Building Better
Digital Products



AI Extraction Service

G-Cloud 14 Service Definition Document

gravity9: Building Digital Platforms, Turning Legacy Complexity into Digital Agility

gravity 9



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Introduction to gravity9

It's never too early to modernize, but it can be too late!

Legacy complexity is a by-product of your success; your organization has grown and your applications and platforms have grown to keep up and support your ever-changing needs. However, many established organisations initiated their operations before modern solution architectures emerged, while today's proven patterns and practices offer efficiency and longevity.

- **74%** of organizations that experience data breaches are due to vulnerabilities in legacy systems - Ponemon Institute
- **52%** of fortune 500 in 2003 no longer exist today
- **45%** improvement in customer satisfaction for organizations that prioritize modernizing applications - Forrester Consulting

Don't become a statistic!

Legacy systems often struggle with the volume of digital transactions, fail to store necessary data for insightful analysis, and face challenges in meeting regulatory compliance. This hinders innovation and agility, resulting in slower time-to-market. New organisations, unencumbered by legacy systems, possess native agility but lack your expertise, breadth of services, resources, and trusted brand. Imagine leveraging modern architecture to enhance your wealth of experience and capabilities.

gravity9 propels you beyond complex, outdated legacy solutions to a sleek AI-led, micro-service, micro-UI platform enabling continuous innovation.

Our application modernization approach leverages cutting-edge AI technologies and microservices architecture to streamline your operations and drive continuous innovation. With our sleek micro-UI platform, we empower your business to adapt and thrive in today's dynamic market landscape, ensuring agility, scalability, and sustained competitive advantage. Say goodbye to the constraints of the past and embrace a future where innovation knows no bounds with gravity9.

Cloud Technology

For organisations not in the cloud, transitioning to a cloud-based infrastructure is fundamental for modernizing as it offers unparalleled scalability, flexibility, and accessibility. By leveraging cloud technologies, businesses can streamline workflows, improve collaboration among teams, and enhance overall efficiency. Moreover, cloud-based solutions enable real-time data analytics, empowering organizations to make informed decisions swiftly. Embracing the cloud also ensures better resilience against disruptions, as data and applications are securely stored and accessible from anywhere, providing continuity even in challenging circumstances.

Don't just modernize – revolutionize!

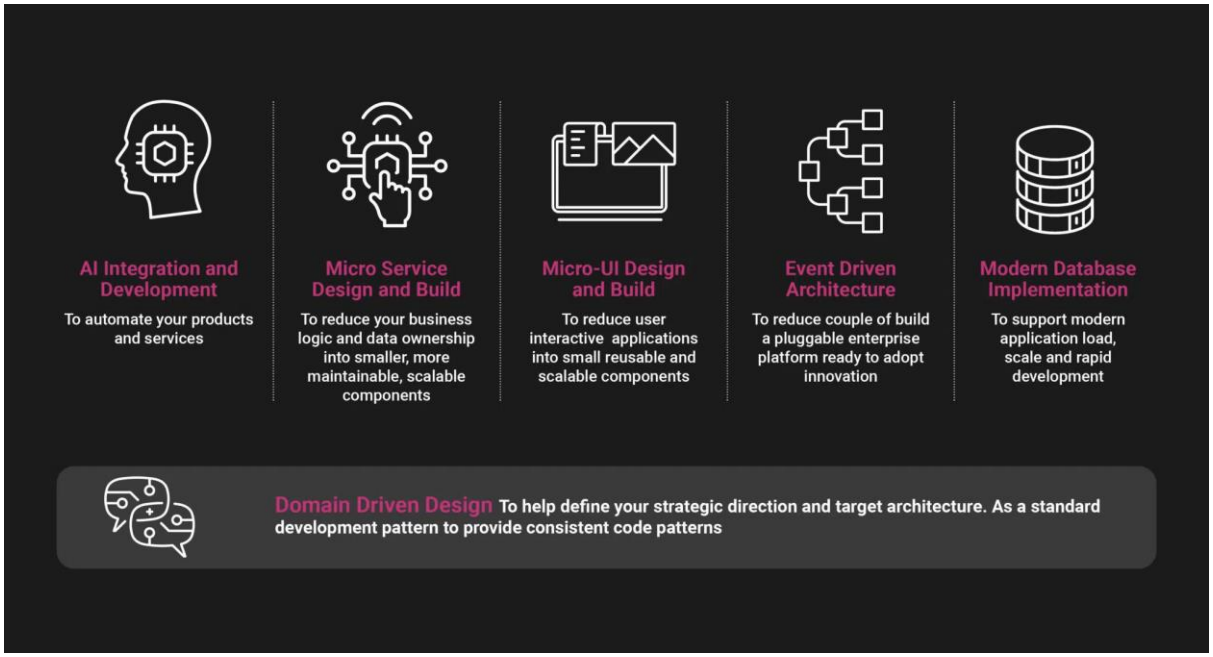
gravity9 understand the challenges of legacy systems and with our experience and expertise will, pave the way for your organization's digital revolution. We guide you through the labyrinth of legacy complexity, identifying inefficiencies, bottlenecks, and opportunities to innovate.

By strategically modernizing and optimizing your systems, we streamline operations, reduce technical debt, and empower your organization to thrive in the digital age. Our approach goes beyond mere



modernization; we prioritize future-proofing your architecture with an emphasis on AI integration and product insulation, ensuring it's scalable and adaptable to evolving technologies and market demands. Through meticulous planning and implementation, we transition your organization from legacy constraints to agile, best-practice solutions.

CORE TO OUR APPROACH



AI

Harness AI to revolutionize operational efficiency and decision-making. Our expertise in AI development empowers organizations to innovate and gain a competitive edge, optimizing performance and profitability through tailored, intelligent system integration.

Engineering

Modernize your applications with confidence and precision. Our expert team specializes in seamlessly transitioning legacy systems to agile, future-proof solutions, ensuring your business stays ahead in today's fast-paced digital landscape.

Product

We are constantly inventing new digital products, services, and revenue streams for our clients by designing, prototyping and building experiences for the next market leaders. We research and define customer journeys by thinking human first to enable technologies fullest potential and build better products.



Global Presence

Highlighting our global presence, gravity9 has teams located in multiple offices worldwide, bringing a wealth of benefits. This international footprint allows us to tap into a diverse talent pool, ensuring we have the right expertise for any challenge. It also enables us to offer round-the-clock development and support, thanks to the different time zones our teams operate in. Furthermore, our global perspective enriches our understanding of various markets and cultures, which is invaluable in crafting digital solutions that resonate worldwide. Ultimately, our widespread teams enhance our agility, foster innovation, and ensure we can meet our clients' needs with unparalleled efficiency and effectiveness.

WE ARE GLOBAL

Our Locations

UK & IRELAND

London
Birmingham
Dublin

POLAND

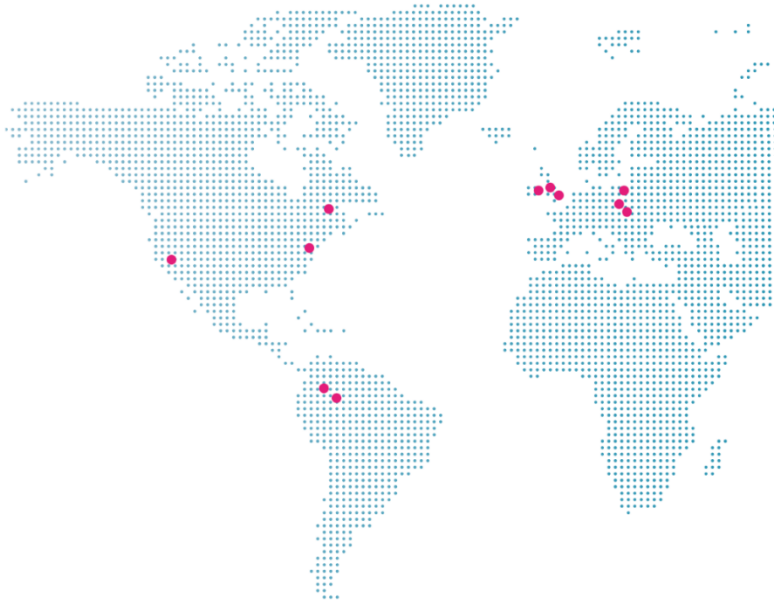
Kraków
Wroclaw
Gdansk

USA

New York City
North Carolina
California

COLOMBIA

Medellin
Bogota



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AI Extraction Service

In an era dominated by information overload, having the capability to swiftly and accurately extract insights from vast pools of data is not just valuable, it's a strategic necessity. "AI Extraction" a cutting-edge service offering is designed to empower clients across both public and private sectors. This service leverages the transformative power of Large Language Models (LLMs) to distil actionable insights and critical information from an array of data sources, including PDF documents, images, spreadsheets, or any structured data sources. At its core, AI Extraction is engineered around the innovative concept of Retrieval Augmented Generation (RAG) combined with advanced AI Agents tasked with executing various analytical operations.

What is the service?

AI Extraction unlocks the power of cutting-edge Large Language Models (LLMs) and Retrieval Augmented Generation (RAG) to streamline information and insight retrieval from vast, diverse data sources. Clients can seamlessly tap into this service to analyse and understand data in ways previously inaccessible, enabling them to make more informed and impactful decisions.

This service is structured to facilitate the seamless integration and utilisation of AI-driven insights across various operational spectrums, thereby enhancing decision-making processes, optimising performance, and driving innovation. It caters to the growing demand for agile, accurate, and scalable solutions for data extraction and insight generation across diverse industry sectors.

Sub-Services Included:

The AI Extraction Service encapsulates a suite of sub-services tailored to address specific aspects of data processing and information extraction:

- Data Extraction, Embedding and Indexing: This foundational step involves gathering data from a diverse array of sources (e.g. databases, cloud storage, APIs, web pages, data lakes, data warehouses). This data then undergoes an indexing process, which includes chunking (breaking down the data into manageable pieces), embedding (creating dense vector representations of each chunk for semantic understanding) and preparing it for storage in suitable databases (like Graph DB, Relational DB, or Vector databases). This indexed data repository is crucial for rapid and relevant data retrieval.
- Query Embedding: When a user query is received, it is first transformed into an embedded form. This embedding process converts the query into a vector representation, making it compatible with the indexed data and ensuring that the retrieval process can efficiently identify relevant information.
- Retrieval: With the query now in an embedded form, the system searches through the indexed data to find and retrieve information chunks that are relevant to the user's query. This step leverages the pre-processed, indexed data to ensure that the retrieval is both fast and accurate.



- Generation: The final step passes the retrieved data, alongside the original user query, to a large language model. The LLM then synthesises a response, integrating the retrieved information with its generative capabilities. This allows the model to produce answers that are not only based on its pre-trained knowledge but also enriched with the latest, specific information related to the query.
- Deployment Agility: The service is designed for seamless deployment across major cloud platforms: Azure, AWS, GCP, Databricks.
- End-to-End Support: Expert guidance covers all phases of project development and deployment, ensuring successful integration of AI Extraction into production environments.

What problem can it solve:

The AI Extraction service is designed to address a multitude of challenges faced by the public sector in data processing and analysis. By leveraging the power of Large Language Models (LLMs) and AI technologies, this service offers solutions to several critical problems:

- Unlocking Knowledge Trapped in Documents: Organisations often possess vast stores of information in PDFs, contracts, reports, and images. This service transforms this unstructured data into searchable, actionable insights.
- Accelerating Research and Analysis: Manually sifting through spreadsheets, databases, or documents can be incredibly time-consuming. "AI Extraction" allows users to swiftly ask questions and get quick answers, making research and analysis far more efficient.
- Improving Decision-Making: By extracting key data points from diverse sources, our service empowers stakeholders to make informed decisions based on a holistic view of information rather than fragmented data.
- Automating Tedious Tasks: Manual data extraction and converting unstructured data into structured data can be error-prone and repetitive. Our service automates these processes, freeing up valuable human resources for more strategic work.
- Enhancing Customer Service: "AI Extraction" can rapidly analyse customer inquiries and knowledge bases to provide instant, accurate answers; improving support experiences and reducing resolution times.
- Data Silos and Accessibility Issues: Data stored in silos across different departments or formats can hinder accessibility and lead to incomplete analysis. AI Extraction facilitates the integration of data from disparate sources into a unified format, improving accessibility and enabling comprehensive insights.
- Scalability Concerns: As organisations grow their data processing needs become more complex and voluminous. The AI Extraction service is scalable, capable of handling increasing volumes of data without compromising performance ensuring that businesses can scale their operations efficiently.
- Compliance and Data Privacy Issues: With stringent data protection regulations, managing compliance while processing vast amounts of data can be daunting. AI Extraction addresses this concern by incorporating compliance and data protection measures into the data handling process, ensuring that customer data is processed securely and in accordance with regulatory standards.



When to Use it

The "AI Extraction" service is perfectly suited for a variety of scenarios where you need to unlock insights and automate tasks from diverse data sources. Here are some key situations where this service shines:

- Organisations Managing Large Document Repositories: Do you have vast troves of documents like contracts, legal files, or historical records stored in PDFs or physical archives? This service transforms these documents into readily searchable and analysable data.
- Clients Working with Big Data: Are you struggling to extract meaningful insights from large and complex datasets spread across databases, spreadsheets, and other formats? "AI Extraction" streamlines the process, providing a centralized platform for data retrieval and analysis.
- Teams Conducting Market Research: Do you need to analyse customer reviews, social media data, or competitor reports efficiently? This service helps you gather, synthesize, and analyse this data, saving you valuable time and effort.
- Clients Aiming to Automate Manual Processes: Are you bogged down by repetitive tasks like data extraction or report generation? Our service automates these processes, freeing up your team to focus on higher-value activities.
- Departments Focusing on Business Intelligence: Do you need to create insightful reports and dashboards to support data-driven decision making? "AI Extraction" helps you unlock hidden trends and patterns within your documents and data, allowing for more informed strategic choices.
- Policy Analysis and Development: When developing or evaluating policies, public sector entities need to analyse vast amounts of data from previous policies, public feedback, and research studies. AI Extraction can streamline this process, helping policymakers extract relevant insights quickly to inform policy decisions.
- Public Records Management: Government agencies often deal with extensive archives of public records, including legal documents, historical records, and administrative paperwork. This service can facilitate the digitisation and indexing of such records, making them easily searchable and accessible, thus enhancing transparency and public access to information.
- Healthcare Data Analysis: In the public health sector, analysing patient records, research data, and epidemiological studies is crucial for informing public health policies and responses. AI Extraction can handle unstructured data from various sources, enabling health authorities to derive actionable insights rapidly.
- Educational Resource Management: Educational authorities can use this service to manage and analyse educational materials, student data, and research publications. It aids in the development of personalised learning resources and the evaluation of educational policies and programs.
- Emergency Response and Planning: For disaster response and emergency planning, the ability to quickly process and find data from multiple sources, including satellite images, weather reports, and on-the-ground data, is vital. AI Extraction can significantly speed up this process, aiding in timely and effective response strategies.
- Fraud Detection and Compliance: Government financial institutions and regulatory bodies can utilise AI Extraction to analyse transactional data, detect patterns indicative of fraud, and



ensure compliance with laws and regulations. This proactive approach can save significant resources and protect public funds.

- Environmental Monitoring and Conservation: Agencies responsible for environmental protection can leverage AI Extraction to analyse data from various sources, including satellite imagery and environmental studies, to monitor ecological changes, assess compliance with environmental regulations, and plan conservation efforts.
- Public Consultation and Engagement: When soliciting and analysing public feedback on proposed policies or services, AI Extraction can process responses from various channels, including social media, emails, and public forums, enabling more effective engagement with the community.
- Infrastructure Planning and Maintenance: Urban planning and infrastructure agencies can use this service to analyse data related to city planning, traffic patterns, and public utilities management, facilitating better decision-making for infrastructure development and maintenance.

Key Business Benefits:

- Enhanced Efficiency and Speed: The service automates time-consuming manual data processing tasks. This frees up public sector employees to focus on higher-value activities and speeds up decision-making processes.
- Improved Accuracy: AI-powered extraction reduces the risk of human error, particularly when dealing with large, complex data sets. This results in greater accuracy, ensuring decisions are made based on reliable information.
- Data-Driven Decision Making: The service enables rapid extraction of key insights and trends from diverse data sources. This empowers policymakers to make evidence-based decisions, leading to better outcomes for citizens.
- Increased Transparency and Accountability: The ability to rapidly extract and analyse relevant information from large datasets can support public sector agencies in meeting FOI (Freedom of Information) requirements. This enhances transparency and bolsters citizen trust.
- Cost Savings: Automating data extraction and analysis tasks can lead to significant cost savings. This reduces administrative overhead and allows resources to be redirected towards essential services for citizens.
- Improved Citizen Experience: The service can streamline citizen service inquiries and support functions by providing rapid, accurate information. This enhances the overall citizen experience when interacting with public agencies.



Engagement Overview

The engagement process for the AI Extraction service is designed to ensure a smooth and effective implementation, tailored to meet the specific needs and objectives of public sector organisations. This structured approach facilitates clear communication, effective planning, and successful deployment of the service. Here's a step-by-step overview:

1. Understand

   a) Initial Consultation and Needs Assessment

   Objective: Understand the organization's needs, challenges, and objectives for using the AI Extraction service.

   Activities:

   - Meetings with key stakeholders to discuss their requirements and expectations.
   - Review of existing data management practices and infrastructure.

2. Plan

   a) Scope Definition and Project Planning:

   Objective: Define the project scope, including specific data sources to be used, desired outcomes, and timelines.

   Activities:

   - Development of a project plan outlining the phases, milestones, and key deliverables.
   - Agreement on project scope, objectives, and success metrics.

   b) Technical Setup and Configuration

   Objective: Prepare the technical environment for the implementation of the AI Extraction service.

   Activities:

   - Setup of cloud platform accounts and networking configurations.
   - Configuration of security and compliance settings according to government regulations.

3. Build

   a) Data Extraction and Indexing

   Objective: Ensure data is ready, then implementing the extraction microservice with indexing pipeline.

   Activities:

   - Developing connectors to extract data from different data sources.
   - Implementing OCR, data cleaning, data chunking and embedding generation processes.
   - Storing data in Vector databases, relational or graph DBs



b) Retrieval and Generation pipelines implementation

Objective: Finding and retrieving the most relevant information and data based on the user's requests and queries and generating responses for the incoming inquiries.

Activities:

- Custom retrieval and ranking algorithms developing.
- Implement required AI agent for running different tasks.
- Build the response generation pipeline using Large Language Models.

4. Release & Test and Measure

a) Pilot Phase and Testing

Objective: Validate the setup and configuration through a pilot phase, ensuring the service meets the organisation's needs.

Activities:

- Running a pilot project on a limited set of data sources or departments.
- Testing and refinement of data extraction, indexing, and retrieval workflows.

b) Full-Scale Deployment

Objective: Roll out the AI Extraction service across the organisation.

Activities:

- Expansion of the service to include all identified data sources and departments.
- Monitoring and optimisation of performance and outcomes.

c) Training and Knowledge Transfer

Objective: Equip the organisation's staff with the knowledge and skills to use the AI Extraction service effectively.

Activities:

- Training sessions for technical and non-technical staff on using the platform.
- Provision of documentation and best practices for data extraction and retrieval.

d) Review and Iteration

Objective: Review the service's impact and make necessary adjustments for continuous improvement.

Activities:

- Evaluation of the service against the initial objectives and success metrics.
- Planning for future steps.

This engagement process ensures that the AI Extraction service is closely aligned with the client's goals, fully integrated with existing systems, and optimised for maximum impact.



Team Structure:

Based on the engagement process, we can identify the required team. But typically, we need the following team members:

- Account manager
- Product Owner
- AI Engineer (Data Scientist)
- Lead Developer
- Data Engineer
- QA Engineer
- DevOps/MLOps Engineer

Scope of Service:

The AI Extraction service offers a comprehensive suite of capabilities designed to meet the diverse needs of public sector organisations within data extraction, processing, and analysis. Its scope includes a broad range of activities and deliverables, ensuring that client can leverage their data assets fully to drive decision-making and improve service delivery. Below are the key components that define the scope of the AI Extraction service:

- Data Source Integration: Integration of a wide array of data sources, including but not limited to PDF documents, images, spreadsheets, structured databases, and multimedia content.
  - Objective: Ensure seamless access and extraction of data from various formats and repositories.
- Data Extraction and Indexing: Utilisation of advanced algorithms and AI technologies to extract relevant data from integrated sources and index it into vector databases for efficient retrieval.
  - Objective: Facilitate quick and accurate data retrieval, supporting comprehensive data analysis and insight generation.
- Retrieval, Ranking and Generation: Application of the RAG concept to enhance the process of retrieving relevant documents or data based on input queries and generating coherent, insightful responses.
  - Objective: Improve the quality and relevance of information retrieved, enabling more effective decision support.
- AI Agents and Custom Model Training: Deployment of AI agents for automating various tasks within the data extraction and analysis process, including the option for custom model training tailored to specific organisational needs.
  - Objective: Enhance the automation and customisation of the data processing workflow, optimising it for specific types of analysis or insight required.
- Cloud Platform Support: Compatibility and support for major cloud platforms including Azure, AWS, Google Cloud Platform (GCP), and Databricks, ensuring flexibility and scalability.
  - Objective: Provide organisations with the choice of cloud platforms that best fit their existing infrastructure and scalability requirements.
- Development and Deployment: Comprehensive support for the entire lifecycle of the project, from initial development and customisation to deployment in production environments.



    - Objective: Ensure smooth transition and integration of the AI Extraction service into the organisation's operational framework, with minimal disruption.
- Security and Compliance: Implementation of stringent security measures and compliance protocols to protect sensitive information and ensure data processing adheres to government regulations.
    - Objective: Safeguard data privacy and integrity, maintaining public trust and regulatory compliance.
- Training and Support: Provision of training programs for both technical and non-technical staff, along with ongoing support and maintenance services.
    - Objective: Equip organisations with the knowledge and skills to effectively use the service, ensuring long-term sustainability and effectiveness.

Deliverables:

- Customized AI Models:
    - Large Language Models (LLMs) and AI Agents specifically trained and adapted for optimal performance within your data environment and to address your outlined use cases.
- Data Extraction and Indexing System:
    - A robust system for extracting data from your specified structured and unstructured sources.
    - Securely indexed vector databases for efficient search and retrieval of the most relevant documents or data segments.
- Intuitive User Interface:
    - A user-friendly interface that allows authorised users to input queries in natural language and receive accurate, synthesised answers. This may be in the form of a web-based application or an integration into existing workflows.
- Deployment in Your Cloud Environment:
    - Full deployment of the "AI Extraction" service within your preferred cloud platform (Azure, AWS, GCP, or Databricks), ready for use by your team.
- Documentation and Training Resources:
    - Clear documentation outlining how to use the service, interpret results, and manage ongoing maintenance.
    - Comprehensive training sessions for your staff to ensure full understanding and effective use of the "AI Extraction" service.
- Ongoing Support Agreement:
    - A support agreement outlining the level of technical assistance and troubleshooting that will be made available to you after the deployment. This may include regular check-ins, issue resolution, and updates to the service based on performance and feedback.

Note: Specific deliverables may be adjusted to tailor the service to your precise needs and requirements as outlined during your initial consultation and engagement with our team.



Case Studies

Major Healthcare Provider

A major healthcare trust required a brand-new system designed and built to address critical issues with their existing process and better serve their needs in the medical technology space (the previous approach was inefficient, potentially inaccurate, and difficult to maintain or scale). Specifically, the client required a way for care providers to review medical technology products for suitability and to communicate with suppliers who needed an efficient way to provide up-to-date product information in relevant formats.

gravity9 won the project tender process, transforming the experience and delivering the "Technology Adoption Platform" by designing and building a highly scalable web-based solution with the potential to serve the entire healthcare provider. After initial conversations, the project began with executive team discovery meetings to map what is "truly" needed, followed by iterative event storming to ensure the product meets stakeholders' needs.

Built around MongoDB, Azure, React and Java, it reduces maintenance workloads, provides a clear communication channel, and enables storing relevant and accurate product information.

Utilised Technology Stack

- Cloud: Azure, Azure AD B2C, Terraform
- Database: MongoDB Atlas
- Backend: Java, Spring Boot
- Frontend: React, NextJS, MUI component

Employee Wellbeing Provider

Our client provides technical employee wellbeing solutions for physical, mental, and financial health. The client approached gravity9 and spoke with Founder Noel Ady to discuss a new module to their existing Mental Health solution that would enable communication between domain microservices and CRM (Customer Relationship Management) in a multicloud environment. Additionally, we would provide additional security, improve system performance, and provide domain separation.

The initial solution uncovered additional requirements, which gravity9 designed and built into the second iteration before conducting a final optimisation pass to streamline further, displaying an evolutionary architecture approach. The client was delighted with the overall result, especially gravity9's ability to adapt and implement event-driven architecture.

gravity9 achieved a remarkable outcome that met all the client's expectations, demonstrating expertise in designing and deploying event-driven architecture and delivering a solution that supports asynchronous communication and facilitates evolutionary changes in response to the dynamic business environment.

Utilised Technology Stack

- Cloud: Multi-Cloud
- QA: SpecFlow, Living Documentation
- Development: .NET Core

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National Defence Organisational

A major defence organisation sought to reform how they generate useful analytics for gauging and reacting to public opinion to NATO operations in specific geographic areas. Their previous approach was to research and generate reports manually, which was resource-intensive, delay-prone, and at risk of accuracy issues. Partnering with MongoDB, gravity9 scoped, developed, and delivered a replacement cloud-based system over a three-week period.

The delivered system can collate data from multiple sources, allowing easy, customisable generation of data-rich reports based on up-to-date information plotted against any number of data points, including GIS. Built around React.js, Node.js, MongoDB, and Microsoft Azure, this system has reduced resource overheads and enabled rapid delivery of relevant and accurate information to decision-makers within the organisation. Resource and actual costs have also been reduced as a result.

Utilised Technology Stack

- Cloud: Microsoft Azure
- Database: MongoDB
- Backend: Node.js
- Frontend: React.js

Beauty & Pharmaceutical Retailer

As part of a fast-track ideation and rapid-build development project, gravity9 partnered with MongoDB to help a popular health and beauty retailer and pharmacy build a new Beauty Concierge application to increase customer loyalty and encourage repeat business in the retail domain. Prior to gravity9's involvement, no history of customer consultations or recommendations was stored, meaning returning customers would have to "start over" be re-interviewed, providing them no advantage at this vendor versus their competitors. The client outlined the project requirements, providing a starting point for a more profound consultation process in which gravity9 challenged, revised, and reached a consensus on the form and shape of the project.

A web-based solution was created, tailoring the customer experience via an accessible in-store app. The app maintains customer profiles and preferences allowing consultants to access this information as well as sales logs and KPI's, creating a more personalised, bespoke service unique to the client. The product is built with a .NET Core backend, Angular frontend, and MongoDB database.

The solution has been delivered to the client and initial reception has been extremely positive, with scope for additional functionality, integration, and quality-of-life improvements to be added later. Customers can enjoy a more intimate shopping experience which encourages trust, brand loyalty, repeat business, and increased footfall versus competitors.

Utilised Technology Stack

- Cloud: Microsoft Azure
- Database: MongoDB
- Backend: .NET Core
- Frontend: React



How To Get Started? What We Need From You

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- We start our process with a simple conversation, discussing the challenges and opportunities that lie ahead of you, touching on potential solutions and how best to proceed. Every scenario is slightly different and we provide a range of offerings that our agile project delivery process supports. As part of this initial step, we may request information from you to get a better understanding of your current set up. This may include information on your technology set up, infrastructure, size and type of data in your system as well as high-level business context.
- To get started on a project, our team members will most likely have to be onboarded to your systems. We follow your requirements as part of the onboarding process. It is also common that we ask you to share any kind of documentation that provides a detailed view into your business and technology set up. Any baseline information in terms of the KPIs you are trying to meet would also be considered helpful.
- At the core of our process are individuals with deep experience of a range of subjects and methodologies. We discuss any additional needs to get started on a project at the beginning and then aim to make change happen one step at a time in a transparent and tangible fashion.



Enquiries

For enquiries, please contact:

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