

Upgrading legacy banking platforms

Bank Governance
Leadership Network

May 2019



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“There have been many attempts by banks to rebuild systems, but I think we’re in a different place now. New possibilities are on the table.”

— Participant

Customers’ increasingly demanding preferences and the evolving competitive landscape are putting pressure on banks to be innovative and agile. Despite the capital and energy recently invested in technology, many major banks remain in the early stages of becoming truly digital organizations. To date, investment dollars have focused primarily on enhancing customer service and efficiency, but these improvements have often been layered over or supported by decades-old ‘legacy’ systems that often obstruct the banks’ achieving the full potential of end-to-end digitalization.

As banks face increasing competition with technology-driven companies—new entrants in the industry that are free of the burden of legacy systems—pressure to improve their own capabilities is unrelenting. The advances in computing and telecoms technologies are lowering the costs of major upgrades and will empower incumbent banks to rethink their approaches to digital transformation. Banks are therefore at, or approaching, a tipping point.

On February 27 (London) and March 7 (New York), 2019, BGLN participants met to discuss the ways incumbent banks are approaching what have become fundamental questions: How can banks effectively address core system upgrades? What are the considerations for boards, management teams, and supervisors as firms weigh their options?

This *ViewPoints* synthesizes the key themes which emerged from the discussions in each of these meetings, and from conversations with network participants beforehand and immediately afterwards. These meetings also included discussions on achieving operational resiliency. Themes from those parts of the discussions are summarized in a separate [ViewPoints](#).

Banks are addressing legacy challenges in new ways

Banks have spent the past few decades cobbling together systems that are no longer fit for purpose. A recent report by the UK's Financial Conduct Authority (FCA) noted that nearly 50% of banks do not upgrade or retire old IT systems as early as they should.¹ An executive said, *"Financial institutions are museums of technology dating back to the 1960s. Firms have stacked so much technology over the years, it's become this huge legacy. The complexity makes it impossible to manage risk."*

According to a 2017 report, 43% of US banks still use COBOL (the Common Business-Oriented Language), a programming language first developed in 1959.² However, some experts note that it might not be the age of COBOL (which is still updated regularly) that causes problems; rather, outages occur when new services are added to existing systems as extra layers as opposed to being embedded properly. New mobile applications are an example.

"Financial institutions are museums of technology dating back to the 1960s ... The complexity makes it impossible to manage risk."

– Executive

Core banking systems often do not run in real time and instead are updated just once a day, an issue that becomes increasingly limiting as customers demand applications and services built around real-time offerings and capabilities. An executive said, *"There have been some system upgrades in the industry, but no one wants to truly tackle 'real time' across a firm's systems, and that's a real issue. Most fintech companies have real time built in, and that's who you're trying to keep pace with."*

To add to the complexity of the legacy issue, few people within a bank truly understand these systems and how they function due to outsourcing and the way they have been pieced together over time. A director said, *"It's a really important piece of this jigsaw ... our systems aren't just 'our' systems; they're aggregated from different providers, or in some cases a single provider. It really complicates the issue and adds to migration concerns as well."*

Banks are reaching a tipping point

The clear logistic and strategic challenges in overhauling legacy systems have often steered banks away from platform migrations; instead, they have searched for ways to maintain existing infrastructure. A 2014 survey of IT leaders at 27 banks found that they were largely committed to existing core systems. The resultant report noted that "No one is contemplating the replacement of core banking systems ... Most bank leaders are engaged in investments for which payback is expected in the same year for highly

targeted modernization initiatives ... Budgets are mostly tight, but adequate for incremental improvement.”³

Perceptions of the necessary urgency of making changes to core systems, and the capacity to do so effectively, are now changing. One executive said, *“It seems in the last 12 months there has been a sea-change: this is now a clear and present issue for banks who are trying to figure out a path to address legacy and remain relevant.”* A bank’s future commercial viability may depend on its capacity to replace its legacy systems. A director said, *“Some firms are ahead of others, but at the end of the day we all have to prepare for a very different future. I think more banks are realizing if they want to get to that future and stay on the leading edge, they must clean up their systems.”* A participant said, *“Legacy will always be with us: anything you’re building today will become legacy.”* Indeed, no matter the approach a firm takes to legacy platforms, whatever is built today risks becoming outdated increasingly quickly, given the rapid, geometric rate of technological advancement. The strategic challenge is to harness advances in technology. One executive explained, *“We’re trying to get out of the episodic updating of platforms and instead make something agile that can be adapted over time as needed.”*

“There has been a sea-change: this is now a clear and present issue for banks who are trying to figure out a path to address legacy and remain relevant.”

– Executive

Maintaining business continuity and managing risk throughout such a massive undertaking are key areas of concern. As one participant put it, *“You have to understand that it is a ‘heart transplant’, because the bank needs to keep running while you do it, and it needs to be safe throughout the process.”*

Increasingly, executives and directors are viewing their antiquated systems as a strategic concern that must be addressed to assure future success, rather than as a problem for IT departments to manage. A participant stated, *“It’s going to be a matter of fundamental relevance. That’s why legacy transformation is so important in this moment, because there is a context around what is so urgent and why banks need to get it right.”*

Participants discussed some reasons why firms may be reaching a tipping point regarding the future of legacy platforms:

- **Technology costs are coming down.** While it may in the past have been prohibitively expensive to make holistic upgrades to core systems or build new banking platforms, some experts and participants have noted that costs are declining.
- **Banks want to maximize returns on IT investments.** Legacy systems leave data fragmented and place a drag on banks’ moves to market with new products and services. Investments in technology have allowed banks to more effectively leverage their data, automate processes, launch

application-programming interfaces, and adopt artificial intelligence (AI) and machine-learning applications. However, many incumbents will need to change their underlying core infrastructure if they are going to reap their investments' full rewards.

Continuous improvement

Fintechs and technology giants have the platforms and processes in place to quickly adapt to changes in the marketplace. Ant Financial, the largest fintech in the world, reportedly refreshes its complete systems architecture every three or four years.⁴ For smaller fintechs, their relative size and agility, and the absence of legacy systems, frees them to continually rethink their platforms and services. A participant said, *"Fintechs have the concept of continuous disruption: they build a platform and never are satisfied with it, they're constantly revising."* Several participants emphasized that banks should take a similar approach, and perhaps not get disheartened when progress is incremental rather than transformational. An executive explained, *"When you're too close to this, it can look like a waste. Our most agile teams are often redoing work they did two years ago. You could ask why they didn't do it right the first time, but that's the wrong lens. If you keep updating and rethinking, that's how you eventually get away from legacy."*

The new leadership challenge is to build agility and adaptability rather than bet on a massive but rigid tech transformation program. An executive explained, *"The point is that these technologies are going to change the game, and you need to find a way to get into this game but there is no 'right way' to do it."*

Technological advances are enabling new possibilities

As technology improves, tasks that were considered too expensive or complex just a few years ago may appear more viable today.

A participant explained how broad and foundational shifts in technology are enabling new possibilities at financial institutions, saying, *"Think about a pyramid. At the top are the use-cases we see in our everyday lives: order a ride through Uber, or Skype our grandchildren. In the middle is the tech enabling those use-cases: things like mobile technology and video capabilities. But at the base is the fundamental improvements in computing power in the hands of virtually anyone, at relatively low cost. That can unleash all kinds of possibilities."*

For bank leaders who are developing a roadmap for the future, a crucial first step is to determine what capabilities their institutions will need to remain competitive and innovative in the coming years, and how upgrading the

systems can support those capabilities. An EY subject matter advisor (SMA) predicted, *“In the next five years, the consumer finance ecosystem almost in totality—banking, wealth management, insurance: the whole ecosystem—is going to get fundamentally reframed.”*

“Banks are really just data, when it comes down to it. Yet we handle data spectacularly badly.”

– Participant

Participants highlighted two areas banks must improve to position themselves for the future:

- **Improving data management.** Improving data management might be the single most important driver of systems upgrades. One participant stated, *“Banks are really just data, when it comes down to it. Yet we handle data spectacularly badly.”* Financial institutions need to be able to identify customers across businesses and products and enhance their risk management. Legacy systems present a significant challenge in that regard, as a bank’s data are stored in numerous locations across its systems. An executive explained, *“You can’t identify a customer with precise accuracy, because they can appear 50 to 100 times across a bank’s database, and you have no way of monitoring that.”* One participant said this issue occurs consistently across the banking industry, whether retail, wholesale, or commercial: *“It’s a strategic problem that really comes down to data fragmentation. It’s not just consumer: the fundamental challenge is the same in commercial. If you can build data around a customer or client, it will solve a lot of problems.”*
- **Responding to changing customer expectations.** Customers will increasingly expect constant accessibility, efficient interactions, and unique, contextualized offerings from their banking provider, all without interruptions or downtime. These increasingly sophisticated expectations reflect both broad economic and technological trends across service industries and the successes fintechs and other tech companies have had in delivering financial services in new and innovative ways. An executive said, *“Fintech shows there is a different way to provide financial services. It’s not a question of whether they can scale and beat banks, it’s about the fact that they are raising customer expectations.”* Another participant said, *“The core of your bank today is your core banking platform, but really the customer should be the core. You must build around the customer.”* A participant described providing this personalized, more holistic view of customer finances as *“relationship banking, on steroids. You have to fix legacy, if that’s the destination point.”*

Cloud technology is key to upgrading bank systems

Cloud technology has become central to the transformation efforts of many financial services institutions. An executive said, *“We think of 2008 as the seminal year in the industry because of the financial crisis, but I think 2006 will be the real one. That’s because Amazon Web Services started in 2006 and introduced cloud computing, which made vast computing power available in ways it wasn’t before.”* A 2018 study predicted that, by 2021, banks will spend more than \$12 billion on public cloud infrastructure and data services, up from \$4 billion in 2017.⁵ Many banks have moved data to the cloud, but the next steps could involve moving entire platforms to the cloud and taking advantage of the speed and computing power of cloud-native software and applications. A participant noted that *“The benefit of cloud is the promise of an evergreen system. You no longer need to worry about the platform becoming obsolete.”*

Uses of cloud are evolving

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– Participant

A participant said, *“I see the conversation around cloud as two parts. One is about power and storage, the other is about innovation and agility ... when you talk about using cloud-native technologies, that’s when you’re really opening up a lot of innovative opportunities.”* Several participants noted that banks should think differently about data strategy, once they move to the cloud, to take full advantage of the technology. An EY participant said, *“I see a lot of clients trying to map existing applications onto the cloud; that’s not the best approach. It’s a chance to start fresh with a new data strategy in the cloud and define your data model across the whole bank.”*

Rethinking data strategy involves new approaches to analysis and how the data is employed. AI technology makes it possible to automate complex tasks and find new solutions. A cloud expert said, *“The first step is to get all that data into the cloud to use the world-scale computing power of a large-scale cloud provider. The next step, once you have the data there on the cloud, is how do you analyze it? The data has to be in the cloud to leverage those AI abilities.”*

Cloud technology has the potential to transform an institution’s operational efficiency. A participant explained, *“You don’t need to procure infrastructure any more: you can just access it right away. Asking IT for 10 more servers is no longer an issue. The infrastructure stops being a blocker in your ability to be agile and evolve.”* A director agreed, adding, *“It saves a lot of hassle in terms of not needing to outsource to multiple providers or procure infrastructure and servers when you want to try something new.”*

Firms and regulators are monitoring the risks associated with cloud

Though most banks are using cloud technology for moving and managing large swaths of data, questions remain—particularly among regulators—about the relative risks of moving even more data and platforms onto the cloud.

“That’s why greenfield is interesting, because you’re trying new technologies but in a controlled, almost ringfenced way.”

– Executive

Some regulators and bank leaders expressed concerns about the concentration risk from having so few large cloud service providers. A regulator explained, *“There are two problem areas we monitor with cloud broadly. First, it must be implemented correctly and safely: knowing how much you can take on, and how you can control and manage that. Second, there is concentration risk and also systemic risk.”* Another regulator agreed, adding, *“We are looking over new data to see what the scale of the concentration problem is. Candidly, it’s making us slightly nervous.”* Regulators themselves have begun to use cloud for their own data management and appear to be at varying levels of comfort with the technology.

Some participants advocated caution, as institutions increase commitments to cloud technology. One director said of vendors, *“We need to be challenging them more, now that we are not the experts any more. I get the sense that we’re all just saying how great it is, and we’re all heading off a cliff together and smiling while we do it.”* Another director added, *“It’s going to come back to the governance challenges, a lot of the time. The regulators aren’t going to sit here and tell you everything with cloud is perfect, because nothing is perfect.”*

Banks are using new platforms as testing grounds for new models

For many incumbents, part of the process of moving on from the aging core has been to create new, smaller platforms that operate on modern, often cloud-based systems and are designed to serve a specific strategic need. Some experts have dubbed this the “greenfield” approach. The idea is to start afresh with a new platform, which could then migrate from the core over time. Greenfield ventures often operate separately from the larger institution, using their own state-of-the-art IT infrastructure and deploying new technology solutions as needed. Some view this approach as less risky than a major upgrade to core systems, as institutions can use the stage-gate process for investment and can quarantine risk to an extent. An executive said, *“Doing something you haven’t done before is inherently riskier. That’s why greenfield is interesting, because you’re trying new technologies but in a controlled, almost ringfenced way.”*

Some firms are partnering with a third party, such as a technology firm or a challenger fintech, to launch these platforms. Several banks have used new digital platforms to expand into different market segments and offer new products and services to new customers. In 2016, Goldman Sachs launched Marcus, an online platform that provided an entry into the consumer lending market. Marcus is a digital-only offering that processes transactions in real time and is delivered over the cloud; it has been described as a self-contained “bank within a bank.”⁶ Other major banks that have launched similar digital platforms include JPMorgan (Finn) and ING (Yolt). Royal Bank of Scotland has enlisted the help of challenger bank Starling to develop a new mobile-only venture, called Bó, that is expected to launch during 2019 and ultimately migrate one million of its NatWest customers to the new platform.^{7,8}

“If your plan is to build massive new platforms and immediately move everything over, you’ll never get there.”

– EY SMA

In another notable third-party partnership, Lloyd’s Banking Group has initiated plans to test a new core system built by Thought Machine, a banking technology provider in which Lloyd’s owns a 10% stake.⁹ The process will begin by transferring data on 500,000 customers to the new core system and, if the move proves successful, the bank may proceed with a similar transfer across all of its business functions over the next few years.

Creating new brands is not a novel idea in financial services; in the past several firms built telephone and internet banking platforms under new brands, such as Egg (originally Prudential plc), First Direct (HSBC), and Open Bank (Santander). A participant asserted that what is different this time is the exploratory intention: *“You may introduce a platform or try greenfield so that you can get experience with new technologies and figure out how to migrate things over time. This is about trying new things and coming away with lessons learned.”*

Effective practices are emerging

A director described a *“strategic roadmap”* approach to tackling legacy system issues, where the bank uses a variety of tools—such as cloud technology, partnerships with third-party firms, and new platform models—that bit by bit, over time, collectively take the burden off aging core systems. An EY SMA explained why this is an effective approach: *“We’ve seen the most success with a more incremental approach to your transition. If your plan is to build massive new platforms and immediately move everything over, you’ll never get there.”*

For firms taking an incremental approach to upgrading their IT infrastructure, decommissioning old systems requires the same attention as launching new ones. A regulator said, *“It is very hard to look at a system you’ve had for 5, 10,*

20 years and turn it off and say you're totally done with it." To fully optimize returns on IT investments, banks must ensure that old systems are actively decommissioned in a carefully managed process as new ones are created and implemented. An executive said, "Decommissioning needs to be as active of a program as the building of the new system. If you don't decommission the old system and the server(s) on which it runs, you are not getting the cost back, you have to give the core the cost back."

To be successful with this strategy, participants noted that banks and their third-party platform providers must also be committed to making difficult decisions around what to keep versus decommission. One director warned that some approaches to updating legacy can leave the lingering problem of old systems that continue to run: *"You often get a provider who will say they'll do everything clean and new and later on you find out that isn't the case, that they have to keep this bit and that bit. It tends to be that we think we're creating a whole new system, but you end up dragging the old system along as well."*

Oversight of system upgrades presents challenges to bank leadership

"These issues should be regarded as matters of strategy for the management and board, not just for the Chief Information Officer to deal with."

– Participant

Investments in system upgrades should be viewed as a serious strategic challenge. As one participant put it, *"These issues should be regarded as matters of strategy for the management and board, not just for the Chief Information Officer to deal with."*

Continuously learning about new technologies becomes a critical responsibility for any bank board member today. An executive said, *"If I was on a board, my three questions would be: What is the legacy strategy? Where are we going to get the skills to accomplish this? And, are we being ambitious enough? The last one is most important."*

Evaluating pace and progress

Several directors noted that it can be difficult for boards to measure progress or success regarding large-scale upgrades to legacy systems. Despite technology becoming cheaper, bank leaders still need to balance the near-term cost of major upgrades with the longer-term requirements to remain competitive. Long-running and expensive initiatives such as these can take years to pay off and, in the meantime, shareholders may grow restless when facing a lack of immediate bottom-line returns.

Participants largely agreed that many banks could benefit from being more aggressive with their innovation strategies, but one director encapsulated the

challenge: *“As banks we can’t take a lot of risk and fail fast; we’re not technology companies and we can’t operate the same way they do. Figuring out how to balance risk versus moving fast enough is a really challenging task for a bank board.”* Regulation and the high level of public scrutiny increases the temptation for institutions to move slowly, but that can be a risk as well. A director said, *“It’s easy to see the risks of doing something, but much harder to see the risks of not doing something.”*

“A lot of the new platforms are being built by new entities that are not very big themselves. Could they build scalable platforms and support the big banks?”

– Director

While reducing costs is a central objective of updating systems, achieving those results may require significant spending upfront. A director said, *“You get a report back saying your firm has X number of applications, or a particular system was augmented or improved upon, but how do you benchmark your progress versus other firms? How do you know what success looks like?”* Some participants suggested that directors should speak with executives below the C-suite level to get insight on how investments are affecting them on a day-to-day basis and the speed and efficiency of the organization.

One participant recommended an indicator that could—perhaps counterintuitively—be a red flag: *“Ask your executives how much work is going on with robotics. If you have a lot of work going on with robotics, that could be a sign that they are just putting a big band-aid on the problem. It’s just trying to automate the old process instead of changing it.”*

Considering questions of geography and scale

Several participants noted that most fintech start-ups and challenger banks that are operating on new digital platforms are still relatively small, as are many of the emerging technology providers that are building digital platforms. Even some of the largest banks are now considering whether to go with the newest platforms from traditional technology providers, or experiment with emerging technologies and platforms that may not have been tested at scale but are on the leading edge. A director said, *“A lot of the new platforms are being built by new entities that are not very big themselves. Could they build scalable platforms and support the big banks? It will be interesting.”*

For the biggest banks, a crucial challenge in managing legacy systems is that these exist across diverse geographies, so separate parts of the firm may operate very differently or be subject to divergent regulations and requirements that may include limitations on the ability to move and store data. This is part of what makes a large-scale system overhaul such a complex proposition for a global bank. One director said, *“We have defined what decisions need to be taken together at the global level and those that can be taken at the local level. There’s a lot of balance to figuring out global versus local, and it’s something we still need to work on when it comes to digitalization.”*

About this document

About *ViewPoints*

ViewPoints reflects the network's use of a modified version of the Chatham House Rule whereby names of network participants and their corporate or institutional affiliations are a matter of public record, but comments are not attributed to individuals, corporations, or institutions. Network participants' comments appear in italics.

About the Bank Governance Leadership Network (BGLN)

The BGLN addresses key issues facing complex global banks. Its primary focus is the non-executive director, but it also engages members of senior management, regulators, and other key stakeholders committed to outstanding governance and supervision in support of building strong, enduring, and trustworthy banking institutions. The BGLN is organized and led by Tapestry Networks, with the support of EY. *ViewPoints* is produced by Tapestry Networks and aims to capture the essence of the BGLN discussion and associated research. Those who receive *ViewPoints* are encouraged to share it with others in their own networks. The more board members, senior management, advisers, and stakeholders who become engaged in this leading edge dialogue, the more value will be created for all.

About Tapestry Networks

Tapestry Networks is a privately held professional services firm. Its mission is to advance society's ability to govern and lead across the borders of sector, geography, and constituency. To do this, Tapestry forms multi-stakeholder collaborations that embrace the public and private sector, as well as civil society. The participants in these initiatives are leaders drawn from key stakeholder organizations who realize the status quo is neither desirable nor sustainable, and are seeking a goal that transcends their own interests and benefits everyone. Tapestry has used this approach to address critical and complex challenges in corporate governance, financial services, and healthcare.

About EY

EY is a global leader in assurance, tax, transaction, and advisory services to the banking industry. The insights and quality services it delivers help build trust and confidence in the capital markets and in economies the world over. EY develops outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, EY plays a critical role in building a better working world for its people, for its clients, and for its communities. EY supports the BGLN as part of its continuing commitment to board effectiveness and good governance in the financial services sector.

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Appendix: discussion participants

In February and March of this year, Tapestry and EY hosted two BGLN meetings on upgrading core platforms and resilience. These meetings included more than 35 conversations with directors, executives, regulators, supervisors, and other thought leaders. Insights from these discussions informed this *ViewPoints*, and unattributed quotes from these discussions appear throughout.

The following individuals participated in BGLN discussions on upgrading core platforms and resilience:

BGLN Participants

- Homaira Akbari, Non-Executive Director, Santander
- Jeremy Anderson, Audit Committee Chair, UBS
- Mike Ashley, Audit Committee Chair, Barclays
- Aditya Bhasin, Chief Information Officer, Consumer Technology and Wealth Management, Bank of America
- Norman Blackwell, Chair of the Board, Nominations & Governance Committee Chair, Lloyds Banking Group
- Lee Bressler, Director, US Capital Markets Lead, Microsoft
- Amy Woods Brinkley, Non-Executive Director, TD Bank
- Pat Butler, Chair, Aldermore Group
- Juan Colombás, Chief Operating Officer, Lloyds Banking Group
- Jim Coyle, Non-Executive Director, HSBC UK Bank plc
- Andrew Dapre, EMEA Lead, Financial Services, Azure Engineering, Microsoft
- Michel Demaré, Vice Chair of the Board, UBS
- Beth Dugan, Deputy Comptroller, Operational Risk, Office of the Comptroller of the Currency
- Lynn Dugle, Technology & Operations Committee Chair, State Street
- Terri Duhon, Risk Committee Chair, Morgan Stanley International
- Betsy Duke, Chair of the Board, Wells Fargo
- Mary Francis, Reputation Committee Chair, Barclays
- Mark Gibbons, Chief Technology Officer, EMEA, BNY Mellon
- Nigel Hinshelwood, Non-Executive Director, Nordea; Senior Independent Director, Lloyds Bank plc and Bank of Scotland plc
- Antony Jenkins, Founder and Executive Chair, 10x Future Technologies
- Robin Jones, Head of Technology, Resilience & Cyber, UK Financial Conduct Authority

- Phil Kenworthy, Non-Executive Director, ClearBank
- Christine Larsen, Non-Executive Director, CIBC
- Callum McCarthy, Non-Executive Director, China Construction Bank
- Richard Meddings, Non-Executive Director, Deutsche Bank and Executive Chair, TSB
- Andy Ozment, Chief Information Security Officer, Goldman Sachs
- Mary Phibbs, Remuneration Committee Chair, Morgan Stanley International
- Nathalie Rachou, Risk Committee Chair, Société Générale
- Bruce Richards, Chair of the Board, Credit Suisse USA
- Patrick de Saint-Aignan, Risk Committee Chair, State Street
- Manolo Sanchez, Former Chair and CEO, BBVA Compass
- Alan Smith, Global Head, Risk Strategy, HSBC
- Danielle Vacarr, Vice President, Financial Institution Supervision Group and Governance & Controls National Co-Chair, Federal Reserve Bank of New York
- Suzanne Vautrinot, Corporate Responsibility Committee Chair, Wells Fargo
- Paul Williams, Senior Technical Advisor, Operational Risk & Resilience, Bank of England

- Tom Woods, Non-Executive Director, Bank of America

EY

- Omar Ali, Managing Partner, UK Financial Services
- Anthony Caterino, Vice Chair, Americas Regional Managing Partner, Financial Services Organization
- Olivier Colinet, Partner, Head of Cloud, Financial Services Advisory
- Dan Cooper, UK Banking & Capital Markets Leader
- John Doherty, Partner, Information Technology Advisory
- Steve Holt, Partner, EMEA Financial Services Cybersecurity Leader
- Nik Lele, Principal, Financial Services Office
- Shankar Mukherjee, Partner, Financial Services Advisory UK
- Daniel Scrafford, Principal, Financial Services Risk Management Practice and Co-Lead, Global IBOR Transition Campaign
- Mark Watson, Deputy Leader, Center for Board Matters, Financial Services Office

Tapestry Networks

- Dennis Andrade, Partner
- Brennan Kerrigan, Associate
- Tucker Nielsen, Principal

Endnotes

¹ Caroline Binham, [“IT Failures at Financial Firms Have More than Doubled Says FCA,”](#) *Financial Times*, November 27, 2018.

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³ [“Banks Are Not Contemplating Core Systems Replacement,”](#) *ComputerWeekly.com* (blog), August 22, 2014.

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⁶ Penny Crosman, [“Goldman Sachs Reveals Technology Behind Marcus,”](#) *American Banker*, November 30, 2016.

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⁹ Nicholas Megaw, [“Lloyds Plans To Cut Costs with Start-up’s IT Platform,”](#) *Financial Times*, January 23, 2019.