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A blueprint for a new RTGS service for the United Kingdom



BANK OF ENGLAND



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Foreword

The world of payments is changing rapidly. Households, companies and financial intermediaries are demanding faster, simpler, cheaper and more flexible ways to pay. In response, new technologies are being developed, some by existing market participants, and some by new service providers, to meet those needs. At the same time, those technologies and broader developments can create new threats to users of the payments system, and to the stability of that system as a whole, which require ever stronger protections and more resilient infrastructure. Balancing the need to safeguard stability whilst enabling innovation is the challenge facing everyone involved in providing payment services.

The Bank of England has a leading part to play in meeting that challenge. As the provider of the ultimate sterling settlement asset, and the operator of the Real-Time Gross Settlement (or 'RTGS') system, the Bank lies at the heart of the UK payments system. RTGS is also the platform through which the Bank implements monetary policy and provides liquidity to the financial system.

In January 2016 the Bank announced its intention to draw up a blueprint for a new generation of RTGS, which would be capable of responding to changing demand whilst continuing to assure high levels of resilience. The Bank consulted publicly

on its proposals in Autumn 2016, and received responses from a wide range of stakeholders. This document presents the final result of that process. It sets out a clear high-level statement of how the new RTGS service will look, and a roadmap for how it will be delivered over the coming years. It also explains the Bank's rationale for nearer-term reforms to the United Kingdom's High-Value Payment System (HVPS), which will result in strengthened end-to-end risk management.

The Bank's aim is that this blueprint should deliver a materially stronger, more resilient, flexible and innovative sterling settlement system for the highest-value payments in the country. And that, together with the parallel strategy for reform of UK retail payments produced by the Payments Strategy Forum, and the other regulatory and technological changes currently underway, should leave the United Kingdom with a world-leading payments landscape in the years ahead. Nevertheless, delivering such a complex body of change, at a time of competing priorities, will require careful planning and close engagement across a wide range of stakeholders. The Bank is committed to playing a leading role in this process, and to ensuring that RTGS renewal is an open and collaborative effort.

Executive summary

This executive summary identifies the key features of the Bank's vision for the next generation of its Real Time Gross Settlement (RTGS) service. Section 1 of the blueprint describes those features in more detail, including nearer-term reforms to the United Kingdom's High-Value Payment System (HVPS), and explains how they support realisation of the Bank's objectives. Section 2 outlines how the Bank plans to work with stakeholders over the coming years on delivery of the RTGS renewal programme.

The content of this blueprint has been heavily shaped by the responses to the Bank's Autumn 2016 consultation.⁽¹⁾ Those responses are summarised in the Annex. Overall, respondents voiced strong support for the vision set out in the Consultation Paper. But in a few areas the responses have led the Bank to tailor its plans, further strengthening the final blueprint.

The vision for the renewed RTGS service

1 The Bank's vision for the renewed RTGS service is organised around five key features: higher resilience, broader access, wider interoperability, improved user functionality and strengthened end-to-end risk management of the high-value payment system.

2 **Higher resilience:** Since its inception in 1996, RTGS has been operated by the Bank with the aim of providing a safe and reliable means of settling high-value cash payments in real time in sterling central bank money. In renewing the RTGS service, the Bank will continue to put resilience at the heart of its design, in line with its mission to promote the good of the people of the United Kingdom through the maintenance of monetary and financial stability. Among other things, that means ensuring that the system has the flexibility and protections necessary to ensure continuity of service and integrity of data across a wide range of possible scenarios, including but not limited to cyber attack.

3 Consistent with that goal, a renewed RTGS will continue to offer best-in-class resilience that is fully in line with international standards through dual-site operation with a third stand-by settlement platform. Strengthened contingency messaging arrangements will be introduced, and the renewed RTGS will be designed to be 'channel-agnostic' (ie with the capacity to accept payment messages from multiple sources in normal operations).

4 **Broader access:** In renewing RTGS the Bank wishes to increase the number and range of firms able to access the

service directly to settle their payments. It will do this, first, by expanding eligibility to RTGS to non-bank Payment Service Providers, subject to appropriate safeguards. And, second, by streamlining the testing and onboarding regimes for direct members of RTGS and by enabling third-party aggregators to provide technical connectivity for smaller firms. This will reduce the connectivity and operational costs incurred by users without diminishing resilience. The Bank will also require institutions above a certain value threshold to access CHAPS directly. Promoting broader membership should reduce the financial stability and operational risks arising from the highly tiered nature of payment system membership, and promote innovation and competition in the payment market.

5 The renewed RTGS service will continue to offer a diverse and flexible range of settlement models to enable existing and emerging payment infrastructures to access central bank money. Ensuring RTGS is capable of supporting innovative payments technologies of the future is one of the priorities of the new service, as long as such support can be provided in a way that does not compromise the essential resilience characteristics of the system and meets the Bank's operational requirements. As stated in the Consultation Paper, the Bank has decided not to build the renewed RTGS service on Distributed Ledger Technology, in light of its findings that the technology is not yet sufficiently mature to provide the exceptionally high levels of robustness required for RTGS settlement. But the new generation of RTGS will be built with the flexibility needed to ensure it can interface with such technology as and when it is developed in the wider sterling markets.

6 **Wider interoperability:** In renewing the RTGS service the Bank wants to promote resilience and efficiency through greater interoperability. The renewed service will give users more flexibility to reroute payments, especially if outages do occur, and facilitate efficiency gains by providing the tools to enable participants to streamline their back offices. The Bank will work with other authorities to promote greater co-ordination between the design of a renewed RTGS service and other key domestic and international payment and settlement infrastructures. The introduction of ISO 20022 messaging, alongside similar reform in retail payments being driven by the Payments Strategy Forum and the Payment System Operators, will ensure that the United Kingdom is part

(1) www.bankofengland.co.uk/markets/Documents/paymentsystem/cp160916.pdf.

of the global adoption of this standard. The Bank will also design the renewed service in a way that will facilitate synchronisation of RTGS payments with payments in other infrastructures.

7 Improved user functionality: Renewal of the RTGS service will enable it to keep pace with the changing demands of its users as payment services evolve. In response to industry guidance that they see demand for wholesale payment services approaching 24x7 availability over the lifetime of the renewed service, RTGS will be designed to be technologically capable of near 24 hour operation during business days from the outset, with short settlement windows also potentially available at weekends. It will also have the capability to be easily upgraded to full 24x7 operation if demand for that emerges over time. Growing demands for richer and more comprehensive payment and liquidity data will be addressed through the provision of modern interfaces to access business intelligence (BI) from the RTGS service. And the Bank will also work with industry to examine if there is any additional functionality needed to support efficient global liquidity management.

8 The core purpose of RTGS remains the provision of safe and efficient immediate settlement for high-value sterling payments. Consultation responses were supportive of the Bank's decision not to attempt to incorporate real-time gross settlement of those payments currently settled by the major sterling retail payment schemes into a renewed RTGS, and similarly agreed that there would be no material benefits from incorporating the ledger of sterling securities accounts into the service. These services will therefore continue to be provided by the private sector. Significant reform is however also underway in both governance and infrastructure of these schemes. The Bank is in close contact with this work through both its supervisory and operational arms, and will ensure that the renewed RTGS service is developed in a way that maintains and enhances the resilience and innovation benefits of settlement in central bank money.

9 Strengthened end-to-end risk management of the High-Value Payment System (HVPS): The scale, type and sophistication of potential threats to the stability of payment systems are rising, be it from cyber attacks or more traditional continuity events. In response, regulators are increasingly stressing the importance of payment system operators being able to assess and manage the full range of risks arising at all points in the system — in the central infrastructure, in direct and indirect users, and in the pipes that join them together. The current split of responsibilities for the United Kingdom's HVPS (in which the Bank operates the central infrastructure but the private sector firm CHAPS Co owns the rulebook and is responsible for system-wide risk management) is unusual internationally, and presents some structural obstacles to tackling future risks in the 'end-to-end' way now expected by

regulators. In light of this, the IMF has recommended in its past two UK Financial Sector Assessments that alternative structures should be considered.

10 The Bank asked stakeholders for their views on this issue as part of last autumn's consultation. In the recent period, CHAPS Co has taken important steps to respond to the new regulatory expectations, streamlining its governance arrangements, strengthening the rulebook, developing an improved member assurance model, and deepening relationships with the Bank's RTGS operational team. However, given the structural constraints imposed by the current arrangements and the changing shape of risks facing the HVPS, the Bank and its Financial Policy Committee, have concluded that financial stability would be enhanced if the United Kingdom adopted the 'direct delivery' model used in the overwhelming majority of jurisdictions globally.

11 Following transition to direct delivery, the Bank will be responsible for operating both the HVPS scheme and the RTGS infrastructure, giving it the ability to manage risks across the system as a whole. Given the systemic importance of CHAPS, it is imperative that such a transition is managed in an orderly way, and that is why on 9 May, the Bank and CHAPS Co, with the support of the major CHAPS users, announced their agreement to work together to bring about a smooth transition to direct delivery before end-2017.

Delivery of the RTGS renewal programme

12 RTGS renewal builds upon the existing strengths of the current system. **Table A** summarises the service characteristics that the renewed RTGS service will have, distinguishing between those that reflect continuity with the existing service, and those which are enhancements arising out of the Bank's outreach and consultation with users. The text in italics highlights the elements of the vision that have been modified in response to feedback on the Bank's consultation.

13 The renewed RTGS service will be delivered through a multi-year programme of work. That programme will begin immediately following the publication of this blueprint, and will be led by the Bank, with the active participation of current and future users of the system.

14 Programme delivery will be staggered over time. The Bank's current intention is that the majority of new RTGS functionality should be live by 2020 — but a great deal of work is needed to get to this point. For the remainder of 2017, the Bank's priorities are three-fold:

- First, securing a smooth and timely transition to direct delivery for the HVPS. The plans for achieving this are set out in more detail in Section 2.3, and envisage production of heads of terms for shareholders by July 2017 and

Table A Service characteristics of the renewed RTGS service

Service characteristic	Retained from current generation of RTGS	Enhancements
Resilience: Strengthen resilience of RTGS and flexibility to respond to emerging threats.	- Well-defined recovery objectives. - Day-to-day dual-site operation. - Third settlement platform for contingencies.	- Further strengthened resilience framework. <i>Enhanced contingency messaging channel and channel-agnostic design.</i>
Access: Facilitate greater direct access to central bank money settlement for financial institutions and infrastructures.	- Broad range of settlement models: real-time gross settlement for instantaneous settlement, 'Delivery vs Payment' for securities settlement platforms, deferred net settlement with and without pre-funding for retail payment systems. - Direct access to CHAPS required for institutions above value threshold.	- Non-bank Payment Service Providers eligible for RTGS settlement accounts (subject to appropriate safeguards). - Streamlined testing, connectivity and onboarding requirements. - Cost of access reduced by streamlined connectivity and contingency requirements. - Third-party aggregators able to provide technical connectivity for institutions seeking direct access to CHAPS. - Institutions of systemic importance required to access CHAPS directly.
Interoperability: Promote harmonisation and convergence with critical domestic and international payment systems.	RTGS not replacing private sector retail payments or securities settlement infrastructure.	- ISO 20022 messaging. <i>Facilitate introduction of cross-border and cross-ledger synchronisation module at a later stage.</i> - Promote alternative processing arrangements for time-critical retail payments.
User functionality: Support emerging user needs in a changing payment environment.	- Liquidity Saving Mechanism (LSM) and collateralised intraday liquidity. - Broad-based reserves account functionality for monetary policy implementation. - Simple business intelligence interface.	<i>Near 24x7 technological capability and able to be upgraded to full 24x7.</i> - Application Programming Interface (API) for richer access to payment and liquidity data. <i>Functionality to facilitate tracking RTGS payments.</i> - Forward-dated and timed payment submission <i>Analyse if further functionality needed to facilitate global liquidity management.</i>
End-to-end risk management: Strengthen capacity to respond to evolving system-wide risks.	- Principles of user voice and innovation retained. - Independent challenge incorporated into new governance arrangements. - Value for money.	<i>Direct delivery of the high-value payment system to enable end-to-end risk management.</i>

Text in italics highlights the elements of the vision that have been modified in response to feedback on the Bank's consultation.

transfer of CHAPS Co as a whole to the Bank before end-2017;

- Second, initiating the process for allowing non-bank Payment Service Providers to apply for access to UK payment systems. Work on the new framework, set out in more detail in Section 1.2, is well advanced, and is expected to be finalised by the early summer; and
- Third, defining the renewal programme as a whole, working closely with users and stakeholders across the industry (Sections 2.3–2.4).

15 Preparatory work for the first stage of the infrastructure programme is already underway. Since the publication of the RTGS consultation paper in September 2016, the Bank's thinking has developed in three areas: technology choice, sourcing models and implementation approach.

16 First, the Bank has confirmed its preliminary view that the renewed RTGS service requires a new central infrastructure. The Bank undertook an evaluation of the ability of the current RTGS infrastructure to deliver the service improvements set out in this blueprint. That evaluation concluded that, although the current system had the technical capability partially to accommodate some of the Bank's near-term requirements, the costs and risks involved with delivering the whole package in this way significantly outweighed the potential benefits.

17 Second, the Bank has concluded that it should continue to act as the operator of the renewed RTGS infrastructure, since it embodies most of the Bank's balance sheet, through which monetary and financial stability are delivered. But it is also clear that the renewal programme cannot be delivered exclusively using the Bank's in-house resources. The Bank's approach will be to enter into partnerships with external providers to supplement in-house teams. This approach will follow an appropriate procurement process. Finalising the procurement approach and identifying external partners is a key near-term deliverable.

18 Third, the Bank has ruled out a big-bang approach to delivery of a renewed RTGS. Instead, the Bank's intention is that migration to the renewed platform should be phased around system capabilities, with technical changes that help to enable or de-risk later migration steps being completed first.

19 In designing and developing a renewed RTGS service the Bank will balance the objectives of risk minimisation, economic benefit maximisation and feasibility of delivery. Further information on these objectives is contained in Section 2.3. The Bank's four success criteria for the RTGS renewal programme will be:

- (a) That the vision set out in this blueprint is not compromised;
- (b) That the renewed service is flexible to future change demands;
- (c) That the Bank's vision for RTGS remains strongly supported at the conclusion of the programme; and
- (d) That neither the renewal programme nor the migration to the new platform will disrupt or impair the operation of the existing RTGS or the payment systems that rely on it.

20 The costs of RTGS renewal will be recovered through the RTGS tariff. The Bank does not intend to begin recovering the costs of the programme in advance of the delivery of the first tranche of functionality. As in the past, the Bank will amortise these costs. For recent projects, such as the Liquidity Saving Mechanism (LSM) and Market Infrastructure Resiliency Service (MIRS), costs have been amortised over a three to five-year period. But the scale of the RTGS Renewal Programme means that the period over which its costs are amortised is likely to be somewhat longer.

21 Building on the preliminary work already completed, the first major stage of the RTGS Renewal Programme will be programme definition, which will set the foundations for the remainder of the exercise. This stage will run for the rest of 2017, and will be based on industry best practice for the mobilisation of major programmes of change. During this stage the Bank will define the end-to-end target operating model, set the scope of new services, design the technology architecture and optimise the phasing approach. Target dates for delivery for subsequent stages of the programme will be confirmed through the detailed planning currently being undertaken, which will be informed by external factors and constraints. But the current intention is that the key phases to deliver the new RTGS services will be initiated from 2018 onwards, with the majority of the new functionality expected to be live by 2020.

22 The work plan outlined above will be influenced by extensive engagement with stakeholders at all stages. The Bank will hold industry-wide events in late-May to present the information contained in the blueprint, and will establish an advisory body, chaired by the Bank and comprising a range of senior figures from the payment industry and other relevant stakeholders, to advise on implementation.

23 The advisory body will be supported by technical working groups made up of representatives of interested stakeholders and focused on inputting on analysis supporting the key decisions required in the programme definition phase. Examples of such decisions include: defining the message standard for the new service and the associated BI capability

to deliver richer data to users; enhancements to the settlement models supported by RTGS; potential functionality to support more efficient global liquidity management; developing comprehensive testing and trialling arrangements for the new service (covering migration, onboarding and ongoing change); and designing the phasing of migration to the new service.

24 The Bank is keenly aware that RTGS renewal is one of several large-scale changes underway in the payment industry. It will therefore also remain in close contact with the Payment Systems Regulator, the Payments Strategy Forum, the payment scheme operators and other domestic and international groups as required throughout this process.

1 The vision for the renewed RTGS service

1 This section of the blueprint provides further detail on the key features of the renewed RTGS service summarised in **Table A**, and explains how these are intended to promote the Bank's objectives. RTGS is the main tool through which the Bank provides access to its balance sheet — so, in choosing the features of the new RTGS service included in this blueprint, the Bank has had primary regard to its financial and monetary stability mission. But the Bank has also sought to shape the future design in ways that promote efficiency, innovation and competition in sterling payments, wherever that can be safely done without impairing stability. Such features can improve the United Kingdom's medium-term economic prospects and also promote financial stability in the long term. Subject to those other principles, the Bank has also chosen options that are simple (to develop, operate and use), flexible (in response to changing future demands) and cost effective (both for the Bank and the wider market).

2 The final vision for the renewed RTGS service is designed to respond to the five key strategic drivers for change over the service's likely lifespan identified in the 2016 consultation paper:

- First, the RTGS service must be able to respond to the changing structure of the financial system, including the progressive unbundling of financial service provision, and the reduced availability of agency payment services to smaller financial institutions;
- Second, it must recognise end-users' demands for simpler and more resilient pathways for their payments;
- Third, it must be capable of interfacing with a range of new payment technologies if or when they achieve critical mass;
- Fourth, it must remain highly resilient to an increasingly diverse range of threats to continuity of service, such as cyber-attacks and technology-enabled fraud; and
- Fifth, it must have the capacity to support the future evolution of regulatory and monetary policy tools.

3 The responses to the consultation showed overwhelming agreement that these were the right drivers for change for the renewed RTGS service. Some responses mentioned that participants were likely to face an increased drive to manage their global liquidity more efficiently in the coming years. The

Bank intends to work with the industry over 2017 to consider how renewal might facilitate more efficient global liquidity management across different jurisdictions and payment systems.

4 The consultation responses and discussions with stakeholders showed high levels of support for the overall vision of: higher resilience; broader access; wider interoperability; improved user functionality; and strengthened end-to-end risk management for the HVPS. Sections 1.1 to 1.5 set out the specific features that will make up the renewed service, combining existing functionality and new enhancements.

1.1 Higher resilience

5 When updating RTGS the Bank will put the resilience of the future service at the heart of its design, with the aim of giving an even greater ability to react to emerging security risks, including those related to cyber threats, and implementing a comprehensive set of contingency arrangements.

Resilience by design

6 The Bank will build resilience into the new service by design, testing every feature of the renewed service against resilience and security principles at each stage of the design process before proceeding to implementation. The Bank will identify the parts of the renewed system that are likely to change, and ensure that change can take place in a way that minimises risks.

7 The renewed RTGS service will comply with the Committee on Payments and Market Infrastructures and the International Organization of Securities Commissions (CPMI-IOSCO) Principles for Financial Market Infrastructures and with the associated guidance on central bank-operated systems. The renewed service will match the current RTGS's recovery objectives of a Recovery Point Objective (maximum data loss) of near zero and a Recovery Time Objective of within two hours or by the end of the operating day in extreme circumstances.⁽¹⁾ Respondents to the consultation agreed with these recovery objectives but some argued for more ambitious targets where possible. After further analysis, the Bank has decided that the renewed service will have an architecture

(1) These objectives comply with principle 17.6 of the CPMI-IOSCO Principles for Financial Market Infrastructures. For more information, see www.bis.org/cpmi/publ/d101a.pdf.

Box 1

Resilience design principles of the renewed RTGS service

- i. Near-zero data loss.
- ii. Data integrity (ie the contents of all data fields) must be maintained.
- iii. Data integrity takes precedence over service availability.
- iv. Data confidentiality must be maintained.

designed to deliver an improved objective of zero or near-zero downtime for currently known resilience problems such as known viruses, hardware or environmental failures (eg data centre fires or floods).

8 The design process for the new RTGS service will build in responses not just against currently understood resilience problems but also against unexpected events, such as previously unanticipated software defects or new types of cyber attack. And the Bank will have well-practiced recovery procedures in place if for any reason the system nevertheless has to be brought down temporarily. The Bank would in those cases prioritise data integrity over service availability if necessary and (as now) will reserve the right to pause settlement while investigations are carried out. The Bank intends to ensure that the necessary recovery and reconciliation tools and processes are delivered alongside the new system to comply with its recovery objectives.

9 The Bank will continue to pursue best practice in developing security capability that focuses on the full range of threats, vulnerabilities and impacts relating to people, process and technology. The approach will draw on advice from the GCHQ, the Centre for the Protection of National Infrastructure, the National Cyber Security Centre and other intelligence partners, as well as the Committee on Payments and Market Infrastructures Cyber Principles. Elements of this approach include but are not limited to: 'security by design' and controls applied throughout the lifecycle of the information. The controls will comprise a mixed approach of commercial security innovation, HM Government national security controls, intelligence-led testing (eg CBEST) and incident response and recovery exercising. At a minimum, all controls will be internationally recognised (eg ISO 27001/2) and underpinned by an industry-leading cyber security framework such as that of the National Institute of Standards and Technology.

10 Box 1 summarises the resilience design principles according to which the renewed RTGS service will be built.

- v. All payments should be settled within two hours of settlement stopping, or by the end of the operating day in extreme circumstances.
- vi. There should be no single point of failure during the normal operation of the RTGS service.
- vii. Finality must be clearly defined in all modes of operation.
- viii. The principal RTGS system will not aspire to be resilient to concurrent catastrophic failures.
- ix. Able to respond to emerging threats and a changing threat environment.

Third settlement platform for contingency

11 Building a renewed system according to the resilience design principles in Box 1 requires a third settlement platform. As with the existing service, a renewed RTGS will operate on dual sites on a day-to-day basis, and will have a third-site contingency settlement platform. This contingency platform will continue to operate from a separate location, on a completely different implementation of the software, in order to create resilience to catastrophic failures such as the loss of both data centres, or a cyber attack which renders the core RTGS software inoperative. Responses to the consultation expressed strong support for the continuation of such a service. The enhancements to RTGS that the Bank will implement via renewal, such as ISO 20022 messaging, the technical capability for longer operating hours and potentially the ability to use multiple messaging networks, will modify the requirements currently placed on the Bank's existing third settlement platform, SWIFT's Market Infrastructure Resiliency Service (MIRS).

Contingency for messaging

12 A strong theme emerging from consultation responses on the future messaging capability of RTGS was that users see potential for significant changes to their messaging requirements over the life of the renewed service. They expect new messaging arrangements may gain traction, driven either by new technological possibilities, or by the drive to modernise existing payment networks (for example efforts to develop a single UK retail payments architecture). However set against these long-term expectations, there was no immediate demand for RTGS to offer connectivity to a specific alternative payment messaging network, and a significant number of respondents expressing the importance of RTGS continuing to offer connectivity via the SWIFT network.

13 Consultation feedback made clear there is unlikely to be strong demand to use multiple providers of message services in a renewed RTGS from the start. In response, it is the Bank's intention that the renewed RTGS will use SWIFT as the provider of message services at the outset. But the renewed RTGS service will also be designed to be 'message network agnostic', ie capable of sending and receiving payment messages in multiple formats and interfacing with multiple

messaging networks. This feature will give RTGS flexibility to respond to the potential change in future demand for messaging arrangements identified by consultation respondents and to mitigate the risk of dependency on a single messaging provider. Further detailed technical discussions will be required on this topic during the coming year to explore the implications of this decision for the complexity and cost of the service.

14 An enhanced contingency procedure will provide the ability to continue to settle payments in the event of an inability of RTGS to connect to the messaging network, an outage of that network, or a question over the integrity of the network. It will allow participants to make file uploads of payments in these contingency scenarios. This contingency mechanism will allow the Bank to meet its resilience principle that all payments should be settled by the end of the operating day, even in extreme circumstances, and should provide a substantial improvement in resilience at a reasonable cost to participants

1.2 Broader access

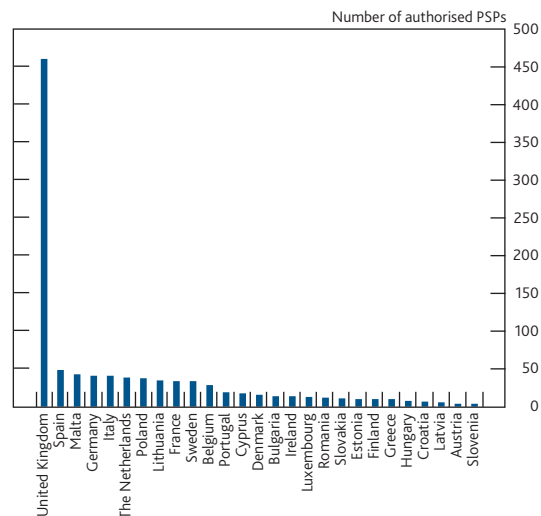
15 More widespread direct access to settlement in central bank money contributes to greater financial stability by both reducing operational reliance on a small number of banks and lowering the credit exposures between direct and indirect participants that indirect access to payment systems can generate. It also enables a more innovative and competitive market in payments. The next generation of the RTGS service will facilitate greater direct access to RTGS for bank and non-bank providers of payment services, and support settlement across sterling payment schemes, through a range of settlement agent models, building on the flexible framework already in place today. The Bank expects a material increase in the number of institutions with direct access to RTGS over time.

Non-bank PSP access

16 The United Kingdom has been a world leader in payments innovation, reflecting a combination of forward-looking infrastructure design and private sector creativity. That is why the Bank's Autumn 2016 Consultation Paper identified the need to ensure that a renewed RTGS service was capable of keeping pace with the changing structure of the financial system, including the potential unbundling of financial service provision.

17 One example of this unbundling is the dramatic growth in the number of UK-authorized non-bank Payment Service Providers (non-bank PSPs) — nearly ten times as many as in any other country in the European Union (**Chart 1**). Non-bank PSPs seek to compete with banks in the provision of payments, and are described in greater detail in Box 2.

Chart 1 Number of PSPs authorised across the EU^(a)



Source: Survey by Payments Policy Working Group of the European System of Central Banks 2017.

(a) Non-bank PSPs can be authorised or registered. Authorisation enables greater rights (such as passporting across the EU) but also comes with greater requirements (such as prudential regulation). Only non-bank PSPs that are authorised in the United Kingdom by the FCA will be eligible for direct RTGS access.

18 Up to now, in common with the situation in most other countries, UK-authorized non-bank PSPs have had to access the sterling payment system through banks — which in many cases are also their competitors. But in Summer 2016, the Governor of the Bank of England announced that the Bank intended to change that by extending direct RTGS access to qualifying E-Money Institutions and Payment Institutions authorised in the United Kingdom by the FCA.⁽¹⁾ RTGS access does not constitute payment system access in its own right, but is a prerequisite of direct participation for several key UK payment systems, including the Faster Payments Service (which a number of non-bank PSPs are actively seeking to join). By extending RTGS access, the Bank's aim is to increase competition and innovation in the market for payments by allowing non-bank PSPs that are able to meet appropriate standards of resilience to compete on a more level playing field, reducing their dependence on competitors and extending the benefits of settlement in central bank money to a wider range of payments services.

19 Over the longer term, the innovation that stems from expanding RTGS access to suitably-resilient non-bank PSPs should itself promote financial stability: by creating more diverse payment arrangements with fewer single points of failure; by identifying and developing new risk-reducing technologies; and by expanding the range of transactions that can take place electronically and be settled in central bank money in RTGS.⁽²⁾

(1) www.bankofengland.co.uk/publications/Documents/speeches/2016/speech914.pdf.

(2) The Governor of the Bank of England discussed in a recent speech that FinTech developments could act to make the financial system more resilient by providing greater diversity, redundancy and depth; www.bankofengland.co.uk/publications/Documents/speeches/2017/speech974.pdf.

Box 2

What are non-bank PSPs?

'Non-bank PSP' is the term used for two regulatory categories of institutions that are not banks but specialise in providing payment services: E-Money Institutions and Payment Institutions. Many of these institutions are emerging payment fintech firms.

E-Money Institutions mainly provide prepaid cash cards and prepaid online and mobile accounts. These range from pre-paid currency cards to online accounts with similar

functionality to traditional current accounts (for example, the capability to make ATM withdrawals, direct debits and internet payments as well as have a debit card).

Payment Institutions tend to follow one of three models. The majority of Payment Institutions provide overseas money remittance and foreign exchange services. Other Payment Institutions are 'merchant acquirers' who provide the payment processing infrastructure that allows retailers to take card payments in-store or online. The other key business model of Payment Institutions is issuing credit cards to consumers and businesses.

20 As the Governor set out last summer, extending RTGS access to non-bank PSPs requires a comprehensive risk management framework to ensure that the resilience of RTGS and the broader sterling payment system is not compromised. The Bank wants to enable innovation to thrive, but in ways that also safeguard stability.

21 Since mid-2016, the Bank has been working closely with HM Treasury, the FCA, HMRC and other stakeholders to develop that risk management framework. The framework is being built around three key themes:

- (a) **Mitigating risks to the payment systems that non-bank PSPs join:** these risks (which include liquidity, operational and settlement risks) are primarily the responsibility of the operator of the payment system(s) that non-bank PSPs wish to join, and any non-bank PSP signing up for access will need to meet the relevant participation requirements. Systemically important payment systems are in turn supervised by the Bank's Financial Market Infrastructure Directorate. The Bank is working with HM Treasury to enable non-bank PSPs to become direct participants while continuing to meet their safeguarding obligations to their clients and without undermining the settlement protections currently in place.⁽¹⁾
- (b) **Mitigating financial crime risks:** This is primarily the responsibility of the FCA and HMRC and is one of the key areas of focus of the supervisory approach being developed for non-bank PSPs with RTGS access. It will be a necessary step for all non-bank PSPs seeking to join RTGS to undergo a supervisory assessment by the FCA (and HMRC where appropriate) to demonstrate compliance with existing regulatory requirements for PSPs (as laid out in the Payment Services Regulations 2009, the E-Money Regulations 2011, the Money Laundering Regulations 2007 and other relevant legislation). As well as focusing on financial crime, the supervisory assessment will also assess a non-bank PSP's safeguarding of customer funds and governance arrangements. The FCA

will require non-bank PSPs with RTGS access periodically to commission independent audits covering key risk areas.

- (c) **Mitigating risks to the Bank (including to RTGS):** all RTGS users pose potential risks to the Bank, including operational risk to RTGS, and credit risk to the Bank. In managing these, the Bank will primarily have regard to the protections and connectivity requirements already in place for existing RTGS account holders, which non-bank PSPs will also be expected to meet. In addition, the Bank has taken a number of other steps to protect its balance sheet, including not extending credit or Sterling Monetary Framework access to PSPs.⁽²⁾

22 Taken together, the Bank believes that this package of measures, when finalised, will provide an appropriate risk management framework for non-bank PSP access to RTGS, capable of protecting RTGS and the payment systems using it by applying proportional risk-mitigating requirements to non-bank PSPs seeking to access the service. Significant progress has been made in developing this framework and the Bank expects it to be finalised by the early summer.

23 All of the existing barriers to opening an RTGS account will need to be removed before the first non-bank PSP can open an account. Given the timeline for this and the requirements of payment system participation, the Bank's expectation is that the first non-bank PSP will go live in RTGS in the second half of 2018 at the earliest.

(1) Payment Institutions will be added to the list of regulated entities covered by the protections of the Settlement Finality Regulations, required for all users of major UK payment systems. The Banking Act has been amended to expand HM Treasury's powers to give the Bank the ability to supervise any relevant payments systems if they ultimately grow large enough to pose a systemic threat. And further provisions are being explored to enable effective safeguarding of client funds being settled across RTGS.

(2) This is because PSPs are not part of the monetary policy transmission mechanism or exposed to inherent overnight liquidity risk. PSPs will receive remuneration at Bank Rate on funds that are required to be held overnight in a prefunding account to back transactions in Bacs and Faster Payments. Settlement accounts in RTGS will be unremunerated.

24 While direct access to major sterling payment systems will be an option that all authorised PSPs can consider in due course, it is not the Bank's expectation that this form of access will be chosen by the majority of non-bank PSPs. Directly managing payment flows in a major payment system requires strong operational processes and technological capability, and the costs of achieving this will be material for most non-bank PSPs given their typically small scale at this stage in the evolution of the sector. Other forms of access which do not require an RTGS account (including indirect access via a clearing bank and direct technical access via an aggregator) are therefore likely to remain the chosen form of access for many non-bank PSPs.

25 Once the framework for non-bank PSP access has been finalised, further information for potential applicants will be made available on the websites of the Payment System Operators. This will set out in detail: what direct participation in a payment system means; a comprehensive list of requirements; and how the application and onboarding processes will work. Following the publication of this information, non-bank PSPs interested in RTGS access will be able to begin the application process by contacting the relevant Payment System Operator to begin discussions about the requirements of direct participation.

Streamlined testing and onboarding for HVPS members

26 The Bank is committed to a materially more efficient testing regime for HVPS members in the renewed RTGS service that maintains or enhances the resilience and security of the system but is less onerous on participants. In particular, the Bank will introduce automated testing and simulators, and will design the new system to ensure the risks involved in making common changes, such as adding new members, are minimised. Taken together, the expectation is that the amount of testing required for such changes should be substantially reduced.

27 A new testing framework reflects the responses to the consultation, which showed the current testing regime to be the most frequently-cited burden on participants wanting to use RTGS to join CHAPS, and a significant barrier to direct participation. The second most frequently-cited barrier was the on-boarding process for new members. The Bank will explore ways to continue to streamline this process.

28 More efficient testing and streamlined on-boarding should result in expanded capacity in the system for new members to join. The Bank will explore whether some of these improvements can be realised as one of the early phases of the programme to renew RTGS.

Access through third-party technical aggregators

29 In recent years technical aggregators have started to play a greater role in the facilitation of payment messaging for financial institutions. An example is the New Access Model in Faster Payments. At present no user accesses RTGS settlement for the sterling HVPS via an aggregator, although that does not reflect technical barriers to doing so. It is the Bank's intention that access to the HVPS through technical aggregators should be fully enabled in the current and renewed RTGS service, subject to appropriate safeguards. The Bank as HVPS operator will ensure that the accreditation process and requirements placed on direct members and their aggregators allow RTGS to maintain best-in-class levels of resilience and safety.

30 In both the current and the renewed RTGS services, the Bank envisages an aggregator model in which the direct member of the HVPS holds its own RTGS account at the Bank, and is therefore responsible for settlement. The third-party aggregator will provide connectivity services but will not hold an account with the Bank.

Settlement agent models

31 RTGS supports settlement in a range of sterling payment schemes, and the service has expanded to capture payments in other systemically important infrastructures over time as they have emerged. In addition to the real-time gross settlement model currently used by CHAPS, RTGS supports: real-time 'Delivery versus Payment' settlement for the CREST system in a series of very high frequency cycles through the day; prefunded settlement arrangements for the Bacs and Faster Payments deferred net settlement schemes that eliminate settlement risk; and net settlement without prefunding for Visa, LINK and Cheque and Credit. Box 3 describes the characteristics of each model and lists the schemes currently using them.

32 The Bank is keen to promote broader access to central bank money settlement and welcomes dialogue with existing and potential future users during 2017 on any additional features this range of settlement models should have in a renewed RTGS to respond to future user needs. The Bank will explore with those designing the new retail payments architecture and others the possibility that a renewed RTGS service should incorporate enhancements to the prefunding arrangements — something identified in the consultation responses of some members of existing schemes that settle across RTGS.

Compulsory membership of HVPS for systemic institutions

33 The Bank intends to review the criteria by which institutions considered systemic are required to be direct participants in the sterling HVPS. The exact criteria by which an institution will be defined as systemic in this context will be

Box 3

The Bank's settlement agent models

Real-Time Gross Settlement: This model is currently used only by CHAPS. Payment obligations between direct participants in a scheme are settled individually on a gross basis throughout the business day. Settlement risk is eliminated, at the cost of an increased need for liquidity, making this model best suited to a High-Value Payment System with the largest potential systemic risk. Settlement of high-value payments will be expected to continue to use this model in the future.

The DvP link: This model is currently only used by CREST, which settles securities transactions on a Delivery versus Payment (DvP) basis in a series of very high frequency cycles through the day. After each cycle, RTGS is advised of the debits and credits to be made to the RTGS accounts of CREST direct participants. Settlement risk has been eliminated as transactions are settled with finality in real time against segregated liquidity.

Net settlement with prefunding: Schemes that do not settle on a real-time gross basis, instead settle obligations between

participants periodically in batches on a net basis. In the periods between settlement cycles, potential settlement risk can arise between direct participants. The introduction of prefunding in 2015 eliminated settlement risk in certain systems by capping the maximum net obligations of participants in the system and by requiring members to hold funds in a segregated account in RTGS equal to that cap, guaranteeing the fulfilment of the participants' net obligations.

This prefunding model is currently used by Bacs and Faster Payments, and Cheque and Credit plan to move to this model in 2017.

Net settlement without prefunding: This is periodic batch settlement between direct participants on a multilateral net basis. A feature of this model is that settlement risk exists in these systems, mitigated by arrangements in the individual schemes.

This model is used by Visa, Cheque and Credit and LINK.

published at a later date. Broader direct participation of systemic institutions in the HVPS supports the Bank's mission of maintaining financial stability by reducing operational and credit risks in the system.

34 The Bank will also be engaging individually with Central Counter Parties (CCPs) and their clearing members for further discussions on whether direct membership of CHAPS would be beneficial from a risk perspective. CCPs are already eligible for such membership if they choose to take it up, and the consultation provided useful feedback on this issue, both from CCPs and from other stakeholders.

1.3 Wider interoperability

35 The Bank will seek to promote resilience in the renewed RTGS service by ensuring users have greater flexibility to reroute payments in an outage from CHAPS to a retail system such as Faster Payments. The renewed system will also help realise back-office efficiencies by enabling the same payment technology to be used across a number of payment schemes, reducing the need for system-specific processing arrangements. The Bank will also work with a wider range of stakeholders to promote coordination between the design of a renewed RTGS service and other key domestic and international payment and settlement infrastructures.

ISO 20022 messaging

36 The Bank will adopt ISO 20022-based messaging standards for HVPS payments across the renewed RTGS service. Properly used, ISO 20022 has the potential to deliver a range of strategic benefits, including greater interoperability between payment systems, more efficient end-to-end payments architecture and improved availability of richer payments data. The consultation response to the Bank's proposal to move to ISO 20022 was overwhelmingly positive.

37 The Bank is not making this change in isolation. The UK retail payment systems are embarking on a project to move to ISO 20022 over a similar timeframe, as are a number of major high-value payment systems in other jurisdictions. Most RTGS participants are active in at least some of these systems. So the Bank will seek to maximise the scope for aligning and, wherever possible, harmonising the messaging standards used in RTGS with those used in the UK retail systems and major international wholesale systems.

38 Effective co-ordination across the industry will be critical to the successful implementation of new messaging standards. The Bank has already held an initial workshop and will establish a technical working group focussed on messaging as part of its industry engagement during the Renewal Programme. This group will be responsible for defining the new ISO 20022-based standard for RTGS and will have a representative membership drawn from across the

UK payments industry. Section 2.4 contains further information on the Bank's proposed stakeholder engagement strategy. The Bank aims to have defined the new RTGS messaging standard before commencing the technical build phase. A decision on the future migration strategy will be made to a similar timescale, in close collaboration with users.

Payment synchronisation functionality

39 The Bank plans to introduce functionality to support the 'synchronisation' of cash movements made in RTGS with the movement of cash and assets held in other systems in the next generation of RTGS.

40 Consultation respondents recognised the strategic case for introducing this functionality, particular in support of cross-border settlement. But they flagged the need for more detailed analysis of the benefits and costs of the different technical options. In recent months, the Bank has begun to deepen its understanding of the message flows required to support this functionality, including through initial proof-of-concept work on technology options. Over the coming months, this will be complemented by further analysis and discussion with stakeholders including participants, other central banks and market infrastructures. The internal work and external engagement will help the Bank understand the implications of synchronisation and where its implementation fits in the overall phasing of the programme.

Alternative processing arrangements for time-critical retail payments

41 The Bank will work to promote interoperability between the current payment systems, reflecting the contingency benefits of having alternative resilient pathways for payments. The Consultation Paper noted that, in the longer term, some categories of time-critical retail payments currently made through CHAPS might sit more naturally with the UK retail schemes. The Bank will reach out to the New Payments Systems Operator and other relevant industry organisations to support this work. The Bank does not however intend to mandate participants to settle specific types of payments in specific systems.

42 One of the potential barriers to implementing a lasting change is the ability for direct participants to identify the underlying purpose of their various payments. Introducing ISO 20022 messaging standards will therefore be an important step in realising this policy aspiration. Promoting interoperability between retail and wholesale schemes will be a key element of the ISO 20022 work that the Bank will carry out in the coming months.

1.4 Improved user functionality

43 Renewal enables the RTGS service to keep pace with the changing demands of its users as their payment services

evolve by expanding the range of functionality and operational capability offered.

RTGS operating hours capability

44 The Bank intends to deliver the following operating hours functionality in the renewed RTGS:

- The technical capability to operate at close to 24 hours a day during business days for real-time gross settlement, and to carry out periodic net settlement of the retail systems over the weekend from the outset. This means the ability to run end-of-day batch processes while the service remains online, and having a design that enables the introduction of additional parallel hardware to enable major maintenance and upgrades while RTGS is in live operation.
- A system architecture designed in such a way that it would present no technical barriers to adapting to demands for real-time gross settlement 24 hours a day, 7 days a week if that becomes required later in the life of the new service.

45 The Bank has no current plans for material changes to the actual operating hours of RTGS, though that will be kept under review in light of user demand. The Bank's decision to move to a design that enables full 24x7 operation but without making all the operational changes needed to enable this from the outset is intended to achieve a balance between the long-term need for flexibility and the low probability that this flexibility is required from the outset in the renewed system. This proposed functionality addresses the clear consultation message that the new system would need to support materially extended hours at some point in the future, but the range of different views on the extent to which hours might need to be expanded. Respondents cited settlement of retail payments, the internationalisation of markets, the entrance of new innovative players, and the need to support synchronisation of payments as drivers for extended hours capability in a new system that could be in operation for a decade or more.

Application Programming Interface (API) for richer data

46 In order to facilitate better access to RTGS data for participants, the Bank will introduce an external facing Application Programming Interface (API)⁽¹⁾ in the renewed RTGS to allow external participants to develop sophisticated and automated real-time tools for accessing RTGS transactional and liquidity data if they wish to do so. As with all functionality, strong levels of system security and resilience will need to be maintained when designing the API.

(1) An API is a set of functions and procedures that allow the creation of applications which access the features or data of an operating system, application, or other service.

47 Moving to a more sophisticated data interface will respond to the increasing data demands RTGS users expect to face in the coming years, exploiting the richer data capable of being carried by ISO 20022 messaging standards. In their consultation responses, participants noted that the introduction of the existing RTGS BI tools had improved their liquidity management. But the majority also identified shortcomings in the current offering, including a time lag in receiving data, and a limited range of functionality for creating bespoke or automated data queries. There was therefore widespread support for the introduction of an API.

48 Technical standards and arrangements for the delivery of the API will be developed and co-ordinated by an industry working group as part of the Bank's stakeholder engagement. Over the coming year, the Bank will also investigate whether to extend the functionality available via an API to allow participants to modify parameters within the system such as their own multilateral limits, manage their liquidity or instruct payments during contingency. At a minimum, the renewed RTGS service will continue to provide a set of standardised BI reports and queries for those users wanting only a simple service.

Track-and-trace functionality

49 The Bank will design the next generation of RTGS to enable industry to develop track-and-trace functionality for payments processed by RTGS. One route towards this would be to attach unique identifiers to payment messages throughout their entire journey, and to ensure the RTGS settlement engine can support the tracking of these through the renewed service.

50 Respondents to the consultation were largely supportive of this approach. There were two main themes: first that the Bank should facilitate end-to-end message identification and second that the Bank should seek to support industry initiatives, such as SWIFT's Global Payments Initiative (GPI). Over the coming year the Bank will conduct further work with participants and network providers to determine what needs to be designed into the renewed service in order to facilitate track and trace functionality.

Additional liquidity saving features

51 The Bank will continue with the policy of flexible provision of sterling liquidity in the new RTGS system through collateralised intraday liquidity for CHAPS members,⁽¹⁾ and through the intraday use of participants' reserves balances to fund payments in RTGS. The next generation of RTGS will also have an LSM, a proposal that received universal support in the consultation.

52 To an extent, the design of the existing LSM will strongly influence how it is implemented in the renewed RTGS. But the Bank will also engage with users to design a new version of the

LSM that maximises liquidity savings while minimising the complexity of the mechanism. It will also consider how best to introduce additional liquidity-saving features put forward in the consultation (forward-dated and timed payments), for which the consultation responses revealed some demand. The Bank has at this point not reached a firm view on whether the potential financial stability risks under stressed circumstances introduced by queue visibility, a third feature in the consultation, can be adequately mitigated.

Global liquidity management

53 Consultation responses revealed that a number of users would like to see further exploration of how renewing RTGS could provide opportunities to support the long-standing industry goal of streamlining global liquidity management across currencies, time zones and payment systems. No specific proposals were made for how the design of a renewed RTGS might be modified to achieve this, but responses identified a number of areas for further thinking, including: re-examining arrangements for taking collateral to support intraday liquidity; and the related possibility of making greater use of cash as collateral both in RTGS and across major global payment systems.

54 The Bank believes that many of the other enhancements included in this blueprint will contribute to facilitating global liquidity management. These include: near 24x7 operating capability; cross-border payments synchronisation; an API for richer data; and forward-dated and timed payment submission. The Bank is committed to exploring with industry during 2017 ways in which the new RTGS service could further support their goal of streamlining global liquidity management and will set up a working group to investigate this.

1.5 Strengthened end-to-end risk management of the HVPS

55 To underpin financial stability and respond to the growing range and diversity of threats to payments systems in general, the Bank has concluded that the HVPS should move to the global norm of a 'direct delivery' model, where the central bank is both the infrastructure provider and payment system operator. This section sets out the Bank's rationale for this decision, and its vision for HVPS governance and risk management over the medium term. Section 2.3 explains how the Bank will work together with the shareholders, Board, management, and staff of CHAPS Co to ensure a smooth and timely transition to the new structure in the coming months.

Current arrangements

56 At present, the Payment System Operator (PSO) for the United Kingdom's HVPS is CHAPS Co, a private sector entity

(1) As discussed in Section 1.2, credit, including intraday liquidity, will not be available to non-bank PSP RTGS users.

owned by its direct participants. CHAPS Co is responsible for managing the system's governance and rulebook and, as a central component of its responsibilities, managing risks across the HVPS. The core infrastructure for the real-time settlement of CHAPS payments (across accounts in central bank money) is however provided by the Bank, in the form of RTGS.

57 This structural separation of responsibilities for HVPS scheme and infrastructure is highly unusual internationally. In a survey of 107 countries that use an RTGS system, the World Bank found that central banks had sole responsibility for both roles in the overwhelming majority of cases.⁽¹⁾

Drivers for change

58 The United Kingdom's arrangements developed in an earlier era in which it was felt that risks to payment systems could be fairly cleanly separated between those bearing on the central infrastructure, those bearing on scheme users (whether direct or indirect), and those bearing on the 'plumbing' in between. Arrangements in which the responsibility for managing these risks was also split may therefore once have seemed an appropriate division of labour.

59 Recent years have however seen a rapid expansion in the scale, nature and sophistication of new types of payment risk, many related to cyber-attack or fraud that may crystallise at any point in the payment chain and then pervade the entire ecosystem. Events such as the February 2016 central bank of Bangladesh hacking incident have brought such threats into particularly sharp focus. The importance of these issues is only likely to grow in the future as access to payment systems is expanded to a new range of users, interconnectivity increases, and public tolerance for even short periods of system outage falls.

60 In response to the changing nature of risks to payment systems, enhanced regulatory expectations both in the United Kingdom and internationally have increasingly stressed the importance of PSOs undertaking so-called 'end-to-end' systemic risk management for payment systems.⁽²⁾ That requires PSOs to assess, manage and respond to the full range of risks arising at all points in their systems, looking at the system as a single entity. For the UK HVPS, the Bank (as the supervisory body for systemically-important payment systems in the United Kingdom) holds CHAPS Co accountable for the end-to-end risk management of the HVPS, including risks emanating from the core RTGS infrastructure.

61 In the recent period, CHAPS Co has taken important steps to respond to these new regulatory expectations, streamlining its governance arrangements, strengthening the rulebook, developing an improved member assurance model, and deepening relationships with the Bank's RTGS operational team. That work has improved the management of the HVPS.

However, at the same time it cannot overcome three key structural constraints on CHAPS Co's ability to be a fully-functioning end-to-end systemic risk manager:

- First, the Bank cannot give CHAPS Co, a private company, access to full information on the cyber risk profile and other defences around RTGS, which lies at the heart of the financial system. So CHAPS Co cannot form a complete end-to-end picture of risks in the HVPS: vital if it is to be an effective systemic risk manager.
- Second, CHAPS Co cannot be given contractual control over the operations and investment programme for RTGS, since RTGS embodies most of the Bank's balance sheet and performs multiple policy functions, including the implementation of monetary policy. So CHAPS Co cannot by itself drive through risk-mitigating change to a key part of the HVPS.
- Third, as an intrinsically small organisation, CHAPS Co does not have access to the full range of tools needed to detect risks and challenge risk management practices in the central RTGS infrastructure and the direct and indirect participants in the HVPS.

62 Given these structural constraints, CHAPS Co has been unable fully to meet regulatory expectations. This has been independently identified by the International Monetary Fund, which has recommended in consecutive UK Financial Sector Assessment Programmes, most recently in 2016, that the Bank should consider alternative structures for the oversight and risk management of the HVPS.⁽³⁾

63 In light of these considerations, and the prospective intensification threats to payment systems outlined above, the Bank has concluded that financial stability would be enhanced if the United Kingdom's HVPS moved to a direct delivery model in which the Bank is responsible for both the HVPS scheme and the RTGS infrastructure. In forming this view, the Bank gave careful consideration to the responses it received in last autumn's consultation, and evaluated the pros and cons of direct delivery against alternative organisational models. The Bank's conclusion has been informed and endorsed by the independent Financial Policy Committee.⁽⁴⁾

The Bank's vision for the HVPS in the medium term

64 In the near term, the priority is to ensure that the transfer of the HVPS to the Bank is carried out in a smooth and timely

(1) World Bank Global Payment Systems Survey 2012.

(2) The international standards are set out in the CPMI-IOSCO Principles for Financial Market Infrastructures. Those standards in turn underpin the Bank's supervisory approach for payments schemes, outlined at www.bankofengland.co.uk/financialstability/Documents/fmi/fmisupervision.pdf.

(3) See the IMF's report at www.imf.org/external/pubs/ft/scr/2016/cr16156.pdf.

(4) See Record of 27 April 2017 meeting, available at www.bankofengland.co.uk/financialstability/Pages/fpc/default.aspx.

way, minimising risks to the continuity of CHAPS, and safeguarding the skills and expertise accumulated by CHAPS Co. Section 2.3 outlines the Bank's plans for doing this, working closely with key stakeholders.

65 Over the medium term, and taken together with the other changes outlined in this blueprint, direct delivery offers the opportunity to position the United Kingdom at the leading edge of global best practice in terms of technology, governance and risk management. It will allow the new RTGS service to be designed from the start in a fully holistic way. And it will ensure that end-to-end risk management can make use of the full set of tools and resources available to the Bank to identify, mitigate, and respond to risks as they emerge across the HVPS ecosystem as a whole, building on the important work already undertaken by CHAPS Co.

66 Future arrangements will be designed to ensure two further strengths of the current HVPS are maintained:

- (a) First, to deliver a continued focus on efficiency, innovation and competition in the HVPS, and to give appropriate voice to users, the Bank will: ensure there are suitably-qualified and security-cleared independent members of the new HVPS governance body; establish a new Strategic Advisory Forum for senior user

representatives; and continue to have regard to the importance of fostering competition and innovation, where doing so can be achieved without threatening stability, as it has throughout the RTGS review. Properly designed, the new arrangements should provide users with a materially more direct line of communication with the Bank, for day-to-day operations, system development, and operational incident management. These are important corollaries of the fact that HVPS participants will continue to meet the cost of running the scheme, including the transition arrangements.

- (b) Second, the Bank will introduce new mechanisms to maintain openness, accountability and challenge in the operation of the HVPS. In addition to the independent challenge from HVPS Board members the Bank will: continue to supervise the HVPS to the same standards as other systemically important payment schemes,⁽¹⁾ making use of recently announced enhancements including the addition of independent members to its FMI Board;⁽²⁾ subject HVPS operation to the Bank's full 'three lines of defence' risk management model; ensure enhanced public transparency on both operational and supervisory activities; and deliver close engagement and oversight on relevant matters from the Governors, Court and the Financial Policy Committee.

(1) www.bankofengland.co.uk/financialstability/Pages/fmis/supervisory_app/supervisoryapproach.aspx.

(2) www.bankofengland.co.uk/about/Documents/ieo/fmidresponse0217.pdf.

2 Delivering the renewed RTGS service

1 This section describes how the Bank intends to deliver the RTGS Renewal Programme, the outputs of which will be a new RTGS infrastructure (including additional functionality and supporting processes) and a fully integrated end-to-end High-Value Payment System (HVPS). This will be a multi-year programme of work, led by the Bank but with the active participation of current and future users of the system. Development work will begin immediately after publication of this blueprint, but the outputs will be phased in over time to enable progressive migration to the new platform and operating model.

2 The remainder of this chapter is set out as follows:

- (a) Section 2.1 sets out the objectives of the RTGS Renewal Programme;
- (b) Section 2.2 identifies the main risks to the programme and the key design decisions that the Bank will need to make to mitigate these risks;
- (c) Section 2.3 sets out the Bank's priorities for the programme during the remainder of 2017, including work to ensure a smooth and timely transition to direct delivery for the HVPS; and
- (d) Section 2.4 explains the governance and industry engagement structures that the Bank will put in place around the Programme.

2.1 Objectives of the RTGS Renewal Programme

3 To guide the delivery of the RTGS Renewal Programme, the Bank has identified four central success criteria. These criteria will run through each element of the programme and must be satisfied in order for the Renewal Programme as a whole to be judged a success. They are:

- (a) First, that the vision set out in this blueprint (and summarised in **Table A**) is not compromised. This vision will result in higher resilience, broader access, wider interoperability, improved user functionality and strengthened HVPS end-to-end risk management.
- (b) Second, that the renewed service is flexible to the future demands for change that will inevitably arise from the

Bank and service users over its lifetime. This includes flexibility to scale the platform if needed, to adapt to changing requirements and technical environments, to respond to evolving risks and to meet the needs of diverse users.

- (c) Third, that the programme is delivered in a way that ensures that the stated benefits are realised across the payments industry and the Bank's vision for the renewed RTGS service remains strongly supported at the conclusion of the programme.

- (d) Fourth, that neither the Renewal Programme nor the migration to the new platform disrupt the operation of the existing RTGS service or the payment systems that rely on it.

4 As set out in the executive summary, the Bank has taken three key framing decisions on delivery and operation of the RTGS Renewal Programme. First, the Bank has concluded that to deliver the vision set out in this blueprint in full requires a new technology architecture. That reflects the results of an evaluation of the existing RTGS infrastructure undertaken following the publication of the RTGS consultation paper last autumn. Second, the Bank has determined that it will remain the operator of the RTGS infrastructure. That reflects the fact that RTGS is built around the Bank's own balance sheet, and plays a central role in the delivery of the Bank's mission of monetary and financial stability. And third, programme outputs will be phased in over time to manage transition risks and cost.

2.2 Programme risks and key design decisions

5 The RTGS Renewal Programme aims to deliver an ambitious vision in a complex and rapidly changing environment. The Bank has identified the following characteristics of the RTGS Renewal Programme as creating risks to its successful delivery:

- (a) Its criticality: RTGS is a vital UK infrastructure and disruption to its smooth operation has the potential to damage the stability of the United Kingdom's financial system.
- (b) Its scale: the RTGS Renewal Programme will involve the largest IT change the Bank has undertaken for some time.

- (c) Its complexity: the programme has many internal and external dependencies to navigate while ensuring the vision is not lost in delivery.
- (d) Its uniqueness: the RTGS Renewal Programme involves delivering a new vision with few domestic or international comparators. This means that some solutions may not be readily available in the market, requiring some degree of tailoring of technologies and processes.
- (e) Its dependency on external engagement: success requires the active support and engagement of a diverse set of external stakeholders.

6 A clear and detailed understanding of the desired end state for the renewed RTGS service and an effective programme structure are essential to mitigating the risks set out above. The most critical judgements will be required in the following areas:

- (a) *The end-to-end target operating model*: the complexity and interconnectivity of business processes, technology and information requires an end-to-end business design to mitigate the risk of missing key interactions across the diverse set of stakeholders. Given the criticality of RTGS, resilience and security features also need to be embedded in a strong, well-understood business design.
- (b) *The scope of new services*: the scale and uniqueness of the RTGS Renewal Programme mean that the scope of functional and non-functional requirements needs to be clearly stated to avoid the risk of either overlooking key aspects of design or wasting resources on unrequired features.
- (c) *The technology architecture*: substantial investment will be required to implement the technology architecture that will support RTGS' complex, unique and critical business requirements. Ensuring an appropriate architectural design will therefore be essential to mitigate the risks of cost and schedule overruns.
- (d) *The optimal phasing approach*: there are risks in migrating from existing RTGS services given their criticality. As a result, the phasing of such migrations needs to be carefully thought through, with a thorough risk assessment of each option.

2.3 The Bank's priorities for 2017: HVPS transition and programme definition

7 The Bank's priorities for the remainder of 2017 are two-fold: first, securing a smooth and timely transition to direct delivery of the HVPS; and second, definition of the RTGS Renewal Programme as a whole.

Transition to direct delivery for the HVPS

8 The most pressing near-term priority for the RTGS Renewal Programme is the transition to a directly delivered HVPS. As set out in Section 1.5, under direct delivery the Bank will both operate the HVPS and provide the underlying infrastructure. In view of the rapidly-changing risk environment, and the merits of aligning HVPS and RTGS governance to ensure the RTGS service can be redesigned in a fully holistic way, delivery of this element of the programme will run to a significantly shorter timeline than the rest of the RTGS Renewal Programme.

9 The Bank is now working closely with the shareholders, Board, management and staff of CHAPS Co to bring about a smooth and orderly transition, minimising the near-term risks to service continuity. The Bank proposes to work with CHAPS Co on a share purchase acquisition, with due diligence starting shortly. The Bank aims to have heads of terms ready to share with shareholders by Summer 2017. The transition is scheduled to be complete by no later than the latter part of 2017 and will see CHAPS Co staff transfer to the Bank.

10 An HVPS Transition Steering Group comprising the Bank, CHAPS Co management and senior industry stakeholders, including stakeholder representatives, will shortly be convened. This group, co-chaired by the Bank and CHAPS Co, will help structure the transition of the HVPS to a direct delivery model, meeting regularly over the spring and summer.

Programme definition

Defining the end-to-end target operating model

11 The Bank needs to define organisational capabilities that will run the enhanced suite of services, including a clear articulation of key roles and interactions (eg the enhanced capability and streamlined interactions needed for the onboarding of new users). Organisational capabilities for the end-to-end operating model will be covered including business functions, key processes and external interfaces, technology and information architecture. This operating model will stretch across all elements of the wholesale payments ecosystem, involving the central infrastructure, connecting interfaces and design features bearing on direct and indirect scheme participants.

Setting the scope of new services

12 The Bank will need to formalise the scope of the functional and non-functional RTGS renewal business requirements so that it can provide certainty on the nature and timing of complementary, dependent activities.

13 The Bank has already decided that the core scope of the new services will be the real-time settlement of payments in central bank money, with securities settlement remaining out of scope of the replacement services. Beyond this the Bank will need to identify key functional and non-functional

requirements. To support this, further work will be carried out during 2017 to determine how to implement the policy decisions set out in Section 1 of this document. This includes, for example, further policy work to define in more detail the future suite of settlement models and how these translate into system requirements.

Designing the technology architecture

14 During 2017, the Bank will define the technology architecture and the components within it underpinning the renewed RTGS service, including key design decisions in relation to security, access, interoperability and resilience. It will also determine how to source the components of the architecture.

15 Designing the technology architecture will involve defining the characteristics of the required components, underpinned by resilience and security design principles. The Bank will develop a procurement approach which will define which components can be re-used, which it will buy 'off the shelf' and which will need to be bespoke built. The Bank will engage with external providers at appropriate points to supplement in-house teams with the specialist expertise required for certain aspects of the technology infrastructure, as well as some aspects of systems integration and testing.

Optimising the phasing approach

16 In order to deliver a phased migration, the Bank will need to define the sequence, timing and scope of the new services it plans to introduce, including the testing and migration approaches for each tranche of new functionality.

17 The Bank has already decided that the most immediate priority is to implement direct delivery of the HVPS and introduce a near-term operating model to support the smooth integration of CHAPS Co operations. Beyond this, the development and introduction of the operating model for the renewed RTGS service and the technology that supports it will be delivered via a phased migration strategy rather than a big-bang approach, with technical changes that help to enable or de-risk later migration steps being completed first.

18 Further work is required in 2017 to determine the optimal phasing of new RTGS services. In structuring the phasing in of new services the Bank will balance three key drivers:

(a) *Risk minimisation*: the Bank will plan and deliver RTGS renewal so that risks to continuity of service including the risks posed by transition to the new service are minimised.

(b) *Maximisation of economic benefits*: the Bank will undertake cost-benefit assessments including assessing the impact of change on RTGS participants.

(c) *Feasibility*: the Bank will work to ensure that dependencies between the component parts of the programme are identified and appropriately managed so that each phase can be introduced in a logical sequence.

19 The output of the above will be a clearly defined phasing approach and delivery roadmap, which will include agreement on approaches to testing and onboarding.

Additional priorities for the programme definition stage

20 The programme definition phase will be based on industry best practice for the mobilisation of major change programmes. In addition to the key decision making areas described in Section 2.2, the programme definition phase will also:

(a) Set out all of the programme workstreams that will deliver the new RTGS services;

(b) Mobilise the programme delivery team and activate associated programme controls; and

(c) Baseline the overall programme delivery plan and key milestones.

21 Once the Bank has concluded the programme definition phase of the programme it will initiate in 2018 a series of workstreams to deliver the new operating model and RTGS services. Alongside this the Bank will carry out work to improve existing processes. Standard project frameworks will be applied to the delivery of these services. Each new service is likely to require one or more phases of procurement, detailed design and build, testing and onboarding.

22 Beyond the programme definition stage, target dates for delivery of subsequent stages of the programme will be confirmed through the detailed planning currently being undertaken, which will be informed by external factors such as industry readiness and the progress of other ongoing industry initiatives. On this basis, both the delivery roadmap and the overall design will be informed through close industry engagement (see Section 2.4). The Bank's current intention is for the majority of new RTGS functionality to be live by the end of 2020.

2.4 Programme governance and industry engagement

Programme governance

23 The Bank will ultimately be responsible for the delivery of the RTGS Renewal Programme. The strategic direction and risk management of the programme will be supported via the Bank's internal governance structure.

24 The Bank intends to continue operating RTGS on a full cost recovery basis via the annual RTGS tariff. The Bank does not intend to begin recovering costs of the RTGS Renewal Programme in advance of delivery of the first tranche of functionality. This approach should ensure that the renewal is funded from future users, who stand to benefit from some of the new features, as well as current users. Recent capital investments in RTGS, such as the introduction of the LSM or MIRS, have been amortised over a three to five-year period. The scale of the RTGS renewal programme means that the amortisation period is likely to be somewhat longer. The Bank will provide more detail on delivery costs and implications for steady-state operating costs for the rendered service at the end of the programme definition stage alongside the final delivery roadmap.

Industry engagement

25 Stakeholder engagement will be a crucial pillar of the RTGS Renewal Programme. The Bank ran the RTGS Strategic Review as an open process, seeking input from a wide range of stakeholders throughout 2016. This approach played a vital role in developing the package of policy and technical proposals in this blueprint designed meet the needs of RTGS users over the coming years, and it will be important to continue this productive dialogue in future. The Bank also recognises the importance of providing, where possible, transparency on the details of key design choices with relevant stakeholders as well as the current and future system users that will bear the costs of RTGS renewal. The Bank recognises

that the payments industry is undergoing a period of profound change and therefore is keenly aware of the need for co-ordination with existing industry change initiatives.

26 As the Bank enters the programme definition stage it will begin to work with external stakeholders to set up external fora and other information sharing channels as follows:

- (a) First, the Bank will hold two open industry events to present the information in the blueprint on 22 and 26 May 2017.
- (b) Second, in the longer term the Bank will form an advisory body, chaired by the Bank and with members drawn from a representative sample of RTGS stakeholders. This body will provide a forum to gather views from a diverse range of stakeholders on implementation.
- (c) Third, the Bank will convene working groups made up of the representatives of all interested stakeholders to drive development of the new RTGS platform and to get input on the Bank's analysis and proposals during the programme definition phase and beyond.
- (d) Fourth, the Bank will consider how best to disseminate information from the advisory body and working groups to its wider constituency of stakeholders as part of a comprehensive communications and stakeholder engagement plan.

Annex Summary of consultation responses

1 This Annex summarises the responses to the 20 questions posed in the Bank's September 2016 Consultation Paper. The consultation closed on 7 November 2016, and the Bank received 61 submissions from a wide range of stakeholders with varying perspectives on RTGS and the broader UK payments landscape, including banks and building societies, financial market infrastructures and schemes, technology providers, non-bank PSPs, fintech firms and individual experts. The Bank is grateful to all those who took the time to input into the review process.

2 The responses were used to provide insights and to inform the thinking for the blueprint, with the free-format comments to the options selected being particularly useful. In the Consultation Paper, the Bank undertook to respect the indications of respondents who regarded the information provided as confidential, to the extent permitted by law. The results shown here are therefore presented in aggregate form only: no responses have been individually identified.

3 Judgment has been required to summarise some of the consultation results (for example where individual respondents' answers appeared contradictory, or where there were no tick-boxes available).

Overarching questions

Question	Respondents	Yes among respondents
1 Do you agree that the key five strategic drivers outlined in the Consultation Paper are the right ones for change for a future UK RTGS service?	53	98%

4 Responses strongly endorsed the five strategic drivers set out in the Consultation Paper. One important addition to the list was the drive for more efficient global liquidity management. Under this heading, a number of respondents highlighted that global banks expected to face increased pressure to optimise liquidity usage over the coming years as and when monetary policy returned to a less expansionary stance and as the use of central counterparty clearing continued to expand, with an associated increase in collateral demand. Some respondents also mentioned the need to

ensure that the RTGS service continued to provide value for money — something the Bank will ensure is factored into the design of the renewal programme.

Question	Respondents	Yes among respondents
2 Do you agree with the Bank's proposals to retain many of the policy principles and core design features of the existing RTGS service in the renewed service?	47	100%

5 There was universal agreement among those responding to this question with the proposal to retain the core design features of RTGS included in **Table A** in Section 1 of the Consultation Paper. A number of respondents highlighted the LSM and MIRS service (the existing third settlement platform) as design features whose retention (whether in their present or modified form) was for them particularly important.

Questions on RTGS access

Question	Respondents
3a To what extent do you feel the following barriers identified by stakeholders discourage firms (including where relevant your own institution) from becoming a participant in CHAPS: the length and requirements of the onboarding process; the testing requirements; and the fixed costs of connection to RTGS? Please provide cost estimates where possible.	36
3b Are there other steps the Bank could take to reduce the costs of accessing RTGS to join or make payments in CHAPS, while maintaining the resilience of the service?	26

6 No respondent disagreed with the barriers identified or mentioned additional ones. The operational burden of the current testing regime was the barrier most frequently singled out, followed by the onboarding process. Suggestions to reduce the burden of testing included: the use of automatic testing; doing more testing during the working week; using simulators and sandbox environments; not involving all members in all testing; having a proportionate approach to testing; and making adding new members a configuration test. To streamline onboarding, some respondents suggested reducing the duplication of processes between CHAPS and the Bank, and increasing the number of slots available.

Question	Respondents	Yes among respondents
4a Is a technical aggregator service something that your institution would be interested in supplying or using, to access RTGS for CHAPS payments?	37	Supplying: 11 Using: 11
4b Are there any risks that the Bank should consider in permitting technical aggregator services to develop?	31	n.a.
4c Do you perceive any RTGS features that could act as barriers to the development of a technical aggregator service?	29	n.a.

7 There was considerable appetite for the provision and use of aggregators in CHAPS, with eleven respondents expressing interest in connecting via such a service and eleven institutions expressing interest in providing it. No respondent was opposed to the use of aggregators, although some highlighted the need for aggregators to be subject to the same standards of security and resilience as current members, and to go through a thorough accreditation process. Responses did not uncover any current RTGS features that acted as barriers for aggregator connectivity.

Question	Respondents	Yes among respondents
5a. CCPs are currently eligible to hold RTGS accounts, but none has joined CHAPS. Do you believe there is a case for CCPs to join CHAPS as direct participants? Please explain your answer.	22	68%
5b If Yes, is there any functionality that would be required in the next generation of RTGS to enable this?	9	n.a.

8 A majority of respondents expressed support for CCPs connecting directly into RTGS. Those who expressed a preference between compulsory or voluntary direct access favoured voluntary access (as it is today). A few respondents suggested additional functionality that might assist direct CCP participation, including direct debit for margin calls and standardised messaging.

Questions on RTGS resilience

Question	Respondents	Yes among respondents
6 The consultation proposes a Recovery Point Objective of near zero and a Recovery Time Objective of within two hours for the future RTGS service (other than for business intelligence). Do you agree with these proposals?	49	90%

9 There was widespread support for the resilience objectives put forward in the Consultation Paper, although a few respondents argued for more ambitious targets. This blueprint clarifies that the Bank is committed to tighter recovery objectives for known threats. The technology companies that responded said that they thought the Consultation Paper's proposals were achievable and affordable with modern technology.

Question	Respondents	
7 The Bank has set out two options for mitigating RTGS's reliance on a single messaging provider. Option A is a contingency mechanism for file submission via an alternative network for use in an outage. Option B is for the Bank to require some or all RTGS participants to use two messaging providers. Which option do you prefer?	41	Option A (49%) Option B (51%)

10 Responses were split fairly evenly between the two options on messaging providers. Current direct participants of the system expressed a significant preference for the enhanced contingency Option A. Near universally those who supported Option B thought that the second network should only be mandatory for larger members. A number of respondents felt that users' messaging requirements could change significantly over the life of the renewed service. The enhanced contingency messaging channel and channel-agnostic design proposed in this blueprint should help provide the flexibility that users requested.

Interoperability

Question	Respondents	Yes among respondents
8a The Bank plans to use ISO 20022 messaging standards for CHAPS in the new RTGS system. Do you support this proposal?	41	98%
8b Please explain where your institution could see the benefits in terms of domestic or international harmonisation of standards or both. Are there ways in which ISO 20022 messaging standards would need to be implemented to realise these benefits?	36	n.a.

11 There was overwhelming support for ISO 20022 adoption, for two main reasons: first, that a global tipping point for its adoption was perceived as having been reached; and, second, the standard's potential to provide richer payments data. Respondents saw no value in a like-for-like replacement that could not exploit the richer possibilities of the standard. In terms of preferences for whom to harmonise with, international banks and infrastructures tended to favour international harmonisation with other RTGS systems, while smaller UK banks favoured domestic harmonisation. The majority of large UK banks did not favour one over the other.

Question	Respondents	Yes among respondents
9a Do you believe there is merit in introducing synchronisation functionality?	37	92%
9b Do you believe that one or both of the proposed use cases (cross-border payments and supporting new settlement venues) will be viable over the lifespan of the system?	30	93%
9c Do you believe that a standardised set of synchronisation functionality would be adaptable to use cases, beyond those listed here?	30	83%

12 There was strong support for the principle of introducing synchronisation functionality. 93% of respondents believed the proposed use case would be viable over the lifespan on the system, and 83% felt that the functionality could be adaptable to other use cases. There was however much more interest in the use case of cross-border payments than in that for new settlement venues. And a number of respondents asked for more information on how synchronisation might work in practice, including further analysis of the potential benefits, before deciding whether it should be adopted.

Question	Respondents	Yes among respondents
10 Do you agree with the proposal to maintain the current scope of RTGS settlement and not to extend it (a) to provide individual settlement of payments currently settled by the major sterling retail payments schemes; or (b) integrate the ledger of sterling securities accounts onto the system?	49	88%

13 A large majority of respondents supported maintaining the current scope of RTGS settlement, with recognition that too much integration across systems could create competing risk priorities and compound the impact of an outage. A small minority argued that the Bank should build a new service to enable real-time gross retail settlement, although it is unclear whether in recommending this approach these respondents had contemplated the possibility that it might involve the Bank competing with existing private sector providers of such services.

Question	Respondents	Yes among respondents
11 The Bank proposes to work with the industry to ensure there are options for time-critical retail payments to be made via retail schemes rather than CHAPS. Do you agree with this proposal?	42	95%

14 Nearly all respondents to this question agreed that the Bank should promote interoperability between systems. Universally these respondents also suggested FPS as an alternative to CHAPS (and vice versa) and noted that the introduction of ISO 20022 and the Payments Strategy Forum's initiative of a New Payments Architecture with a Simplified Payments Platform⁽¹⁾ provided the right opportunity to deliver the change required. Respondents nevertheless mostly opposed mandating a forced transition of retail payments from CHAPS to FPS in business as usual.

Question	Respondents	
12 Do you anticipate demand for RTGS to offer true 24x7 capability over the next decade or more?	48	True 24x7: 55% Near 24x7: 25% Some expansion: 12% No change: 8%

15 92% of respondents stated that a new RTGS service would need the technical capacity to support materially extended hours over the next decade or more, given global trends in payments markets. However, respondents had somewhat different views on the precise extent to which hours might need to be expanded, with 55% believing that RTGS would need the capability to operate full 24x7, and a further 25% that near 24x7 would be sufficient.

Question	Respondents	Yes among respondents
13a The Bank is proposing to provide an Application Programming Interface (API), which will allow firms to access their own data in real time. Do you anticipate this being a useful service?	39	100%
13b For what purposes could your institution utilise the API?	38	- Improved liquidity management 74% - Quicker reconciliation 72% - Early warning indicator 58% - Other 47%
13c Are there changes to the way in which the Bank delivers information about the status of payments in RTGS that could help facilitate the development of 'track-and-trace' functionality?	25	84%

(1) <https://implementation.paymentsforum.uk/working-groups/npa-design-hub>.

16 Responses to this question confirmed that current RTGS participants saw shortcomings in the current RTGS Business Intelligence tool. There was strong support for having an API, based on its flexibility and increasing prevalence in the industry. Track-and-trace was also widely supported. Responses noted that the Bank should consider facilitating end-to-end message identification as a way to deliver track-and-trace, and liaise with SWIFT in order to make progress on both issues.

Question	Respondents
14 The Bank intends to continue to provide a Liquidity Savings Mechanism for payments in CHAPS. Are there any liquidity management tools, such as queue visibility in CHAPS or any others, that you would find useful? Can you give a list of advantages and disadvantages of your proposals?	30

17 Among those responding to this question, there was unanimous support for maintaining a Liquidity Savings Mechanism in the new system. Only one response raised objections to queue visibility; the remainder either indicated positive demand for it, or at least saw no objection.

Question	Respondents	Yes among respondents
15a Would you find functionality to submit payments in advance of the day of settlement useful?	38	58%
15b Would you find functionality to set the time at which a payment should settle useful?	39	69%

18 Responses to this question showed some support for the introduction of forward-dating and timing of payments, but not overwhelming demand. Some institutions said they would find it very useful, but others said that they already had the functionality internally. The use cases for forward-dating payments were better defined than for timed ones, and included CLS payments, house purchases and bond interest payments. Respondents warned that forward-dating functionality would not be used unless it was easy to cancel payments submitted to RTGS's central scheduler between submission and the settlement date.

Question	Respondents	Yes among respondents
16 Is there any other functionality that you want to see the Bank build into the new RTGS service?	44	61%

19 27 respondents provided suggestions for additional functionality, with some mentioning more functionality via an API to cover payments messaging, and others wanting the new system to facilitate liquidity management and visibility of payments. Better interoperability was also mentioned. A very small number of technology firms suggested use of Distributed Ledger Technology (DLT) to replace the current ledger in RTGS. But, as set out in the Consultation Paper, the Bank has concluded after careful consideration that DLT is not yet sufficiently mature to form the core of the next generation of RTGS. Most respondents endorsed that decision.

Question	Respondents	Yes among respondents
17 Do you agree that this is the right vision for the future RTGS service?	47	96%

20 There was near-universal agreement that the vision set out in the Consultation Paper was the right one for the future RTGS service.

Questions on the future delivery of CHAPS, the United Kingdom's High-Value Payment System (HVPS)

Question	Respondents	Percentage view on direct delivery by the Bank
18 What in your view would be the most appropriate model for delivering the United Kingdom's HVPS?	29	In favour: 48% Neutral: 24% Against: 28%

21 Respondents that favoured a move to direct delivery of the HVPS felt that it would strengthen system resilience and integrity, underpinning financial stability and providing a more direct dialogue for members with the central bank during business as usual and in response to operational incidents. Some also felt that it would reinforce the broader industry strategy of simplifying the structure of UK payments, helping to drive efficiencies and thereby benefiting competition and innovation. Those opposing direct delivery felt that CHAPS Co ran the scheme effectively, had improved its overall risk management framework and provided valued services to its members. All respondents sought further information on the costs, governance and transition arrangements entailed by a move to direct delivery by the Bank and these have been key considerations in the design of the transition plan set out in the main body of this blueprint.

Cost recovery

Question	Respondents
19 Of the proposals in this consultation paper, which do you expect will have the most material impact on the costs of your participation in RTGS (either by increasing or reducing them)?	34

22 Respondents felt the three most impactful proposals were the alternative messaging network, 24x7 operation and ISO 20022. Some respondents stressed the sensitivity of their businesses to costs, particularly at a time of significant change in other areas.

Other issues

Question	Respondents
20 Please provide any other comments that you would like to contribute to the Bank's Review of its RTGS service.	34

23 In answering this question, most respondents reiterated points made elsewhere in their submissions. Some respondents stressed the importance of the Bank thinking carefully about the sequencing of implementation and providing clarity on this. The Bank's decision on DLT was generally endorsed. On non-bank PSP access, some respondents asked the Bank to make progress on access to RTGS accounts in advance of the move to the new system.