



Trust. Value. Velocity

G-Cloud 15

Interoperability and Data Exchange Architecture

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1. About Mastek

Mastek has been delivering Critical National Infrastructure programmes in the UK Public Sector for over a decade now. We are trusted with multiple contracts for the UK Government across Central Government, Health, Local Government, Policing, Public Protection and Defence. The majority of our national services are delivered in a context of high uncertainty and complexity while collaborating in multi-supplier environments.

While working for these large and complex public sector organisations, we have continuously refined our management, delivery and underlying processes to reflect key learnings from the sector:

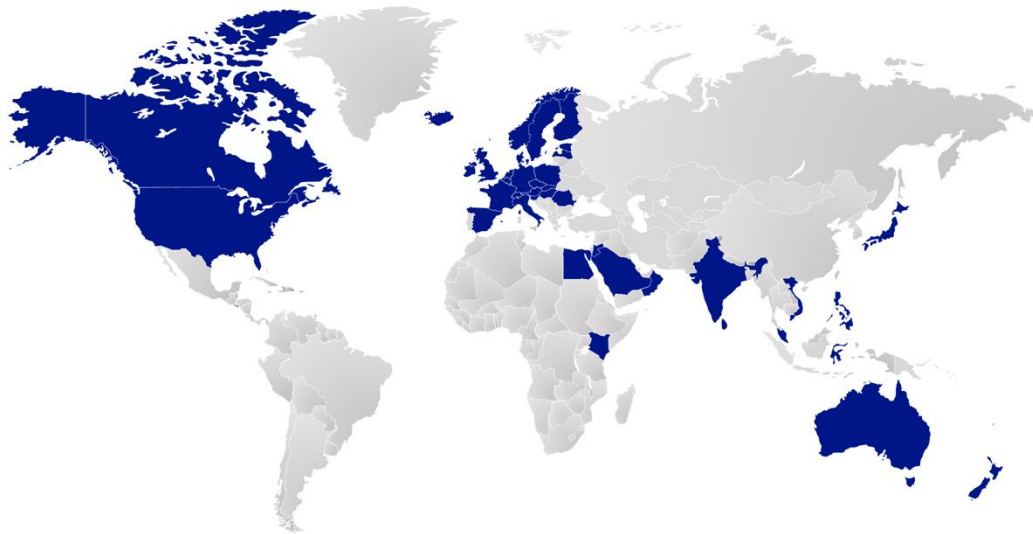
Working through a complex stakeholder landscape: We understand the importance of establishing effective communication channels, building trust and fostering a collaborative working environment that empowers stakeholders to contribute meaningfully to the project's success. Our approach is based on a deep understanding of stakeholder needs and requirements. We leverage our experience and expertise to design governance structures that promote transparency and accountability and use data-driven reporting mechanisms to ensure stakeholders have real-time visibility into project status and progress. At the Home Office, GDS, Ministry of Defence and NHS, we have a proven track record of working seamlessly with large stakeholder groups, including civil servants.

Standards, compliances: We comply with >20 policies and standards, including Government Digital Standards and Government CDDO Service Toolkit covering service standards, service manuals, TCoP, API technical and data standards. Our stringent governance, methods, playbooks and processes (both manual and automated) span across service delivery phases, ensuring continuous compliance.

Policy-driven: Policies and procedures largely drive Public Sector organisations. We need to be Agile and flexible to meet demands for policy/regulatory changes, geopolitical events and ministerial commitments.

Culture: We adhere to the Civil Service core values of integrity, honesty, objectivity and impartiality. Key behaviours we promote stem from a combination of Civil Service and Mastek values. These include being passionate, accountable, sustaining predictable and repeatable outcomes, not transferring risk, being transparent, leading to enablement, acting with transparency, practising a no-blame culture and being flexible.

Mastek's global presence



Australia

Austria

Bahrain

Belgium

Brunei

Canada

Denmark

Egypt

Estonia

Finland

France

Germany

Hungary

Iceland

India

Indonesia

Ireland

Italy

Japan

Jordan

Kenya

Kingdom of Saudi Arabia
(KSA)

Kuwait

Latvia

Luxembourg

Malaysia

Netherlands

New Zealand

Norway

Oman

Philippines

Poland

Romania

Singapore

Slovakia

Spain

Sri Lanka

Sweden

Switzerland

United Arab Emirates (UAE)

United Kingdom

USA

Did you know?

75%

Around three quarters of Local Authorities in the UK who run Oracle have worked with Mastek on their digital transformation journey.

300,000 Users

Supported managing up to 750,000 logins per month to MOD through Identity and Access Management

Crime reduction

We designed, built and manage the UK's Strategic National DNA Database that helps Forensics and Law Enforcement Authorities investigate and stop crime

90% faster

We enabled the National Health Service (NHS) to drive 90% faster response times with a billion pharmacy prescriptions a year.

Technical Service Desk

We provide level 2 and ITSM support for the One Login service at Government Digital Service

22k

Our systems enable 22,000 schools to function efficiently every day of the year.

Healthcare and manufacturing

We delivered Finance, HCM and Supply Chain transformations for clients across health and manufacturing globally powered by Oracle Cloud

Transformation of trade

Transforming UK's trade with the EU and rest of the World by supporting Customs Declarations Services and its trade users.

99.99% Availability

We support the Home Office Biometrics (HOB) Platform, Having migrated it to an AWS platform.

Our digital and cloud services portfolio

Powered by Glide 4.0 and value-based delivery

Industry-aligned approach with business outcomes

Digital engineering and experience	• Cloud engineering and migration • Legacy modernisation • Low code / no code App Dev • DevSecOps • Enterprise integration	• MACH • Digital commerce • UX and CX • Platform engineering • Gen AI software development.
Oracle Cloud and enterprise apps	• Oracle Cloud applications • Oracle consulting • Oracle Cloud infrastructure	• Value-based delivery • Glide 4.0.
Data, automation and AI	• Cloud data modernisation • Business Intelligence and Analytics	• Data management • Intelligent automation • Data Governance.
Salesforce	• Sales Cloud • Service Cloud • Marketing Cloud • Industry Cloud	• Experience Cloud • Mulesoft.
Innovation labs and platforms	• Enterprise workforce scheduler • Connected enterprise • icx-Pro – intelligent part assistant	• iLeaseFinPro.
Cloud enhancement managed services	• Oracle managed services • Digital managed services • Commerce managed services	• Salesforce managed services.

Home Office Biometrics (HOB)

Public sector platform modelled 24x7 with 99.99% availability

Problem

- Transition business-critical Platform services from incumbent supplier with minimal risk
- Migration from private cloud to AWS Cloud.

Solution

- Migrated the infrastructure from private cloud to AWS
- Embedding Kubernetes Containerisation
- Introduced Docker and fully-baked AMIs
- Supporting the platform's self-service functionality using Jenkins Jobs
- Applying security updates to the OS base images through pipelines
- Instituting automated patching and testing for infrastructure images
- Support of configuration, test and releasable artefacts through the pipeline.

Outcome

- **Zero impact** on live service
- **80% automation** of SIT
- Environment Provision **2 days to 1 hour**
- **5x scalability** in handling student BRPs
- Cost saving the authority circa **£9.5m/year.**
- Won the '**Best Use of Cloud Services**' award
- **35%** Incident Volume Reduction.



Government Digital Service

Problem

GDS initiated the One Login programme to create a single front door for identity verification and authentication, which could be adopted and scaled across all government departments. This would improve the user experience by providing the public with a single identification and verification service for the government, reduce costs as each department no longer required its own identity service and reduce identity fraud and identity-enabled crime.

GDS released a tender in June 2023 to provide a Technical Service Desk (TSD) managed service for the One Login service. This service would provide a single point of contact for level 1 and 2 service support as part of the wider support ecosystem. It would be provided in the UK and replace the incumbent's scaled-down non-ITIL-aligned break-fix service.

Solution

In September 2023, Mastek were successfully awarded the TSD contract to deliver TSD on behalf of GDS. GDS had an extremely aggressive programme driven by the onboarding of HMRC as a user, which was a major milestone planned for February 2024, migrating new and existing HMRC users to the One Login platform. The TSD service was expected to go live in November 2023. This was an extremely complex programme which, within this timescale, would deliver:

- The contact centre provider for level 0 directly facing the public
- The TSD supplier in place directly facing all government departments
- The TSD supplier in place providing L1 and L2 engineering support and monitoring
- Continued delivery on the One Login backlog of features
- Continued migration of smaller government departments to the platform.
- Delivery of a new ITSM toolset to be configured for use by GDS and the One Login programme, integrating level 0 to level 3 support
- Working as one team, Mastek quickly integrated into the programme, appointing the leadership team early in the engagement. We collaborated with GDS from the outset, ensuring we tailored the service to their expectations rather than delivering what was written in the contract.

Our leadership team consisted of:

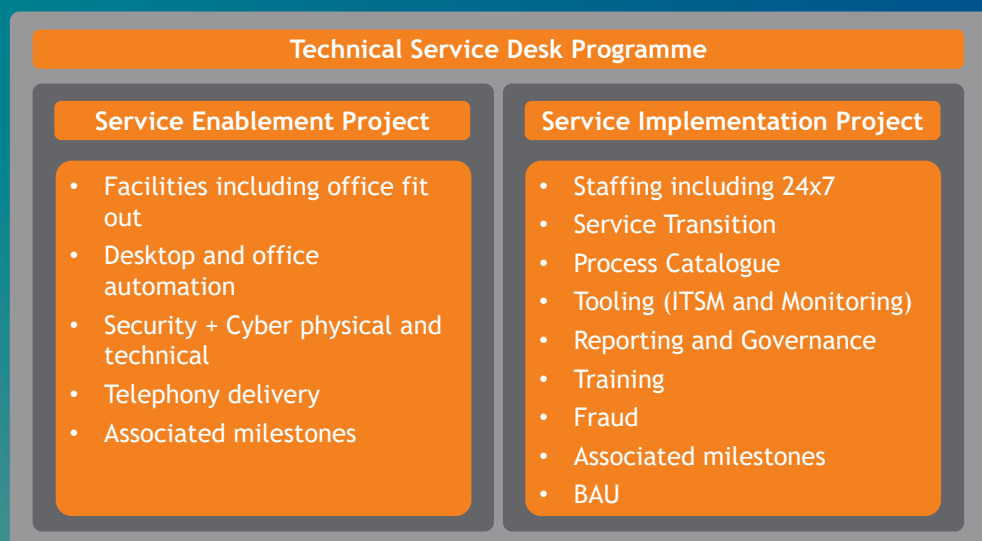
- Service Management Vice President
- Programme Director
- Chief Technology Officer
- Programme Management office lead.

Outcome

At its height, the programme team was circa 15 strong, covering programme/project delivery, PMO, architecture, fraud, security, support, omni-channel and quality assurance. The service team is currently in place providing circa 21 resources now covering end-to-end service management, service delivery and L1 and 2 engineering roles.

As the One Login migrations continue, Mastek is supporting Government departments onboarding to the platform as they transition into the new service and provide One Login a secure Technical Service Desk managed service with:

- Omni channel access for other government departments via telephony, email and web form
- Provision of L1 and L2 engineering support
- 24x7, 365 days a week cover
- 24x7x365 eyes on monitoring service
- Fraud detection and security, GDPR compliant
- End-to-end (L0-3) incident and problem management
- End-to-end 24x7 Major incident management (MIM)
- On-call/call-out engineering support, incident and MI management
- Adherence to stringent SLAs on incident response, call handling and fix times
- End-to-end monthly service reporting alongside TSD KPI and SLA reporting.
- A shift left culture and mindset, reducing the impact of service on product teams (L3)
- Support with service maturity in the programme, preparing GDS to run critical national infrastructure.



Internet-facing platform and applications for Army Digital Services

Developed mobile app and web app with 24*7 high availability

Problem

- New Defence Gateway Portal
- Combine all internet-facing applications into one
- Easy to use
- Enable easier access to the MySeries portfolio of products.

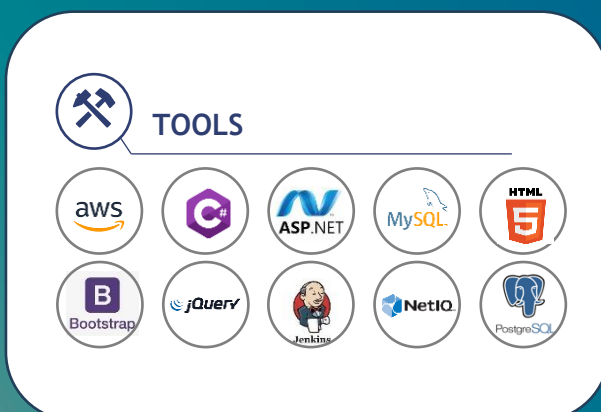
Solution

Designed and developed the following easy-use Progressive Web Apps:

- Defence Gateway Landing Page
- My Leave App
- My Expenses App
- My Health App
- My Details App
- My Appraisal App
- My Admin App
- COVID-19 Reporting Tool
- Commanders' COVID-19 Tool.

Outcome

- Delivered 20+ successful projects
- Deployment Automation
- £7.5m in savings annually
- Zero Downtime
- Environment creation in hours.



Delivered a platform for the Department for Health and Social Care

Delivered capability supporting 200k+ tests in a day,
traced millions of COVID-19 infections

Problem

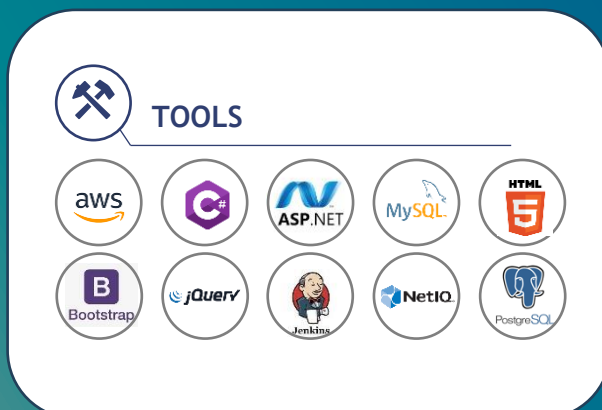
- Leveraging DevOps platform based on reusable GitHub, AWS and Azure DevOps Pipelines
- Introduce more flexible, scalable and reusable IaC capabilities
- Implement CI/CD pipelines.

Solution

- Uplifted from Cloud Formation into Terraform (IaC)
- Pre-built the AMIs using Packer, with automated security checks
- Immutable infrastructure, thus eliminating the risks of partial upgrades and patches
- Continual Cost Optimisation processes and other service functions, such as Change and Risk management
- Migrated into an organisation-wide collaboration toolset. This included Jira, Confluence, Trello, Miro, Teams, SharePoint, O365, Slack, etc.

Outcome

- 75% reduction in lead time due to pre-built AMIs
- Zero Downtime Deployments
- Delivered a Platform - Secured, multi-tenanted hosted on Azure and AWS in 5 weeks
- Cost reduction achieved through close monitoring of resource utilisation.



Mastek and Technology in the Public Sector

Technical Capabilities	Relevant Technology Capability	Mastek Scale
Software Development Continuous Integration, Platform - Other Products, Cloud Collaboration Tools		Software Engineering 2354 FTE
QA and Test ; API, Automated Functional and Compatibility, Accessibility & Performance		QA and Testing 774 FTE
Cloud Platforms Amazon Web Services AWS Microsoft Azure		Cloud Platforms 1046 FTE
Data BI/MI Components, Integration		BI and Visualisation 725 FTE
User-Centered Design		UCD 25 FTE
Office Automation Tools		Collaboration 4565 FTE

2. Summary

Interoperability and Data Exchange Architecture services enable organisations to seamlessly connect, share, govern and leverage data across diverse systems, platforms, partners and industry ecosystems—without compromising on security, performance, or regulatory compliance. The offering provides an end-to-end, standards-driven architectural framework for secure, scalable, governed and real-time data exchange, acting as a strategic foundation for digital transformation, modernisation, AI adoption and data-driven decision-making.

The service encompasses strategic advisory, architecture definition, delivery engineering, and ongoing operational optimisation across APIs, enterprise messaging, microservices communication, ETL/ELT pipelines, data streaming platforms, and canonical data models. It ensures consistent data semantics, metadata management, lineage tracking, data quality, validation, encryption and access control across multi-cloud, hybrid and on-premises estates.

The architectural approach aligns with industry standards, including REST, GraphQL, FHIR/HL7, GTFS, OpenAPI, ISO 20022 and asynchronous event frameworks, enabling interoperability within and across enterprises, government bodies, healthcare institutions, supply chains, payment networks and customer ecosystems. It provides the governance guardrails needed to ensure trust, auditability and compliance with UK public sector data governance regulations (including GDPR), sector-specific reporting frameworks and modern data protection requirements.

Platform-wise, the service supports leading integration technologies, including iPaaS, API gateways, enterprise service buses (ESB), event-driven platforms, streaming frameworks, data hubs and master data management capabilities, ensuring the right platform patterns are deployed for the right interoperability use case. It enables modern patterns, such as event sourcing, publish/subscribe, CQRS, and domain-driven data exchange, backed by telemetry, observability, and self-healing automation.

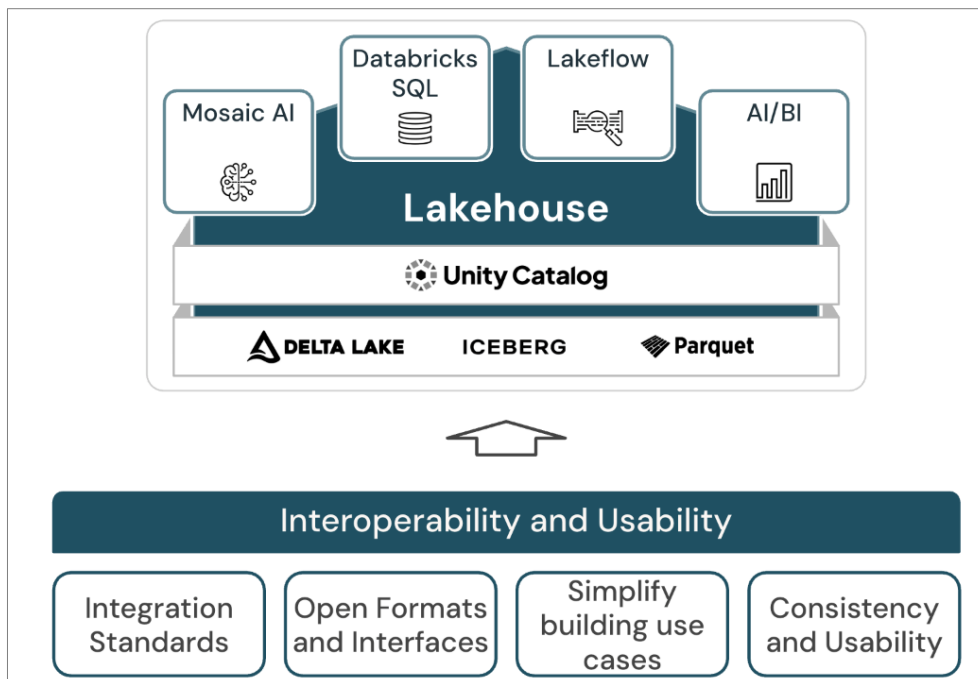


Figure 1: End-to-End Lakehouse Architecture

3. Masteks Service

This service provides end-to-end support for designing, implementing and governing interoperability and data exchange architectures in complex enterprise landscapes. It includes:

- **Interoperability Strategy and Roadmap:** Assessment of current integration maturity, business drivers and regulatory requirements; definition of interoperability vision, principles and target operating model.
- **Reference Architecture and Blueprinting:** Creation of logical and physical architectures for data exchange, including canonical data models, integration patterns and system-of-record mapping.
- **Standards and Protocols:** Adoption of open standards (HL7, FHIR, X12, EDIFACT, ISO 20022, OData, REST, SOAP, GraphQL, MQTT, AMQP) for structured, secure and portable data exchange.
- **Integration Platforms and Middleware:** Enablement of ESB, iPaaS, event streaming and API management platforms for orchestrating data flows, transformations and routing.
- **Data Governance and Quality:** Implementation of metadata management, master data management (MDM), data lineage, cataloguing and quality controls.
- **Security and Compliance:** Data protection, privacy, consent management, encryption, audit trails and compliance with GDPR, HIPAA, PSD2 and sector-specific mandates.
- **Monitoring and Observability:** Real-time monitoring of data flows, error handling, SLA enforcement and analytics for operational excellence.
- **Developer Enablement:** Provisioning of SDKs, documentation, sample integrations and self-service onboarding for internal and external developers.

4. Key Features

4.1 Interoperability Strategy and Governance

- Business capability mapping, integration maturity assessment and regulatory alignment.
- Definition of interoperability principles, policies and governance boards.
- Roadmap for phased enablement and continuous improvement.

4.2 Reference Architecture and Patterns

- Canonical data model design, system-of-record mapping and semantic harmonization.
- Integration patterns: point-to-point, hub-and-spoke, publish/subscribe, choreography, orchestration, data virtualisation.
- Blueprinting for hybrid, multi-cloud and legacy modernisation scenarios.

4.3 Standards-Based Data Exchange

- Implementation of open standards (HL7, FHIR, X12, ISO 20022, OData, REST, SOAP, GraphQL, MQTT, AMQP)
- Schema registry, contract-first design and versioning policies
- Data serialisation formats: JSON, XML, Avro, Parquet, CSV

4.4 Integration Platforms and Middleware

- Enablement of ESB (MuleSoft, IBM Integration Bus), iPaaS (Dell Boomi, Azure Logic Apps), event streaming (Kafka, RabbitMQ) and API management (Apigee, Azure API Management)
- Data transformation, enrichment, routing and protocol bridging
- Support for batch, near-real-time and streaming data flows

4.5 Data Governance and Quality

- Metadata management, master data management (MDM), data cataloguing, lineage tracking
- Data quality rules, profiling, cleansing and reconciliation
- Policy enforcement for data ownership, stewardship and retention

4.6 Security, Privacy and Compliance

- Data encryption (at rest/in transit), tokenisation, consent management and access controls (RBAC/ABAC).
- Audit logging, anomaly detection and compliance reporting (GDPR, HIPAA, PSD2).
- Secure onboarding and offboarding of data consumers/providers.

4.7 Monitoring, Analytics and SLA Management

- Real-time monitoring of data flows, error handling and SLA enforcement.
- Dashboards for throughput, latency, error rates and consumption analytics.
- Automated alerting, incident response and root cause analysis.

4.8 Developer Enablement and Support

- SDKs, sample integrations, documentation and onboarding guides.
- Self-service portals, sandboxes and code samples.
- Community engagement, training and support channels.

4.9 Continuous Improvement and Lifecycle Management

- Data exchange catalogue, lifecycle tracking, versioning and deprecation management.
- Metrics-driven optimisation, feedback loops and governance board reviews.

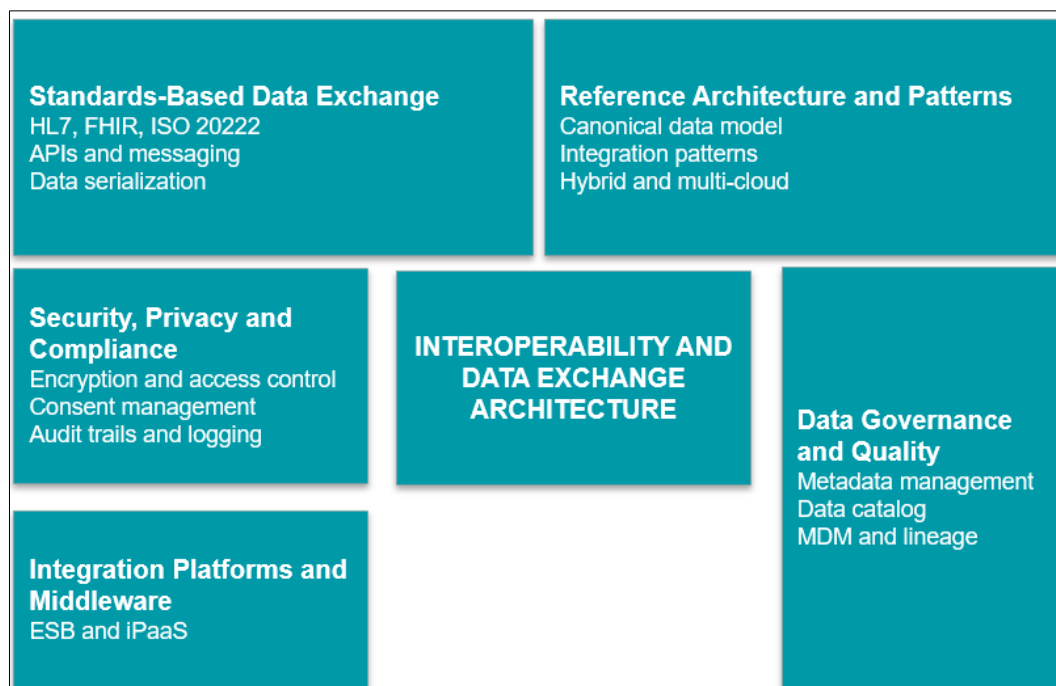


Figure 2: Interoperability and Data Exchange Architecture

5. Business Benefits

- **Seamless Data Connectivity:** Enable frictionless data sharing across internal, partner and regulatory ecosystems, reducing silos and accelerating business processes.
- **Regulatory Compliance:** Ensure data exchange meets stringent privacy, security and reporting requirements (GDPR, HIPAA, PSD2, ISO 20022).
- **Operational Efficiency:** Automate data flows, reduce manual interventions and improve data quality, lowering integration costs and risks.
- **Business Agility:** Rapidly onboard new partners, channels and applications with standardised, reusable data exchange frameworks.
- **Enhanced Data Trust:** Improve data lineage, provenance and quality, supporting analytics, reporting and decision-making.
- **Future-Proof Architecture:** Adopt open standards and modular integration platforms that scale with evolving business and technology needs.
- **Developer Productivity:** Empower developers with robust SDKs, documentation and self-service tools for faster integration and innovation.
- **Resilience and Reliability:** Ensure high availability, fault tolerance and SLA adherence for mission-critical data exchanges.

6. Technologies, Languages, Methodologies and Vendor Support

#	Technologies	Languages	Methodologies	Vendor Support
1	MuleSoft Anypoint, IBM Integration Bus, Dell Boomi, Azure Logic Apps, Informatica	Java, .NET/C#, Python, Go	ESB, iPaaS, API-led connectivity, Agile/DevOps	MuleSoft, IBM, Dell, Microsoft, Informatica
2	Apache Kafka, RabbitMQ, Azure Event Grid, Confluent Platform	Java, Python, Scala, C#	Event-driven architecture, CDC, choreography, orchestration	Confluent, Red Hat, Microsoft, Amazon
3	HL7, FHIR, X12, ISO 20022, OData, REST, SOAP, GraphQL, MQTT, AMQP	JSON, XML, Avro, Parquet, CSV	Contract-first design, semantic harmonisation, versioning	HL7, ISO, SmartBear, Stoplight
4	Informatica MDM, Collibra, Azure Purview, Talend Data Quality	SQL, PL/SQL, Python, Java	Data governance, MDM, data cataloguing, quality management	Informatica, Collibra, Microsoft, Talend
5	Azure Key Vault, HashiCorp Vault, Okta, Auth0, AWS KMS	Java, .NET, Python, Go	Security-by-design, Zero Trust, consent management, audit logging	Microsoft, HashiCorp, Okta, Auth0, AWS
6	Prometheus, Grafana, ELK/EFK, Splunk, Azure Monitor	Java, .NET, Python, Node.js	Observability, SLA management, incident response, analytics	Grafana Labs, Elastic, Splunk, Microsoft

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Mastek UK Ltd.
100 Brook Drive, Green Park,
Reading, Berkshire
RG2 6UJ
+44 (0)118 903 5700
Email: g-cloud@mastek.com

