HOW THE BANK OF ENGLAND WILL BUILD A NEW RTGS SYSTEM FOR THE UNITED KINGDOM

The Bank of England will over the next three years build an entirely new RTGS system. Its objective of encouraging competition and innovation while enhancing resilience and reducing systemic risk is ambitious. But the central bank is minimising the risks of an awkward transition by reuniting operational and risk management, retaining what works, adjusting gradually, eschewing the temptation to take on functions already performed effectively by the private sector - such as securities settlement - and working closely with the banks.

"A central part of the review, and the subsequent decision to renew the system, was market-led," says William Lovell, head of future technology at the Bank of England. "What we are addressing is a radical change in payments markets." The publication on 9 May of *A blueprint for a new RTGS System for the United Kingdom* marked the third stage of a process dating back to January 2016, when the Bank of England announced it had decided to renew the Real Time Gross Settlement (RTGS) system it has operated since 1996. The blueprint is the result of the subsequent consultation, which ran from 16 September to 7 November 2016.

The 61 submissions to the consultation pointed to one clear conclusion: meeting the future needs of the payments markets meant building an entirely new RTGS system. The Bank is approaching this commission in an understandably cautious spirit. The existing RTGS system, now 21 years old, may not meet the needs of the banks and payment providers of the future, but it still settles an average of £500 billion of payments a day between the banks of the present. "It plays a vital positive role in the United Kingdom economy, supporting its economic and financial stability," says Lovell.

It is easy to forget that the RTGS system is also the means by which the Bank implements the monetary policy decisions which maintain that stability. "RTGS is our general ledger," explains Lovell. "It is where the banks have their bank accounts. It enables risk-free payments to happen. It enables us to implement monetary policy via the reserve accounts. RTGS is not just a settlement system. It is the operational arm of the Bank in delivering its monetary and financial stability policy objectives."

Fresh competitors and new risks

Which is why, paradoxically, the RTGS system must be changed. Challenger banks, new non-bank entrants to the payments markets, and a growing range of cyber-threats, present the Bank with a demanding test. It must balance the opportunity to encourage competition and innovation in payments against the risks that this might introduce, while maintaining or improving the current high levels of resilience.

"The world has changed," explains Lovell. "It presents new challenges with which we have to engage if the Bank is to meet its policy goals of ensuring monetary and financial stability. In a changed environment, we have to make sure not just that the RTGS system works properly, but that we understand how all the players in the system fit together. Systemic risk may materialise not just because a component of the RTGS fails, but because one of our members is struggling with the knock-on effects. In recent years, the way we think about financial stability has become much more about the inter-connectedness of the system."

That inter-connectedness applies to transactions as well as institutions. The Bank is increasingly alive to the links between apparently separate transactions. Cash, for example, might be used by one participant to pay for securities, whose seller then posts the cash as collateral, whose taker uses it to fund a loan. The failure of any one link in the chain could spark a systemic crisis. "Could we make those transactions happen simultaneously rather than sequentially?" asks Lovell.

Waiting for DLT to mature

It is an interesting question to ask – and one made familiar by a particular new technology. Synchronisation and simultaneous settlement of transactions is an idea which is forward-looking enough to be redolent of the aims of many distributed ledger technology (DLT) solutions. By replacing the reconciliation of multiple ledgers by the distribution of a single

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ledger agreed by all parties to a transaction, DLT promises massive reductions in cost as well as risk.[1]

Certainly, the *Blueprint* leaves the possibility of using DLT open more generally. It declares only that “DLT is not yet sufficiently mature to form the core of the next generation of RTGS.”[2] It also describes a synchronised settlement function where the settlement of funds in RTGS is synchronised with the settlement of assets in other systems. The Bank says proof of concept work has already shown how this can be achieved, and adds that it could open up new opportunities for delivery-versus-payment (DvP) and payment versus payment (PvP).

“Resilience is the defining feature of RTGS, now and in the future,” says Lovell. “We need the core part of the new RTGS system to be built on robust, resilient, known technology. However, we expect the use of DLT in other settlement systems to grow quickly, and it is something we want to support and be able to interface with. DLT networks are an emerging risk as well as an emergent technology, and we need to be able to bring central bank money onto those networks in an emergency just as we do in existing payments schemes. In order to do so, we do not need to build our core system on DLT, or issue sterling as a digital currency on a DLT network. We are DLT-aware rather than DLT-based.”

Linkages with DLT networks may complicate the challenge of managing an inter-connected financial system. But some decisions about the management of the new RTGS system are straightforward enough to make. First, the Bank will continue to operate the new RTGS itself. Secondly, it will phase in functionality over time, avoiding the obvious risks of a Big Bang approach.

Why CHAPS Co is being absorbed

Another key aspect of the renewal programme is that it will remove the current separation of the operation of the system from the management of the systemic risk it represents. A model in which a private company controlled by a group of directly participating banks (CHAPS Co) uses an RTGS system operated by the Bank of England to transfer funds between their accounts at the Bank of England will give way to one in which the management of systemic risk as well as the operation of the system itself is vested in the central bank. The Bank sees this as an essential response to the increasing need to take an end-to-end view of risks in the payments eco-system, particularly in light of the growing cyber-threat.

By the end of this year, the Bank of England will have absorbed CHAPS Co. “Having made the decision, on financial stability grounds, to move to direct delivery, there are benefits in not having an extended transition period,” says Lovell. “We want to deliver a best-of-breed RTGS system with a holistic view of risk in the system, and the sooner we can start working on that together the better.”

In the *Blueprint*, the Bank says that the indirect delivery of RTGS services is unusual in international terms. It also notes that the International Monetary Fund (IMF) has described the separation of operational responsibility from risk management as less than optimal.

John Jackson, policy lead, RTGS renewal, at the Bank of England, prefers to cast this issue in a positive light. “It is not so much that we face a ‘burning platform’ today,” he says. “In some areas, CHAPSCo has led the way in thinking through how to do end-to-end risk management. But to take that work to the next level requires, in our view, a direct delivery model, especially in this more challenging environment.”

Balancing stability, competition and innovation

The challenges of the current environment include new entrants, both conventional challenger banks and FinTechs looking to use digital technology to transform the cost as well as the quality of payment services. Jackson says the Bank wants to encourage new entrants and increase innovation and competition, in part by widening access to central bank money settlement through the RTGS system.

So it is not surprising that one of the principal benefits of the new system will be faster and simpler on-boarding of new members. This will become steadily more valuable as membership is widened. The consultation found even established banks keen to streamline the trialling, testing and admission of new members, since the current processes devour staff time and technology budgets. At the same time, easier admission of new members creates new risks. So it is significant that, under the new RTGS system, both the established and the newly admitted service providers will also be under the direct purview of the Bank for the first time.

Indeed, it is tempting to ask whether this was necessary because the interests of incumbent banks have prevented more rapid growth in CHAPS membership. But Mike Jones, head of the market services division at the Bank, says the obstacle to wider access is technical, not political. “We can add a new CHAPS member in RTGS, but it is quite an undertaking to do it, because we made certain choices when we

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1 The Governor of the Bank of England himself has argued publicly that securities settlement in particular seems “ripe for innovation” precisely because a typical settlement chain “can involve many intermediaries, making securities settlement comparatively slow, operational risks and costs high.” See Mark Carney, Governor of the Bank of England, “The Promise of FinTech – Something New Under the Sun?” at the Deutsche Bundesbank G20 conference on “Digitising finance, financial inclusion and financial literacy,” Wiesbaden, 25 January 2017, page 7.

2 Bank of England, *A blueprint for a new RTGS System for the United Kingdom* Paragraph 19, page 27.

built the system that were right for the small number of members we had back in 1996," he explains. "With a burgeoning membership, it does not work so well." Wider access was certainly not a high priority in the 1990s, when the Internet - let alone challenger banks and FinTechs - was not yet established.

But the emergence of new entrants, and the post-crisis appetite for settling in central bank money generally, has put the historic model under pressure. According to Jones, new entrants are pushing for direct access to the RTGS less to compete more effectively with the incumbents than because the 25 direct members insist it is not economic to service low-volume participants as indirect members. This is especially the case after taking into account the onerous requirements to perform Know Your Client (KYC) and anti-money laundering (AML) checks on the clients of new entrants. "Agent banks are not finding it very attractive to service some of these firms," says Jackson.

As the recent announcement[3] to allow non-bank payment service providers access to the RTGS platform shows, the Bank has a different concern. It is to encourage the competition and innovation that new entrants promise, but without putting the RTGS system at risk. New entrants create new risks, which are amplified by the growing threat of cyber–attacks. "The market in the United Kingdom is a vibrant one, with a range of non-bank payments services providers (PSPs) now authorised to compete in the domestic payments market," says Jones. "We think there are benefits to financial stability from competition and innovation, because different channels spread risk as well as providing more choice for consumers. But in encouraging competition and innovation, we must always ensure this is not done at the expense of financial stability, and be careful to ensure the relative degree of regulation does not give new entrants an unfair advantage."

This focus on stability and resilience has received strong support from market participants, old and new. "In the consultation process, we thought the industry would be concerned primarily about functionality and access," says Jackson. "Those issues did matter to the banks, but resilience was always the first priority for users. Banks and non-banks reminded us continuously that our unique selling point is running a settlement platform that is safer than anything else in the sterling payments eco-system."

Multiple layers of resilience

This is why the *Blueprint* places its primary emphasis on resilience, alongside innovation and competition. In fact, the text is noticeably insistent that the new platform is not about addressing perceived shortcomings in the operational resilience of the existing system but about enhancing its strengths. The Bank already runs dual sites simultaneously and has subscribed to the Market Infrastructure Resiliency Service (MIRS), the back-up service provided by SWIFT, since 2013[4]. It remains strongly committed to running a third site as part of the new system.

The chief advantage of MIRS is that it is not technologically equivalent to the dual sites, eliminating the risk of a successful cyber-attack on the dual sites making it impossible for the Bank to settle transactions at all. MIRS may form the basis of a third site, to which the Bank is now committed. "We want to build resilience into the design of the new system," says Jones. "In particular, we want to address cyber-risk. This is a different threat to component failure, which is the primary risk addressed by the existing system. With cyber-threats, people are actively trying to bring the system down. The altered nature of the threat environment since the existing RTGS system was built 20 years ago has influenced and will continue to influence our thinking at the design, build and running stages of the new system. The concept of a technologically non-similar third site will remain core to the new design. Precisely what package we will use to deliver that concept is a key part of the next stage of design."

To address the ever-mutating cyber-threat, the Bank is adopting a secure-by-design approach to building the new RTGS system. It aims to ensure that components and processes are tested for cyber-security vulnerabilities at every stage in the project. "Rather than taking an Armadillo approach, and putting a hard shell around the entire system, we are actually looking to make the platform secure throughout," says Lovell. "We are also looking at people and processes too, to ensure they are hard to compromise. We want to relieve the people executing the processes of the burden of being the last line of defence."

He accepts that effective cyber-security is itself a process, and one without end. "We will never stop making the system more secure," says Lovell. "As vulnerabilities are revealed, and new methods of attack are devised, we will need to defend against those. We see it as a continuous process. It is happening now, and will continue to happen with the new system."

Contingency networks can wait

Surprisingly, this emphasis on resilience does not extend to adding contingency network providers at this stage. This is because the consultation identified no near-term appetite for any means of accessing the new RTGS platform other than SWIFT. Banks are reluctant to support multiple suppliers from the outset,

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3 'Bank of England extends direct access to RTGS accounts to non-bank payment service providers' - read more

4 See "A back-up plan called MIRS," Market Infrastructure Forum Magazine, Sibos Dubai, 2013, pages 21-22.

and to incur the costs of reducing their current reliance on SWIFT, because they are convinced the price at present outweighs the benefits. Furthermore, the SWIFT network in itself already relies on multiple vendors (Multi-Vendor SWIFT IP network) and thus inherently offers a high level of resilience.

Despite, the design for the new RTGS, it will be network-agnostic, allowing the system to interface with, and accept messages from, different networks - as and when they gain traction. “Members told us they fully expect to appoint other network providers at some point during the lifetime of the new RTGS platform,” explains Jackson. “Although they did not want a link to any specific provider now, they did want us to make it easy to adapt to new providers when the need or opportunity arises. Initially, we expect the vast majority of messages to be received through the SWIFT network, but we are nevertheless going to build a network-agnostic system.”

Future-proofing by design

The logic of retaining SWIFT as sole initial network supplier, while retaining flexibility for the future, applies to the project as a whole. “What we have learned from the recent history of technology is that you cannot anticipate what will be going on in five or seven or ten years’ time,” says Lovell. “We are building a system that meets the demand for changes that we can predict now but which can also accommodate the unforeseeable changes of the future.”

Neither the Bank nor the banks see any point in jettisoning aspects of the current RTGS system that either do not need to be replaced, or which could be enhanced. Equally, there is recognition that not all future possibilities can be anticipated, so the architecture of the new platform has to remain flexible. “We want to build a system that does not just capture benefits now, but which is flexible enough to accommodate future changes,” says Jackson. “Since change always entails cost, the readier the system is to respond at the time, the less it will cost to future-proof the service.”

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A good example of future-proofing by flexibility in design is the decision not to operate the new RTGS platform 24/7 from the outset, but nevertheless to ensure it is capable of being operated around the clock. If it ever became possible to synchronise sterling payments made through the new RTGS system with US dollar payments settled via Fedwire, for example, operating the RTGS 24/7 would make good business sense.

“At the moment, the eco-system as a whole cannot support operating 24/7,” says Jones. “But by taking the technical constraint off the table, the new RTGS system will not be the critical obstacle to moving to 24/7 operation. The discussion now and at the time can be about the business benefits to the banks and their clients, not whether or not it is technically feasible.”

If and when it does eventually happen, the Bank expects the shift to 24/7 operation to proceed in stages. In fact, a first step towards continuous operation was taken on 20 June 2016, when daily closing of the RTGS system was extended from 16.20 to 18.00. This gives banks the opportunity to extend their real-time settlement service to their customers by a further hour and 40 minutes a day.

Benefits of the new system

The new RTGS system, once it is up and running, promises to add a string of additional benefits. Chief among them is more efficient management of liquidity. With payments in the United Kingdom currently reaching the RTGS system via four retail payment schemes – Bacs, the Faster Payments Service (FPS), Cheque and Credit Clearing (CCC) and LINK – as well as the CHAPS Co high-value payment scheme, there is obvious scope to manage the costs of liquidity downwards.

Payments from different schemes could be sequenced more efficiently and the collateralisation of payments could be automated. “We have got liquidity-saving functionality built into the design of system today, and will have in the new system too,” says Jackson. “But we will also be trying to make the way settlements happen across the different schemes more efficient.”

Standardisation of interfaces

But the Bank is thinking beyond the United Kingdom, and designing a system with the same or at least similar interfaces to RTGS systems in other countries. Interchangeable interfaces will make it easier for United Kingdom banks to inter-operate with other systems, creating savings in back office connectivity expenditure. “International banks have their core payment systems, which they use around the world,” says Mike Jones. “The simpler it is to link to our system, and the more similar our system is to other RTGS systems, the easier and cheaper it is for banks to set up and maintain the interface.”

This is why the Bank is a member of the HVPS+ ISO 20022 global market practices group for high value payments systems, developed by the HVPS Task Force. “ISO 20022 is at the heart of efforts to harmonise access to settlement systems around the world,” says Jackson. “At present, banks have to set their operations up differently to access systems in the United States, Europe and Japan, and between high and low value payment systems, and between payments systems and securities systems, even in the same country. Harmonising as much as possible on how we move to ISO

20022 can reduce the costs of this work considerably."

More and better management information

ISO 20022 compliance has the further benefit of providing richer message fields. These can be used to automate regulatory reporting and improve service to customers, not only by allowing banks to give customers more information but by furnishing the banks themselves with data they can analyse to find ways of lifting their own performance. "To deliver improved services banks need to analyse their payment and liquidity flows," explains Jackson. "We want to get to the point where users can pull bespoke information out of the system to meet their needs."

The Bank already provides a business intelligence database based on payments activity the previous day, which banks are using to complete regulatory reports and analyse their activity. The new RTGS system will make this data available for download directly into bank systems, report to banks how efficiently their payments settled, and tell them how much liquidity they consumed. It will also introduce message tracking capabilities, so users can see the exact point a payment has reached between initiation and settlement.

No integration of cash and securities settlement

The new RTGS system will not change the way cash payments are integrated with the Euroclear CREST securities settlement system. This puts the Bank on a different strategic path from the European Central Bank (ECB), which already operates its own high value payments and securities settlement systems, and is planning to integrate them with its new instant retail payments solution into a single all-encompassing platform. John Jackson explains that the consultation identified no appetite for integration of this kind in the United Kingdom. Securities settlement and retail payments are provided in the private sector – and the Bank sees no market failure which would warrant imposing the costs of such a change on the industry.

Indeed, Jackson argues that separation of settlement systems has the potential to enhance resilience. "On 20 October 2014, when we could not make CHAPS payments, CREST payments continued smoothly," he says. "The outage therefore had much less impact on the functioning of wholesale markets. So we are intentionally not making drastic changes on the securities side. It is true that a number of central banks have either used the same engine for cash and securities settlement, or are now merging them, but we have explicitly ruled out an end to the United Kingdom model of separating the two, while keeping them tightly coupled around settlement."

Minimising the risk of failure

It is prudent also not to attempt too much. The transition of a critical national infrastructure to a new technology platform over the next three years – the majority of the new functionality is expected to be in place by the end of 2020 - is risky enough without attempting to integrate cash and securities settlement simultaneously.

The Bank is already working hard to ensure the integration of CHAPS Co involves minimal disruption to the high value payments system in the United Kingdom, as well as for the Bank as operator of the RTGS system. Three of the retail schemes affected by the transition to the new RTGS platform - Bacs, Faster Payments and Cheque and Credit Clearing (CCC) - have embarked on a merger of their own. Inevitably, this will place time and resource demands on their employees, and the employees of the banks they service.

Any major technology investment is vulnerable to weaknesses in project management and cost over-runs. In building the new system, the Bank will involve third party contractors – but they will work closely with their own in-house teams. A successful transition to the new platform will also depend on the co-operation and active engagement of RTGS members. It would be surprising if this was not forthcoming, since it is they who will ultimately pay for the new system.

While the Bank will fund the design and build, it will recover the costs from the users over time. Estimates of the costs are still being developed, but they will be substantial. So it is obviously vital to ensure the banks are fully engaged from the outset, and the Bank has already established industry outreach bodies to ensure an open dialogue. It is also promising full transparency on the costs it incurs as the project proceeds.

The risk of failure in any project of this size is real, and cannot be eliminated. But Lovell is confident the Bank can identify and mitigate the major obstacles to success, and deal with them in collaboration with the banks that are the ultimate users and beneficiaries of the new RTGS system. "Eschewing a Big Bang approach removes the risk of losing our RTGS capability altogether," he says. "In fact, the thing we most need to avoid, in the process of trying to renew this system, is taking our eye off the current system. The current service has to continue unaffected, irrespective of any changes we impose, and irrespective of the many changes taking place in the payments industry as a whole."

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