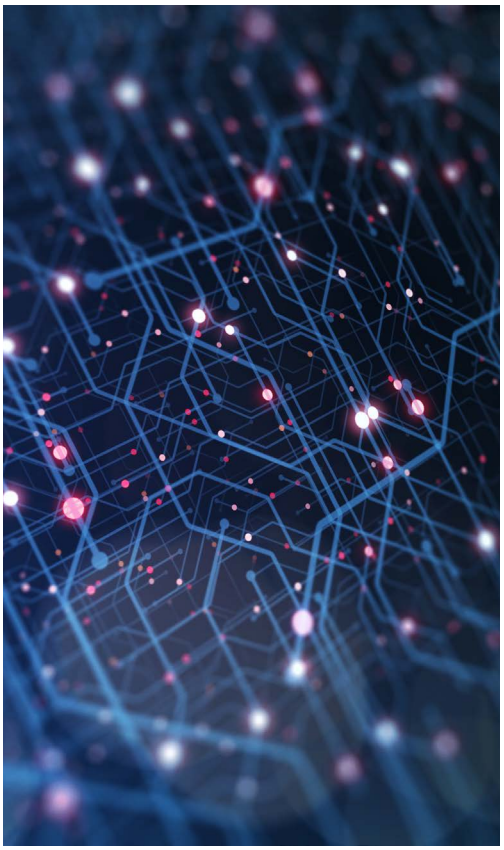
FUJITSU

AI and Data Science Consultancy Services

Data science and agile analytics that drives insightful intelligence

As our reliance on technology continues to increase, sensor-enabled autonomous edge devices, enterprise data and open data sources are becoming more prevalent in our everyday lives. These edge devices are collecting huge amounts of data about their surrounding environment and how we are interacting within it. In the military environment, this could be traditional IT equipment, unattended devices and weaponry, along with highly valuable capital assets like vehicles and aircraft.

To tackle this challenge, Fujitsu adopts a co-creation, consultancy-led approach designed to work collaboratively with customers, academia and a partnership base supported by the SME community to build bespoke, yet responsible AI solutions.



This volume of data being collected and made available for analysis is increasing exponentially, and these data sources are also becoming increasingly multi-modal and complex. So, knowing which sources to collect and manage and how to interrogate the data quickly and accurately is a critical challenge for military decision-makers. Previously, data would be analysed manually by a team of users trawling through a range of sources in the hope of finding a connection or trends. Such methods are both inefficient and very time consuming.

Fujitsu understands the military environment and the challenges faced better than most. We have applied this experience to our AI and Data Science Consultancy Services to deliver the requisite skills and expertise required to translate data into actionable military intelligence. By employing the necessary AI, data mining and machine learning techniques, we can help to identify the usable data and understand its relevance to seek innovative ideas and solutions to real-world problems.

Accurate, meaningful insight

Utilising Artificial Intelligence, or AI, and advanced analytics technologies that deliver accurate and meaningful insight, Fujitsu has developed a unique approach that allows organisations to interrogate and analyse huge volumes of data from different sources in a fraction of the time, compared to traditional manual techniques and processes. Fujitsu's approach to data science greatly increases the capacity of the volume of data being interrogated in a fraction of the time, and the resulting analysis drives a far greater level of insight that would not have previously been possible.

Data sources from different trusted levels can also be layered, allowing users to make sense of all data and information available, trusted or not. Such analysis generates incredibly powerful insight that analysts can then use in a far more meaningful way to inform future decision-making.

Our data services include:

Data engineering

Where no standard format for data collection and recording is present, we create a bespoke set of pre-processing algorithms and data pipeline tooling to ensure data is standardised prior to analysis and adjusted according to domain expertise.

Data quality assessment

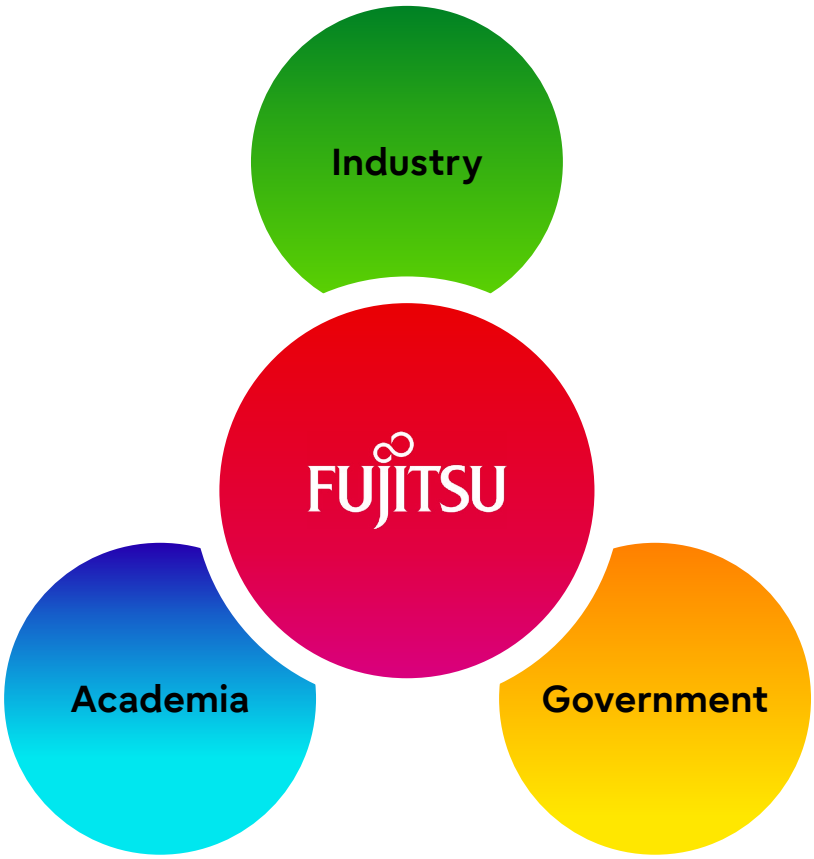
AI is only as good as the data behind it, and as such, this data must be complete, fair and representative to ensure that it can be used in a non-discriminatory way. We recognise that bias can be an inherent problem when using AI as a decision-making tool, so we optimise your data sets to minimise data bias and ensure they can be interpreted fairly and add value.

Data annotation

This approach labels the data available in various formats like text, video or images. Labelled data sets are required for supervised machine learning, so that machines can easily and clearly understand the input patterns. Such approaches like active learning can help create labelled data from the huge volumes of unlabelled data sets that are collected and stored.

Synthetic data

Fuelled by huge advances in algorithmic innovation, today's AI-models are incredibly data hungry. While having huge volumes of data available is essential, synthetic data can sometimes be created to aid the development of a solution. Synthetically generated data can assist organisations and researchers to build reliable data repositories needed to train, and even pre-train AI models and supplier lock-in.



Triple Helix – bridging the gap with industry

Fujitsu's consultancy-led approach is designed to work collaboratively with customers to build bespoke, yet responsible AI solutions to automate, optimise and extract insights that improve their operations and services. Our ultimate aim is to extract the maximum value from the available data.

Fujitsu is acutely aware of the importance of ethical and responsible AI and the potential risks posed by the development of unethical AI systems. As a result, we are closely engaged with industry, academia and government as they continue to investigate and develop best practice and guidelines to ensure the ethical use of AI solutions across a wide range of industry applications. This 'Triple Helix' approach is bridging the gap with industry, enabling agile, innovative yet responsible and ethical adoption of AI.

Innovative solutions to real-world scenarios

It can often be expensive and - especially in the military environment – risky, to test and apply real-world scenarios. So, having the ability to replicate these applications in a sterile, risk-free environment can be hugely beneficial. A wide variety of real-world operational scenarios can benefit from the application of AI and data science services across a myriad of different environments.

Here are just a few examples where we have applied these techniques:

- **AI simulations** – Fujitsu has recently acted as the technical lead in an exciting collaboration with the University of Manchester that could potentially enhance military training programmes. The project looked in detail at how the application of AI-based simulations currently used by the video gaming industry can help to evaluate decisions common to a military logistics supply network. The results of the project were presented to the NATO Modelling & Simulation Group Symposium (MSSG).
- **Digital twinning** – by replicating existing physical objects, infrastructure, systems or processes in a digital twin environment we can create a virtual representation of the real-world scenario. Various parameters can then be adjusted and tested to evaluate their impact within a sterile, laboratory environment, to find the optimum solution.
  This improves decision-making, enhances learning and helps to dynamically understand how a product is performing, both now and in the future.
- **Scenario planning** – we are able to apply multiple scenarios to the available data to conduct course of action and counterfactual analysis. This helps to evaluate the size and severity of any impact any changes may have to a particular event or other actors within that scenario using agent-based modelling techniques. For instance, what impact will a temperature increase have on the performance of a vehicle, and its occupants on a given journey.
- **Machine learning in the operational environment** – once the AI scenario has been created and tested, it is ready to be deployed. But in order to introduce AI into its real-world scenario, we need to understand the tooling required to bring it into a live production environment. Creating a machine learning operational environment helps us understand what we need to have in place to fully leverage the AI that's been created.
- **Large Language Models** – Large Language Models (LLM) use deep learning techniques that interrogate massively large data sets to understand, summarize, generate and predict new content. With many different models available, Fujitsu has developed a LLM evaluation tool that gives the user a unique ability to interface with the models. Based on up to 15 metrics that have been thoroughly researched and established, the tool enables the user to select the most appropriate measures that will allow them to evaluate which LLM model is best equipped for their task, while also assessing the quality of the output before application integration.

Case Study:
Health Usage Monitoring System (HUMS)

Challenge

Create an algorithm and toolset that predicts component failure on military vehicles, as well as the vehicle's future availability, while also enhancing the scheduling of vehicle maintenance.

Solution

We took the raw, unprocessed data of the vehicle fleet and optimised it to allow it to be analysed. Once analysed, an algorithm was created which presented the likelihood of component failure over a user-defined timeline.

Outcome

Fleet managers, maintenance engineers and operation planning staff can confidently know the availability of vehicles at any given time with a high degree of accuracy, based on real-world data. This has enabled the military to move to a conditions-based maintenance regime, meaning vehicle maintenance can be scheduled based on the actual condition of the vehicle and its components, rather than time-based. This has resulted in a reduction in rudimentary maintenance which has delivered a significant cost saving, while increasing vehicle availability. This capability can also be coupled with Fujitsu's GlobeRanger RFID asset tracking solutions that accurately monitor and assess the conditions of a specific asset.

Case Study:
Fujitsu Information Management Portal

Challenge

Provide a user community with a single view where information can be discovered, connected, de-risked and governed centrally, before being shared. Creating such a portal will improve information visibility to the user through intelligent natural language search and retrieval methods across disparate data modalities, like text, image or audio.

Solution

We developed an information management portal consisting of bespoke AI functionality to help manage information efficiently, while also aiding the user during their discovery process. Data used for concept purposes was predominantly open information (e.g. Twitter, Wikipedia) facilitating the move to incorporating open source intelligence.

Outcome

The end result is that users will be able to triage and identify key factual information quickly to provide timely insights for effective decision-making outcomes. This is made possible by providing the user with a 'connected view' of this unstructured data landscape with the right tools to answer key strategic objectives in a timely manner.

Data science and agile analytics that drives insightful intelligence

Fujitsu's innovative data science consultancy-led approach is based on an open, scalable architecture that enables rapid, agile analytics to drive valuable data insight.

- **Speed and volume** - allows organisations to interrogate and analyse huge volumes of data from different sources in a fraction of the time, compared to traditional manual techniques and processes.
- **Rapid deployment** - dramatically cut time from weeks, to just minutes thanks to a scalable, repeatable architecture.
- **Data sources** - a wide variety of data sources can be interrogated and tailored to any feed which is completely configurable to suit operational requirements.
- **Analysis enrichment** - automated intelligence is applied to trends and correlations to tune data in support of statistical analysis to further improve insight.
- **Scalability** - this approach can scale up, from a standalone deployment in disconnected or remote environments, through to a fixed or enterprise-wide network.
- **Iterative digital development** - the capability can continually evolve alongside your ongoing operational requirements, delivering incremental benefits every 2-3 weeks, instead of maybe longer timescales with more traditional, 'waterfall' approaches.
- **Low-cost, low risk** - crowd-sourced technologies help to reduce start-up cost while reducing risk, providing organisations with a means to implement an inexpensive 'analytics-ready' solution that can be deployed on a range of hardware platforms and hosting models.
- **Open source software** - use of well-established FOSS tools such as Python, Spark, Kafka, Tensorflow, and JavaScript do not require niche training or skills adoption.

Why Fujitsu in Defence and National Security

We want to build a more sustainable future for us all. To do this, we keep evolving in the face of future threats. But we can't do this alone. Which is why we partner with the world's best technology providers to create a readymade ecosystem, designed to harness sustainable innovation and withstand the rigours of the Defence sector.

Bringing together our unrivalled integration capabilities of business critical computing with the very latest emerging technologies - like AI, blockchain and quantum – we're helping our Defence customers prepare for the future, tackling the threats we face today – and tomorrow. By instilling trust in society through innovation that connects people, technology and data, we can design effective solutions that are both ethical and responsible.

We've been adapting to this changing world since 1935, solving humanity's greatest challenges by transforming our customers' businesses. And we've been operating some of the world's most critical infrastructures at the highest levels of security demanded by nations, militaries, governments and industry.

We're continuing to develop this level of collaboration with international experts to ensure we thrive in the face of unprecedented disruption. Together, we can exploit technology to unleash the power of data to deliver better outcomes and define our digital future that will benefit society, the environment, the economy - and generations to come.