APPLICATION MODERNISATION

Making your organisation more responsive to change through the transformation of legacy applications

The world is how we shape it

sopra steria

Introduction

One of the major contributors holding organisations back from being able to truly transform to an agile, responsive organisation is their legacy application estate.

For many business and not for profit organisations applications are what their staff use on a daily basis to help them be successful in their jobs and add real value for the companies they work for. Failing to modernise and manage the application estate means lower staff productivity, poor customer experiences and an inability to keep up with the changing competitor landscape in many industries.

So what is the reality for IT teams? Many of today's organisations are facing increasing levels of technical debt due to inflexible applications built on technology stacks and platforms that are ageing and difficult to manage. There is a need to adopt modern tools, technologies, and processes as part of the software development lifecycle. This is so businesses can keep pace with competitors by accelerating 'time to market', offer more innovative products, and improve customer experiences through omni-channel self-service.

At the same time there are drivers to reduce operational costs and the costs of dealing with regulatory compliance, which often makes the IT budget difficult to manage due to inefficient change management as a result of having to update ageing legacy platforms.

Most IT professionals follow Gartner's 7 step approach to application modernisation which includes:

- Application refactoring
- Re-hosting to take advantage of IaaS
- Containerisation / PaaS
- Auto-scaling cloud-native solutions using containerisation / PaaS

Additionally, existing functionality can be exposed through API Gateway's to speed up provision of business functionality via web friendly APIs, including functionality residing on Mainframes. For many organisations there is also the problem of considerable investments having been made in core platforms such as the Mainframe for example. The evolution of these core platforms needs to be considered alongside the replacement of monolithic applications with greenfield solution development.

Selecting the right modernisation option for any legacy application can be difficult. Rebuild / Rewrite or Replace may be right for some applications but alternative modernisation options may be more suitable.

SO HOW DO YOU CHOOSE?

Sopra Steria has a discovery and assessment methodology with a range of tools to move your IT Strategy forward. We can work with you to define and implement your roadmaps for application modernisation and business transformation.

Additionally we are a trusted Systems Integrator with over 40+ years' experience in application management and modernisation. We are technology agnostic, and hold partner accreditations with all the major technology companies including Microsoft, Amazon, Google, Redhat, IBM, Oracle, and SAP to name just a few. This means we are able to assess and recommend the right approach for your business and help IT teams leverage the products, technologies, and tools of our key partners to successfully guide their application modernisation programmes.

Understanding the challenges

As discussed in the introduction section of this paper, today's business and not for profit organisations are facing a significant number of challenges around application management and modernisation.

At Sopra Steria some of the most common business challenges we see related to application management and modernisation include:

- Inability to keep pace with competitors due to a combination of the existing change management processes (e.g. waterfall, poor implementation of agile) and operational teams 'fear of change' (due to risk of failed releases).
- A poor understanding of the IT estate's application interrelationships and interdependencies meaning many IT and business projects overrun and in some cases fail.
- Mergers and acquisitions (M&A) leading to overly complex IT estates with long periods of co-existence of platforms having duplicate functionality, difficultly providing a single customer view / product holdings view, excessive data transfers to support MI and BI, and a poor customer / user experience.
- The impact of the IT skills shortage. The pool of people with technical skills in the languages used to develop and maintain legacy applications is reducing at a rapid rate (e.g. COBOL, Assembler on the Mainframe).
- Poorly documented business processes which are allowing users more control over their IT choices. In many cases giving end users flexibility over their choice of applications was seen by many in the industry as a good thing. But many employees have taken advantage of this stance and inadvertently opened up security and data risks due to users selecting applications which have not been properly tested / vetted by IT.
- Shadow IT – If users cannot access the information they need on applications which have been approved by IT they will quite often bypass IT altogether. A high level of 'Shadow IT' is often a symptom of an IT estate that is in need of modernisation and improved change management.
- Inability to participate in the API economy and gain new revenue and efficiencies from partner integration due to legacy technology not being an enabler, and failure to take advantage of more modern integration technologies.
- Change Management processes with excessive regression testing cycles (rather than risk-based testing) due to the 'fear of change' that results from not fully understanding application dependencies and interrelationships.

In terms of how these business challenges around application management manifest themselves in the technology space, the most common problems we see IT teams experiencing are:

- Tightly coupled applications / systems that are leading to projects overrunning in terms of time and budget due to high levels of impact analysis and testing. Many of these systems are classed as having a monolithic architecture (including older J2EE and .NET Framework applications).
- Poor customer / user experiences. Many of the applications businesses use today are not built for digital user demands and require the use of integration layers to connect to new user interfaces and devices. Open Banking, use of 3rd parties, cross border data exchanges and increased use of mobile technologies by customers (including IoT) means applications are all under pressure to perform for customers in a safe and secure IT operating environment.

- Poorly documented applications / systems making it difficult to determine the impact of application changes not just on the application being changed, but also on downstream applications.
- Inability to reduce operational costs and increase operational efficiencies in highly regulated environments where change budgets are geared towards supporting regulatory changes due to the cost of supporting an inflexible legacy IT estate.
- Applications becoming End of Line (EOL) and 'out of support' with high costs of extended support.

Making the case for Application Modernisation

Application Modernisation is being driven by the need for organisations to remain competitive and deliver a better customer and end user computing experience.

This is because of the pressures being placed on organisations to rapidly transform through the adoption and provision of a digital and omni-channel experience to their customers, whilst simultaneously trying to reduce operational IT costs.

The reason why IT teams need to reduce IT operational costs is simple. The more budget they spend on legacy infrastructure and applications the less money they have to invest in new infrastructure, applications, processes and systems. Although spending on cloud, cyber security and software has risen significantly over the past 2 years, Gartner still estimates that maintaining and operating legacy applications consumes anywhere from 60 to 80 percent of corporate IT budgets.

> "JUST IMAGINE WHAT THE IT TEAM COULD INVEST IN IF IT SAVED 10% OF ITS OPERATIONAL EXPENDITURE ON APPLICATIONS MANAGEMENT!"

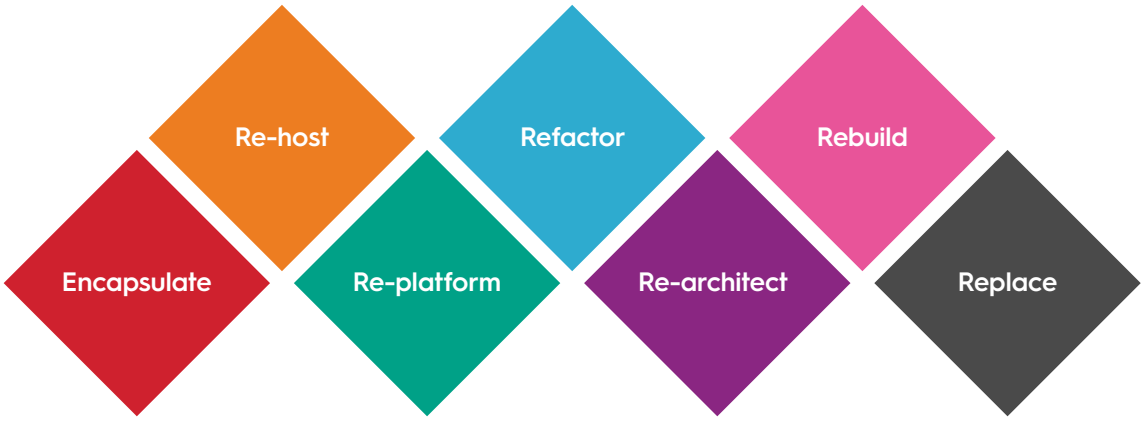
In addition to the budget reasoning for application modernisation, business and not for profit organisations can no longer just run applications until they fail or hope they continue to work for an indefinite amount of time by relying on a few skilled IT staff. They must have a clear plan for application modernisation or risk being left behind in terms of their customer experience, business models and employee productivity rates.

Many organisations have already realised that modernising their application environment will be crucial to future success. This is why Orbis's recent study in 2019 of the Worldwide Application Modernisation market estimates that the market will grow from $10.4 Billion in 2019 to $25.6 Billion by 2024, at CAGR of 16.3%. Much of this growth is going to be around meeting new user demands and access requirements around data via new applications which meet business needs.

In some industries such as banking the changes required to their application environments are so great that they will need to prioritise what they modernise first. e.g. Traditional banks with multiple core banking systems.

As discussed earlier in the paper application modernisation is not as easy as it looks. Many legacy applications are monolithic in nature, with tight coupling of the applications components and application layers, which increases the length of change cycles as changes typically require a longer design, development and test lifecycle. Typically, organisations see these applications as holding back the business and they expect application modernisation to help address these challenges and remove barriers to change.

So what are the options and suggested approaches for application modernisation? Gartner recognise seven general application modernisation approaches:



Each approach is unique and what is right for one particular application / system may differ to another. The reason for needing to modernise an application will also relate to one or more of technology, architecture and functionality constraints and the relative importance of each of these factors. Depending on the state of the application, the risks of not modernising and the potential impact on the business will have a significant bearing on the approach that needs to be taken for any specific application or system.

Where to start with Application Modernisation

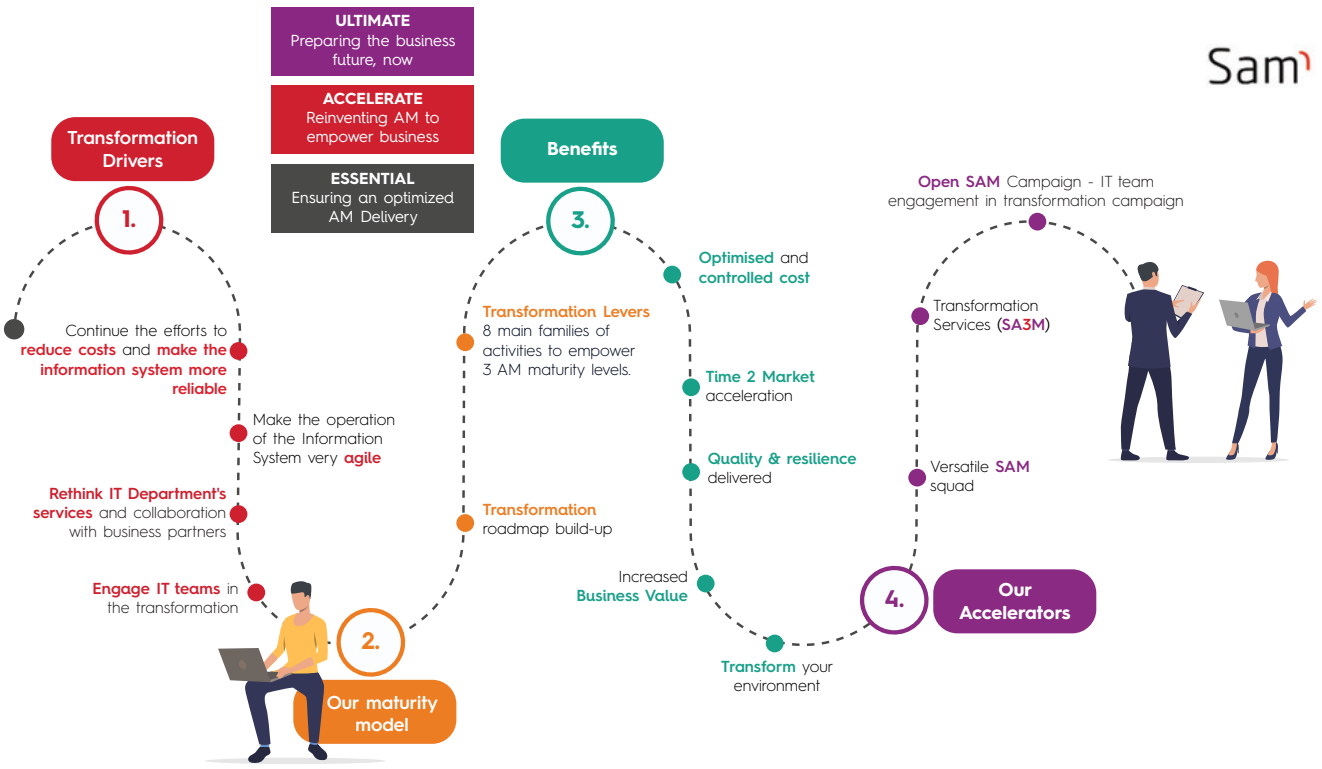
At Sopra Steria we believe first of all it is important to understand your application estate before recommending a particular approach.

To do this piece of work Sopra Steria utilise SAM Squads (Smart Application Modernisation Squads) which are versatile teams consisting of experts in architecture and design, application technology stacks, systems integration, Cloud technologies and services, migration, cybersecurity, and service management. Our SAM teams also leverage our consulting and business domain expertise.

A SAM Squad will typically perform an IT Landscape and Service Delivery Assessment first. The assessment, in conjunction with the business and IT strategy, enables your business to make decisions based on business benefit prioritisation in areas such as:

- Optimisation and control of costs
- Accelerating 'time-to-market'
- Quality and resilience
- Business Value
- Transformed human resources

SMART APPLICATION MODERNISATION



Following this initial assessment the SAM squad will conduct a 'time-boxed' discovery and assessment, designed according to the output of initial workshops with key stakeholders to ascertain the key business drivers influencing the need to modernise. The extent of the discovery can range from targeted discovery of a specific problem area to a wide-ranging Current State Assessment.

Some examples of the assessments we undertake at this stage include:

- **Mainframe Current State Analysis:** This involves the use of our automated discovery tooling, MOAT, to provide an accurate understanding of your Mainframe application estate answering the questions ***"What have we got?"*** and ***"What happens if I change this application?",*** with a view to being able to make informed decisions regarding mainframe optimisation, modernisation on the mainframe, migration of workloads to the Cloud or a combination thereof.
- **Application Modernisation Assessment:** This involves assessing applications throughout the IT estate with a view to application modernisation treatments based on the Gartner 7 options discussed earlier in the paper - Encapsulate, Re-host, Re-platform, Refactor, Re-architect, Rebuild, and Replace.

Each of our assessments consider:

- The key drivers for your modernisation
- The current IT landscape
- The desired target architecture and any existing roadmaps
- Organisational risk appetite
- The IT budget and its utilisation
- Processes (e.g. software development lifecycle, operational processes)
- Human resources capability

Following the assessment the SAM team will deliver a bespoke customer transformation roadmap for application modernisation which is underpinned by over 100+ organisational methods and tool levers to enable the transformation journey.

Our discovery and assessment approach uses a variety of proprietary and partner tooling and products such as Sopra Steria MOAT and IBM ADDI for mainframe analysis for data modelling, application performance management and discovery and Cloud Readiness tooling.

All of our application modernisation recommendations are supported by TCO (Total Cost of Ownership) analysis, and an understanding of the anticipated Total Economic Impact of solution options to ensure that there is business value in modernising. Some applications may require consolidation and decommissioning where there is more than one application performing the same function (e.g. due to M&A).

What is Total Economic Impact (TEI) of Application Modernisation?

The application modernisation solution options and recommendations Sopra Steria make for our clients are influenced by the relative impact that each of technology, architecture, and functionality issues has on a particular application or system. Additionally, the options and recommendations should have a firm business case based on TCO (Total Cost of Ownership) Analysis, the need to provide a ROI (Return of Investment), and a clear understanding of our clients risk appetite and key drivers.

To help our clients understand and measure the Total Economic Impact (TEI) of modernisation choices, Sopra Steria work with our clients to establish measures which quantify the following when comparing a modernisation implementation relative to the legacy 'status quo':

- Application planning, design, and documentation savings
- Reduction in initial application development, testing, and deployment costs
- Application upgrade, maintenance, and management efficiencies
- Infrastructure utilisation efficiency savings

Understanding Typical Application Modernisation Approaches

Following a discovery and assessment using our SAM Squads, a transformation / modernisation roadmap will be produced in the context of the overall organisational IT Strategy.

There is no 'one size fits all' approach to application modernisation and whilst the application modernisation treatment for applications residing on the same technology stack may be broadly similar, for each application it depends upon factors such as:

- Business value and criticality
- The risk of not addressing a legacy application's technical debt (e.g. impact of regulatory changes)
- Ongoing operational costs to support an application
- The ability to change the application to meet business and customer needs (keeping pace with competitors)
- The overall IT change budget

Rebuild / Rewrite or Replace are likely to be the preferred approaches used to modernise end of line (EOL) applications where a skills gap, lack of vendor support, technological debt, and functionality debt are impacting 'time to market' and increasing operational costs. We will return to these modernisation approaches later in the paper.

Rearchitect - (which goes well beyond refactoring) is an option for migrating an existing application to a new application architecture or architectural style; this may involve extensive alterations. For example, migrating older monolithic style .NET Framework applications to .NET Core and applying bounded context architectural principles to break-up into more manageable deployable units and services using a microservices architecture.

Implementing bounded context in a microservices architecture is more of an art form than an exact science and organisations have to be careful not to make similar mistakes with this architectural style as have been made with SOA (Service Oriented Architecture).

Re-architect may also be combined with a **Re-platform** approach to take advantage of PaaS (Platform as a Service) capabilities. For example bringing Java, Spring Boot, Python, and .NET Core applications into a container management platform - simultaneously reducing operational costs (e.g. containers utilising a lower infrastructure footprint than more traditional VMs, with the management framework making deployment and configuration easier) and enabling 'time to market' acceleration due to having smaller deployable units to test. This modernisation approach is well-suited to organisations who are embracing a DevOps culture (and microservices) where the business and IT are aligned, but the cultural change can take time to embed.

Many applications still reside on the Mainframe and these represent a very significant investment, often running the core of an organisations' business especially in the financial services sector. In recent history there has been a tendency for IT departments to develop a catch all IT strategy that moves all workloads off the Mainframe at once. However, this carries enormous risks and often reflects a lack of understanding of the complex interdependencies between applications and a failure to take advantage of the business functionality within the core applications using modern approaches.

An IDC study (The Business Value of the Connected Mainframe) found that those organisations that embraced the Mainframe were more successful. Mainframe applications can be given a new lease of life via a modern Connected Mainframe strategy taking an **Encapsulate** approach to modernisation.

Business functionality can be discovered using a variety of tools including IBM ADDI (Application Delivery and Discovery Intelligence) and Sopra Steria's own MOAT tool (Mainframe Optimisation and Analysis Tool) and can be exposed in several ways. The predominant legacy approach to expose Mainframe functionality was via MQ accessed via either an organisational ESB (Enterprise Service Bus) or directly using connectivity via Application Servers (e.g. using Java with JMS).

The demand for improved Customer Experience (e.g. self-service capability) is only going to accelerate as it provides a differentiator in today's competitive market. To meet this demand organisations should consider API Gateways which can provide a modern way to implement and encapsulate an app modernisation strategy. API Gateway's can expose APIs and services to consumers in the web-friendly RESTful style and offers a more direct lightweight mediation whilst also supporting reuse of existing internal facing services (e.g. ESB hosted SOAP/XML services).

For the Mainframe, IBM zOS/Connect Enterprise Edition offers a rapid and effective Encapsulate modernisation option. It does this by providing bi-directional API connectivity between applications that need to consume Mainframe-hosted functionality via RESTful APIs and crucially giving Mainframe applications hosted on z/OS an opportunity to consume APIs hosted elsewhere.

A wider organisational API Gateway providing access to internal business functionality regardless of backend technology stack provides an opportunity to extend the life of some applications and participate in an API economy with partners whereby APIs can be monetised.

Where the driver is to mitigate legacy application risk as a result of running on an end of line operating system or to reduce infrastructure and operational costs, a **Re-host** modernisation approach is appropriate. This typically involves moving application workloads from physical tin either using on-premises virtualisation (e.g. VMWare) or increasingly moving to IaaS (Infrastructure as a Service) in private or public Cloud. A Re-host may also involve simple containerisation.

Whilst a Re-architect approach changes an application's architecture to provide better features or take advantage of PaaS capabilities a **Refactor** approach seeks to make the application easier to maintain with a lower cost of investment, for example by restructuring to introduce more clearly defined layers, introducing abstraction via interfaces and adapters to minimize impact on other application layers and consumers of application services.

Whilst a Refactor will not deliver the capabilities of a Rebuild / Replace or Re-architect, a Refactor may extend the lifetime of an application and offer a better short term ROI.

Rebuild / Rewrite or Replace offers an opportunity to take advantage of hybrid Cloud or public cloud hosted solutions using features such as auto-scaling, on-demand environments, cloud platform services and SaaS (Software as a Service).

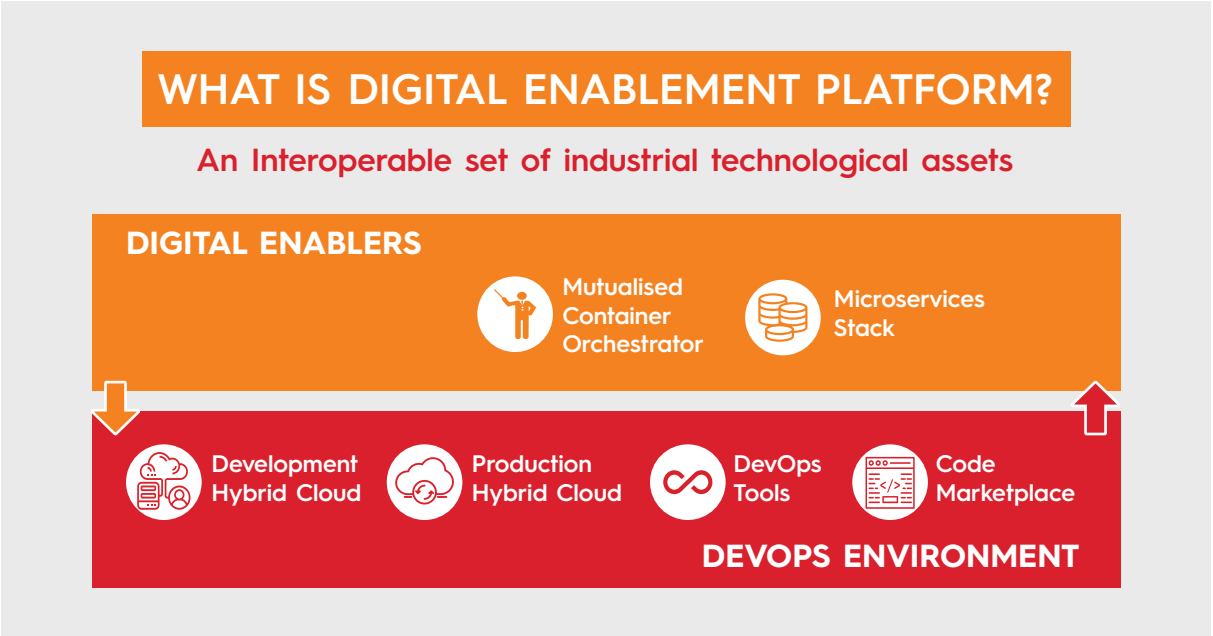
Cloud-native applications built according to the principles of 12-factor app methodology (and its variants) is perhaps the zenith of today's application modernisation approaches.

Introducing the Digital Enablement Platform by Sopra Steria

The Digital Enablement Platform created by Sopra Steria enables IT, Business and Dev Ops teams to build and provision new applications and to modernise existing applications which are ready to take advantage of the cloud (including cloud-based IaaS or PaaS benefits).

Sopra Steria have built DEP in order to optimise the way applications are designed, built, deployed and maintained when moving from an on-premise to a cloud based environment. The platform provides consistent and modern tooling support and management for the development and deployment of new 'Cloud ready' and 'Cloud native' applications for both Sopra Steria and its customers.

The DEP platform enables a hybrid cloud infrastructure, industrial tools and technological accelerators. By using the DEP platform, IT and DevOps professionals can access Infrastructure resources via a marketplace, DevOps tools to automate the entire development cycle and reusable components to accelerate application developments.



DEP Assets

Hybrid Cloud Development – Have access to development infrastructure ready in just a few clicks. Based on Microsoft Azure/ Azure Stack technologies, DEP allows access to infrastructure resources (e.g. VMs, databases) through a marketplace or API.

Hybrid Cloud Production – Host and operate the applications on a secure production cloud allowing end to end services from development to production on Sopra Steria's Cloud platform.

Dev Ops Tools - Automate the whole project lifecycle, with a set of ready to use tools. Based on InnerSource and CDK (GitLab and Open Source technologies), the DEP provides a performant Source Code Management and a highly automated Continuous Delivery chain for all the main programming languages.

Code Marketplace – Re use components from our Group wide developers community with InnerSource; driving standardisation and efficiency.

Container Orchestrator – Run applications packaged in containers to allow them access to the cloud assets they need to perform. Ready to use OpenShift cluster (InnerShift) for containers orchestration.

Microservices Stack - Accelerate the build of microservices applications. Access a proven set of documented software components to quickly start development.

DEP is designed as a modular approach. This means each asset can be used independently and of course, the combination of several assets can provide increased added value for example you can use DEP to:

- Have the ability to rapidly spin up dev and test environments in the cloud (supporting rapid prototyping etc.)
- Access containerisation tools to allow the deployment and running of applications in container managed services in the cloud
- Re-use and maintain efficiency through sharing of components and micro-services
- Deployment and code-management solutions (supporting DevOps pipelines and continuous deployment)

The benefits of using Sopra Steria's DEP for IT and Dev Ops teams include:

- **Tools and best practices enabling large-scale deployment and delivery excellence**
- **Project teams can focus on creating value with ready to use assets**
- **Increase the level of automation for Agile and DevOps practices**
- **Categorise code and APIs making sure they are documented correctly and can be re-used e.g. on the Mainframe**
- **Accelerate the Cloud adoption in our developments**
- **Reduce onboarding efforts of new team members**

So why should your business choose Sopra Steria for Application Modernisation?

As discussed in this paper Application Modernisation is something all organisations are going to have to go through in the next 5 years.

By starting your application modernisation journey now and partnering with an expert in application management and modernisation your chances of successful outcomes around your digital programmes of work are greatly increased. So why should you choose to partner with Sopra Steria for Application Modernisation?

We have over 40+ years' experience in a wide range of hardware, networking, operating systems, coding languages, vendors, applications and tools involved with application management / modernisation – which underpins the legacy application environment.

We can develop and deploy customised toolsets to analyse your application estate and help you identify skill, cost and gaps manifested by shadow IT from end users choosing and using applications which are not supported or security cleared by IT.

We can help you minimise the 'unknown unknowns' – the knowledge from managing and modernising critical applications over very long periods of time is fundamental in being able to anticipate problems.

We can enable you to derive bounded context from monolithic applications to support the evolution of a microservices architecture and expose your 'locked-in' legacy business functionality to provide early wins via API discovery, publication, and management.

We are vendor agnostic and will recommend what is right for your business. Additionally we will help you leverage our key partnerships with vendors such as IBM, Red Hat, Microsoft, Axway, AWS, Google, Blueprism, and UiPath, and utilise our expertise in products and technologies from these vendors (amongst others).

We have an in depth knowledge and engineering expertise of all the major public cloud providers plus extensive experience in the development, implementation and management of private and hybrid cloud solutions.

We have unrivalled understanding of mainframes, with skills, experience and proprietary tools that many of our competitors do not have.

As demonstrated in this paper our SAM teams have proprietary application modernisation methods and tools that will accelerate the formation of a clear business base, transformation strategy, roadmap and plan that will deliver incrementally to provide early value.

Final thoughts

The challenges with application modernisation are not going to go away. In fact they are going to be exacerbated as customers expect more from the businesses they interact with. Employees want access to the right applications to keep them productive and businesses want technology investments that will help them stay ahead of the competition and enabling them to successfully execute on their strategy.

At Sopra Steria we believe the key to success in application modernisation is down to picking the right partner who can help you design the right strategy, discover the opportunities to modernise and help the IT team to successfully deliver.

The most important way to start any application modernisation project is with an application estate assessment. Taking an inventory of what you have is almost always one of the most obvious ways to start any major transformation programme. We would love to help you on the first step of your application modernisation journey.

For more information about Sopra Steria's Application Modernisation assessments and complimentary workshops please email **pscomms@soprasteria.com** and one of our Application Modernisation experts will be in touch.