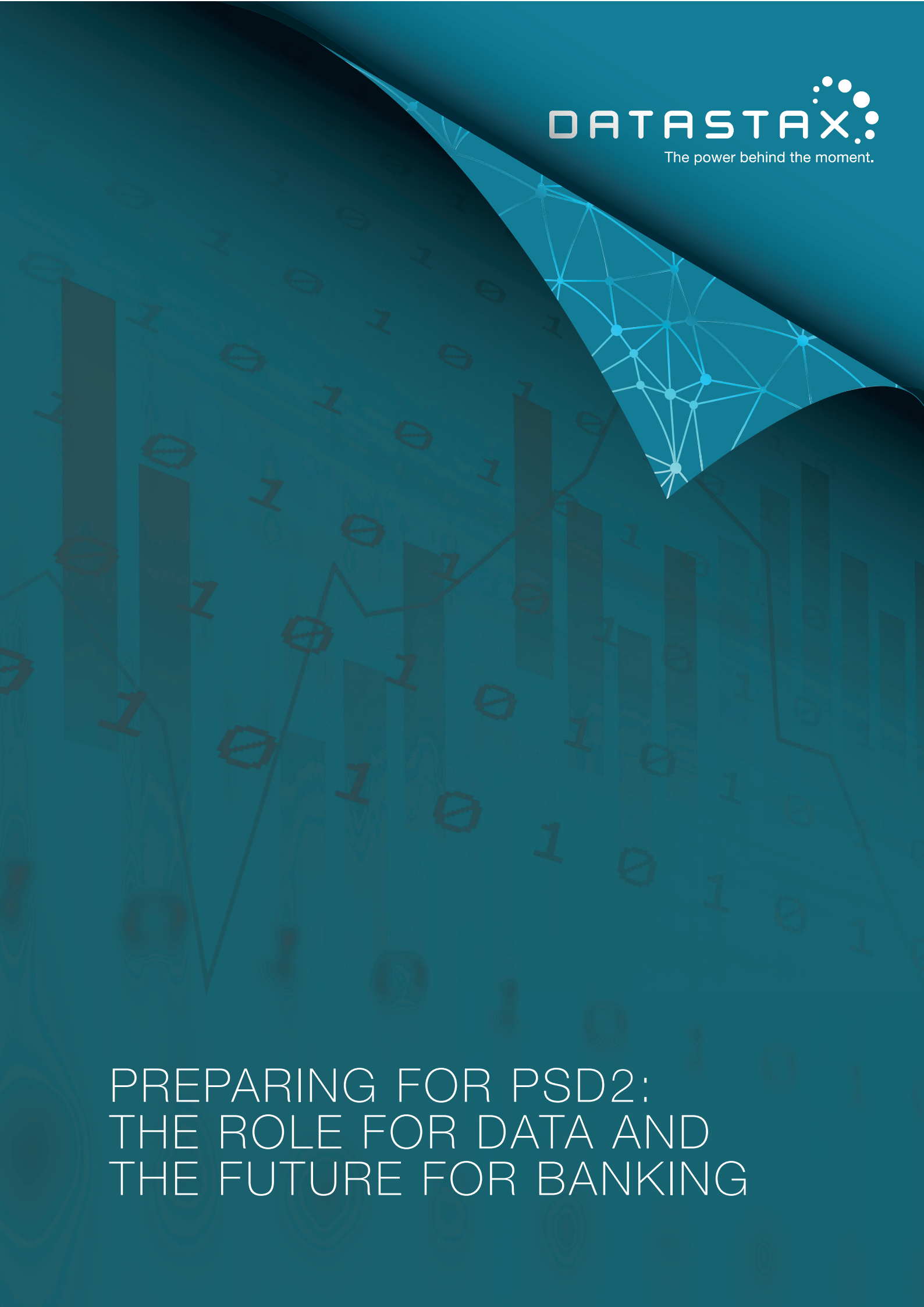



# PREPARING FOR PSD2: THE ROLE FOR DATA AND THE FUTURE FOR BANKING

# CONTENTS

# EXECUTIVE SUMMARY

The implementation of the updated Payment Services Directive (PSD2) will affect banking institutions of all sizes, opening up financial services and payments markets to new competitors and service providers. PSD2 will provide new opportunities to make use of banks' internal data and external market information in real-time and at scale, as part of delivering customer services.

To meet the requirements around customer experience and PSD2, consolidation of data should be a prerequisite. By looking at how to manage data at scale, banking IT teams can implement new cloud applications that can meet new customer experience expectations. Without the ability to consolidate data effectively, understand the relationships between the data elements, and achieve all this in real time, banks will find it difficult to implement new services that customers will value and face a potential loss of those customers to competitors.

**This white paper covers the following:**

- The current challenges that exist around data and complying with PSD2
- The opportunities for banks to use data more effectively and deliver a real difference to customer experience
- The role of data management at scale within customer experience and compliance management

# FOREWORD: DATA IS THE DIFFERENTIATOR

by Chris Skinner

As we move into the 2020s, banks are being forced to open up their systems to third parties. How this will impact each bank is an unknown but, for those who are fit and ready, it will be a huge opportunity, based on the potential of data as the differentiator. How will this work and what will be involved?

Banks have been embracing technology for decades, which is both an accolade and an issue. The accolade is that banks are the leading market for technology change and have been automating for years. The issue is that, as early adopters of the key technologies of computing for branch systems in the 1960s and 1970s, those systems are now holding the banks back.

For decades, banks have added technology to their branch automation systems and, as a result, have cemented those systems in place at the core of their business. Now, in the 2010s, a mixture of fast changing consumer needs and regulatory demands are forcing banks to open those systems to the markets and banks are fundamentally challenged in doing so. The fact is that most banks in developed economies have systems firmly organised in silos

> "Firms that have no legacy, and see the flaws in the financial market structures, can create the vision to deliver what customers need"

on old platforms. In order to be engaged in open marketplaces, those systems need to be re-engineered to be structured for deep data analytics. If that does not happen, then there is a huge danger to current revenues from opening bank data to third party access, as demanded by the Payment Services Directive 2 (PSD2).

By way of example, a bank that has a legacy silo systems structure is being ordered to share customer data with third parties that are streamlined and visionary. Firms that have no legacy, and see the flaws in the financial market structures, can create the vision to deliver what customers need and have no constraints. Are these firms going to operate in a fragmented silo way? Of course not. They will instead drive advantage through data. Just as Amazon, Google, Alibaba and others are driving differentiation through data, any FinTech start-up is going to look for weaknesses in bank operations and overcome them with better use of data.

That is why the Number One trend of 2017 is removing the friction in the customer journey. In banking, this means taking away things that frustrate in apps and operations. A great example is one of the start-up banks in the UK, Loot.

Loot has been created to solve an issue for millennials, and its founder, Ollie Purdue, started the bank whilst at University because of his frustration with traditional bank systems. He and his friends all found that the major high street bank mobile apps were fundamentally flawed because they only showed you what you had spent. They only gave you a historical debit and credit view. That is because the systems behind the app are just that: ledger systems of debits and credits created in the 1980s or earlier for branch-based support.

This approach is irrelevant in the modern world of data analytics and visualisation. This is why Loot has been created as a visualisation tool for cash flow forecasting, and answering key questions for younger folks, such as, 'Can I afford to go out tonight? Can I afford a weekend break with friends? When will I save enough to buy my first car? Therefore, Loot is a data visualisation and analysis tool of spending and financial habits for young people.

Could a traditional, incumbent, main street bank launch such a service? Yes, but only if their data is cleansed, integrated for a single customer view and organised in a holistic structure. That is pretty much the opposite of traditional systems, which are fragmented, spread into multiple hosts and organised in a silo structure.

Opening bank systems to third party access is a huge risk unless banks organise themselves to leverage data as a differentiator. Yet this is what they are being forced to do by PSD2. I strongly urge all banks to rise to his challenge or be subsumed by the new age competition of data differentiators.

**Chris Skinner**
Chairman of The Financial Services Club
Author of *The Finanser, Digital Bank* and *ValueWeb*

# PSD2 AND THE IMPACT ON BANKS

# PSD2 AND THE IMPACT ON BANKS

The Payments Service Directive (PSD) was originally brought in by the European Union to update the payments market in Europe, opening the market up to more competition and delivering better services for customers. Developed originally to make cross-border payments as efficient as those taking place in one country, PSD led to the development of the Single Euro Payments Area (SEPA).

Following on from the initial PSD in 2007, the latest update to the Directive covers many new payment services that have developed in the meantime. As the Directive states, "Significant areas of the payments market, in particular card, internet and mobile payments, remain fragmented along national borders. Many innovative payment products or services do not fall, entirely or in large part, within the scope of Directive 2007/64/EC."

In response to this update to PSD, banks and financial services providers now have to adapt to a new market and infrastructure for payments. The development of open banking and payments Application Programming Interfaces (APIs) goes hand in hand with new processes for routing information between customers, retailers and banks. Alongside these new processes, new third party providers (TPPs) can enter the market around payment processing and information services.

Banks in other regions are also using some of the lessons from PSD for developing their own strategies around real time payments. In Australia, the New Payments Platform (NPP) started in 2012 to support faster payment processing for banks, retailers and customers in the country. This has evolved over time, with NPP phase three and four targeted for the second half of 2017. This will provide open access infrastructure for banks and payment processors to connect to, while creating richer data sets around transactions too.

Capitalising on these opportunities will require a new approach to managing data. In PSD2, the role of open APIs will make processing payments easier on behalf of customers, while the availability of real-time data across accounts from multiple banks in one place should also help customers receive the best potential service when they need it. However, the exclusive link that previously existed between banks and customers around their data will be broken.

In order to prepare for PSD2 and compete with both other banks and new market entrants, banks will have to improve how their current knowledge of their customers can be used in the future. This goes beyond looking at current data sets that are held in individual silos and instead involves thinking about how to use external and internal data sets together. The alternative is to let competitors take this approach.

KEY QUESTIONS TO ANSWER

# PSD2 AND THE IMPACT ON BANKS

Continued...

## KEY QUESTIONS TO ANSWER

1 What effect will PSD2 have on our operations?

2 Are we able to get a complete picture of our customers right now? If not, will we have this in place before PSD2 comes into force?

3 Will we bring in external data on our customers to develop more insight into their needs?

4 How will data be managed as part of these real time infrastructure implementations? How can approaches like data streaming and APIs be combined to support faster payment processing and implementation of global customer identifiers?

5 What approach to customer experience will we take in future, and how will our technology strategy support this? Can we track each customer interaction over every channel in a consistent way at the instant that is happens?

6 How much competition do we think will enter the market, and what approaches will other banks take?

7 What will the long term impact be on the whole banking sector?

INDUSTRY COMMENTS

# PSD2 AND THE IMPACT ON BANKS

Continued...

## INDUSTRY COMMENTS ON PSD2

Across the banking and financial services sector, the potential impact of PSD2 has been predicted to be significant:

> *PSD2 will accelerate the adoption of open banking, reinforce the creation of new business models, redistribute responsibilities in the overall value chain, and therefore have a significant impact on the overall banking landscape."*
>
> **Patrick Laurent** Partner Technology & Enterprise Application Leader, Deloitte
>
> **Pascal Eber**, Partner Operations Excellence & Human Capital, Deloitte
>
> **Steve Hauman**, Director Technology & Enterprise Application, Deloitte
>
> From *PSD2 - Challenges and Opportunities for the CIO* **Inside Magazine issue 13**

> *A PwC Strategy& study on PSD2, conducted in the first quarter of 2016, suggests that 88 percent of consumers use third-party providers for online payments, which indicates that there is a large, primed base of customers for other digital banking services.*
>
> *... The overall response of Europe's bankers to PSD2 is one of uncertainty: Although 68 percent of bankers fear that PSD2 will cause them to lose control of the client interface, many of them remain unsure how to respond to the new directive. Despite the high perception of risk, 44% of banks plan to provide an open bank offering in the next 5 years.*
>
> *Because the directive mandates open banking, Europe's banks should respond by formulating business models that embrace collaborative relationships with new partners and the exchange of data via APIs. Otherwise, banks will be vulnerable to service commoditization and competitive marginalization."*
>
> **Jörg Sandrock**, managing director, Strategy& Germany, PwC
>
> **Alexandra Firnges**, engagement manager, Strategy& Germany, PwC
>
> From the white paper *Catalyst or threat? The strategic implications of PSD2 for Europe's banks* **PwC**

# PSD2 AND THE IMPACT ON BANKS

Continued...

## INDUSTRY COMMENTS ON PSD2

*Accenture believes that PISP services could account for up to 16 percent of online retail payments by 2020, led by the displacement of up to 33 percent of online debit card transactions and up to 10 percent of online credit card transactions. Taking the UK market as an example, this would result in the loss of over £1.45bn of card transaction revenues between 2017 and 2020 - money that was previously captured by the banks and card networks.*

*These changes are poised to contribute to UK banks losing up to 43 percent of their current payments-based revenues by 2020."*

By **Accenture Payment Services**

From the white paper *Seizing the Opportunities Unlocked by the EU's Revised Payment Services Directive*

*In response to the business risks, European banks have two alternatives for responding to PSD2. They do not have a choice of whether their industry will be disrupted. their only choice is when to build ongoing disruption into their business strategies: now or later, perhaps when it is too late."*

**Randy Heffner**
Vice President and Principal Analyst, Forrester

From the research report *APIs Turn Disruptions Into Business Opportunities*

# THE FUTURE ROLE OF DATA WITHIN BANKING

**Customer 360**
Internal silos and issues caused

**Customer 720**
Internal data joined with external data – how PSD2 will accelerate this

The need for banks to make use of data is a strategic necessity

# THE FUTURE ROLE OF DATA WITHIN BANKING

For many years, banking IT systems have sat in silos. This could be caused through different departments running their own applications and infrastructure – for example, mortgage services being hosted on older mainframe apps while debit and credit card records were on more modern systems. Alternatively, growth through acquisition could lead to multiple sets of customers being hosted in parallel.

Whatever the reason, migration to single platforms was often deferred into the future due to reasons of cost and risk. However, the impact of this decision can be felt today when it comes to customer experience. For many customers, getting a real-time and comprehensive picture of their accounts is difficult even when they have multiple accounts with the same bank. Creating a Global User Identity (GUID) for each customer that can consolidate activity on each channel into one place is essential.

However, this internal GUID should not be the end goal. Banks can go one stage further and source external data to use alongside their account information. To describe this approach, the term "Customer 720" has developed. This latter approach has the most potential to help banks in the move to implement PSD2. Customer 720 initiatives are designed to aid banks in understanding their customers' needs and requirements more accurately, based on the data created by their account activities alongside external information on those customers.

"Customer 720 initiatives are designed to aid banks in understanding their customers' needs and requirements more accurately, based on the data created by their account activities alongside external information on those customers."

Many banks have already embarked on new projects to centralise their data around customers and put GUIDs in place. For banks linking up information on customer accounts, the term "Customer 360" has been popular. However, many customer relationships exist only within branch or on traditional channels. These relationships are very difficult to capture and make useful for the bank or for the customer; they also pre-date many of the identity checking phases that are now standard for new accounts. Getting a set of accurate GUIDs in place is therefore a significant challenge.

By looking at different customer groups and analysing their activities over time, it's possible to build up more contextual insight into how customers respond to market circumstances and offers.

PSD2 will take this a step further. Not only will banks be able to carry out this kind of analysis, but customers will be able to use third party providers (TPPs) to get this kind of market insight too. For banks, this may be a significant challenge to customer experience and retention.

# THE FUTURE ROLE OF DATA WITHIN BANKING

Continued...

For example, if customers choose a TPP to analyse their account data in context, the bank may lose some of the opportunities to interact with them when they are at their most willing to change. These TPPs may bring together information from different sources that can be used to differentiate their offerings from any bank that the customer has an account with, or from other banking service providers. To compete with this, banks will have to consider how they make use of data tactically within their own mobile banking apps for highly personalised, real-time interactions, as well as supporting the strategic infrastructure to deliver information out via APIs for compliance.

In this environment, data is essential to banks and how they deliver customer service. The one critical advantage that banks have is how they make use of the information that they already hold. It is therefore important to think through the services that customers will use to access bank data, as well as the infrastructure required to support the API integrations and produce that data for consumption.

For banks, the right approach to these kinds of projects will depend on two things: the appetite for risk and innovation that exists within the bank, and the availability of budget to support projects that are in development. Based on these two items, banks can qualify their approach.

| | Appetite for risk – **Low** | Appetite for risk – **High** |
|---|---|---|
| Willingness to invest – **High** | **FAST FOLLOWER** | **MARKET MAKER** |
| Willingness to invest – **Low** | **COMPLIANCE ADOPTERS** | **FUTURE PLANNERS** |

CATEGORY DESCRIPTORS

# THE FUTURE ROLE OF DATA WITHIN BANKING

Continued...

## CATEGORY DESCRIPTORS

### MARKET MAKERS

For banks that have money to invest as well as a greater willingness to innovate, the potential to make or develop new markets based on PSD2 compliance will be the most appropriate approach. This strategy relies on banking IT teams using their investment in compliance to develop more innovative approaches to customer experience and support – in turn, these projects can be coupled into wider digital transformation initiatives.

**KEY REQUIREMENTS**

- Adopt strategy to seize market share by making and marketing new services for customers
- Infrastructure should support best-in-class experience across all online channels
- Use API and compliance project and align with wider roadmap for banking IT – ultimately look at how to lead those projects based on data infrastructure planning and preparedness

APPETITE FOR RISK → WILLINGNESS TO INVEST →

### FAST FOLLOWERS

For those organisations that have a low appetite for risk, a suitable strategy is to split compliance and creative. For the IT team, the aim for these projects is compliance but also flexibility to respond to market demands and creative requests from the rest of the business.

By seeing what approaches resonate with customers in the real world, new services can be developed quickly and then marketed to the bank's existing customers. While this does risk the loss of some brave 'early adopter' customers to other apps or services, it's less risky than creating a whole strategy that does not work in practice.

**KEY REQUIREMENTS**

- Use compliance budget to develop a flexible and responsive system that can then support other strategies
- Work with banking leadership team on what customers want after compliance date is passed
- Use data alongside new development strategies based on responding to overall market demand

APPETITE FOR RISK → WILLINGNESS TO INVEST →

# THE FUTURE ROLE OF DATA WITHIN BANKING

Continued...

## CATEGORY DESCRIPTORS

### FUTURE PLANNERS

Companies in this category may want to take on the world, but budgets to support these great ambitions may be limited. For the IT teams involved here, looking at compliance requirements should be considered alongside how to make best use of future budgets as well. Building on open source software components can help reduce some of the costs involved with the compliance infrastructure, but can also open up potential opportunities to make use of data over time.

**KEY REQUIREMENTS**

- Make use of tried and trusted open source components and cloud computing services to scale up while delivering compliance
- Look at smaller projects that can make use of data to prove a return before expanding investment
- Use data to maintain competitive advantages in key areas, rather than trying to do everything

APPETITE FOR RISK → WILLINGNESS TO INVEST →

### COMPLIANCE ADOPTERS

For those companies that are focused more on reducing risk and costs, compliance with PSD2 will still be a necessary requirement. This will involve making minimal additions to current infrastructure in order to meet the letter of new regulations, rather than looking at any new services on top, or re-organising infrastructure for reduced cost. Projects will therefore focus on compliance with PSD2 in an efficient and cost-effective manner while reducing costs for running the associated infrastructure.

**KEY REQUIREMENTS**

- Focus on letter of requirements for PSD2 – implementing API platform for delivery of information to customers and for processing payment requests from retailers and TPPs
- Get ready to comply quickly and with as little management overhead as possible
- Look at expense for project alongside wider IT budget strategy on cost containment rather than market growth

APPETITE FOR RISK → WILLINGNESS TO INVEST →

# HOW TO GET READY FOR PSD2?

**Implementing new data strategies**
Centralising data for internal purposes

**Supporting PSD2 and open APIs with open data**

**Where competitive advantage can still be maintained**
The difference between having a customer's data and knowing their preferences

# HOW TO GET READY FOR PSD2?

One of the biggest decisions for banks meeting the needs of PSD2 is how existing applications and services can work via APIs. While new applications can be developed specifically to work via the new API standards, all existing services will have to go through an API layer. This layer will handle the request and then return back the necessary information to the customer or to the business requesting it.

The customer's bank will act as an Account Servicing Payment Service Provider (AS PSP), and will receive two kinds of request:

**Account Information Service Providers (AISPs) will ask for Authentication / Authorisation of the transaction, provide the Customer and Account details, then request Transaction information.**

This information can include all transactions made within a customer's account and then be used for analysis. Typical examples for the use of this data might include comparison services, bank account aggregation services and credit checking.

**Payment Initiation Service Providers (PISPs) will ask for Authentication / Authorisation of the transaction, provide the Customer and Account details, then request the authorised processing of a Transaction.**

In the future, all payment requests from retailers will follow this model, while any other organisation involved in taking or making payments will also have to act as a PISP.

The PSD2 regulations set out how banks must have APIs in place for sharing information and to support payments; however, there are no specific rules or specifications in place on how those APIs should be structured. Instead, the technical standards and concrete requirements are being defined locally.

LOCAL DEFINITIONS

# HOW TO GET READY FOR PSD2?

Continued...

## SETTING OUT STANDARDS AND REFACTORING APPLICATIONS

In the UK, the Open Banking Working Group (OBWG) was set up in September 2015 at the request of HM Treasury to specify the implementation of a set of APIs to achieve similar goals for customers. In Europe, the European Banking Association (EBA) is responsible for defining the technical standards that banks will have to meet. However, as of February 2017 the EBA has only worked on the security standard for APIs rather than the full specification.

Based on the Working Group definitions of standard banking services like 'Statements' and 'Transactions', UK banks have been given an advantage on other banks across Europe when it comes to implementing API support in practice. Making use of this work on standards can therefore provide a boost for getting ahead of competitors before the PSD2 deadline. For European banks, this effort in the UK can be used as a guide for deployment, even as country- and EU-specific guidelines are still being formulated.

"Making use of this work on standards can provide a boost for getting ahead of competitors before the PSD2 deadline"

For European bank IT infrastructure teams, the current draft standards put together by the OBWG can be used to start on PSD2 programs. The EBA may either adopt the OBWG standards wholesale in order to reduce future workloads, or align their guidelines with OBWG for ease of deployment. Either way, European banks will be not too far away from where PSD2 will be completed. To make this approach provide more business value, this programme can be started under the umbrella of a wider web and mobile app strategy. By refactoring applications and making use of the OBWG API specifications as the interface between the app and the backend of the bank, banking IT teams can get ahead of their competition.

This refactoring of web and mobile apps can then support the delivery of more customer services over time. For example, consumer tools like spend analysis and classification, search support and bank account dashboards can be easily added over time.

## API LAYER DEPLOYMENT

At the most basic level, the API Layer will sit on top of a bank's existing core banking applications and process API calls from PISPs and AISPs. However, implementing this in practice so that it can cope with the volume of transactions per second that most banks receive is harder. Issues like security, redundancy of systems and availability of data will have to be considered alongside the customer experience when using banking services. Any slow or lost transaction requests will have a negative impact on customers, so implementing steps to prevent this will be essential.

For customers, the availability of a service is the primary indicator of quality. For banks, AISPs and PISPs, delivering responses to customers at any time will be essential. The standard of mobile apps and consumer Internet services means that anything less than full 24/7/365 availability is perceived as poor. For banks, delivering customer data back to requests instantly will be a challenge with existing applications.

Alongside this availability requirement, banks will also have to scale up the volume of transactions that their systems are able to handle. With each transaction request potentially triggering multiple API calls, this increase will lead to extra resource and compute requirements. To implement the

# HOW TO GET READY FOR PSD2?

Continued...

necessary levels of additional resources in the real world, architects would have to consider increasing the amount of processing capability on existing infrastructure. In order to meet the requirements around service quality, additional hardware and storage to act as a cache between back-end infrastructure and customer-facing applications will be needed.

However, these applications were not developed with API-based designs in mind, so an API translation layer would have to be added in any case. This new layer would have to translate API requests into transactions for processing on the legacy hardware and software. Depending on approach, companies will have to look at the infrastructure behind this API Layer and how they architect this for future services and growth.

One approach is to implement this API Layer and then increase the investment in existing applications and hardware to support the growth in transactions. However, this can be very expensive in terms of processing workload, which directly translate into MIPS (Millions of Instructions Per Second) costs when the core banking system is running on legacy mainframes. Caches, redundant API servers, and load-balancers will typically be put in place to achieve the required level of service while limiting the impact on legacy systems. This will also have to be joined with more supporting infrastructure for customer session support, so that any issues on the back-end do not affect the customer experience.

The alternative is to look at the role that the API Layer will play over time. Instead of relying on back-end infrastructure, the new API Layer can handle most of the processing around API requests before passing final transactions over to the existing systems. This will rely on new database management and software design, that can achieve all the technical requirements in an integrated manner, but should represent a significantly reduced level of spend compared to continuing with the current legacy approach on its own.

This approach can also help in the "real world" environment where most banking IT teams find themselves. Based on the need to meet customer expectations around availability, response times and service quality, the initial priority would be to implement redundancy in the API Layer, as well as caching data locally for better performance. Alongside this, data streaming technologies can be used to move data into the right places to be processed. The data cache would then interact with the back-end legacy applications once all interactions and analytics have been carried out. Alongside this, all transactions taking place in the API Layer would have to be authenticated then logged and recorded in a database.

"Delivering customer data back to requests instantly will be a challenge with existing applications."

## KEY REQUIREMENTS FOR PSD2 INFRASTRUCTURE

- **High availability** - If there are any problems that develop in the infrastructure, then the service to customers should not be affected.
- **Session Aware Load Balancing** - If specific individual sessions are interrupted, then these should be picked up by other elements automatically and without the customer noticing.
- **Servers and Cache for data** - This additional hardware supports the work being carried out, both in terms of processing and in near-line storage of data for performance.
- **Database** - This will create, sort and manage the records of each transaction over time.

# HOW TO GET READY FOR PSD2?

Continued...

For the API Layer, the volume of transactions and interaction requests from customers is predicted to be high. Coping with this volume will cause its own issues, as an under-resourced API management platform will lead to poor customer experience. Similarly, the database, data streaming and caching elements will have to scale up alongside the API Layer implementation to reduce the potential for bottlenecks within the overall infrastructure.

Rather than extending the traditional approach to banking application infrastructure, an alternative approach is to look at a stateless model for the API Layer and the database that supports it. Stateless computing involves using components that are pre-built and can be added to the API Layer in order to scale as demand goes up or down. These components do not store their own data or settings; instead, they are added to a pool of compute resources as required. Alongside this approach, the database layer will have to take on some similar characteristics. By using this more "cloud-based" model, it's possible to scale up alongside demand levels in a more cost-effective way.

**In response to the infrastructure demands on the API Layer, a distributed computing approach can provide the following:**

- **Native, always-on architecture based on distributed computing models** – rather than relying on multiple components that switch service between primary and secondary services when something goes wrong, distributed computing uses components that are built to carry on running even if other nodes go wrong. By using multiple nodes that communicate with each other, any individual failure does not affect the service to the customer.
- **Scale-out model** – similarly, distributed computing systems can scale up through simply adding more nodes to the infrastructure. Data and compute requests are automatically sorted across all the nodes to ensure quality of service as well as redundancy of data.
- **Location of data** – as nodes can be geographically located close to where data is created and in multiple locations, caching of data is not necessary.
- **Database management** – looking at databases that can run alongside stateless components and support a similar scale-out, distributed computing model can help.

# HOW TO GET READY FOR PSD2?

Continued...

This infrastructure strategy should support the implementation of the API Layer for compliance with PSD2, but also ensure that the bank can scale up its implementation in a cost effective manner over time. Taking a distributed computing approach makes scaling up easier as it simply involves adding more nodes to the infrastructure.

Alongside the support for processing API requests and interactions with the core banking system as they happen, the data created by transactions can be used for analytics and to create more instant insight around customers. This can happen in parallel to the transactions being processed. This operational data can analysed in near real time by streaming data into a separate instance so that there is no impact on the operational performance.

This ability to run real-time analytics can provide the difference between having a customer's data and knowing their preferences. For customers with multiple accounts at the bank, information from different accounts can be combined to spot trends that are developing over time. This can also be supplemented with external data sources where possible. By creating more insight into what customers really want from the bank, the service can provide more value in comparison to forthcoming PISP competitors.

> "Delivering customer data back to requests instantly will be a challenge with existing applications."

## Based on these requirements, it's worth looking at the role that the infrastructure design will play.

Rather than simply looking at the cache and database as static elements that simply save data locally and for logging purposes, this architecture can be used to offload some of the processing and compute resource requirements from both the back-end infrastructure and the API Layer.

DataStax Enterprise (DSE) can be used as an always-on, scalable database for the API Layer. DSE provides a platform for storing data and transactions from the API Layer as well as reducing the impact on performance for the legacy systems. To deal with the potential issue of performance and availability, DSE can support full active geo-distribution of data so that service is located close to where it is needed. At the same time, DSE can scale in a linear way by simply adding more nodes to clusters.

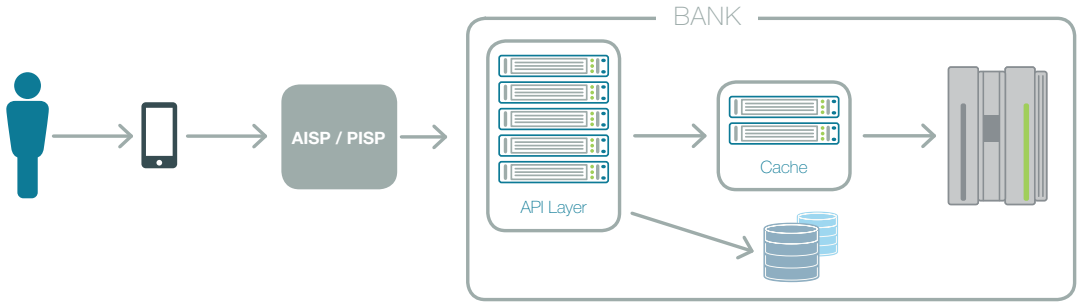
Looking at the database layer as an active component of the service can help to reduce the impact on back-end applications. DSE can be used

# HOW TO GET READY FOR PSD2?

Continued...

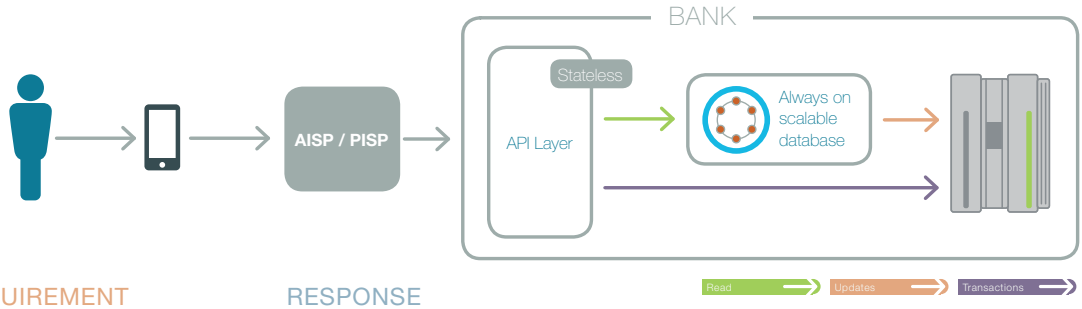
as a cache for data on account balances and status, allowing the application to check that a customer has enough in their account to process a transaction before handing it over to the mainframe for processing. If data can be served from the cache within DSE, then this reduces the impact on the existing application. DSE can also support integration with data streaming technologies to shift data into other systems for analytics to be carried out. Implementing DSE provides a route to maintain service quality while also significantly reducing the cost to serve customers via APIs.

## PSD2 / OB APIS ON TOP OF EXISTING SYSTEMS IN REAL LIFE




| REQUIREMENT | RESPONSE |
|---|---|
| 24/7/365 service | HA deployment |
| Auth + Session | More Servers + DB |
| More Tx / Legacy? | More Servers + Cache |
| Logs | More Servers + DB |

## PSD2 / OB APIS USING AN ALWAYS ON SCALABLE DATABASE




| REQUIREMENT | RESPONSE |
|---|---|
| 24/7/365 service | Native always on |
| Auth + Session | In the DB |
| More Tx / Legacy? | Just scale (add nodes) |
| Logs | In the DB |

# BUILDING NEW APPLICATIONS FOR BANKING & CUSTOMER EXPERIENCE

**The critical role of mobile banking**
Ownership of the customer relationship and protecting against competitors

**Mobile banking services and innovation**

# BUILDING NEW APPLICATIONS FOR BANKING AND CUSTOMER EXPERIENCE

Alongside the infrastructure to support compliance with PSD2, banks will have to consider how to support their customer interactions too. The growth of online, mobile and app-based banking services will continue with the adoption of PSD2. This can have an impact on core banking infrastructure which will have to support more transactions and GUIDs.

As an example, in the days of traditional branch banking, customers might interact with their bank once a week at most. With the move to online and phone banking, this interaction could be every day. With more mobile and app services, the number of interactions continues to grow. Couple this with calls for data from third party AISP and PISP companies, and the sheer volume of transactions will go up even further.

To cope with this volume of transactions – and to ensure that customers can interact with their current bank in ways that suit them – it is worth looking at how mobile banking services can be designed to take advantage of data. New services like analytics and search can be applied to a customer's account details to provide them with more insight into their spending, while integration with other banks can potentially put that insight into more context.

As more customer service interaction moves onto mobile devices, the increased volume of transactions can have unintended consequences for banks' core infrastructure planning. Looking at how increases in transactions might affect performance is therefore necessary when planning ahead. At the same time, reconciling all this customer activity and interaction into one place should also be a consideration.

"New services like analytics and search can be applied to a customer's account details to provide them with more insight into their spending."

For banks, scaling up services without adding significant new core banking infrastructure can be achieved through smarter service design in the first place. This can then be coupled with refactoring of existing mobile applications and services to take advantage of the new API Layer that is brought in to meet PSD2 compliance requirements. By looking at the potential of the API services separately to the infrastructure side, banking IT teams can support future service innovations without having to re-invent the wheel every time something new is needed.

# ABOUT DATASTAX

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Company overview


It starts with a human desire, and when a universe of technology, devices and data aligns, it ends in a moment of fulfillment and insight. Billions of these moments occur each second around the globe. They are moments that can define an era, launch an innovation, and forever alter for the better how we relate to our environment. DataStax is the power behind the moment. Built on the unique architecture of Apache Cassandra™, DataStax Enterprise is the always-on data platform and has been battle-tested for the world's most innovative, global applications.

With more than 500 customers in over 50 countries, DataStax provides data management to the world's most innovative companies, such as Netflix, Safeway, ING, Adobe, Intuit, Target and eBay.

Based in Santa Clara, Calif., DataStax is backed by industry-leading investors including Comcast Ventures, Crosslink Capital, Lightspeed Venture Partners, Kleiner Perkins Caufield & Byers, Meritech Capital, Premji Invest and Scale Venture Partners. For more information, visit DataStax.com/customers or follow us on @DataStax.

## DATASTAX ENTERPRISE
## – HOW DSE SUPPORTS PSD2 IMPLEMENTATIONS

DataStax provides an always-on data platform that makes it easy to scale out the data layer horizontally across data centers, cloud regions, or hybrid environments. DataStax Enterprise is built on the best distribution of Apache Cassandra.

DSE takes a multi-model approach to handle mixed workloads. So cloud apps are **always-on**, **effortlessly scale**, and deliver **instantly actionable insight**. All of which is made possible from our unique masterless architecture. With DSE, apps can remain online through any failure and ready to support any number of users without compromising on real-time performance.

Because these types of cloud apps are so mission-critical, engineers are turning to DataStax to solve the new challenges they create – volume of data is growing like crazy; performance must be consistently great; and an hour of downtime costs an average of a million dollars. The always-on data platform DSE helps support all of those requirements.

With banks demanding easier approaches to consolidate and manage their data, DSE helps companies bring their critical data sources together in one place. As banks implement new open API strategies, both existing data and new information will have to be stored in a centralised, high-performance database layer. Based on Apache Cassandra™, DSE provides the fastest write performance for data as it is ingested.

# ABOUT DATASTAX

DSE is based on a distributed and masterless architecture, which means that scaling up services can be achieved simply through adding more nodes. These nodes can be located anywhere, providing fully active-active geo-distribution for data. At the same time, data is spread across multiple nodes, ensuring that everything from individual server issues through to full data centre losses do not affect performance for the application or lead to downtime.

**DSE includes the following elements that support PSD2 deployments:**

- **DSE Search** – a high performance real-time live indexing engine with powerful search capabilities, DSE Search makes it easy to manage and search data as it is stored. This ability to look at the complete data set rather than running multiple silos of data that is replicated in third party systems. DSE Search also provides full support for real-time aggregations, faceting and filtering.

- **DSE Graph** DSE Graph is the first graph database built to power customer-facing applications and capable of scaling out to cope with massive data sets. As it is based on the core Apache Cassandra™ architecture, DSE Graph can scale to billions of objects spread across hundreds of machines and multiple data centre environments with no single point of failure. Using Graph, banks can find new relationships and trends in customer data.

- **DSE Analytics** – For banks that want to glean new insights from their data, DSE Analytics integrates real-time and batch analytics capabilities. The analytics functionality can be used to generate advanced personalisation responses and process real-time streams of data. By applying analytics to internal data and new information provided from other customer accounts, banks can ensure that they are providing the best potential products to customers. As DSE Analytics is embedded into DSE, banks can run this as part of a wider approach to managing the data that APIs will create without having to keep multiple data silos synchronised.

DSE also includes Operations Center for management of the always-on data platform, enterprise-class security functionality, and development tools to make ongoing projects successful and secure. DataStax can also provide industry-leading expertise around deploying production-ready, enterprise class cloud applications based on the best distribution of Apache Cassandra.

**BANKING CUSTOMERS USING DSE**

In the banking sector, DataStax powers critical applications and data services for financial services institutions including UBS, ING, Macquarie and CapitalOne.