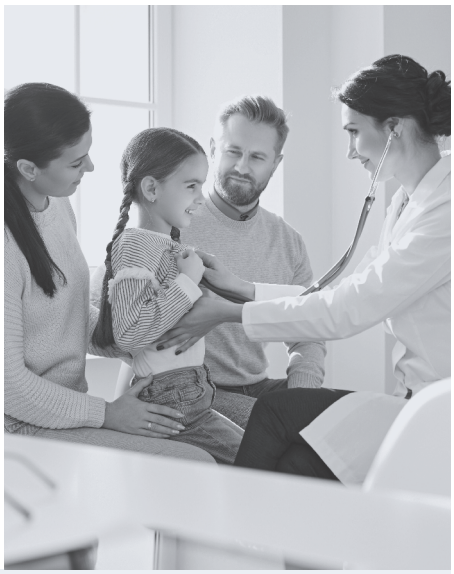
AI | Data Modernization

Public Health Organization

Healthcare

Our client, a Public Health Organization, manages one of Europe's largest digital health ecosystems. Their mission is to make healthcare data more open, intelligent, and useful for clinicians and researchers.

With huge volumes of patient information stored in the openEHR format, finding and understanding clinical records had become a growing challenge. Traditional query languages, while powerful, required specialist knowledge, limiting how easily doctors and analysts could explore the data. The organization wanted a better way to access insights quickly and confidently.



Utilized Technology Stack:

Database: MongoDB

Framework: openEHR, LangChain

AI & Machine Learning: Vector embeddings, Large Language Models (LLMs)

Programming Languages: Python

Architecture: Semantic Enrich

Our Solution

gravity9 designed and delivered a semantic enrichment framework for openEHR data, powered by MongoDB and AI techniques such as vector embeddings and large language models (LLMs).

Our experts created three working components that brought the concept to life:

Metadata Template System – Defined how new meaning could be extracted or calculated from each clinical record. It combined structured openEHR data with derived and AI-generated insights. For example: summarised findings or qualitative text interpretations.

Enrichment Engine – Processed each clinical composition to apply metadata templates and produce semantically enriched parameters. Even without being integrated into the live repository, this engine demonstrated how enrichment could happen automatically as new data arrives.

Question-Answering Workflow – Allowed users to type natural questions, such as "Show me patients with rising blood pressure over the past six months." Behind the scenes, the system converted the question into database queries and delivered the right results, no query syntax required.

These components worked together to show how AI can unlock the full potential of healthcare data. Within just 13 days, gravity9 delivered a working proof of concept that turned complexity into clarity, proving what's possible when advanced technology meets practical design.

Our Approach

We began by analyzing how clinicians and analysts interact with openEHR data today and where friction occurs. From there, our architects designed a flexible metadata model to extract, calculate, and infer new values using logic rules and AI prompts.

The enrichment pipeline automated this logic, generating vector embeddings for relevant parameters to enable similarity and context-aware searches. Finally, we built a prototype workflow that linked natural language to database queries — allowing users to interact conversationally with their data.

Despite the tight 13-day timeframe and the lack of real-world data, gravity9 delivered every major component successfully. The outcome was a smart, working demonstration of how AI and MongoDB can simplify access to complex medical information.

Subsequent Outcomes

The proof of concept confirmed that AI-assisted semantic enrichment can transform how healthcare data is accessed and understood. It showed that openEHR records could be automatically enriched with contextual meaning and that natural language could replace traditional, technical query methods.

The project delivered:

- A functioning metadata and enrichment engine.
- A working natural language query prototype.
- A proven foundation for future integration into clinical data repositories.

More importantly, this initiative demonstrated how AI can make healthcare data faster to search, easier to interpret, and ultimately more useful in improving patient outcomes.

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"Within just 13 days, gravity9 transformed complex medical data into actionable insight - proving how AI canbridge the gap between human understanding and machine intelligence."

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