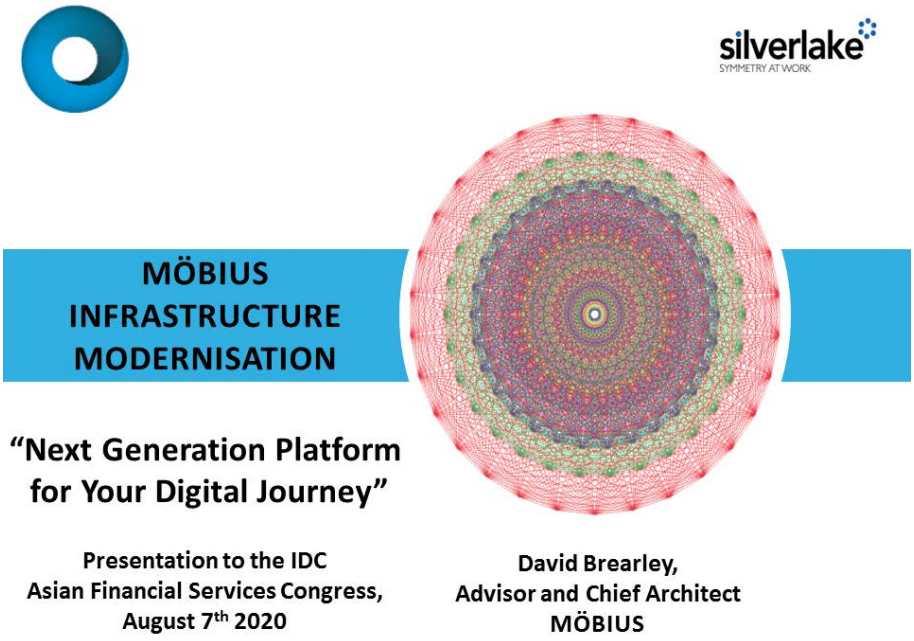
# MÖBIUS INFRASTRUCTURE MODERNISATION

This MÖBIUS briefing is based on a presentation and discussion from the last day of the 2020 IDC Asian Financial Services Congress which focused on Infrastructure Modernisation. David Brearley was invited to talk about the capabilities, economics and lessons of NEXTGEN digital platforms, based on the Silverlake experience of bringing the MÖBIUS Platform to market.




Arthur C Clarke, the eminent science fiction writer, once said that 'any sufficiently advanced technology is indistinguishable from magic'. For those seeking to transform banking, there is magic in today's new enterprise application tools and in the convergence of virtualisation and cloud models to create the new supporting modern infrastructure. This magic is present in the NEXTGEN Banking Platforms such as MÖBIUS which are designed to help banks deliver the next decade's customer experiences and transformed financial performance.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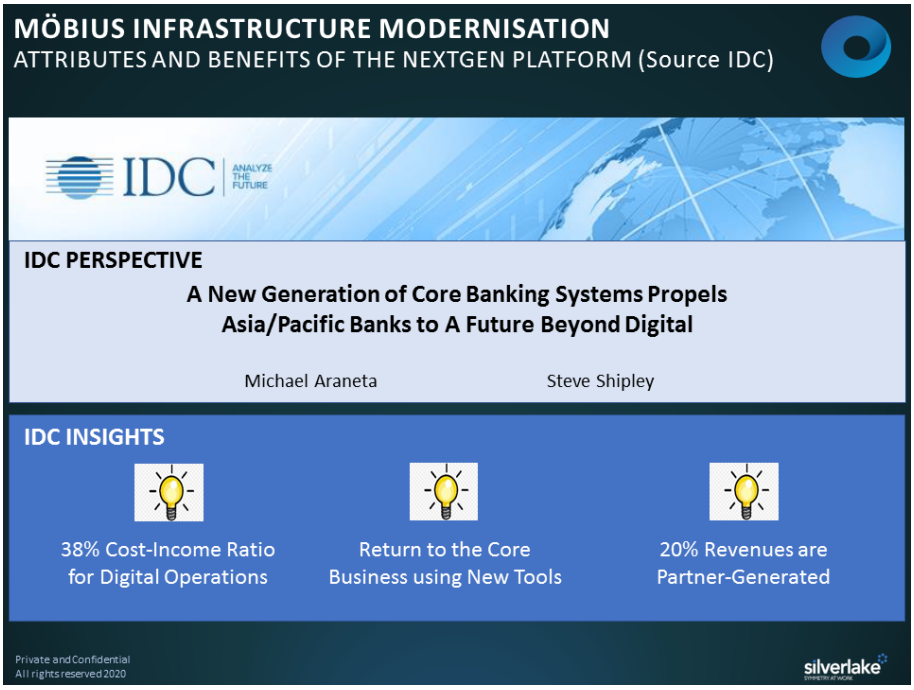
In July 2020, IDC published a paper titled '*A New Generation of Core Banking Systems Propels Asia/Pacific Banks to A Future Beyond Digital*' which provided an analysis of core banking platform architectures and set out a definition of the attributes of a NEXTGEN Banking Platform under the headings of change, technology and functionality. I am happy to confirm that, based on these attributes, MÖBIUS is indeed a NEXTGEN Platform.

On the opening day of the congress, Michael Araneta also pointed to the experience of the industry leaders in Asia in demonstrating the superiority of a digital operating model (as measured against typical incumbent banks' cost income ratios) and the growing importance of business eco-systems in revenue generation. NEXTGEN Platforms should facilitate these business performance improvements.




The MÖBIUS team began their work in 2012 as a FINTECH focused on the provision of front-end customer access and orchestration services, fronting a traditional core banking system. In 2018, the FINTECH was acquired by Silverlake AXIS to develop this base into a full NEXTGEN Platform that provides a digital cloud-native option to incumbent banks whose core banking solution is reaching end-of-life and who are looking for an early move to the cloud. The MÖBIUS platform automates each step of the customer journey from the initial key-stroke to posting of the accounting entry in real-time for all retail and corporate, conventional and Islamic services.

This presentation focuses on a few key aspects of NEXTGEN Banking Platforms using MÖBIUS as an example of core banking abstraction and extraction, the use of cloud and open banking technologies, seamless migration to the cloud and the provision of future-proof capability.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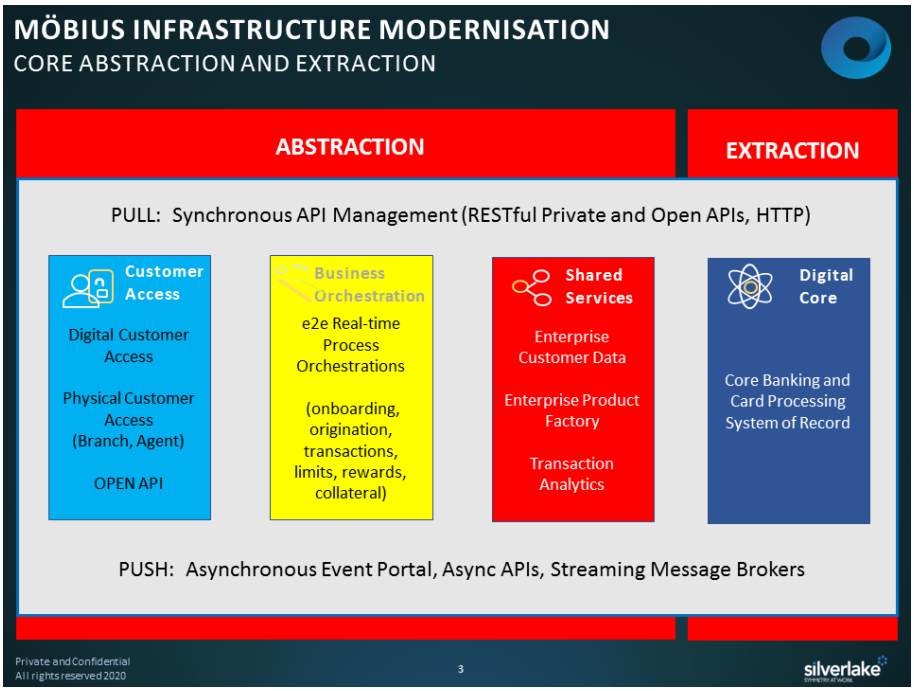
The MÖBIUS architecture is simple. All customer access (from mobile banking to a visit to an agent or ATM) and all staff access is handled in the blue pillar. All business orchestrations from onboarding to consumer loan origination to transaction handling are handled by micro-services in the yellow pillar. All sharable services such as customer data and the product factory are managed in the red pillar. The purple digital core pillar contains the accounting and system of record. All are available out-of-the-box.

All the services are tied together by RESTful APIs or an event mesh to provide push and pull capability to the customer. MÖBIUS is cloud-native but was designed to use micro-services and web services before the move to the cloud; it also designed-in future-proofing capability such as Hibernate that has enabled MÖBIUS to move from DB2 in 2015 to POSTGRES in 2017 and cloud-native TiDB in 2020.




The MÖBIUS enterprise architecture demonstrates core banking abstraction in action. MÖBIUS has gradually abstracted out traditionally tightly-coupled services such as CIF, Customer 360 aggregation, product factory, limits and collateral management from the digital core and put them into the orchestration or shared service pillars. So MÖBIUS now has one abstracted product catalogue that provides its data, rules and content both to the system of record for processing and to the customer access layer to provide a better customer buying experience. As another example, the CIF is positioned as a shared Customer Repository for use by all enterprise systems – not just core banking.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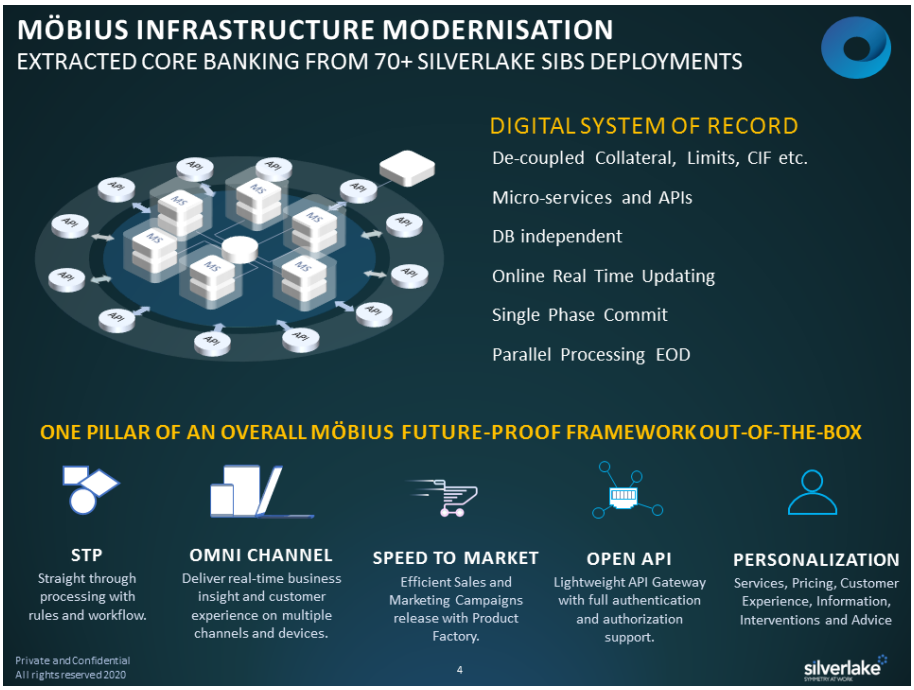
When it came to re-building a JAVA system of record, MÖBIUS did not begin with an empty shell but with several hundred man-years of Asian core banking experience codified as the Silverlake SIBS solution, running on IBM AS/400 infrastructure. The challenge was how to use the thousands of lines of RPG code to create a cloud-native design that would provide the same manufacturing performance with a better customer experience at lower cost.




The principles for extraction were that the new MÖBIUS digital core should be real-time (the donor system used a memo posting model), should retain largely the donor data model to aid in migration, be DBMS independent and should be converted into a set of JAVA micro-services and APIs. These principles defined what had to be re-written and what could be code converted from RPG. The performance goals were to support processing in the 5-10,000 TPS range and reduce the end of day work-load to interest posting and scheduled events.

The impact of this abstraction and extraction process has been to create a functionally rich alternative to a mature core banking system in a modern banking platform that can use all the scalability, sharding, fail-over and cost advantages of the cloud infrastructure. All it has taken is hundreds of micro-services and thousands of APIs!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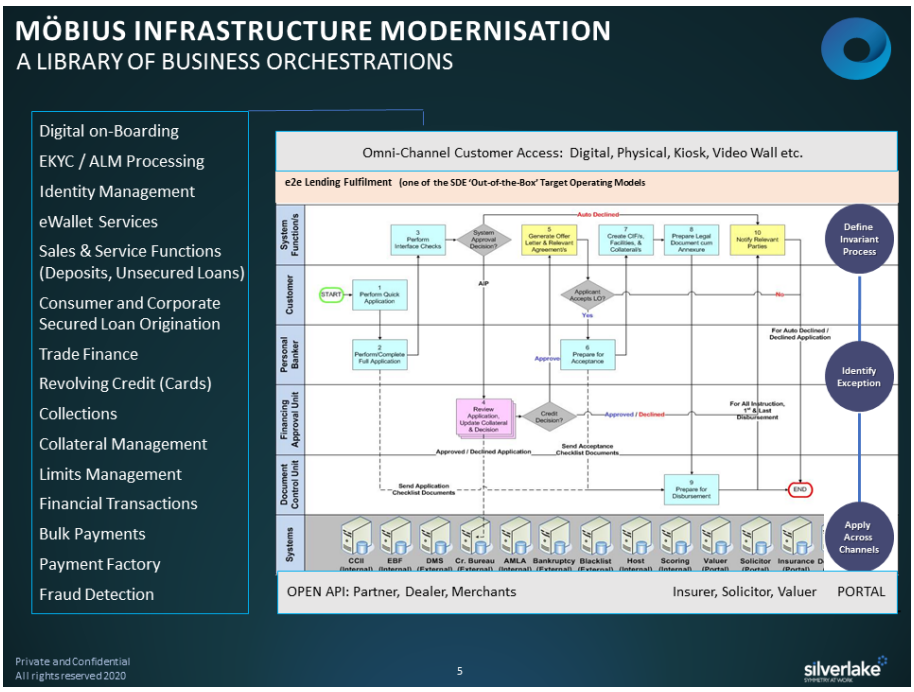
Most banks have built up their portfolio of orchestrations over a long period of time. Typically, these will have been deployed as point solutions from different in-house development teams or external vendors and integrated to a traditional heavy-weight core banking solution with a variety of integration solutions. How will this architecture cope with infrastructure modernisation? Not well.

The MÖBIUS orchestrations include components from core abstraction and front-end services. The list identifies all these capabilities, all delivered from a clean slate following digitally re-engineered process flows. The illustration is of a generic end-end customer loan workflow which begins with the customer preparing to buy and ends with the disbursement of funds. The micro-service and API design enables easy integration to localised credit bureaus and to optional third party credit scoring engines.




Providing a library of different orchestrations enables customer choice of initial MÖBIUS deployment. It also enables easy replacement of existing incumbent applications as they life-expire. The more MÖBIUS digital banking orchestrations that are used, the higher the code reuse, the better the platform economics and the more the data that is available in real-time to fuel the platform's transaction analytics capabilities. That is why platforms are a better long-term economic proposition than applications development. Using the example of Salesforce for sales-related services, MÖBIUS sets out to be the platform of choice for banking customer execution and transaction services.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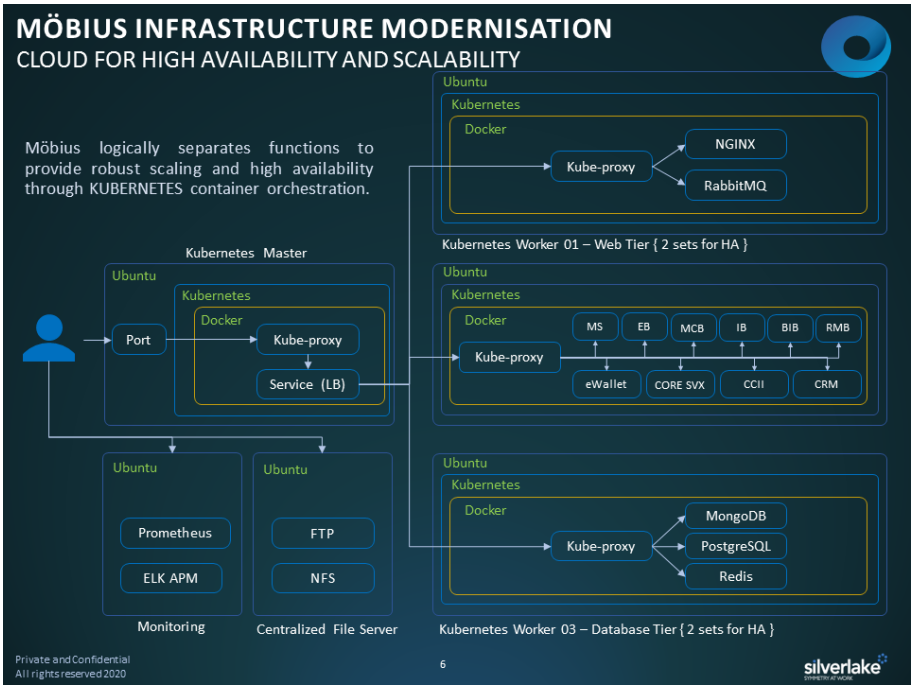
The cloud is already becoming a dominant infrastructure for banking as it has been for many other industries over the past decade. Banks have come late to the cloud but have recently recognized its growing dominance. The MÖBIUS Platform is designed to run natively on the cloud and to use all the technology convergence that has defined the cloud infrastructure. MÖBIUS uses the cloud to deliver high availability and scalability and recovery and production performance so that MÖBIUS can focus on solving business transformational problems through platform services.

The diagram shows the deployment of the MÖBIUS Platform on a public or private cloud infrastructure. The release management approach is based around DOCKER containers and KUBERNETES orchestration. In-built visibility into the production environment provides a level of instant feedback on software design efficiency and OLTP performance that is difficult to achieve on traditional infrastructure.




Of course, having a cloud-native NEXTGEN platform has involved changes from traditional banking designs. MÖBIUS began working on JAVA-based digital banking in 2012, using J2EE servers. But because of the prescience of our designers (and no doubt a little luck), MÖBIUS has quickly achieved the move to cloud containerisation and cloud-native data base management and from RESTful APIs to additional event-mesh communication mechanisms. The cloud has been the MÖBIUS home now for two years.

Recently, as banks have recruited more experience in the cloud, we are seeing an increasingly sophisticated approach to POCs and benchmarks. In a recent OLTP POC, MÖBIUS was given a TPS base-line which we were asked to scale up 300% to around 18,000 TPS before returning automatically to about 12,000 TPS. This type of test ruthlessly exposes the difference between 'so-called cloud-ready' and real cloud-native designs in their use of infrastructure resource and related public cloud costs.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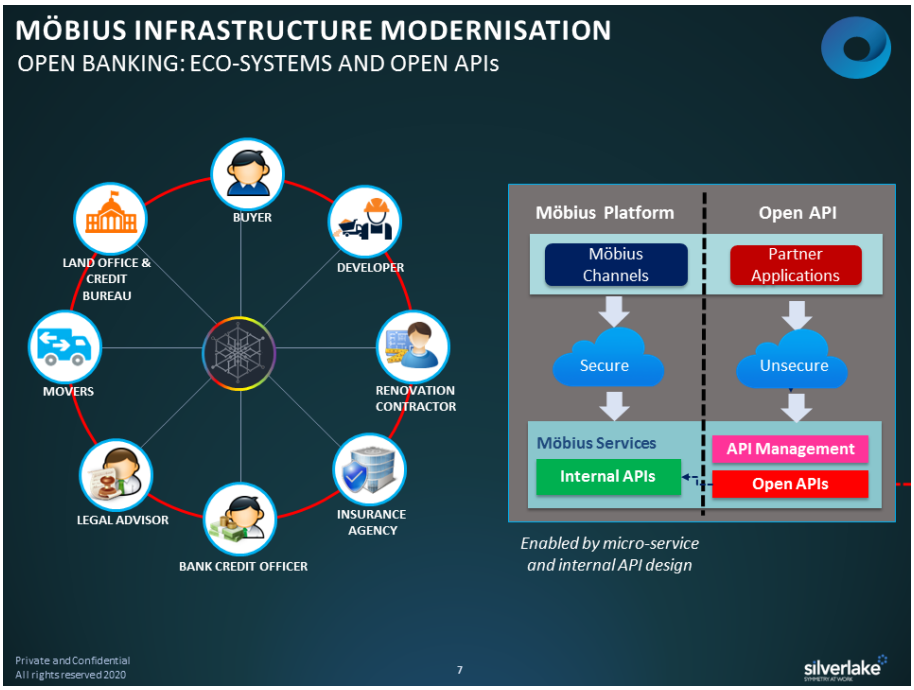
Let's now turn to the importance of open banking in infrastructure modernisation. The World Economic Forum defines the 4th Industrial Revolution as an era that 'extends Digitalisation in New and Unanticipated ways'. How to prepare for the 'New and Unanticipated'?

One improvement is likely to be inter-operability among business partners to serve customers better, faster and cheaper. A key technology is likely to be Open API and the opportunity to monetise service APIs. The concept of an Open API Market may not be imminent, but the approach depicted by the diagram of an automated eco-system around property buying is not far-fetched - even though some countries currently lack the supporting digital identity, credit history and property registries.




The banking legacy world does not do Open APIs well or easily. This is where the new NEXTGEN platforms have an advantage in speed in creating new Open APIs. MÖBIUS is written in micro-services and APIs – it has over 10,000 internal private APIs which are routinely used in high-volume OLTP processing. The challenge for MÖBIUS when asked to provide a new Open API is therefore to decide what internal APIs should be grouped and published as Open APIs conforming to the OpenAPI Specification. MÖBIUS can then publish on any of the commonly-available API Management Platforms that handle the security, sand-box, charging and other services to support a more collaborative world.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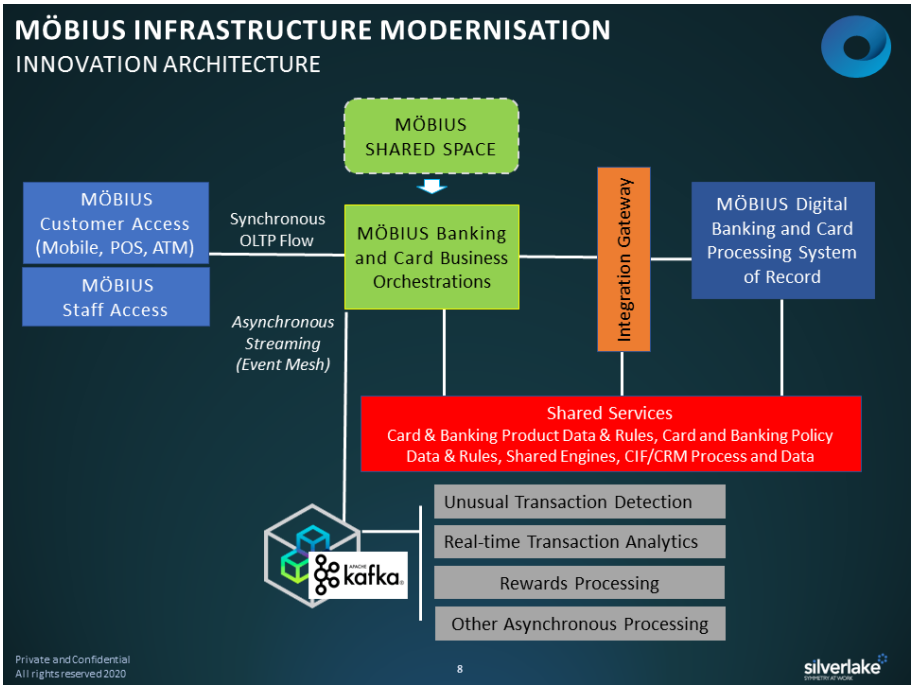
# MÖBIUS INFRASTRUCTURE MODERNISATION

The last aspect of infrastructure modernisation to be discussed in the context of the MÖBIUS platform is the ability to continuously innovate. This slide shows the MÖBIUS architecture which separates out the pillars partly because they have different innovation profiles. Customer access is heavily influenced by technology devices and customer experience fashion; re-engineered business orchestrations currently use rules and computer logic but the main-stream adoption of machine learning seems likely to extend automation to previously manual error-handling and compliance checking.

The MÖBIUS platform also reuses as many services as possible (in its shared services layer) to ensure that the many repetitive and commodity things that banks do can be supported as economically as possible. Finally, as I have already discussed, MÖBIUS slims down the core banking system of record to minimise real-time posting overhead and EOD work-load.




The MÖBIUS platform began by focusing on producing a powerful execution platform for banking using RESTFUL APIs as the main mechanism to provide the OLTP flow. Now MÖBIUS contains an event mesh to open up parallel processing for fraud detection and to leverage the transaction analytics capabilities to provide personalised real-time customer interventions at the customer touch-point. This illustrates the need for an architecture that can flex to include technology innovations quickly.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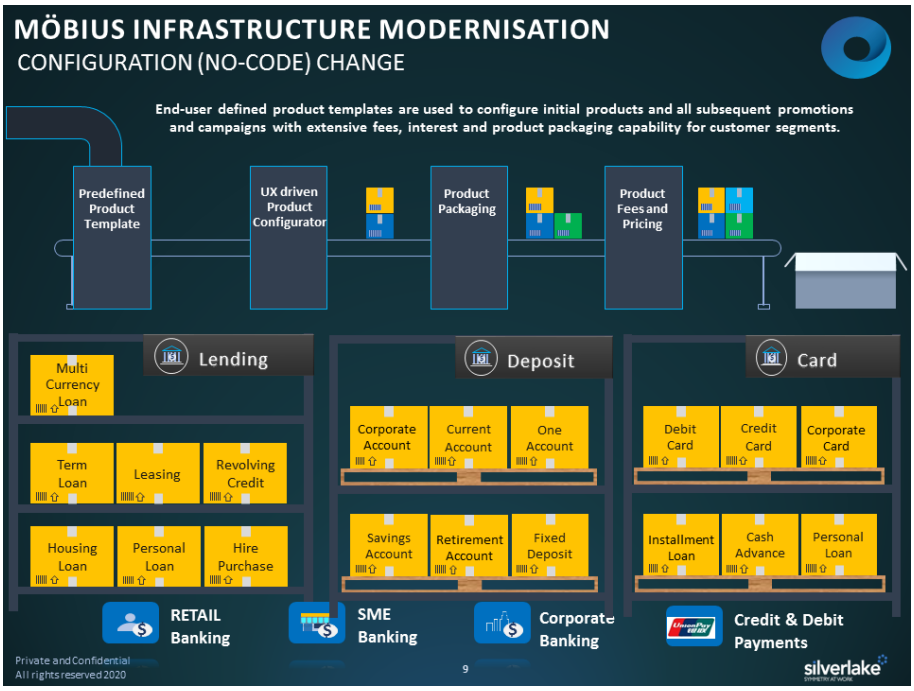
One aspect of innovation is a NEXTGEN Platform attribute that IDC calls 'low-code' change. MÖBIUS actually has a goal of 'no-code' change for the common changes that banks typically undertake every day. These are changes to products, policies, users, channels and all the messiness of supporting banking Business as Usual.

Some of the low-code vendors provide clever SDK and testing capabilities to enable internal IT people to provide these changes. MÖBIUS goes further by enabling bank subject-matter experts to configure and re-configure data and rules to manage change - so releasing IT resource for other work.




The example on the screen is of the process followed by the MÖBIUS product factory which contains the data and rules to set up and change products. Subject-matter Experts are provided with copy and paste templates with controlled drop-downs to define new products or promotions for different banking and card products for different customer segments. The changes to the MÖBIUS product factory data are then available to all the customer experience and orchestration services and to the digital core system of record to provide secure, controlled change.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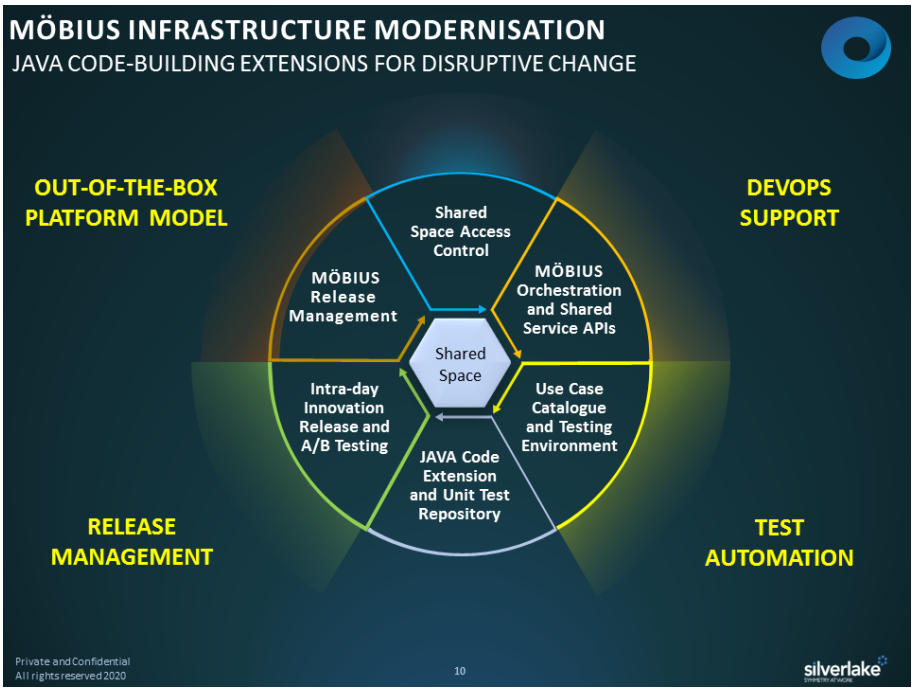
Inevitably, there will be some changes that are more disruptive in nature and cannot therefore be supported by services that are pre-defined and pre-configured. So there will be a need for code-based development. The technology giants have taken speed to market to a new level on the consumer marketing side, enabling hundreds of new releases intra-day following 'fast failure' principles.

Personally I am not convinced that this is an appropriate approach for new banking execution services in a heavily regulated industry; or that regulators will see frequent fast failure as being compatible with continued public trust in banks. But whatever the debate about the scale and urgency of disruptive propositions, banks need their NEXTGEN banking platform to deliver tooling for speedy change.




The MÖBIUS shared space capabilities shown in the diagram provide the capability to take services from within the MÖBIUS platform and combine them with services from outside – either from other FINTECH providers or by client development. This is not just about the JAVA development environment and access to private APIs but about test case automation, simulation, customer testing and the promotion of successful client-specific innovation into the next release of the MÖBIUS platform. All of these capabilities comply with industry DEVOPS approaches.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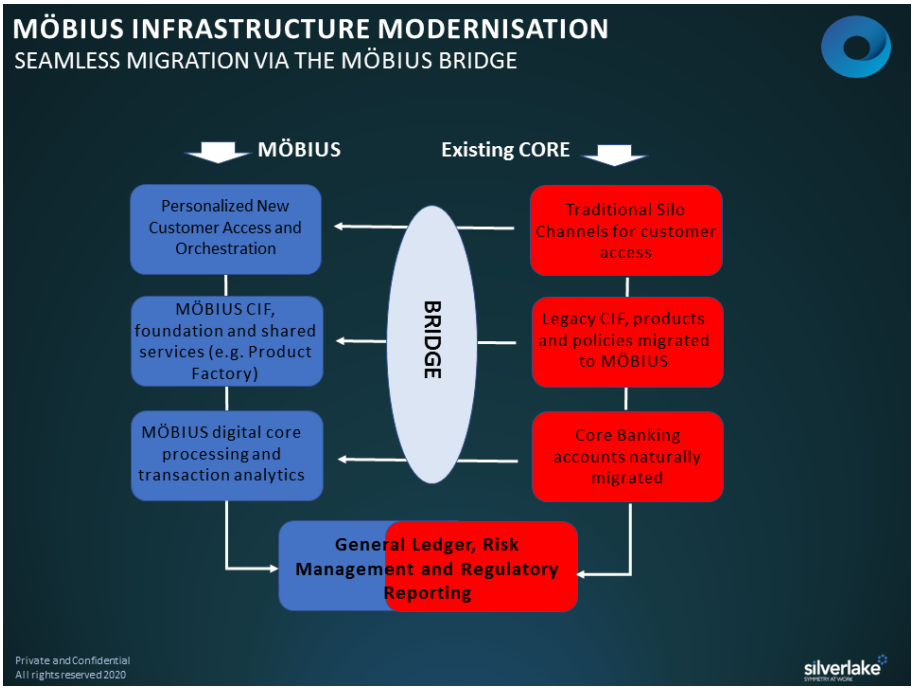
The discussion so far has been focused on what a NEXTGEN Platform such as MÖBIUS can do and its key attributes. We do not expect that banks switching to the MÖBIUS Platform will take every MÖBIUS orchestration immediately nor that clients will rip out all their channel and orchestration components. But we do believe that over time banks will become used to a more economic model of buying services not applications as they become more experienced with the cloud model. However, this vision of the future has one immediate stumbling block - the risks related to core banking change which have been a major reason for banks postponing core banking replacement over the past decade.




Recognizing that banks will need expertise, methods and tools to mitigate the risks of core replacement, MÖBIUS has developed the MÖBIUS BRIDGE to help banks make the change to MÖBIUS as seamless and risk-free as possible. The purpose of the MÖBIUS BRIDGE is to migrate all customers, products, orchestrations and data used by the bank's existing core banking systems to the MÖBIUS Platform over time and without 'ripping and replacing' old core banking systems.

In the scenario depicted by the diagram, a bank deploys the MÖBIUS Platform to service a specific set of products and customers tied to the bank's GL and regulatory reporting capability; the bank then establishes the MÖBIUS platform as the 'master' repository for all customer and product data including the legacy core banking system. The conversion of system of record data from legacy to the new platform is then done as a by-product of the normal daily operating process of the customers' account, building up the transaction and history data in the MÖBIUS Platform. Once this passes a tipping point, the remainder of the customers can be migrated and the legacy system switched off. This approach provides a controlled approach to migration and addresses the management fear of failure.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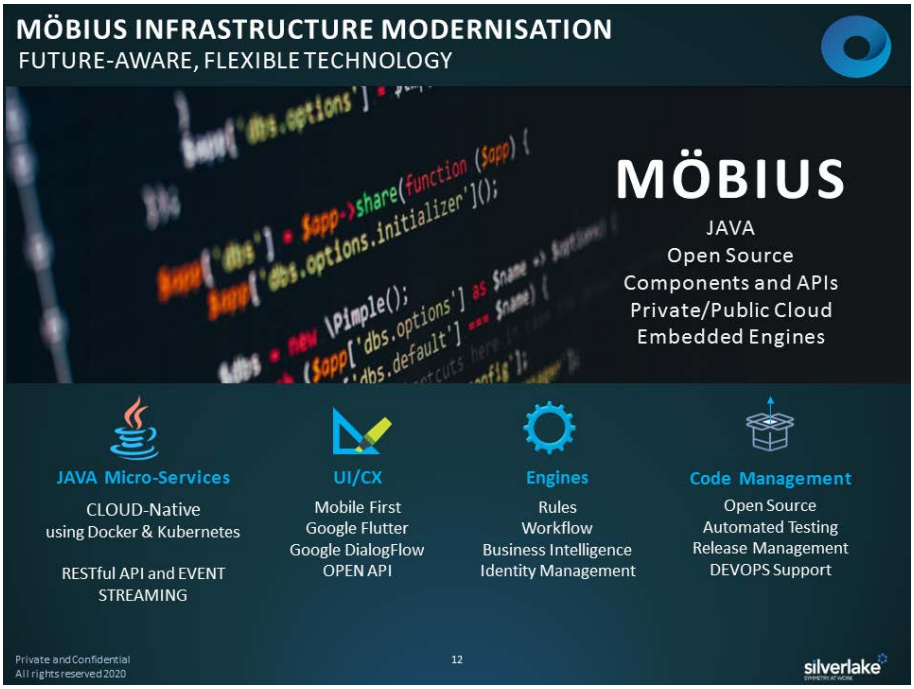
In summary, Silverlake has re-designed its enterprise-wide banking platform around the customer and the cloud to provide a new out-of-the-box NEXTGEN banking execution platform called MÖBIUS. MÖBIUS is designed to help banks make a transformational improvement in operating efficiency and cost at a time when their profitability is under threat from viruses, changed customer behavior and new competition. Only through a transformational, digitalised platform such as MÖBIUS can vendors such as Silverlake deliver 'better, faster, cheaper' services for their customers' customers.




MÖBIUS provides this functionally rich execution and transaction analytics platform for broad-based banking businesses by using main-stream Open Source development and release management technology. It is as future-proof as possible as defined by the IDC NEXTGEN attributes.

The recent MÖBIUS experience is that a magical tipping-point has been reached to enable infrastructure modernisation in risk-sensitive industries such as banking; and that this can be done now.

**About the Author:**

David Brearley is the Chief Architect of the MÖBIUS Open Banking Platform. David Brearley has spent 50 years in senior management positions in financial services world-wide – 20 years in consulting, 20 years as a financial services CIO and 10 years in software development. An Oxford University graduate, David was trained by Andersen Consulting (now Accenture) and was the first Group Head of IT at Standard Chartered Bank. He is now engaged in turning his transformation experience into banking software.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