

Service Definition

Digital Twin

FUJITSU



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Fujitsu Digital Twin Service Overview

Programme overview

The Internet has transformed how people and organisations share information and communicate, enabling us to both enjoy better digital experiences and use IoT sensor data to monitor and control the physical world.

In the coming years, these two parallel evolutions will converge with developments in augmented and virtual reality in the connection of multiple digital twins, providing us with opportunities to rehearse complex real-world scenarios in a digital space, prepare a response to systemic risks and generate prompt and appropriate actions.

Fujitsu has recognised this likely evolution and the associated requirement for regulations and rules that will be inevitably required if we are to integrate the physical and the digital worlds effectively and on this basis is actively investing in research to develop:

Federated Digital Twins: Collaborating to enable response to systemic issues, by connecting multiple digital twins, as participants in the National Digital Twin Programme (NDTp).

Social Digital Twins: Combining data analysis capabilities with human-centric insights cultivated by humanities and social sciences, enabling us to combine large-scale, real-time digital twins with computing models of behavioral science

The development of these capabilities will provide social digital twins that digitally rehearse complex urban and social dynamics.

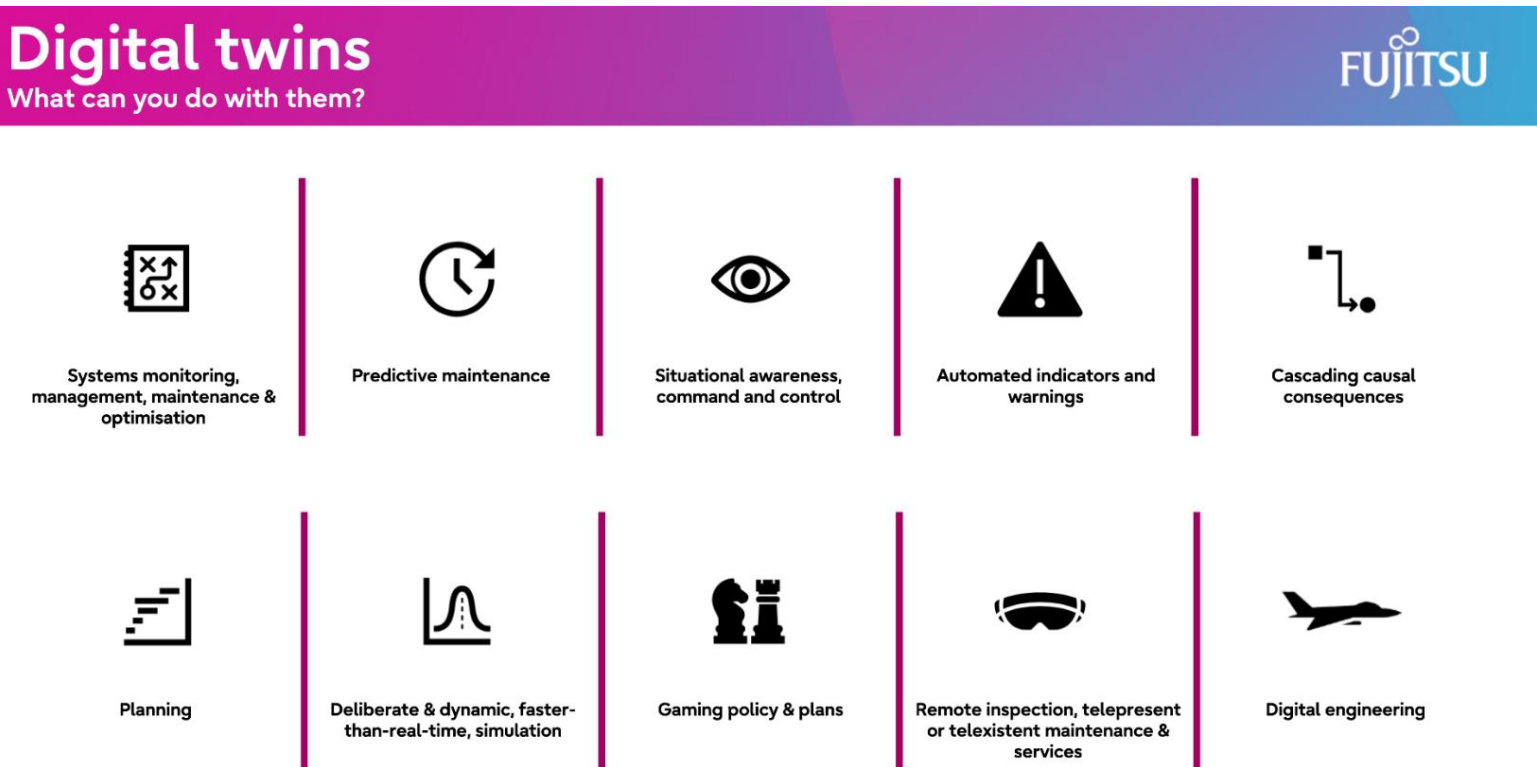


Figure 1: Digital Twin Opportuntiees

Fujitsu Digital Twin Service Scope

Fujitsu Digital Twin Services acts as an extension of customers' operational and engineering teams to help design, build, and manage sophisticated digital representations of physical assets, processes, or systems. We leverage advanced digital twin accelerators that provide robust simulation capabilities, real-time data integration, and intelligent analytics.

This provides a **dynamic, insightful, and adaptable digital twin ecosystem that allows organisations to optimise operations, predict outcomes, and focus on achieving high-quality business outcomes**. It consists of the following core features:

- **Secure & Scalable Data Ingestion and Synchronisation:** Ensuring consistent, real-time data flow from diverse IoT devices, operational systems, and historical databases to maintain an accurate twin.
 - **Modular Digital Twin Template Development:** Streamlining the creation of digital twins for various asset types, facilitating rapid deployment and customisation.
 - **Automated Data Model Integration:** Enabling seamless integration of complex data models (CAD, P&ID, BIM) into the digital twin, ensuring a holistic representation.
 - **Credential Management for Connected Assets:** Securing sensitive operational data and access across the integrated physical and digital environments.
 - **Automated Deployment of Comprehensive Monitoring and Simulation Environments:** Providing full visibility into the twin's behavior and the physical asset's performance, alongside advanced "what-if" scenario testing.
 - **Digital Twin Versioning and Restoration:** Protecting critical twin configurations and data, ensuring business continuity and the ability to revert to previous states.
 - **Interoperable Platform Components (Open Standards-Based):** Reducing vendor lock-in and fostering integration with existing enterprise systems and future innovations.
 - **Digital Twin Lifecycle Support:** Providing ongoing assistance to ensure the stability, accuracy, and continuous evolution of the digital twin throughout its operational life.
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Fujitsu Digital Twin Service Accelerators

Fujitsu Digital Twin Services offering is based on a suite of curated application and platform accelerators and resources. By extending your existing operational and IT capabilities with our specialized service accelerators – offering advanced simulation, predictive analytics, and integrated asset intelligence – we remove the complexity and burden of digital twin development and management.

The following Fujitsu Digital Twin application and platform service accelerators can be provided:

Fujitsu Digital Twin Consultancy

Fujitsu's experts will engage with key stakeholders to assess the current state of operational processes, asset management, and data readiness within an organisation. We then make proposals for how to implement and leverage Digital Twins in simple pragmatic steps, using proven methodologies to achieve specific business objectives.

Solution Blueprints

Fujitsu has several standard solution blueprints for Digital Twin implementation across various industries. This includes leveraging Cloud-native services (such as AWS IoT TwinMaker, Azure Digital Twins) or platform-independent tools and frameworks (such as open industrial IoT standards and simulation platforms). Fujitsu can provide fully automated deployment pipelines for:

- **Industrial IoT Asset Twins** (e.g., manufacturing equipment, energy systems)
- **Infrastructure Twins** (e.g., smart buildings, transportation networks)
- **Process Twins** (e.g., supply chain optimization, resource management)
- **Urban Twins** (e.g., city planning, public services)
- **Custom Enterprise Twins** (e.g., bespoke operational models)

Digital Twin Model and Data Pipeline Development

Our Digital Twin services can develop robust data ingestion and processing pipelines for common IoT platforms, data lakes, and enterprise systems, ensuring high-fidelity data Synchronisation for the twin. We are also able to develop automation scripts in tools like Python, Terraform, and Ansible to integrate these pipelines and manage the digital twin infrastructure.

Tool Support

Typically, the following tools and platforms can be supported, and additional technologies are continually being integrated. This reflects our commitment to a comprehensive Digital Twin ecosystem:

- **AWS IoT TwinMaker**
- **Azure Digital Twins**
- **Siemens Mindsphere**
- **PTC ThingWorx**
- **GE Predix**
- **Unity, Unreal Engine** (for visualization)
- **ANSYS, MATLAB Simulink** (for simulation)
- **Grafana, PowerBI** (for visualization and dashboards)
- **Kubernetes** (for containerized twin components)
- **Kafka, MQTT** (for real-time data streaming)
- **Databricks, Apache Flink** (for data processing)
- **TensorFlow, PyTorch** (for integrated AI/ML models)
- **Terraform, Ansible** (for infrastructure automation)
- **Jira, Confluence** (for project management and documentation)

Tool License Management

Where enterprise versions of specialized digital twin tooling or simulation software are required, Fujitsu can source the licenses and provide a license management function on behalf of the customer.

Tooling Identity Management

The Fujitsu Digital Twin service can provide Identity management services for single sign-on and manage movers, leavers, joiners' processes for users interacting with the digital twin platform and its associated tools.

Integrated Observability: Digital Twin Health Monitoring

Using advanced monitoring tools such as Datadog or Dynatrace (or specialized industrial monitoring solutions), the Fujitsu Digital Twin service can provide real-time monitoring of the digital twin's health, data integrity, and simulation performance.

Integrated Observability: Physical-to-Digital Alignment

Fujitsu can provide full-stack monitoring capabilities to offer application performance management for twin components and user experience monitoring of deployed digital twin interfaces, ensuring seamless alignment with the physical world.

Integrated Security

Fujitsu's Digital Twin services have been designed to enhance the solution to provide robust security throughout the entire digital twin lifecycle. This includes secure data ingestion, secure model storage, access control, and continuous threat monitoring to adopt a secure-by-design model for critical operational data.

Digital Twin Platform Evaluation

The Fujitsu Digital Twin service can provide evaluation of various digital twin platforms and technologies to meet specific customer requirements and make recommendations.

Portal Development for Digital Twin Interaction

The Fujitsu Digital Twin Service can develop intuitive portals and dashboards to support the visualization, interaction, and automation of digital twin processes. This typically involves the integration with APIs of various digital twin platforms and data sources, an area in which Fujitsu has considerable experience.

Automated Simulation and Testing

Fujitsu's Digital Twin service has the ability to develop automated simulation pipelines and performance testing frameworks to validate digital twin models and assess their operational accuracy.

Automated Asset Onboarding

Our Digital Twin service enables automated onboarding of new physical assets into the digital twin ecosystem, allowing organisations to efficiently create, configure, and integrate digital representations at scale. This automation helps streamline operations, enhance model consistency, and ensure compliance with operational policies.

Fujitsu Digital Twin Service Approach

Adaptive Digital Engineering (ADE)

Fujitsu understands that customers are unique, and that the scale and pace of change in industrial processes, market demands, and advances in digital twin technology, require organisations to respond and adapt evermore quickly.

So, while understanding the importance of Agile industry methods such as SAFe, Scrum, etc., we know that these need to have the flexibility to meet each customer's specific needs for digital twin implementation.

To meet these needs, we have created a set of adaptable and dependable working practices that provide the flexibility required to accommodate standard and bespoke methods, all whilst maintaining a reliable and effective delivery of digital twin solutions. This allows our Agile approach to be determined on a case-by-case basis, that best suits customer needs. We call this Adaptive Digital Engineering (ADE).

Our Adaptive Digital Engineering (ADE) methodology underpins our Digital Twin services and defines our unique delivery approach to drive the delivery of high-quality digital twins at high velocity, delivering tangible business value sooner. ADE blends modern engineering practices with a deep focus on user-centered design and iterative twin development; it is Agile by design.

It is a phased, modular approach which can be applied end-to-end or in individual sub-sections, allowing our customers the flexibility required to deliver maximum impact and business benefits. It comprises four phases and eight stages, which outline a workplan for the delivery of successful outcomes, as shown in the diagram below:

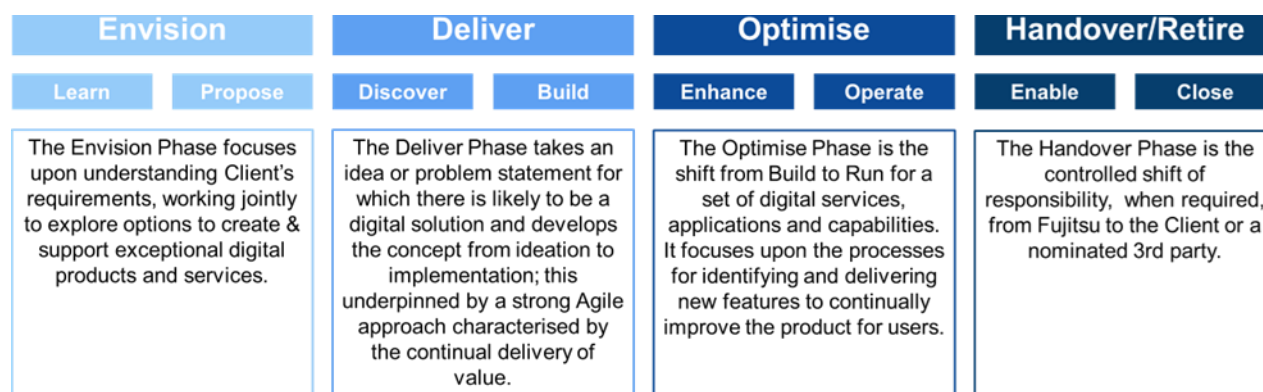


Figure 2: Fujitsu ADE Methodology

ADE has been especially developed by Fujitsu to align with established best practices for digital transformation and is consistent with the Digital, Data, and Technology (DDAT) approach, focusing on delivering measurable operational improvements by applying approaches such as:

- **Model-Driven Development:** Ensuring twin accuracy and consistency from the outset through robust modeling practices.
- **User-Centred Design:** Focusing on the end-user (e.g., operator, maintenance engineer) and their needs when developing digital twin interfaces and functionalities in each phase.
- **Secure by Design:** Integrating robust security into the digital twin architecture and data pipelines from day one.

These practices ensure the most robust, secure, and optimised digital twin outcomes, adding the most value for our customers.

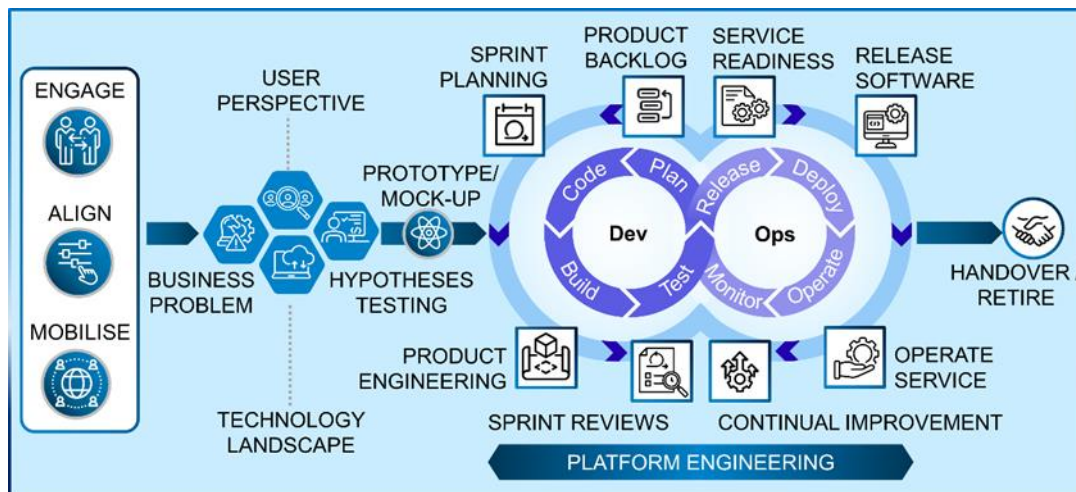


Figure 3: Digital, Data and Technology approach

Our Digital Twin service is flexible to align with this delivery methodology model, where we:

- **Build:** Fujitsu will be responsible for delivering the functional digital twin solution.
- **Supply:** Fujitsu will deliver your digital twin outcome using Fujitsu capability or a hybrid team (where Fujitsu augments your team) for a defined term, including enablement and knowledge transfer to allow you to insource the management of the twin.
- **Deploy:** Fujitsu will deploy and configure a Fujitsu or partner digital twin product/platform to help you accelerate insights and operational improvements.

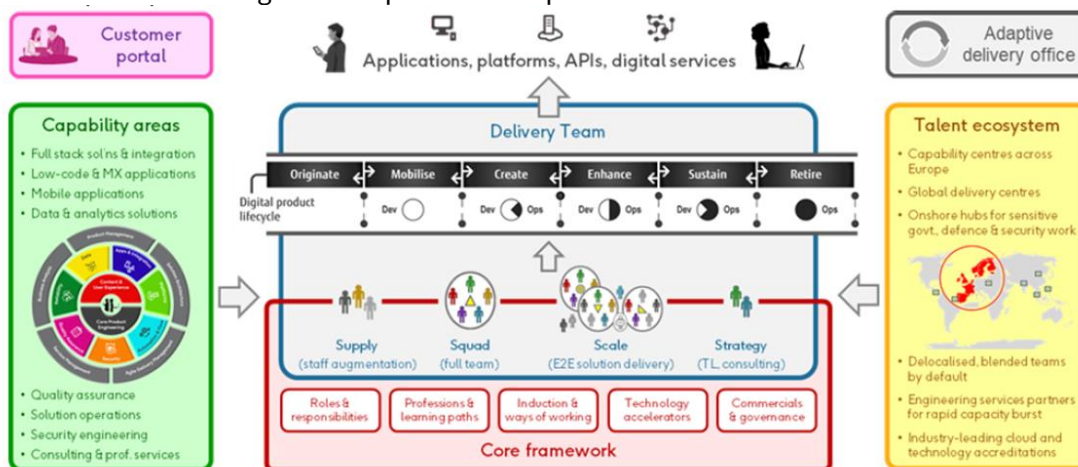


Figure 4: Fujitsu Digital Twin service approach

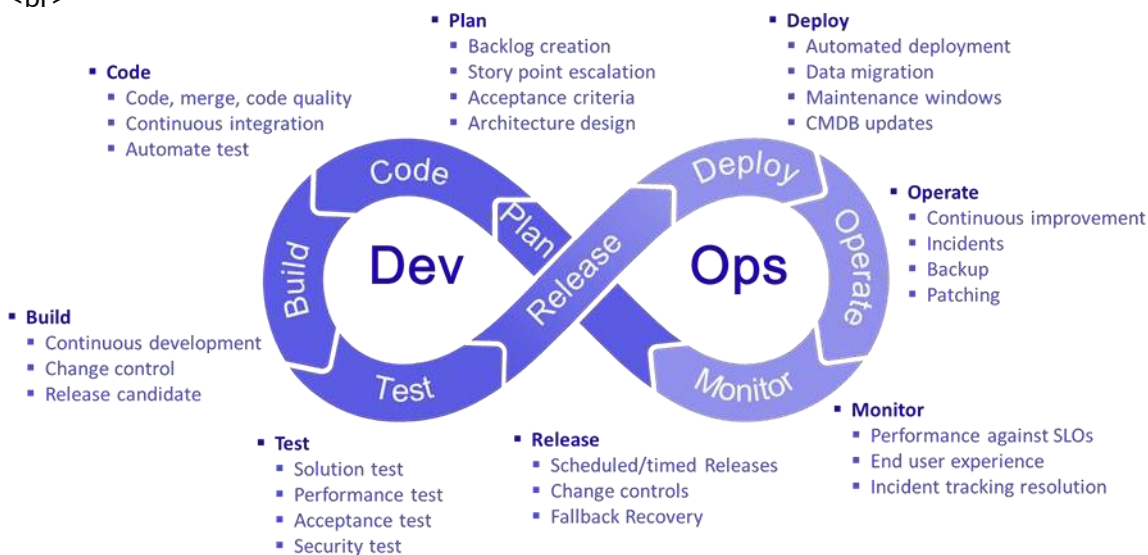
Our Digital Twin Working Principles

The success of Digital Twins is as much about a cultural shift towards data-driven operations and predictive insights as it is about technology, enabling seamless and rapid operational transformation. To enable this cultural shift, Fujitsu implements a collaborative approach to break down the traditional barriers that have historically existed between operational technology (OT) and information technology (IT) teams, as well as engineering and business units.

Our tried and tested methodology drives professionalism in asset and process management by fostering collaboration and standardization in the digital twin development and operation.

Our Working Principles for Digital Twins are centered around collaboration, automation, and continuous improvement:

- **Culture of Collaboration:** We promote a culture where operational teams, IT, data scientists, and other stakeholders collaborate seamlessly, breaking down silos and fostering shared responsibility as "One Digital Twin Team."
- **Automation:** We maximize automation to drive optimum efficiencies, including data ingestion, model updates, simulation execution, and reporting, to ensure accuracy, reduce manual errors, and accelerate insight delivery.
- **Continuous Digital Twin Integration:** We encourage frequent integration of new data sources and model refinements, enabling early detection of discrepancies and ensuring the digital twin always reflects the physical reality.
- **Continuous Delivery of Insights:** We automate the delivery of analysis, predictions, and operational recommendations to stakeholders rapidly and reliably. We implement robust monitoring and alerting mechanisms to track twin performance and detect anomalies early.
- **Digital Twin as Code (DTaC):** We treat digital twin configurations, data schemas, and simulation logic as code using tools/frameworks to ensure repeatability, version control, and scalability for complex twins. We use configuration management tools to automate deployment and updates.
- **Monitoring and Feedback:** We advocate continuous monitoring of both the physical assets and their digital twins to provide feedback on performance and deviation, enabling data-driven decisions and model recalibration.
- **Feedback Loops:** We establish feedback loops throughout the digital twin lifecycle, leveraging agile ceremonies such as sprint retrospectives and "show and tells" to iterate and improve the twin's accuracy and utility rapidly.
- **Lean Practices:** We apply lean principles to eliminate waste in data processing, streamline model development, and optimise workflows, ensuring resources are utilized efficiently in twin creation and use.
- **Cross-Functional Teams:** We encourage the formation of teams with diverse skills (OT, IT, data science, domain experts), enabling them to take ownership of end-to-end digital twin delivery and respond quickly to changing operational requirements.
- **Security:** We adhere to strict security principles at every stage of the digital twin lifecycle. We undertake threat modeling to drive the hardening of data pipelines, twin models, and access controls.
- **Shared Goals and Objectives:** We align Digital Twin goals with overall customer business and operational objectives, fostering a common purpose and collective responsibility towards delivering measurable value.



[Figure 5: High-level tasks performed during the Fujitsu ADE DevOps stages]

Support

A support service provided by Fujitsu Engineers is available for our Digital Twin service. The support service has been designed to ensure the operational stability, data integrity, and continuous availability of the core digital twin platform and its associated tooling. It encompasses critical services such as:

- Routine backup and restoration procedures for twin models and data.
- Proactive patching & essential upgrades for digital twin platforms and associated technologies (including vendor support where required, e.g., AWS, Azure, simulation software providers).
- Dedicated assistance for digital twin portal functionalities and data integration issues.

Our structured support approach can be tailored and configured to individual customer support requirements and aims to maintain the integrity and performance of your digital twin environment.

Business Value

The Fujitsu Digital Twin Service is engineered to empower your organisation to achieve the following outcomes, by unlocking tangible business value with predictive insights and operational excellence:

- **Accelerated Operational Insights:** Rapidly move from raw data to actionable insights, significantly accelerating the understanding of complex operational scenarios and asset performance.
- **Enhanced Innovation Capacity:** Free your operational and engineering teams to focus on strategic initiatives and predictive maintenance, unburdened by manual data analysis and reactive problem-solving.
- **Superior Predictive Capabilities & Risk Management:** Reduce the risk of costly failures, unplanned downtime, and operational inefficiencies through advanced simulations and data-driven predictions.
- **Operational Efficiency & Cost Reduction:** Maximize the benefits of a data-driven approach for consistent, repeatable, and cost-effective asset management, maintenance, and resource allocation.
- **Adaptable & Compliant Operations:** Benefit from a flexible, collaborative model that ensures continuous alignment of digital models with physical realities, while adhering to industry standards and regulatory compliance.
- **Leverage Extensive Digital Twin Expertise:** Gain direct access to deep, proven expertise in designing, building, and managing digital twins across various industries.

In addition, Fujitsu has access to a substantial pool of in-house, highly skilled resources, covering a wide range of experience and roles required to meet our customers' needs. This is drawn from a workforce of over 7,000 UK employees, with extensive experience in IoT, data science, simulation, and cloud engineering.

Fujitsu manages a robust partner ecosystem comprising over 60 organisations, ranging from Global Alliance Partners like Microsoft and Amazon to smaller, specialist SMEs. This ecosystem provides a broader pool of specialist and niche resources essential for comprehensive digital twin implementation.

By actively managing our partner ecosystem and continually fostering healthy relationships, our extensive resourcing model allows us to respond to our customers' ever-changing demands for digital twin solutions.

Some of the most common opportunities that the Fujitsu Digital Twin service can help organisations with include:

- **Operational Optimization:** Traditional operational models provide reactive insights. Fujitsu's Digital Twin services transform reactive operations into proactive, predictive management, decreasing unplanned downtime and optimizing resource utilization.
- **Innovation & Product Development:** Difficulty visualizing and testing new designs or process changes without physical prototypes. Digital Twins allow for rapid virtual prototyping and "what-if" scenario testing, accelerating new product development and operational innovation.
- **Scalability & Resiliency:** Requires time-consuming manual monitoring and reactive maintenance. Digital Twins provide continuous, automated monitoring and predictive maintenance models, significantly enhancing asset resiliency and optimizing operational scaling based on real-time data.

- **Risk & Compliance:** Faced with complex regulatory requirements and increasing exposure to operational risks. Digital Twins reduce operational risks with predictive insights and enhance compliance through transparent, auditable simulations and performance tracking.
 - **Decision-Maker Experience:** Organisations struggle to gain real-time, holistic visibility into complex operations. Goodbye fragmented data and delayed decisions. Hello intuitive dashboards, predictive insights, and data-driven recommendations – helping decision-makers achieve strategic objectives.
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Pricing

This service is priced as per the SFIA rate card for this service.

Other pricing models can be agreed to support the project requirements.

About Fujitsu

As one of the world's leading IT companies, Fujitsu is at the forefront of pioneering technology in the UK since we made our initial investment over 40 years ago. As a key strategic partner we deliver essential services, from our secure hybrid IT which underpins critical national infrastructure to our investment in emerging technologies to boost national capability. Drawing on our Japanese technology expertise we provide bespoke digital transformation solutions. This unrivalled expertise has allowed us to specialise in emerging focus areas; Hybrid IT, AI & RPA, Data analytics, Agile application development/transformation and Security. Together, we offer a full package of solutions to support the UK as a long-term industry supplier.

We believe in realising the significant alignment between the UK and Japan in emerging technologies and in creating a UK-Japan 'Innovation Bridge' to support the UK's science and technology superpower objectives. We are committed to investment in UK skills and research and development, driving customer outcomes and promoting social value. We employ 124,000 people around the globe, including around 8,000 people across the UK, promoting diversity and inclusion as a DWP Disability Confident Leader. We are recognised as a Times Top 50 employer for Women since 2017, a Stonewall Top 100 Employer for 2023 and were awarded an EcoVadis Silver Rating, the world's largest provider for sustainability ratings.

Contact: government.frameworks@fujitsu.com

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