



Improving UK Healthcare Decision Making with AI Applications

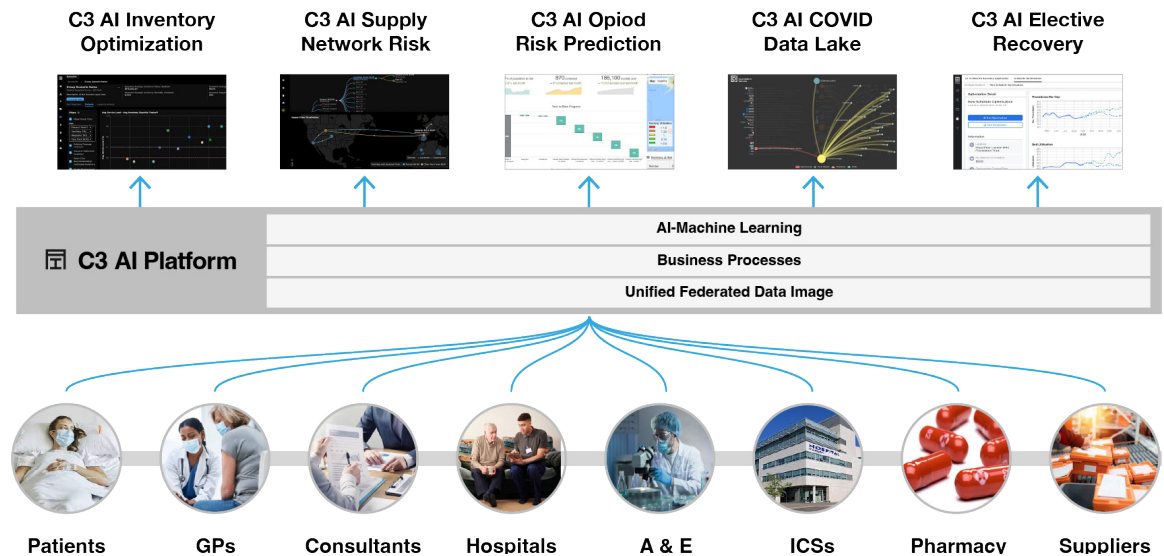
Rapidly develop secure AI applications with an open architecture

Introduction

The opportunity for the National Health Service (NHS) to digitally transform is far reaching, with benefits from optimising the supply chain to more available patient care and longer life expectancy. Artificial Intelligence (AI) is transforming solutions across the healthcare value chain including forecasting procedure demand and predicting when hospital beds will become available. The NHS has a large ecosystem of healthcare partners, suppliers, and users that can each benefit from modern NHS applications with AI insights.

The C3 AI Platform's open architecture will enable the NHS to rapidly develop secure, AI healthcare applications to address the needs and scale of UK healthcare. C3 AI applications use a human-centred design methodology that delivers AI-driven insights into a user's workflow. This empowers healthcare professionals to make rapid and informed decisions so they can, ultimately, deliver the best care for each patient in the UK. The C3 AI offering includes customisable healthcare applications and an end-to-end platform that tightly links data integration to AI capabilities to rapidly deploy applications at scale.

Solution Architecture



Benefits of the C3 AI Platform and Applications



Improved Patient Experience

C3 AI identifies personalised healthcare service opportunities and health preserving proactive interventions to deliver an individualised care experience.



Timely, Convenient Appointments

Advanced analytics and C3 AI models improve scheduling, so patients are seen sooner, reducing record-long queues for surgical procedures, and providing more convenient care options



Accelerated Innovation

Researchers and business use best-in-class tools to drive innovation, including no-code interfaces that connect seamlessly to bring data and AI to a much broader user group.



Optimised Supply Chain

Administrators anticipate demand forecasts and supply network risks, enabling optimised planning and stocking levels, so patients and healthcare professionals have supplies when and where they need them.



Improved Urgent and Emergency Care

Decision makers receive daily AI predictions when and where emergency services will be needed to ensure patients get lifesaving critical care. convenient care options

C3 AI Custom Healthcare Applications

What C3 AI provides is unique in the industry: An application platform and AI services that connect disparate data and generate AI insights through an end-to-end solution with user applications that can directly drive organisational change and improve patient experience and outcomes. Data connections and insights are necessary precursors but not sufficient to generate high-value outcomes. C3 AI applications empower the decision-making workflow.

Examples include:

Ventilator Supply Chain Resilience

The NHS continues to experience supply chain vulnerabilities with hundreds of clinical and non-clinical items out of stock.³ Using the C3 AI Supply Chain Suite, UK healthcare will be able to increase operational efficiency and supply chain resiliency for medical supplies when and where they are needed. As an example, C3 AI developed a custom healthcare supply chain application in four weeks to anticipate ventilator unit supply network risk. In addition, the C3 AI Supply Network Risk application provides supply chain managers with global real-time visibility, predicts customer order lead times, and surfaces potential on time, in full (OTIF) risks for over 10,000 stock keeping units (SKUs) across multiple business units so the manager can see mitigation options and take steps to reduce delayed orders by more than 35%. Finally, the C3 AI Inventory Optimization application provides supply chain managers with optimal reorder parameters to reduce inventory of excess raw materials and optimise safety stock across finished goods inventory during ordering to better meet service levels.

Addiction Prevention

Opioid addiction is a growing concern in the UK with over 50 million prescriptions written in the last year and over 2000 deaths.² C3 AI drug dependency applications are a powerful means to identify population health needs and design personalised health plans. These applications have AI models with 80% accuracy in predicting patients who will develop opioid dependence. With these applications, NHS frontline workers can see which of their patients are at risk of developing a dependence and take action to mitigate dependence before it develops. Administrators can design customised health services for high-risk areas to mitigate hospitalisation risks and lower cost of care. Patients receive more personalised care and better outcomes through addiction prevention, benefitting society at large.

Healthcare Research

UK healthcare research, including COVID-19 research, costs approximately 2 billion GBP per year.⁴ NHS researchers could use the open architecture of the C3 AI Platform to securely access data with standardised APIs to accelerate innovation and research. As an example, C3 AI developed a unified COVID-19 data lake and knowledge graph to fight the pandemic. The C3 AI COVID-19 Data Lake integrates data from disparate sources, then models and presents those data in a unified, cohesive structure. It is available at no cost to the global research community. In addition, C3 AI funded 26 research projects with \$5.4 million to address a range of challenges including forecasting the spread of COVID-19 across municipalities and counties, forecasting demand for ICU (intensive care unit) bed capacity to plan for the anticipated surge in COVID-19 cases, and identifying the impact of government responses.

Application Opportunities

The healthcare value chain includes many additional application opportunities where AI can improve decision making.

Examples include:

Elective Recovery

The NHS is experiencing unprecedented wait times for treatments, which have been exacerbated by the pandemic and the need to postpone non-urgent elective operations in 2020. In addition to the current waitlist of 6.84 million people, it is estimated that an additional 3.3 million people need elective procedures who have yet to be identified.⁴ AI-powered schedule optimisation can reduce procedure backlog, so patients are seen sooner and have a better experience. AI models the people and resources necessary for efficient procedure scheduling including the operating theatre, clinical and non-clinical staff, inpatient beds, and medical supplies. AI is also able to predict the demand of elective recovery services, including the specialty and location of need. The advanced analytics and AI described above are applied to the appropriate data systems and the insights are shared directly to healthcare professionals through a custom application. NHS healthcare professionals will then have the real-time data and insights necessary to improve decision making in their native workflow. Patients receive more timely and convenient care as elective recovery wait times decrease.

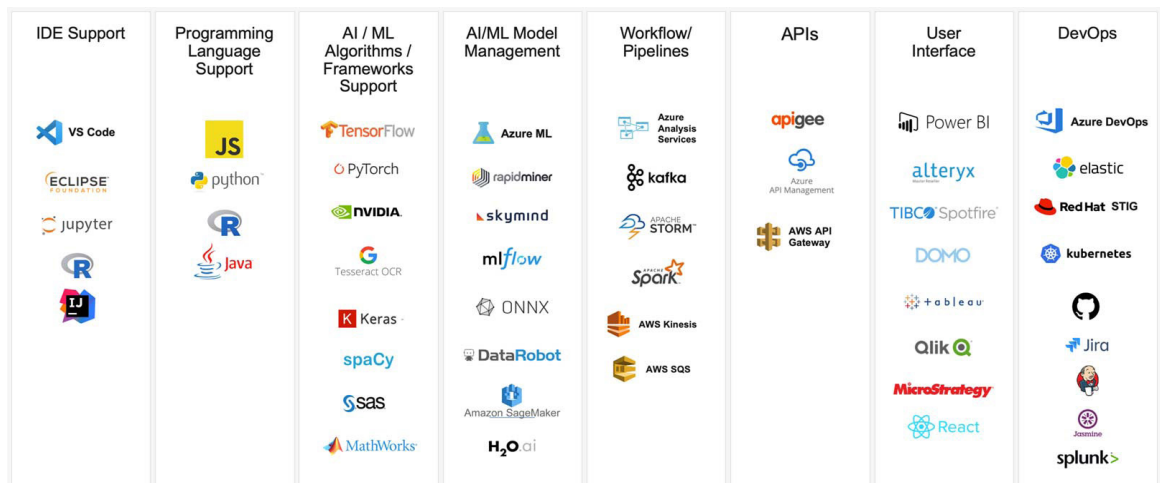
Vaccinations and Immunisations

The COVID-19 pandemic underscored the need for a healthcare solution to understand the spread of infection, course of disease, manage hospital capacity, and provide much needed personal protective equipment and other consumables through the NHS supply chain. The UK made strides in developing a unified information governance model during the pandemic, but more can be done to deliver forward-looking insights that proactively address emerging health concerns. AI and machine learning can address vaccination and immunisation challenges by predicting spread before it occurs and generating recommendations to optimise resources for patient outcomes. AI can also model capacity and demand planning to improve workforce and care delivery. Healthcare professionals have connected real-time data to effectively anticipate and address emerging health challenges to improve outcomes.

Population Health And Person Insight

The NHS can utilise AI optimisations to match healthcare capacity and demand following consistent reporting and methodologies to improve the effectiveness of service design. The C3 AI Platform can use advanced analytics and AI on unified population health data to generate insights that an administrator can use to plan where to allocate healthcare professionals and other resources. AI predicts where services will be needed and recommends to healthcare directors where resources can be equitably distributed to benefit patients. Improving decision making for resource planning leads to better and more equitable patient care.

Open Architecture



Why C3 AI

C3 AI rapidly develops highly secure healthcare AI applications for organisations, suppliers, and users with an open architecture that integrates easily with data, tools, and technologies already in place to facilitate collaboration and innovation. Partners early in their digital journey will be able to link their existing healthcare data and improve decision making with applications that address workforce planning, elective recovery scheduling, and supply chain resilience. Digitally native partners can leverage best-in-class tools and technologies including a breadth of AI services and application development tools possible only through an open architecture.

The C3 AI Platform abstracts the infrastructure and services leveraged throughout the technology ecosystem to minimise learning time and accelerate value generation. Abstraction allows programs, algorithms, and data structures, written in different programming languages and held in disparate systems, to interoperate. UK healthcare can connect existing and developing investments without needing to overhaul and standardise every application and data store at its source. The C3 AI Platform's open architecture provides the capability to replace any component with next-generation improvements. It enables the incorporation of any new open source or proprietary software innovations without adversely affecting the functionality or performance of any existing applications. Open architecture is necessary to build custom applications across the UK healthcare ecosystem both today and in the future.

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