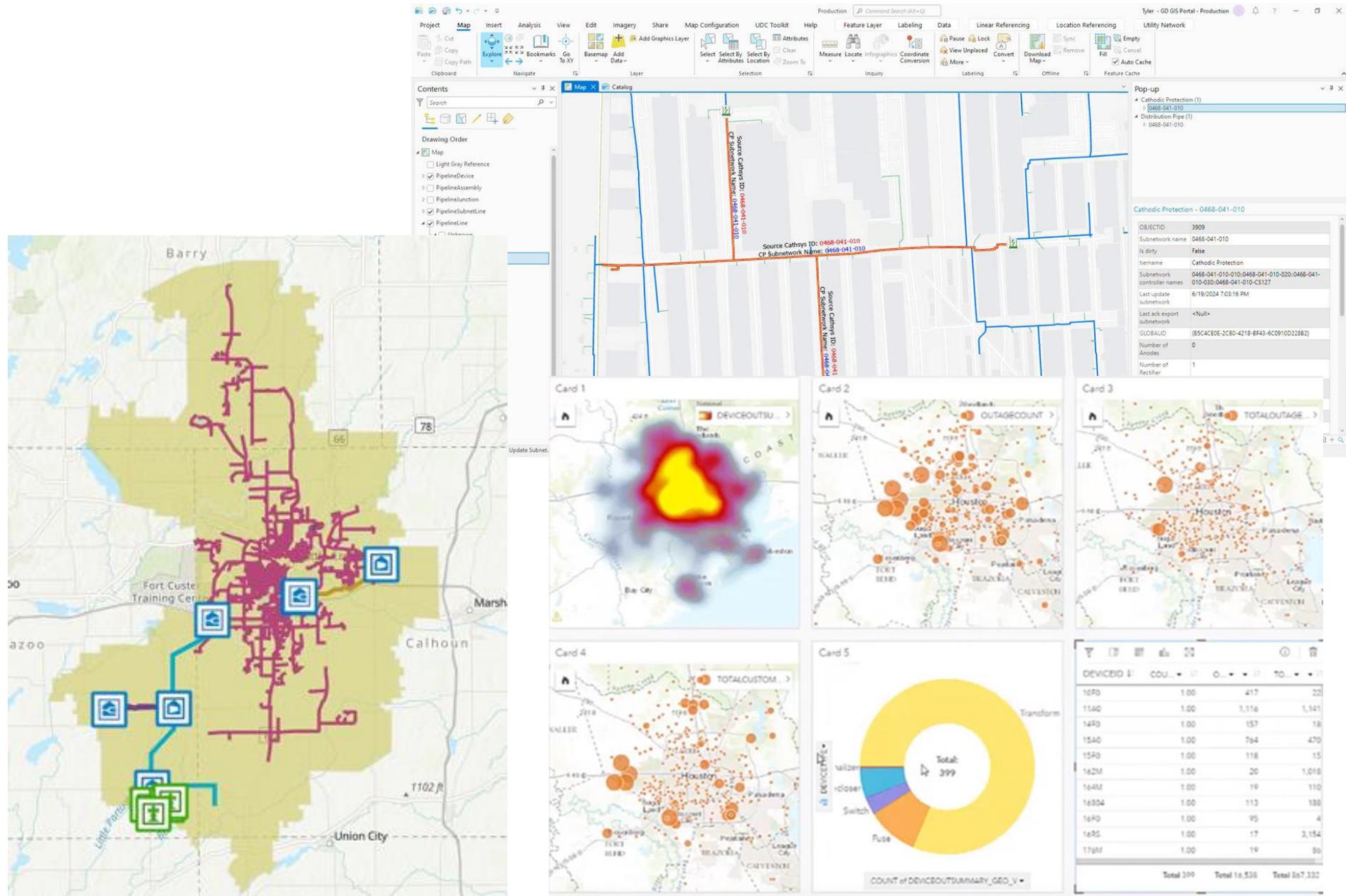
Challenge

The transmission and distribution assets were previously managed in two separate databases, employing the geometric network and the Pipeline Open Data Standard (PODS) data model.

Enbridge's distribution and transmission data operated as two separate gas models. Without connectivity at the regulator stations, tracing from gate stations to meters could not be performed, and the utility also could not perform traces within its transmission environment.

To meet these challenges, Enbridge decided to merge the two databases. The merging initiative also aimed to increase data integrity, enhance the editing experience, streamline operations, support enterprise applications, and better support pipeline safety and compliance reporting.

Enbridge worked with [UDC](#), an Esri partner who specializes in helping utilities and infrastructure companies navigate the complexities of data migration and configuration. Their expertise allowed Enbridge employees to prepare the utility's data for the advanced functions of Esri's network management system. Using its HEIDE tool and [ArcGIS Pro Add-In](#) toolkit, UDC supports migration with an automated, iterative approach. This approach aims to reach the maximum potential for refining the data and getting the most value from the utility's existing data during and after migration.



3° DEMOCRATIZAÇÃO DA INTELIGÊNCIA

INFORMAÇÕES ACESSÍVEIS E AO ALCANCE DE TODOS

The screenshot displays the ArcGIS Pro software interface. The main map area shows a topographic view of North America, including Canada, the United States, and Mexico. The AI Assistant (Beta) panel is open on the right side, displaying a search query: "how to do interactive object detection" with a timestamp of 9/10/2024 3:45 PM. The panel contains a list of steps for performing interactive object detection:

1. Ensure you have an **ArcGIS Pro Advanced license** or the **ArcGIS Image Analyst extension**.
2. Install the necessary **deep learning libraries** before running the tool.
3. On the **Analysis** tab, in the **Workflows** group, expand the **Exploratory3D Analysis gallery**.
4. Click **Object Detection** to open the **Exploratory Analysis** pane and activate the object detection tool.
5. Choose a **deep learning model** to define the detection parameters.
6. Review the parameters and select a **creation method** to use the tool.

Below the steps, it lists different creation methods available:

- **Current Camera:** Use the current camera position to detect objects. Navigate using the **Explore** tool to set the perspective of the scene on the region of interest. In the Exploratory Analysis pane, under the **Create** tab, select **Current Camera** from the creation method options. Review or update the deep learning model and output parameters, then click **Apply**.
- **Reposition Camera (3D only):** Detect objects by adjusting the camera either horizontally or vertically on the viewpoint. In the Exploratory Analysis pane, select **Reposition Camera** from the creation method options. Optionally, change the view direction to either horizontal or vertical. Click in the scene to move the camera and perform detection.
- **Interactive Detection of Individual Objects:** This method is available with the **Esri Generic Object Model**. Click objects in the map or scene to detect them. Ensure the model is set to **Esri Generic Object** in the Exploratory Analysis pane. Review the output parameters and use the **Explore** tool to navigate to the area of interest. Click once over the object to detect it.

Remember, the **Esri Windows and Doors** model relies on camera position, while the **Esri Generic Object Model** relies on clicking a location in the view.

SOURCES:

1. Interactive object detection creation methods
2. Interactive object detection basics

At the bottom of the panel, there is a feedback section with a "Good Response" button and a note: "Click if you found this response helpful." Below that, it says "Ask a question or type / for options. Use Ctrl + Up or Down arrows to scroll previous queries." and "All generated content may be inaccurate or misleading." The bottom status bar shows coordinates: 1:25,869,515 and 59.0886153°W 45.6845382°N.

3° DEMOCRATIZAÇÃO DA INTELIGÊNCIA

INFORMAÇÕES ACESSÍVEIS E AO ALCANCE DE TODOS

The screenshot displays a web application interface for "Redlands Parks Incident Report - v2". The top navigation bar includes "Overview", "Design", "Collaborate", "Analyze", "Data", and "Settings". The "Design" tab is active, showing a toolbar with "Add", "Edit", "Appearance", and "Options". Below the toolbar is a "Text, number, date, and time" section with buttons for "Singleline text", "Multiline text", "Email", "Website", "Number", "Date", "Time", and "Date and time". On the left, a "Location" section shows a map of Redlands, CA, with a search bar and a "Find address or place" button. The map displays a location with coordinates "Lat: 34.044041 Lon: -117.178055". Below the map is a "Comments" section. A chat assistant bubble is visible, stating: "Hi, I'm Survey123 Assistant. Tell me your survey topic, idea, description, or any specific requirements. I can convert your ideas into a survey draft in designer page." At the bottom, a text box contains the instruction: "Imagine you work for the City of Redlands. Create a questionnaire to help citizens report damage to their houses after a recent storm event".

The screenshot shows a mobile application interface for "Quick Pole Inspection". The top status bar displays the time "13:10" and battery level "66%". The app is in "BETA" mode. The main form includes the following sections:

- Pole Tag Photo:** A dashed box with the text "Drop image here or select image" and a camera icon.
- Pole ID:** A text input field.
- Pole Location:** A map section with a "Press to set location" button and a location pin. The map shows a street view with labels for "Building", "Plant", "Library", and "New York St". Below the map are the coordinates "Lat: 34.057772 Lon: -117.196602".
- Condition:** A text input field.

The bottom of the screen shows a browser address bar with the URL "Survey123beta.arcgis.com" and standard mobile navigation icons.

3° DEMOCRATIZAÇÃO DA INTELIGÊNCIA

INFORMAÇÕES ACESSÍVEIS E AO ALCANCE DE TODOS

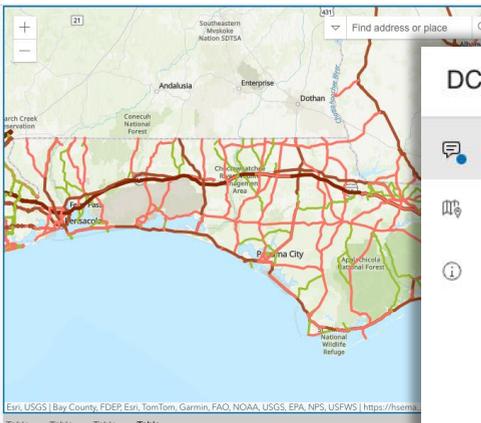
FEMA Geospatial AI assistant (concept)

The most recent emergencies include the following datasets:

- CA EVACUATIONS** - This feature service is an aggregation of multiple California County Evacuation Zone services that are being refreshed every 20 minutes.
- Emergency Medical Services** - The EMS stations dataset consists of any location where emergency medical services (EMS) personnel are stationed or based out of, or where equipment that such personnel use in carrying out their jobs.
- Regional Evacuation Routes** - This dataset contains points representing locations of Regional Evacuation Routes, created as part of the DC Geographic Information System (DC GIS) for the D.C. OI.
- Emergency Wildfire Area Closures** - Active Forest Area Closure Orders for Idaho public lands created from information from multiple sources, such as InciWeb, BLM Twitter, and USFS National Forest Alerts & Notices.
- Hurricane Evacuation Routes** - This feature layer, utilizing data from Homeland Infrastructure Foundation Level Data, displays the locations of hurricane evacuation routes in the United States.

Let me know if you need more information about any of these emergencies.

CA_EVACUATIONS from CDT_GIS

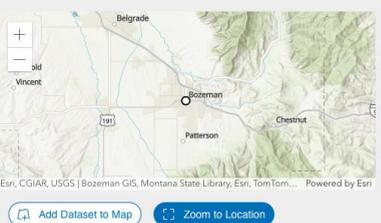


Hurricane Evacuation Routes (Total: 31,593 | Selection: 0)

Intelligent National Map (Demo Only)

make a map of watersheds near Bozeman, MT

Here is the map of the Gallatin watershed near Bozeman, MT.



Watersheds 8-Digit HUC (USGS 2022) from EPA_GEO

Watershed

ObjectID	Value
1	
2	
3	
4	
5	
6	
7	

DC Zoning AI Assistant

AI responses may be incorrect. Please provide feedback to help us improve.

what are gateway zones

Gateway zones are intended to assure development of the area with a mixture of residential and commercial uses, and a suitable height, bulk, and design of buildings, as generally indicated in the Comprehensive Plan and recommended planning studies of the area. They also encourage a variety of support and visit-related uses, such as retail, service, entertainment, cultural, and hotel uses. Additionally, they provide for a reduced height and bulk of buildings along the Anacostia riverfront in the interest of ensuring views over and around waterfront buildings, and provide for continuous public open space along the waterfront with frequent public access points.

Sources: [Special Purpose Zones](#)

Sources: [Residential Zones Definitions](#) [Downtown Zones](#) [Special Purpose Zones](#)

Special Purpose Zones from DDOThub



View Details

Residential Zones from michael.sakinejad_OZ



View Details

[3CF05DAC-18EF-454D-8...
[2325F13E-9591-429C-A8...
[1A4CA9F6-890D-41BC-B...

DC Zoning AI Assistant

AI responses may be incorrect. Please provide feedback to help us improve.

make a map of zoning around ward 5

Here are some of the zoning overlay areas around Ward 5, Washington, D.C.:

- Georgetown (GT) - R-1B/GT, R-3/GT - [More Info](#)
- Woodley Park (WP) - NMU-4/WP, NMU-5A/WP - [More Info](#)
- Naval Observatory (NO) - R-1B/NO, R-3/NO, RA-1/NO, MU-4/NO - [More Info](#)
- Reed-Cooke (RC) - RA-2/RC, MU-4/RC, MU-5A/RC - [More Info](#)
- Tree and Slope Protection (TS) - R-1A/TS, R-1B/TS, R-1A/TS/NO - [More Info](#)

You can explore the zoning overlay areas in more detail using the following dataset: [Overlay Areas 2016](#)

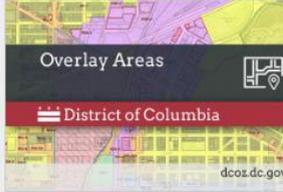
Here's a map showing the zoning overlay areas around Ward 5, Washington, D.C.:



Esri, NASA, NGA, USGS, FEMA | DCGIS, Fairfax County, VA, M-NCPPC, VGIN, Esri, TomTom, Garmi... Powered by Esri

Add Dataset to Map Zoom to Location

Overlay Areas 2016 from DCGISpendata



District of Columbia dcoz dc.gov

Add to Map View Details

AI responses may be incorrect. Please provide feedback to help us improve.

Ask a question...

3º DEMOCRATIZAÇÃO DA INTELIGÊNCIA

INFORMAÇÕES ACESSÍVEIS E AO ALCANCE DE TODOS

The screenshot displays a web-based GIS application titled "Tree maintenance". On the left, there is a vertical sidebar with a search bar and four text input fields containing sample queries: "Where are EV chargers in Redlands, CA?", "Show me all thefts in the Seward neighborhood of Minneapolis, please.", "Find all parcels in Teton County with a total value of more than \$3,000,000.", and "Ask anything...". A green arrow button is located at the bottom right of the sidebar. The main area is a map of Portland, Oregon, showing a dense distribution of green tree icons. A legend in the top right corner lists three layers: "Portland Oregon Street Tree Inventory", "Portland Neighborhoods and Associations (Oregon)", and "Portland Oregon Parks". At the bottom of the map, there is a footer with the text: "Esri, Garmin, GEBCO, NOAA NGDC, and other contributors | Open GIS Portal, Portland, Oregon, 2024 |... Powered by Esri".

Os **Agentes de IA** são orquestradores inteligentes de **habilidades de IA** e **ferramentas GIS** para **executar fluxos de trabalho complexos**, tanto em aplicações quanto em processos **agentivos**.

TRANSFORMANDO DADOS EM AÇÕES

TORNANDO GRANDES VOLUMES DE DADOS EM INSIGHTS



Abraçando o futuro ...GIS com IA

Previendo o impacto do amanhã

“GIS é sobre entender nosso mundo e contribuir para ele de maneira positiva”

– Jack Dangermond

... A IA, quando aplicada com cuidado, é uma extensão dessa missão