payments strategy forum

Horizon Scanning Working Group

Working Group Solution Descriptions

Draft for discussion 07/04/2016
Version 1.0

'informing the forum of relevant market, technological and regulatory developments'

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Horizon Scanning Working Group

Solution Assessments - Contents

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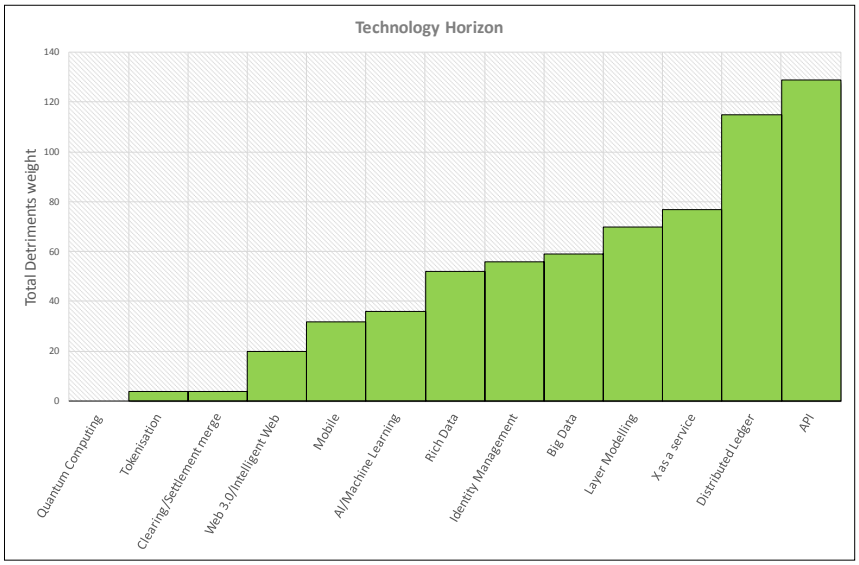
Payment APIs and Layer Model

Solution Concept Assessment

SOLUTION NAME: APIS FOR LAYERED PAYMENT SERVICES

PROBLEM STATEMENT:

The list of detriments given to the Horizon Scanning Working Group reveals extensive deficiencies along the value chain of payments. The analysis performed by the working group shows that a grouping of various technologies would directly address many identified detriments. The following histogram shows that implementation of technology-related solutions using APIs, distributed ledger, blockchain and layering would potentially result in improvement to 76% of detriments.



The degree to which solutions based on APIs, Distributed Ledger, Blockchain and Layering would solve detriments is as shown in the table below; from the table it can be seen that the use of Application Programming Interfaces (APIs) in particular would be a solution to a number of customer detriment themes:

1. Access to Payment information, such beneficiary identification, payments data or balance information
2. Access to the payment schemes, due to the complexity of the multiple current scheme formats and "lock in" by existing service providers
3. Real-time access to payment services and information, pull and push features
4. Multiple security access standards.

	Detriment Name	Detriment Code	Weight	API, DL, BC, L
Detriment 44	Difficult for PSPs to switch bank provider	SA8	4	4
Detriment 37	Not enough direct PSPs	SA1	4	4
Detriment 48	Different in rules and standards within EU to the UK	SA12	2	4
Detriment 42	Existing sponsor banks can limit competition	SA6	4	4
Detriment 50	Difficulty to enter market because of complex rules	SA14	4	4
Detriment 2	Difficulty in handling exceptions and failures caused by inability of consumers to control payments	UN2	4	3
Detriment 35	Reconciliation costs and treasury management for businesses; also government reporting costs	UN31	4	3
Detriment 14	Corporate service users would like to know where payments are at all times in case it is not real-time	UN10	4	3
Detriment 13	Lack of confirmation of receipt (FP)	UN9	3	3
Detriment 22	Lack of transparency/clear information on types of payments (and products) for consumer to be able to select best choice with confidence	UN18	4	3
Detriment 51	No real substitutability between payment systems in the event of system failure	SA15	2	3
Detriment 15	No real-time balances causing financial detriment (overspending causing returned payments, fees)	UN11	2	3
Detriment 38	More direct / indirect PSPs	SA2	4	3
Detriment 39	Indirect participants have little choice of providers	SA3	4	3
Detriment 40	Lack of commercially viable offers for indirect PSPs	SA4	4	3
Detriment 41	Consumers have little choice if they want a PSP with real-time FPS	SA5	4	3
Detriment 45	Too many standards and too much complexity	SA9	4	3
Detriment 49	Range of standards means potential risk to infrastructure competition	SA13	4	3
Detriment 43	Lack of competition between schemes	SA7	2	3
Detriment 46	Fewer scheme and standards to allow far greater front end simplicity and innovation	SA10	1	3
Detriment 47	Complex message types for all schemes	SA11	4	3
Detriment 52	Cost and complexity of complying with scheme rules	SA16	4	3
Detriment 56	Indirect PSPs don't own the schemes so change and governance of schemes is driven by the big banks	SA20	4	3
Detriment 17	Difficult to know who you are paying leads to misdirected payments and fraud	UN13	4	2
Detriment 1	Poor flexibility or ease of use to control your push and pull payments	UN1	4	2
Detriment 23	Consumers don't understand which payments to pick for which purpose	UN19	4	2
Detriment 25	Data acts as a barrier to getting products and services – lack of transparency	UN21	4	2
Detriment 83	Distance between physical and financial supply chains affects e-invoicing	HS1	3	2
Detriment 18	Missing reference data causing misdirected payments/expensive in management of exceptions	UN14	3	2
Detriment 19	Data – limited input and output, no third party reporting	UN15	1	2
Detriment 36	Inflexible collection accounts cause input errors and additional costs for customers and agency banks	UN32	3	2
Detriment 87	No real-time balances causing financial detriment (overspending causing returned payments, fees)	HS5	4	2
Detriment 7	No real-time pull functionality	UN3	2	2
Detriment 8	Existing payments mechanisms not keeping up with pace of change with work and living habits – i.e. Direct Debits	UN4	4	2
Detriment 20	Cost differentials between Chaps, Bacs and FPS (esp. for wholesale)	UN16	1	2
Detriment 53	Lack of interoperability between schemes means consumers don't need to have to choose on a scheme name but choose what attributes a payment should have	SA17	1	2
Detriment 57	Multiple schemes cause overheads in users/PSP/Retailers fees	SA21	1	2
Detriment 60	New third party providers can't initiate payments and access data	SA24	1	2
Detriment 61	Third party systems can't use the system real-time	SA25	4	2
Detriment 71	Increasing reluctance to use agency banks	FC8	4	2
Detriment 96	SMEs see risk in switching	AP1	2	2
Detriment 12	Security measures are too complicated so consumers bypass systems	UN8	4	1
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Detriment 65	KYC authentication is complex and expensive for all PSPs	FC2	1	1
Detriment 9	Account charges for bounced Direct Debits and unauthorised Direct Debits etc. affects the disadvantaged	UN5	4	1
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Detriment 84	Lack of a long term strategy with the Blockchain	HS2	1	1
Detriment 98	Difficulty of switching bank provider caused by need to change sort code/account number- causing difficulty for customers making payments / companies receiving and loss of competitiveness in banking provision	AP3	2	1
Detriment 24	Lack of confidence in shift to online – lack of trust increases costs, reduces engagement, slows move to non-cash	UN20	1	1
Detriment 54	Expensive for card issuer/acquirers to be direct with card schemes	SA18	2	1
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Detriment 63	Difficulty in obtaining a BoE settlement account as a new direct participant	SA27	4	1
Detriment 73	Bank account access – opening or maintaining account facilities – regulatory burden in different territories (AML)	FC10	1	1
Detriment 85	New technologies –lack of products not running on old 'rails' (i.e 4-party-scheme model). Need to make it easier for new entrants to get established in the market.	HS3	2	1
Detriment 86	Lack of competition between schemes	HS4	1	1
Detriment 88	Execution risk – the more change we add into the system, the greater execution risk in the climate of cyber crime	HS6	2	1
Detriment 89	Banks not good at innovating – external market should innovate	HS7	1	1
Detriment 91	Online payments – lack of access for business users for alternative rails (i.e. need more availability of credit transfer payment online)	HS9	1	1
Detriment 92	New third party providers can't initiate payments and access data to initiate payments	HS10	1	1

SOLUTION DESCRIPTION

The Layer Modelling approach is established best practice in the IT and telecoms industry where end-to-end systems are built in layer stacks. Each layer offers a standards-based service to the layer above. The link between layers is clearly defined as service definition, which isolates the function of each layer. In this way it is possible to replace the components inside any layer, preserving the service characteristics without affecting the other layers. The most well-known layer stack is the OSI model for networks, which composed of 7 layers and is the foundation of the internet model.

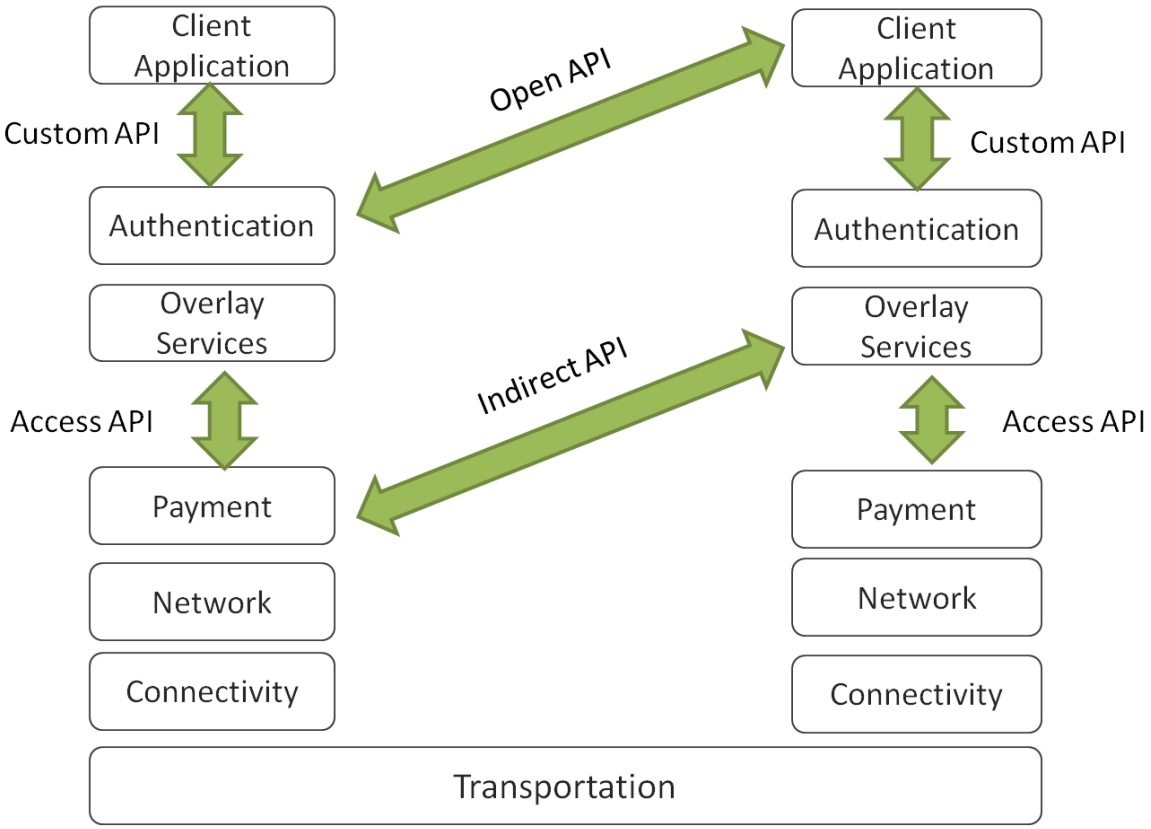
An Application Programming Interface (API) is a software-to-software interface, not a user interface. With APIs, applications talk to each other without any user knowledge or intervention. APIs operate over various technical protocols inside software systems and between software systems.

The technical solution HSWG recommends the use of Web APIs, defined as a set of Hypertext Transfer Protocol (HTTP) request messages along with a definition of the structure of response messages in JavaScript Object Notation (JSON) format, used in direct representational state transfer (REST) style of web resources and resource-oriented architecture (ROA).

When Web APIs are applied to payments, it will be necessary to consider a constrained form of REST architecture - HATEOAS, an abbreviation for Hypermedia as the Engine of Application State. A client then needs no prior knowledge about how to interact with any particular application or server beyond a generic understanding of hypermedia. So for example, an account enquiry could offer the ability to deposit, withdraw, transfer or close; but if the account is overdrawn then only the deposit is available. As HATEOS is self descriptive architecture, it makes clients simpler, less coupled to the service provider and the APIs themselves more flexible and able to evolve and updates without breaking existing clients – which in the context of developing payments standards and regulation will be required.

Web APIs are also core to the Payment Services Directive 2 and Open Banking Initiative.

HSWG recommends that each of the following APIs categories are needed to meet specific detriments:



1. **Open APIs** provided by PSPs based on the PSD2 and Open Banking standards, allowing Payment Initiation, Available Balance, Transaction history, as well as access to non-payment specific information and product creation. [HS5, UN8, UN12, UN18, FC13, FC15, …

2. **Custom APIs** enabling PSPs and TPPs to offer competitive services. HSWG recommend that standard resource definitions are defined so as to maximise the interoperability and use of data.

3. **Overlay APIs** that support specific features of the overlay service. HSWG recommends these be detailed and used to enhance the current schemes with features such as Request2Pay (ControlledPullPayment), BeneficiaryIdentification, RicherDataAccess, , [UN13, UN31, SA22, …

4. **Access APIs** to payment schemes, a single ISO standard to cover multiple underlying payments schemes and align with overlay services. [SA1, SA2, SA3, SA4, SA11,SA23, SA25,…

5. **Indirect APIs** are offered by direct PSPs to indirect PSPs, which will be deprecated and indirect PSPs utilise Access APIs.

API governance will be required to manage the use and standards of API.

PEOPLE INVOLVEMENT AND ACTION

There are existing bodies defining the PSD2 and Open Banking APIs, which will require further collaboration with the existing schemes, processors and banks. Governance, creation and maintenance of standards and standards testing environments are key to adoption and innovation.

WHO	WHAT
PSR, HMT	• PSD2, Open Banking technical standards to be extended to allow for evolution
FCA/Operator	• Governance, Registry of TPP/API providers, Testing/Sandbox
PSPs	• Implementation of APIs
Payment Processors	• Implementation of Access APIs
PSPs, Payment Aggregators (TPPs)	• Implementation of Access APIs, Overlay APIs - and custom APIs
PSR Forum (or committee by delegation)	• Coordination, definition, tendering and oversight

LEADERSHIP

One of the recommendations to the PSF from the HSWG is that consideration be given as to how best to lead the continued efforts of the open banking working group and API development more generally. Regardless of the ownership and leadership chosen, the Terms of Reference and constitution of the committee would need to be defined, but the body would need significant technical expertise. The effort to develop APIs for the industry requires involvement of resources with deep knowledge of the payments as well as web APIs design and delivery at scale.

A governance body and systems company will be lead the reference implementation of APIs, registration, testing frameworks and hosting at scale

COMMUNICATION

The concept of Web APIs is already well established, bodies are in-place that are communicating similar APIs, as the specifics of the APIs recommended are defined these bodies with established relationship can help communicate the new features and migration approaches.

The PSD2 and Open Banking Initiative have already brought APIs to the forefront of public and bank thinking in recent months – both for Open APIs and the wider recognition of the value of PSPs providing Custom APIs, as the industry moves to Banking-As-A-Service/Plaform model for FinTechs.

Existing initiatives under Payments UK, World Class Payments, have already established Overlay Web APIs
The PSR Payment Aggregator initiative has engaged with key vendors and potential users of Indirect an Access APIs

We think it is important that the Forum organises a "road show" in the industry to explain the intention and as much a possible the process to be followed and applicable principles.

SYSTEMS AND PROCESSES

A key process will be the development of the API specification in combination with PSD2, Open Banking, W3C, et al which can evolve its first requirement. Systems of governance and on-boarding, including the Testing frameworks for all parties, linked to the TPP Registration.

DEPENDENCIES

There are obvious dependencies on PSD2 and Open Banking Initiative which will set the legal and control frameworks. The PSR Aggregator initiative is also in-flight which needs to be incorporated.

COST BENEFIT ANALYSIS

To be determined by a detailed economic review, as recommended in the main HSWG report.

NOTE: Benefits of implementing a open APIs would include the solution of identified detriments, and in addition (perhaps more importantly) the creation of a system able to support incremental innovative overlay services for the benefit of service users. A system based on layering and defined protocols should also be easy to maintain and upgrade.

SECURITY / RESILIENCE

PSD2 and Open Banking will define core security frameworks.

Its security and resilience will be the consequence of its design, so it is to be defined.

Cyber crime is a serious consideration and PSPs will need to adequately protect these API channels.

The technologies involved do not limit the level of security and resilience that may be pursued.

EXISTING OR IN-DEVELOPMENT SOLUTIONS

PSD2 and Open Banking at the key initiatives following this model, there are current Web API overlay services for CASS and payM

INTERNATIONAL INSIGHTS / BENCHMARKS / HORIZON SCANNING

APIs are widely used in many industries and for existing eCommerce, the standards and approach are evolving rapidly, they are coalescing around REST and JSON. In many countries financial services organisations are building APIs and ecosystems of development communities as a means of address customer needs.

COLLABORATIVE OR COMPETITIVE

Collaboration within the industry, regulators, vendors and industry standards forums will be required to specify the APIs in the common Open, Overlay and Access APIs scope. By doing so it will clarify how these can be extended to enhance competitive innovation and framework that will enable more rapid development of Customer APIs.

QUICK WIN VS SUBSTANTIAL PROJECTS

Some APIs standards could be established rapidly, within months and piloted, especially in the PSP to PSP, and PSP to scheme space ahead of PSD2 security standards.

- Coordinating the direct action to the schemes – under a single platform and protocol
- Confirmation of Payee API could be provided as Overlay API enhancement to the existing payM database, if banks can supply the customer information
- Request to Pay API can be specified as an Overlay API, without changes to existing schemes

- Develop the overlay services as an alternative to the DD mandate, providing users with greater payments execution control, resulting in a Faster Payment (Push).
- Coordinate the PSD2/Open Banking API specifications and the on-boarding and test frameworks

IMPLEMENTATION APPROACH AND TIMEFRAME (OVERALL)

Standards could be delivered in a year, further implementation could be done in line with the PSD2/OpenBanking timescales completing in 2018/2019.

IMPACT: SUCCESS METRICS

Adoption of APIs by Third Parties and PSPs and provision of the customer facing applications that remove the customer detriments.

Technical access to schemes should be significantly reduced in cost and time for new PSPs.
Indirect PSPs and Customers should have access to Real-time payments services and information.

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Horizon Scanning Working Group

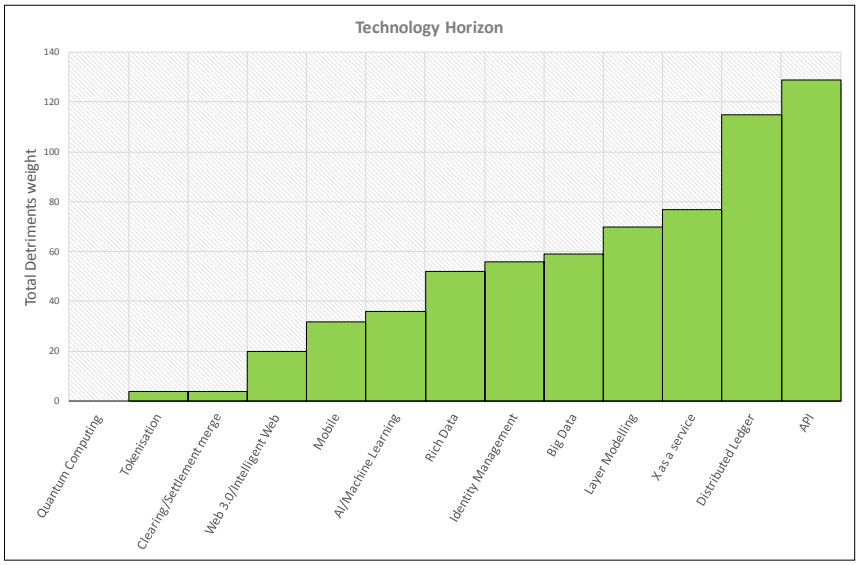
Creation of a new simplified core payments scheme platform

Solution Concept Assessment

SOLUTION NAME: CREATION OF A NEW CORE PAYMENTS SCHEME PLATFORM

COMMON PROBLEM STATEMENT:

The list of detriments given to the Horizon Scanning Working Group reveals extensive deficiencies along the value chain of payments. The analysis performed by the working group shows that a grouping of various technologies would directly address many identified detriments. The following histogram shows that implementation of technology-related solutions using APIs, distributed ledger, blockchain and layering would potentially result in improvement to 76% of detriments.



The degree to which solutions based on APIs, Distributed Ledger, Blockchain and Layering would solve detriments is as shown in the table below:

	Detriment Name	Detriment Code	Weight	API, DL, BC, L
Detriment 44	Difficult for PSPs to switch bank provider	SA8	4	4
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Detriment 42	Existing sponsor banks can limit competition	SA6	4	4
Detriment 50	Difficulty to enter market because of complex rules	SA14	4	4
Detriment 2	Difficulty in handling exceptions and failures caused by inability of consumers to control payments	UN2	4	3
Detriment 35	Reconciliation costs and treasury management for businesses; also government reporting costs	UN31	4	3
Detriment 14	Corporate service users would like to know where payments are at all times in case it is not real-time	UN10	4	3
Detriment 13	Lack of confirmation of receipt (FP)	UN9	3	3
Detriment 22	Lack of transparency/clear information on types of payments (and products) for consumer to be able to select best choice with confidence	UN18	4	3
Detriment 51	No real substitutability between payment systems in the event of system failure	SA15	2	3
Detriment 15	No real-time balances causing financial detriment (overspending causing returned payments, fees)	UN11	2	3
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Detriment 39	Indirect participants have little choice of providers	SA3	4	3
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Detriment 17	Difficult to know who you are paying leads to misdirected payments and fraud	UN13	4	2
Detriment 1	Poor flexibility or ease of use to control your push and pull payments	UN1	4	2
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Detriment 25	Data acts as a barrier to getting products and services – lack of transparency	UN21	4	2
Detriment 83	Distance between physical and financial supply chains affects e-invoicing	HS1	3	2
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Detriment 36	Inflexible collection accounts cause input errors and additional costs for customers and agency banks	UN32	3	2
Detriment 87	No real-time balances causing financial detriment (overspending causing returned payments, fees)	HS5	4	2
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Detriment 20	Cost differentials between Chaps, Bacs and FPS (esp. for wholesale)	UN16	1	2
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Detriment 33	Online payments – lack of access for business users for alternative rails (i.e. need more availability of credit transfer payment online)	UN29	1	1
Detriment 84	Lack of a long term strategy with the Blockchain	HS2	1	1
Detriment 98	Difficulty of switching bank provider caused by need to change sort code/account number- causing difficulty for customers making payments / companies receiving and loss of competitiveness in banking provision	AP3	2	1
Detriment 24	Lack of confidence in shift to online – lack of trust increases costs, reduces engagement, slows move to non-cash	UN20	1	1
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Detriment 91	Online payments – lack of access for business users for alternative rails (i.e. need more availability of credit transfer payment online)	HS9	1	1
Detriment 92	New third party providers can't initiate payments and access data to initiate payments	HS10	1	1

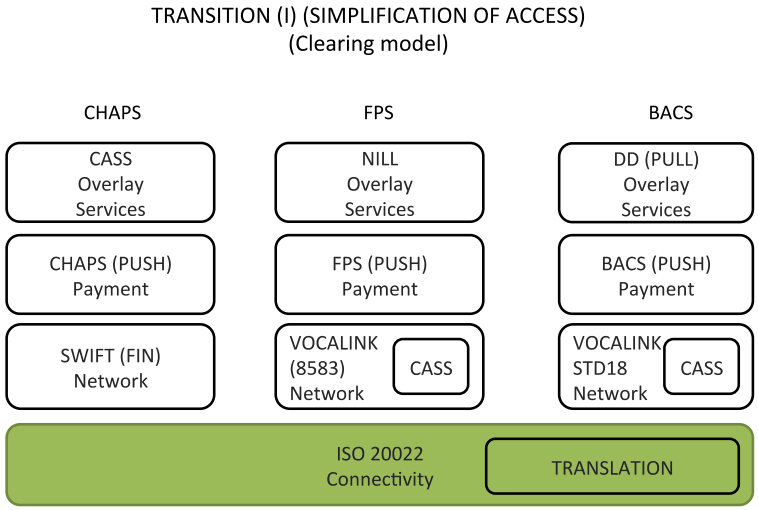
SOLUTION DESCRIPTION

The proposed solution involves the introduction of a new scheme platform based on the identified technologies that will act as the core ("common rails") to support a variety of payments services. In this model the services provided today by the existing schemes in the UK become overlay services for backward compatibility, whilst enabling the emergence of new overlay services to fit the most diverse user needs, financial crime needs, etc.

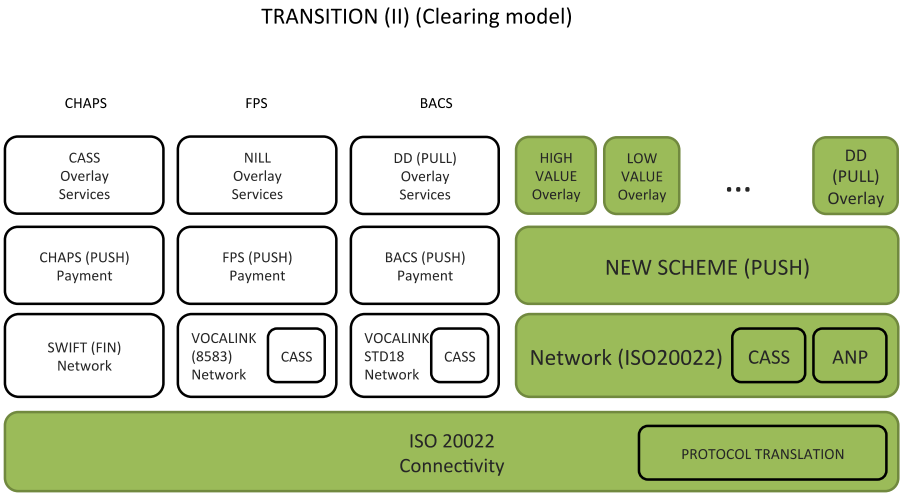
By necessity, moving to such new common rails would not be achievable overnight. However a migration approach would be possible whereby existing payments schemes could migrate onto the common rails preserving their existence and user capabilities, while the new core technologies would be progressively put in place. Once the new technology common rails are in place, new services can be provided over them by various economic actors.

The introduction of the new scheme platform could be achieved by following three steps:

1- Step 1 is encapsulated in the short term recommendation (solution 2) outlining the API solution: the creation of a single access layer to all existing schemes

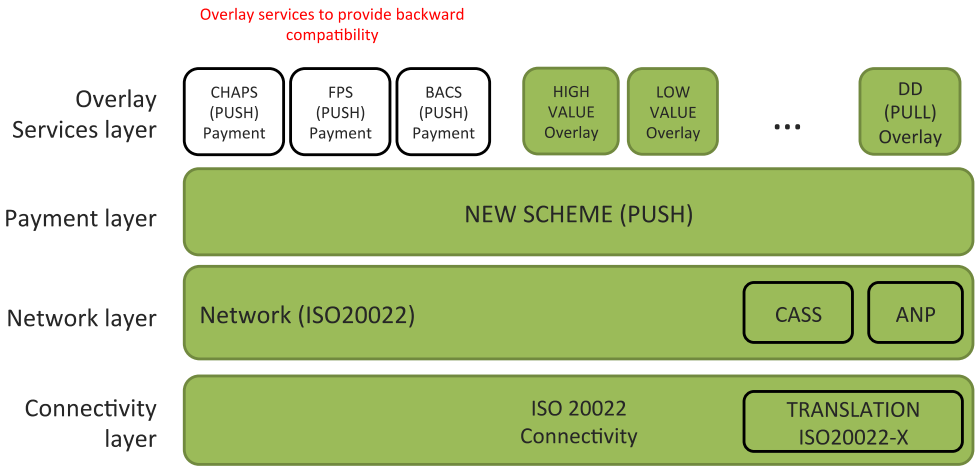


2- Step 2 is the introduction of the new core scheme platform- a common "push" mechanism to be used by new overlay services.



3- Step 3 is the replacement of the existing schemes by overlay services that provide the same functionality over the new core scheme platform

TRANSITION (III) (Clearing model)



PEOPLE INVOLVEMENT AND ACTION

The creation of this solution would be an industry-wide effort and requires the collaboration of all key players as well as new technology experts.

WHO	WHAT
• All major UK banks (Lloyds, Barclays, Santander, HSBC, RBS)	• Assist with definition of new scheme, requirements to ensure that overlay services and other layers continue to support existing systems
• A representation of Building Societies and other agency banks / PSPs	• A view from an "agency" PoV to ensure that smaller institutions are able to access the new core scheme but equally continue their legacy relationships with sponsor banks and existing schemes
• Key new PSPs	• Provide input as to the services and overlays they would require to participate in the new scheme without reference to the old schemes
• Software Vendors	• Assistance in standards definition and requirements to allow software to be developed to connect to the new scheme
• PSR Forum (or committee by delegation)	• Coordination, tendering and oversight

LEADERSHIP

The PSR would need to consider, in line with our recommendation, the best route forward to study how a new scheme platform would operate. It may be that initially the PSR would lead this work but it is likely that this would need to evolve if the new scheme platform development were to start formally. The Terms of Reference and constitution of the committee would need to be defined, but the body would need significant technical expertise.

COMMUNICATION

HSWG suggests that the Forum organise an industry "road show" to explain the intention and as much a possible the process to be followed as well as applicable principles. This will help to develop a view of key stakeholders who could assist with the process of studying how a new scheme would operate.

SYSTEMS AND PROCESSES

The first step is the implementation of the simplification of access based on API as defined in solution 2.

This will create a single access to all existing schemes that will insulate PSPs from the introduction the new core until it is completed.

DEPENDENCIES

As explained above.

COST BENEFIT ANALYSIS

Evaluation to be performed – as per our recommendation it is suggested that the PSF conduct an independent economic analysis as to how a new scheme platform might operate.

NOTE: Benefits of implementing a new core payments scheme would include the solution of identified detriments, and in addition (perhaps more importantly) the creation of a system able to support incremental innovative overlay services for the benefit of service users. A system based on layering and defined protocols should also be easy to maintain and upgrade.

SECURITY / RESILIENCE

The security and resilience will be the consequence of its design, so it is to be defined.

The technologies involved do not limit the level of security and resilience that may be pursued.

EXISTING OR IN-DEVELOPMENT SOLUTIONS

Non-existing

INTERNATIONAL INSIGHTS / BENCHMARKS / HORIZON SCANNING

Around the globe there are examples of core systems being developed to implement some of the principles recommended. None of them implement the concepts fully such as the case of Singapore or Australia. Distributed ledger and block chain work already in the context of bitcoin and its many variations as well as in Ripple.

The principles of layering and API are the basis on which the telecommunications industry is built. Layering and APIs provide both the opportunity to make efficiencies in operation as well as innovation in new functionality possible as consequence of separating concerns and allowing different economic actors to build capabilities that interface with each other using agreed protocols.

COLLABORATIVE OR COMPETITIVE

The creation of a new core payments system, which will become the common rails for all the industry is undoubtedly a collaborative effort. The technologies involved, however, allow for the competition of provision of technology for the schemes at all levels, thanks to the layering approach. Network providers, and software vendors may compete to provide infrastructure services.

As the infrastructure to operate payments under the proposal would be distributed there may not be a requirement for a central PSO or infrastructure provider which may eliminate the dependence on a single operator or provider.

QUICK WIN VS SUBSTANTIAL PROJECTS

This a long term project and should not be considered as a quick win.

IMPLEMENTATION APPROACH AND TIMEFRAME (OVERALL)

It is expected that a first version could be delivered in 3 years, but a full available system would be between 3 to 6 years.

IMPACT: SUCCESS METRICS

The best judge of success for a new core scheme would be that the detriments observed by both PSPs and service users are diminished:

- Service users when will receive enhanced features and service using increased numbers of overlay services
- PSPs will be enabled to develop services and to be innovative without being restricted by the underlying payment system
- Enhanced number of competing PSPs and infrastructure providers.