



MODERNIZATION | UX | PRODUCT BUILD

# Electronic Vehicle and Automotive Software Development

Automotive

The client, a dedicated to electric vehicle powertrain development, faced significant challenges in managing powertrain simulation projects due to reliance on outdated tools like Excel and SharePoint. These tools proved inadequate for handling complex metadata management, traceability, and collaboration needs. Inefficiencies included disjointed data storage, difficulties in tracking project relationships, and delays in retrieving critical simulation details, which often took up to two days.

Recognizing the need for a centralized solution, the client sought a modern platform to streamline workflows, enhance collaboration, and enable seamless data traceability and visualization. gravity9 was selected for their expertise in bespoke solutions and demonstrated success with graph-based tools for previous clients.

The gravity9 solution centralized metadata management, allowing the client to efficiently track inputs, outputs, and relationships between projects, milestones, experiments, and results. Key features included node creation and editing, dynamic graph visualizations, customizable views, change history tracking, and secure access via the client's authentication systems.

By implementing this bespoke application, the client's simulation data retrieval time was reduced from two days to mere minutes. The agile project execution, combined with design-thinking principles, ensured rapid development and exceeded expectations. Positive stakeholder feedback confirmed the application's value in streamlining workflows, improving operational efficiency, and enhancing decision-making capabilities.



## Review of Challenges

The client, a division focused on electric vehicle powertrain development, faced critical challenges in managing their powertrain simulation projects. These simulations required meticulous metadata management to track unique combinations of inputs, models, and test conditions for traceability.

However, the client relied on tools such as Excel spreadsheets and SharePoint, which were insufficient for their complex requirements. This led to inefficiencies in managing project data, difficulty in tracing relationships between various elements, and limited collaboration across teams.

The absence of a centralized platform made it difficult to streamline workflows, further compounding delays and affecting productivity. The client needed a modern, robust solution to address these challenges and enable seamless data traceability, visualization, and sharing among stakeholders.

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## Utilized Technology Stack

- Cloud: GCP
- Database: MongoDB
- Backend: NodeJS, NestJS
- Frontend: Angular
- Other: Okta

## Review of Challenges

The client's powertrain simulations demanded accurate tracking of inputs, outputs, and metadata across a range of activities. Their existing tools lacked the ability to maintain relationships between projects, milestones, experiments, and results.

This inefficiency resulted in disjointed data storage, making it nearly impossible to derive insights or track historical simulations effectively. Retrieving critical simulation details often took up to two days, hampering decision-making processes and delaying project timelines. Furthermore, the absence of a graphic tool to visualize relationships between project elements further limited their ability to interpret complex datasets.

The client recognized the urgent need for a centralized repository to store and visualize metadata, reduce administrative overhead, and enable seamless collaboration. While the client initially explored solutions like Neo4j Bloom, they ultimately chose gravity9 for their expertise in bespoke solutions and demonstrated success with graph-based tools for other clients like Bosch Rexroth.

## Our Solution

gravity9 delivered a bespoke web application tailored to the client's needs. The solution included a frontend built with Angular, a lightweight backend developed in NodeJS, and MongoDB Atlas as the database for efficient data storage and retrieval. Hosted in the client's cloud environment, the application provided a centralized platform to manage and visualize relationships within their simulation projects.

The tool's core functionalities included creating and editing nodes, importing and searching data, and visualizing relationships through graph representations. Additionally, the application featured customizable views, change history tracking, and secure access through the client's authentication and authorization systems.

These enhancements addressed the client's challenges by centralizing metadata, simplifying data management, and significantly improving collaboration and traceability. By implementing a tailored solution, gravity9 ensured that the client's workflows were streamlined, enabling faster access to critical information and better decision-making capabilities.

## Our Approach

Our approach combined agile methodologies with design-thinking principles to deliver a solution tailored to the client's requirements. The project was executed in one-week sprints, enabling rapid iterations and close collaboration with the client's stakeholders.

A dedicated UX designer, experienced in graph-based solutions, ensured the application's usability and functionality aligned with user needs. Leveraging reusable code assets from previous projects, the team accelerated development while customizing features to meet the client's specific requirements.

The technical stack included MongoDB Atlas for its robust graph data storage capabilities, NodeJS for a flexible backend, and CytoscapeJS for dynamic graph visualizations. Challenges, such as transitioning from a deprecated API and designing adaptable graph layouts, were addressed through innovative problem-solving and close client collaboration.

This approach ensured the solution was not only delivered on time but also exceeded the client's expectations by incorporating additional features that enhanced usability and functionality.

## Subsequent Outcomes

The bespoke application was successfully delivered and deployed in the client's production environment, where it has received positive feedback during stakeholder demonstrations. The solution streamlined project workflows by providing centralized data storage and enabling efficient traceability. This reduced the time to retrieve simulation details from two days to mere minutes, significantly improving operational efficiency.

Employees now have a user-friendly platform to access and manage project relationships, fostering improved collaboration and productivity. While the immediate impact of the solution is evident, the client has also identified opportunities for future development.

The application's flexibility and scalability pave the way for additional features and modernization efforts based on user feedback and industry trends. gravity9's success in delivering this solution positions them as a trusted partner for the client's ongoing digital transformation initiatives.

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