WORLD ECONOMIC FORUM

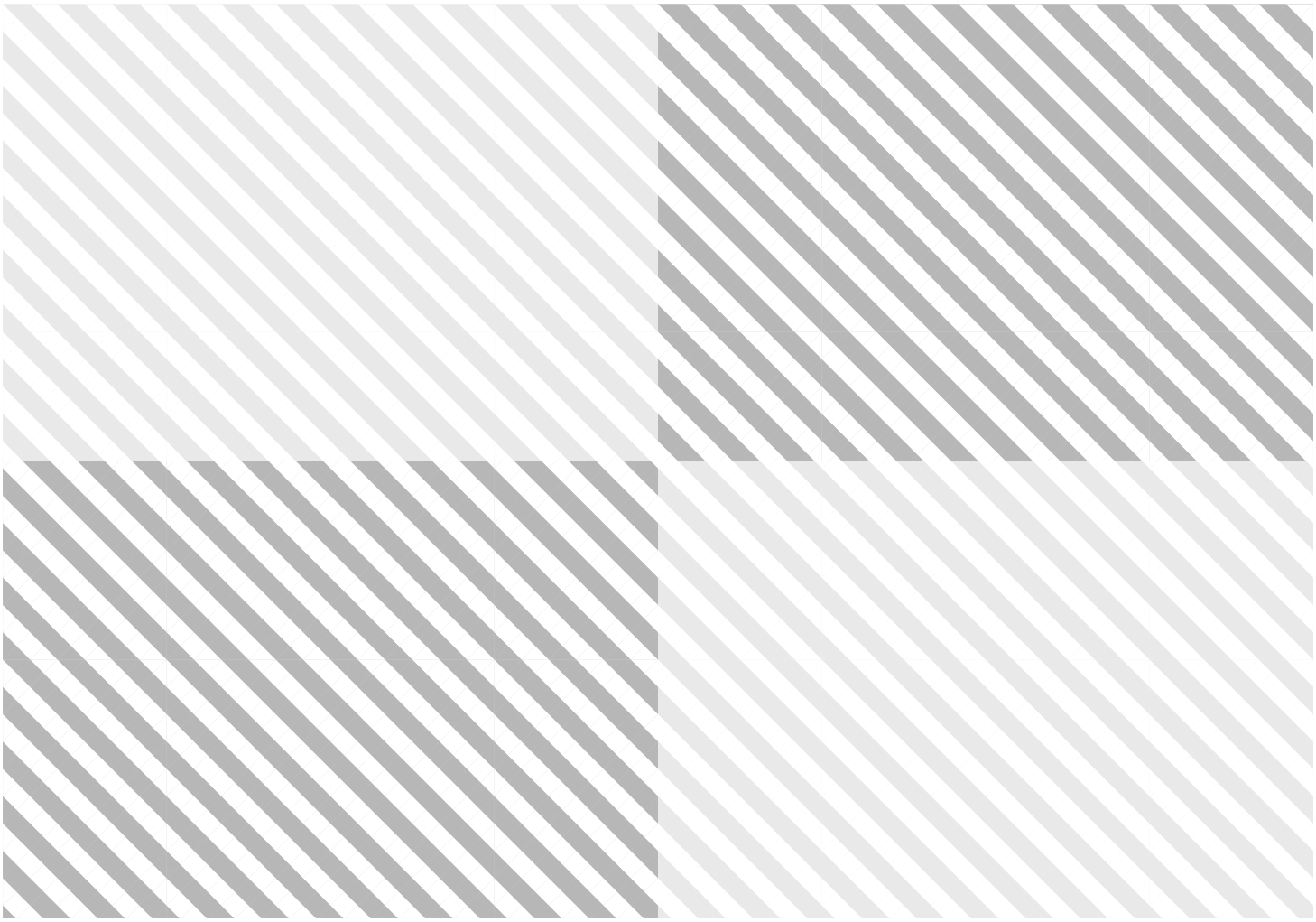
COMMITTED TO IMPROVING THE STATE OF THE WORLD

White Paper

Balancing Financial Stability, Innovation, and Economic Growth

Prepared in collaboration with Oliver Wyman

June 2017



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Foreword

In an effort to understand better the implications of the Fourth Industrial Revolution – a technology-led transformation that is fundamentally altering the way people work, live and relate to one another – the World Economic Forum has prioritized a review of the financial system through the launch of a new initiative: Balancing Financial Stability, Innovation, and Economic Growth (FSIEG).

Led in partnership with Oliver Wyman, FSIEG aims to bring together practitioners and policy-makers to understand better the competitive, human capital, and regulatory dynamics of the financial sector in the future.

As part of this work, **the Forum has held a series of roundtable discussions and completed interviews with industry executives and experts** to examine the technological transformation taking place in financial services.

A particular focus has been understanding the trade-offs between the customer service and economic growth benefits of innovation on the one hand, and the need to manage risks to systemic stability on the other. This White Paper provides a summary of findings identified during the ongoing discussions and interviews, which at a very high level can be condensed in the following four points:

1. Further major innovation-driven change is coming in financial services.
2. Joint, concerted action is needed to enable the system to reap the benefits of innovation.
3. Managing some systemic risks introduced by this wave of innovation poses challenges.
4. The financial services system would benefit from certain tools to achieve greater enablement and risk management.

"Innovation-driven change will overhaul the industry at a time when other strategic drivers including the low-rates environment and the regulatory tightening are still unfolding their impact. Close dialogue between the authorities and the industry will be key to reap the benefits of innovation for consumers while ensuring financial stability"

Axel A. Weber, Chairman of the Board of Directors, UBS

"Fintech has great potential, but needs to develop in a way that maximizes the opportunities and minimizes the risks. To reach the potential and address the challenges, global regulators may take consistent regulatory approaches across jurisdictions"

Eric Jing, Chief Executive Officer, Ant Financial Services Group

"Digital technology holds great promise to expand financial inclusion, but we must ensure that its growth does not undermine customer well-being or financial system stability. Close dialogue between private-sector innovators, regulators, supervisors and standard-setting bodies is a priority so that we build toward the digital future on solid footing"

H.M. Queen Máxima of the Netherlands, United Nations Secretary General Special Advocate for Inclusive Finance for Development

1 Further major innovation-driven change is coming in financial services

Financial and monetary systems have continuously evolved and developed over time. Since the 1960s and 1970s, much of this change has come from technology-enabled innovation. However, the changes taking place today are faster and more substantial than previously experienced, and affect all actors in the system.

Financial services is undergoing an overarching shift towards an increasingly modular system. In the past, one organization would own the client service relationship, develop all products and own all the infrastructure end to end (one-stop shops). It is now more often the case that different firms compete or partner at a variety of points along the value chain. Incumbents looking to leverage innovation as a source of differentiation and to broaden services, and new competitors harnessing innovation to take market share, are driving this transformation.

To simplify the view of the system, the modules of the new financial services value chain can be thought of as:

- **Customer service platforms** that aggregate a diverse set of products and services from various providers for customers to choose from. Partnerships are critical for successful platform development and increasingly traverse industry affiliations: e.g. telecoms and retailers competing for client mindshare.
- **Financial product or component suppliers** that include an explosion of new fintech companies aiming to deliver specialized products. These companies plan to either compete or to integrate with incumbents, while harnessing customer service platforms for distribution.
- **Data and infrastructure platforms** manage how data is defined, stored, used, shared and communicated. Distributed ledger technology (i.e. blockchain) will play a critical role in driving overall functionality. Incumbents will deliver scale to smaller players, and third party platforms will become more prevalent.

The FSIEG work has focused on assessing some of these shifts in detail, and in particular on understanding how to enable and capture the societal benefits while managing the potential systemic risks (Table 1).

Table 1: Modularization and Benefits/Risks

Customer Service Platform: Demand Aggregator

Typical activities

- Maintain consolidated view of and for the customer
- Identify beneficial customer outcomes
- Design streamlined and valuable ways for customers to access services

Example benefits and risks

+ Improved customer services; more efficient use of customers' time
– Increased points for failure of cyber-resilience through fragmentation of data
– Ethical use of data inside and outside the regulatory perimeter

Financial Products: Component Supplier

Typical activities

- Design products that are of higher quality or cost less than existing products

Example benefits and risks

+ Specialization and competition for provision of products
– Shifts in, for example, credit risk or maturity transformation to new points in the system
– More complexity in interconnectedness

Data and Infrastructure: Platform Provider

Typical activities

- Provide standards for efficient data exchange and evaluation among ecosystem members (e.g. US government-sponsored enterprises standardizing mortgage application information)
- Provide specialized data or analytics (e.g. FICO)
- Encourage trust for users by creating standards for payments, data exchange, transaction confirmation, issue resolution, etc. (e.g. Visa, New York Stock Exchange)
- Ensure system resilience by emphasizing safety and security

Example benefits and risks

+ Reduced costs, accessing scale
+ Faster adoption of new technologies
– Increased points of failure, possibly outside the regulatory perimeter
– Increased potential entry points for cyberattacks

Source: World Economic Forum and Oliver Wyman

Taking a customer-oriented approach is key to the future success of financial services organizations

Brian Hartzer, Chief Executive Officer and Managing Director, Westpac Banking Corporation

When considering what the future might look like for financial services, people instinctively think about technology. And while important, it is arguable that the key to success is not to focus on technology. Rather, the key is to focus on the customer.

The idea behind being a service-oriented company should be to help customers achieve what is important to them. Financial services companies must not lose sight of the fact that people dream of owning a home, not a mortgage; of protecting their spouse and children, not buying life insurance.

Over time, firms have been seduced by frameworks derived from retail and consumer packaged goods companies and an unbalanced approach to delivering value to shareholders – both of which led them off the right path. Technology provides a new toolkit to help the financial services industry deliver a superior customer experience. It has never been more important to remember what business we're in – that is, financial services, not financial products. In shorthand, it means providing superior customer service.
It means putting customers first, rising to the challenge of higher community expectations, while maintaining a strong bottom line.

This is against a backdrop of a fast changing global environment, with rapidly changing customer expectations and people rightly demanding more convenience, better service, and greater transparency. Regulatory expectations have changed as well, with increased prudential requirements, and zero tolerance for poor conduct and culture. We expect the future of banking to change just as fast, and that service will be at its core.

In order to fully enable the benefits of innovation and proactively manage potential risks, key market players, including public, private incumbent and private fintech communities must be able to identify areas where material transformation is to be expected. Transformation is likely where customer needs go unmet; where the incumbent operating models are less efficient; or, conversely, where incumbents have attractive profit margins. The key drivers of change identified by FSIEG's work are:

Ne **Unmet needs:** Products and services which address the unmet or inadequately addressed needs of a customer. Real change has already occurred in lending and payments where customer-driven product design is prevalent.

CS **Less efficient cost structures:** New innovation which allows for lower-cost delivery, replacing high-cost, inflexible legacy systems. To date, asset managers and insurers have been most effective at leveraging new technologies to lower product and service delivery costs.

CU **High capital usage:** Lower capital models, and lower return expectations by new entrants, enable innovative models to compete. This has been the key driver for marketplace lending, which is less capital-intensive than more traditional balance-sheet lending models.

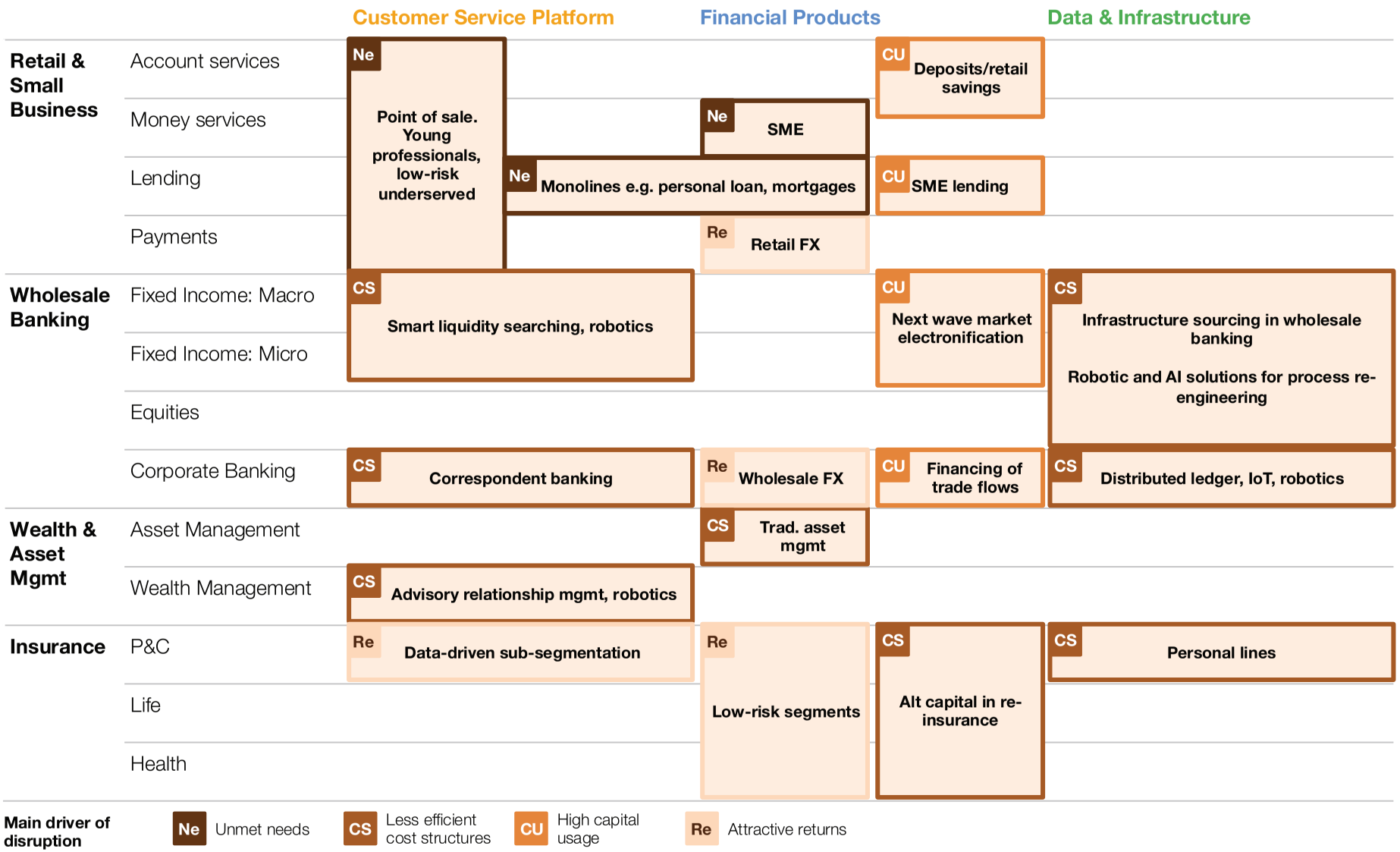
Re **Attractive returns:** The allure of significant returns attracts disruptive players. Pricing in some segments can allow for cross-subsidizing of others, and bundling of products and services can allow for higher margins. For example, low-risk segments in insurance have drawn innovative companies due to high returns.

By looking at these key drivers of disruption across the system, it is possible to anticipate where additional change is likely to occur (Figure 1).

These changes will affect the "triumvirate" of public, private incumbent and private fintech communities differently:

- **Public:** This sector must balance its support of entrepreneurship and innovation with its mandate to protect the integrity of the system and manage systemic risk.
- **Private incumbent:** In many areas of change, margin compression and loss of market share will continue beyond levels already seen following the global financial crisis. Incumbents need to transform their business models to respond to these challenges by enhancing customer service to retain customers, and, just as importantly, by dramatically improving cost and capital efficiency. At the same time, incumbents hold many advantages around customer franchises, marketing and distribution channels, providing them with a competitive advantage vis-à-vis new entrants.
- **Private fintech communities:** The outcome for fintech companies is likely to be split: a small number of large competitors will take a new and very material role in the industry, while the majority of smaller firms will slip into a modular structure in cooperation with incumbents.

Figure 1: Anticipated Areas of Change Highlighted by Participants During Interviews and Roundtables



Note: Mgmt = Management; P&C = Property and Casualty; SME = Small to mid-sized enterprise; IoT = Internet of things; AI = Artificial intelligence

Source: World Economic Forum and Oliver Wyman

Transformative innovation comes through platforms, not "the next killer app"

Jonathan Auerbach, Executive Vice President and Chief Strategy and Growth Officer, PayPal

At PayPal, we see enormous opportunities to address the needs of large segments of the global population that are underserved by the financial system. To do that well – and at scale – requires innovation, not simply at the product level but along the whole value chain from risk modelling to data/analytics to technology platforms.

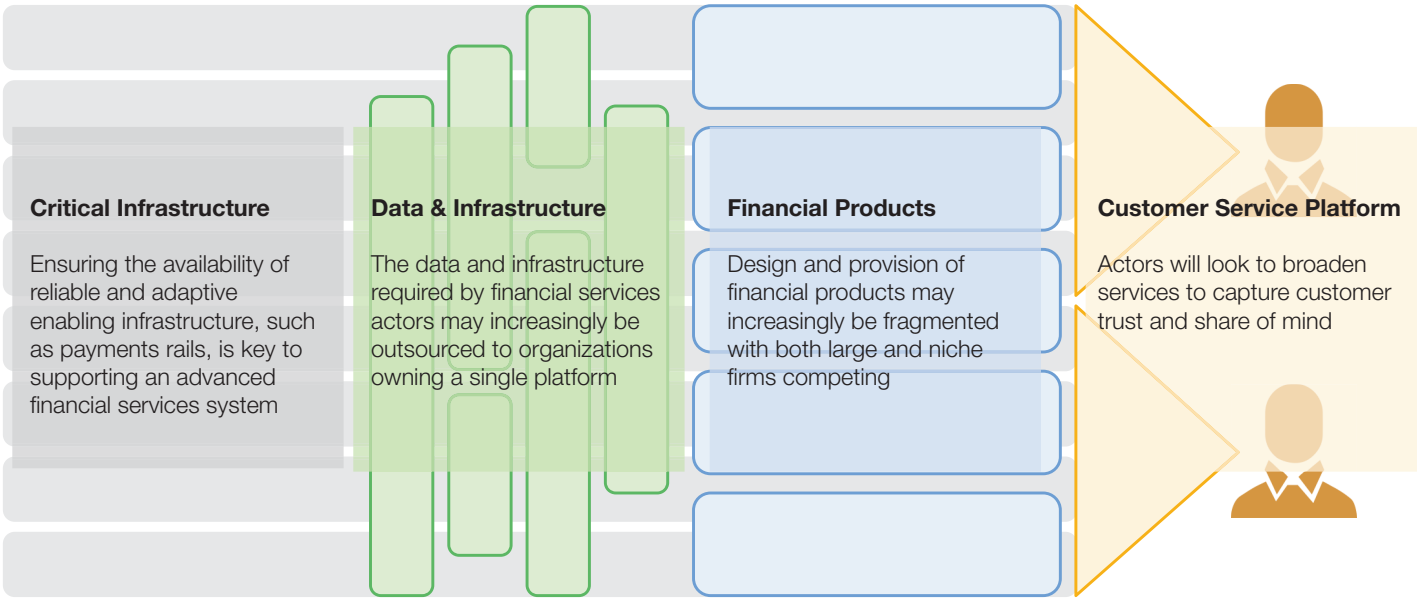
While the next "killer app" is important to find and understand because it often tells us something new about customer needs, it's not, in and of itself, enough to scale globally. The innovations we see now that have the potential to contribute to change at a global level are in areas like security, platforms and partnerships – all of which may seem a bit more quotidian, but which we believe are critical for widespread impact (in our case, to democratize the financial system, and ensure digital/secure payments and financial services are accessible to everyone).

When I think about examples from our own experience, I think about our product called One Touch, which provides simple authentication in any environment (online, in app or in store) not with a pin code, but rather using all the information we capture on customers, merchants and devices. One Touch required fundamental innovations across areas like product, risk and platforms – but has given our customers greater security and confidence, and led to higher conversion rates for our merchants. Perhaps that's why we were able to launch One Touch simultaneously in 100 markets and it's become the fastest-growing product in our history. The key to unlocking this scale wasn't in an excellent technology product alone; it was in the creative thinking about the customer experience on an end-to-end basis.

Another good example is our work with Visa and MasterCard to enable full customer choice on payment preferences. To do this efficiently, we need platforms that are global, and models of partnership that work globally and locally throughout the world. This is necessary not only to provide the value propositions that consumers want, but to do so at a cost that opens up our ability to jointly serve populations that are underserved by the system today.

Innovation is much more than just the next new product. It needs to be end to end – starting with customers at the center, radiating out through all our processes and platforms, and extending to partners who share our commitment to serving our mutual customers at scale.

Figure 2: Visualization of Future State of the Financial Services Sector



Source: World Economic Forum and Oliver Wyman

2 The anticipated changes can bring enormous benefits to the financial services system, but more concerted action is needed

The many anticipated benefits of this transformation are simplified into four overarching areas: **improved, more accessible and cheaper customer service; better risk management; improved efficiency for incumbent industry participants; and new value creators**. All industry participants, in particular policy-makers and regulators, will need to approach the changes in the industry with a culture of enablement, as only more collective action will ignite change and help to realize significant benefits.

Improved, more accessible and cheaper financial services

Technological innovation will provide consumers with expanded access to a diverse set of affordable financial services. The delivery of financial services will support better living standards by taking a life-cycle approach that addresses myriad needs, such as trade, mobility, education, healthcare, real estate, and savings. Effectively, this could allow customers to shift from being strictly consumers of financial products to actively managing their financial health over time, though this would require effective financial literacy education to be provided. Some participants, however, express skepticism as to the extent to which cost reductions will be passed through to the end consumer.

Increased public-private cooperation is needed in the following areas to reap further benefits:

- **Access to capital for small to mid-sized enterprises (SMEs):** SMEs are not yet seeing the benefits of the revolution in data provision and accessibility in credit markets, the areas where it is most needed. Further effort is required from the public sector to strengthen incentives for open data sharing, increasing transparency in these markets.

- **Extension of payment services to underserved population segments to promote inclusion:** Increased coordination between regulators and innovators, the removal of regulatory inconsistencies, and the advancement of risk-based know-your-customer (KYC) / anti-money-laundering (AML) account tiering and international payment standards would all support this extension.

- **Creating a tiered structure that will foster new financial life management (FinLife) services to be delivered to customers:** This must be done without introducing greater risks through, for example, industry conduct, limited transparency in advice algorithms or financial illiteracy.

- **Ensuring clear and effective conduct and consumer protection regulation is in place:** As technological innovation brings financial services to a wider set of customers, both public and private sectors need to ensure that consumers and investors are not harmed or exploited. This will ensure that the reputation of the system remains intact and will aid in enabling the expansion of new services

Better risk management

The financial services system is responsible for the effective management of financial and non-financial risk associated with providing financial services. Innovation can allow these risks to be better monitored and understood, and better distributed to the points in the system willing and incentivized to hold these risks. For example, more detailed and faster analysis of large amounts of data through machine learning and artificial intelligence will lead to more sophisticated management information, permitting enhanced early warning systems such as those used to counteract cyberattacks.

Heightened public-private cooperation is needed in the following areas to reap further benefits:

- **Improved industry-wide data on risk positions:** Progress is under way, but the data repositories so far have not reached their full potential. Moreover, the private sector is proving slow to develop industry data utilities for use in areas such as the fundamental review of trading book (FRTB). The public sector's further involvement would be valuable to accelerate the development of such repositories.

- **Identification and sizing of risk:** While many supervisors and regulators are working on this topic, no agreed risk taxonomy or materiality framework currently exists to identify and size systemic risk connected to innovation, especially for non-financial risk types.

Improved efficiency for incumbent industry participants

Incumbents have substantial opportunities to improve service, increase customer loyalty, reposition towards helping the customer achieve their financial objectives (as opposed to simply introducing products), and redevelop some of the customer trust that has deserted the industry in the last decade. New tools to manage data and digitally redesign processes offer the path to significantly reducing costs and, therefore, improving efficiency and returns. This benefit could come in part through a reduction in data variability due to outsourcing, with the potential of lowering data reconciliation and management costs over time.

Additional public-private cooperation is needed in the following areas to reap further benefits:

- **Creation of industry utilities and outsourcing solutions:** Certain utilities and outsourcing solutions exist where, subject to a sound control environment, regulators could help, or where facilitation is required for the industry to collaborate more effectively, such as in creating industry standards for managing cyber risk. A good example of effective enablement is the 'India Stack', a set of APIs that allow governments and private companies to deploy cashless and paperless technology products.

- **Retraining of workforce to adapt to Fourth Industrial Revolution:** There is a need to increase overall IT skills for current employees, including skills related to general competencies and skills with applications in specific companies / sectors. Additionally, employees must be prepared for increased cooperation with machines and programs as many tasks in the future will likely be delivered by some form of human-robot interaction and cooperation.

New value creators

Over the past 10 years, fintech companies have been responsible for driving significant value creation within the financial services system, both directly and by working with incumbent institutions.

More public-private cooperation is needed in the following areas to reap further benefits:

- **Extension and international standardization of sandbox approaches:** Sandboxes are controlled environments that allow for ideas to be tested on a limited segment of the market. They are intended to promote the emergence of successful new businesses and business models by creating consistent parameters for testing new products and services in an environment that controls risk. While there is ongoing debate about the optimal construct to allow for controlled experimentation, sandboxes were consistently cited as a good conduit for entrepreneurs to service clients on a trial basis before mass market rollout. Sandboxes can also satisfy regulatory precautions or guidelines; however, the public sector must ensure that the implementation of sandbox approaches does not constitute an uneven playing field between different actors in the financial services system.

- **Development of workforce with requisite skills for success that the system of tomorrow demands:** University education should be innovated on a deep level, preparing students for a life of continuous learning and open-ended solutions rather than fixed curriculums and set theories that may be outmoded shortly after graduation

- **Access to data:** Vast datasets rest with regulators and system participants. Access to this data can enable fintechs to offer improved services to consumers. However, access arrangements need to be carefully managed to ensure consumers are not disadvantaged and consumer data privacy is maintained.

How the public sector can encourage positive innovation in the financial services system

Cecilia Skingsley, Deputy Governor of the Central Bank of Sweden (Sveriges Riksbank)

The public sector needs to strike a balance between innovation and stability. In order to do this it must be prepared to act in order to influence transformation.

Sweden has moved to become a cashless society. While in the 1950s cash/GDP was at about 10%, it is now closer to 1-1.5%, and cash in circulation has fallen by around 40% in the last 10 years. This has been driven largely by customer habits but also by modernizing approaches to bank notes and coins. By the end of the 1990s, the Central Bank decided it should not subsidize societies' usage of cash and gradually reduced vaults and left the transportation mechanism for cash to the private sector. It thus pushed the private sector to innovate its approach to cash usage.

The Central Bank should support innovation where it makes sense. For example, the bank is holding a standing credit in Swish, the commercial banks' real-time payments system for person-to-person (P2P) and person-to-business (P2B), to allow it to function 24/7.

These two examples show that a central bank may need to be both "hands off" and "hands on", depending on the situation to foster innovation. The trick is to find the right degree of intervention at the right time. And to perform that trick there are no shortcuts. A thorough analysis of costs and benefits is needed.

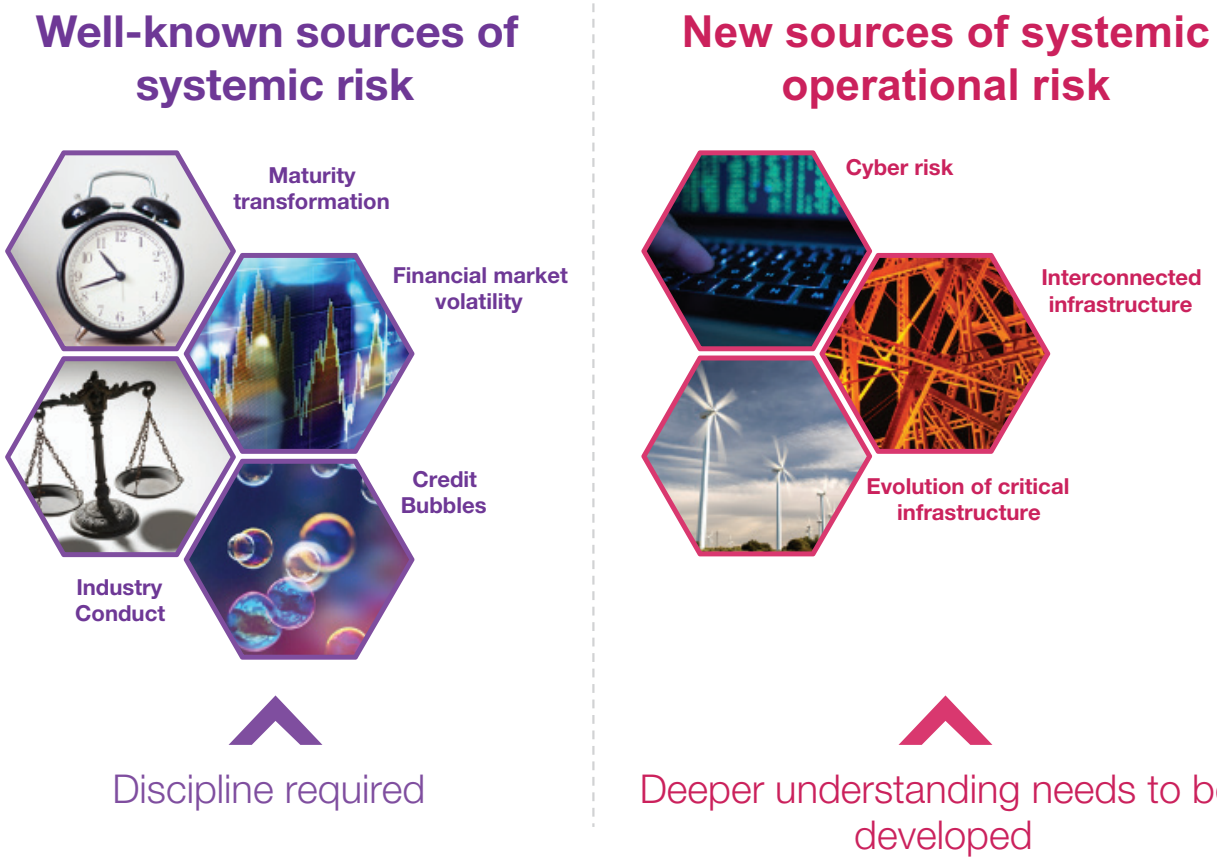
Dialogue between the public sector and industry is important, but it is also important to remember that dialogue takes time. A balance must be struck between allowing time for dialogue and the need for rapid responses.

3 Managing some systemic risks introduced by this wave of innovation poses challenges

Transformation across the financial services system brings a number of risks which could affect system stability. These new systemic risks are driven in part by the altered dynamics many market participants are experiencing, such as increased market fragmentation, regulatory changes causing an uneven playing field, and increasing pressure from declining margins.

The major systemic risks identified during the course of work on FSIEG fall into two groups: those which the financial services sector understands reasonably well, but are subject to a mix of structural and cyclical change, and those which represent new sources of risk in the system (Figure 3). Managing both types of risk requires discipline and an increased focus to develop a deeper understanding of the latter group.

Figure 3: Key Systemic Risks Identified during FSIEG Work



Source: World Economic Forum and Oliver Wyman

Discipline is needed on systemic risks that are understood reasonably well but are subject to a mix of structural and cyclical change

The well-known systemic risks identified during work on FSIEG include:

Credit bubbles: Among the most studied financial risks, credit bubbles – the expansion of easy money in an economy – have consistently proven a harbinger of financial crises. Substantially increased risk-taking is a common symptom, as is the viewpoint that "this time is different": a perspective expressed by the market that the current environment somehow supports sustained risk taking. Therefore, as new business models arise, such as marketplace lending, tracking the amount of credit originating from both traditional and atypical segments of the market is critical to safeguarding financial stability.

Maturity transformation: Responsibility for maturity transformation is shifting from banks to other actors within the system, for example through marketplace lending with alternative beta funds, other non-banks, and even individuals. More transparency on this shift is required to ensure that risks are being well monitored and managed.

Financial market volatility: Market electronification is an evolving area of technological innovation that has been monitored by the industry for some time. The main risk related to innovation is the extent to which electronic trading and agency trading models are reducing the margins and returns for capital/balance sheet provision of financial market intermediaries. High-frequency trading, dark pools and the use of alternative trading platforms have prompted debate about the appropriate use of algorithms and the actual versus perceived level of liquidity in capital markets.

Industry conduct: Anyone providing a financial service to a customer, even if they may not be regulated from a macroprudential perspective, needs to be subject to conduct oversight. Poor industry conduct, including the inappropriate use of customer data for business purposes, can impact systemic stability in a number of ways. Firstly, and primarily, conduct can undermine trust and confidence in the financial system, thereby encouraging participants to withdraw. This is particularly impactful where misconduct is pervasive across a sector or sectors. Significant individual or firm misconduct can also create volatility in the financial system, such as where a large trading loss is incurred. Misconduct can also create systemic risk where large fines impact the financial viability of firms or sectors. However, at present, not all financial services companies that "touch" clients are under the umbrella of conduct authorities. In fact, some jurisdictions lack such an authority altogether.

Increased focus and the development of a deeper understanding of new sources of operational risk are needed

The newer systemic risks identified during work on FSIEG include:

Cyber-risk: Data security has become a top priority for the financial services industry. As such, members of the FSIEG Steering Committee identified cyber-risk as perhaps the single most important risk to the current financial services system. As businesses rely more on technology and continue to amass larger stores of data, ensuring that resilient systems are in place to safeguard information becomes increasingly important (and difficult). Examples cited of areas of transformation where cyber-risk is especially heightened include electronic payments and fragmented client-facing platforms. Risk with data sharing is becoming a more frequent concern for the public and private sectors, and increased cooperation could reap significant benefits.

Evolution of critical infrastructure: Given the importance of critical infrastructure, such as payment rails, to the broader workings of the financial system, it is especially important that it is kept at the forefront of technological innovation. By doing so, it avoids falling behind the numerous actors (corporates, consumers, financial services providers) that rely on the architecture to operate, and that are also evolving at a rapid pace due to competitive forces. The public and private sectors must work together to encourage its continued evolution to ensure a state-of-the-art financial architecture that can adapt its users' needs and is robustly defended from cyberattack. For example, leveraging distributed ledger technology would enable a more decentralized system, which would therefore be more resilient to cyberattack. It is essential to understand and monitor risks associated with this evolution due to their systemic implications.

Interconnected infrastructure: As banks continue to face increasing cost pressures, they are looking to outsource more of their post-trade processing to a variety of service providers. This leads to concerns about the cost and complexity of harmonizing and integrating data after it has been fragmented, as well as the potential for activities to be pushed outside of the financial services regulatory perimeter. This also impacts the exposure to cyber-risk due to increased points of connection.

Many of the risks and regulations associated with technology-enabled innovation are the same as those we have seen previously in financial services

Barbara Novick, Vice Chairman, BlackRock

As digital advice increases, it is worth considering the risks associated with this technology and the regulation that is warranted. As a starting point, investors and regulators should recognize that many of the risks that arise from digital advice are the same as those of traditional investment advice, while noting some unique risks.

Digital advisers are regulated by the Securities and Exchange Commission (SEC) and the Financial Industry Regulatory Authority (FINRA) in the United States, the Financial Conduct Authority (FCA) in the United Kingdom, and equivalent authorities in other jurisdictions. The SEC recently released guidance that provides suggestions on how digital advisers should address issues specific to digital advice as they seek to meet their regulatory obligations under the Investment Advisers Act of 1940.

Like traditional advisers, digital advisers are required to make suitable investment recommendations based on their knowledge of clients' circumstances and objectives. Similarly, digital advisers are required to provide clear disclosures and cost transparency to ensure that clients understand what services they are receiving and the potential risks involved.
In order to mitigate risks associated with trading and order handling, digital advisers need to have reasonably designed trading procedures and oversight. In this age of technology, it is crucial that both digital and traditional advisers view cybersecurity as a critical component of their business model and carefully safeguard sensitive client information.

Given the focus on technology, algorithm design and oversight warrant special attention in digital advice models. To address this, digital advisers should ensure that algorithm assumptions are reasonable and that investment professionals with sufficient expertise are closely involved in the development and ongoing oversight of algorithms.

As digital advice business models continue to evolve, regulatory regimes should encourage innovations that could be beneficial to investors, while ensuring appropriate protections are in place.

Understanding cyber- and interconnectedness risk is key to managing the transformation driven by technology-enabled innovation in financial services

Michael Bodson, President and Chief Executive Officer, Depository Trust & Clearing Corporation (DTCC)

The financial services industry is actively exploring new technologies that hold vast potential to transform the global marketplace, including the post-trade ecosystem where trading activity is processed.

However, given that market infrastructures play a critical role in protecting the stability and integrity of the financial system, a fundamental question we grapple with is: How do we balance innovation with market security?

To fully take advantage of new innovations, such as blockchain technology, the industry must collaborate at a higher level. This greater collaboration, however, will inherently increase interconnectedness, requiring an enhanced risk management effort, especially with regard to cyber security.

Regulators recognize the seriousness of the threats posed by cyber criminals and are providing appropriate oversight. While their guidance is welcomed, positive regulatory impact and the strength of the ecosystem would be amplified through increased coordination on both a national and international basis—particularly in terms of utilization of appropriate and common frameworks, a risk-based approach to oversight and the avoidance of one-size-fits-all prescriptive measures.

And therein lies the challenge – how do we protect the entirety of the system without forcing firms to resort to a check-the-box compliance approach in order to meet new cyber regulatory requirements? This is an issue where regulators and the industry must forge a partnership aimed at developing a consistent, principles-based approach to cyber regulation.

At the same time, regulators also need to gauge the appropriate level of openness of the financial system. As parts of the system are exposed to new players and technologies, the possibility exists of introducing less stringent standards that could create systemic risk. Regulators and the industry must continue working together to protect market stability while avoiding actions that stifle innovation or create unnecessary barriers to entry. It is a tough balancing act.

Measuring and managing systemic risks introduced by transformation

Developing tools to properly identify and assess the materiality of these risks is a key element of successfully managing the risks connected with transformation across the financial services system. Two critical benefits can be achieved by developing and publicizing such tools: they assist the public and private sectors in directing their resources towards the most systemically significant issues; and, they ease conversation between the public and private sectors by enabling them to "speak the same language" about risks. The main tools required for successful risk identification at a systemic level are a risk taxonomy and a materiality framework.

Systemic risk taxonomy: The expansion and development of risk types alluded to in previous sections of this paper make the development of an effective and comprehensive risk taxonomy an ever more pertinent issue. While multiple regulators are putting significant work into developing risk taxonomies, no industry standard has yet been fully agreed. Without a fully agreed risk taxonomy cross-border innovations will be more difficult to develop, since regulatory approaches can differ significantly between jurisdictions.

As such, throughout the FSIEG initiative, the team has focused on developing a new, fit-for-purpose risk taxonomy that the industry can use in the future (Table 2). This taxonomy strives to provide a comprehensive list of risk types to aid in the systemic risk identification process. Risks identified refer to systemic risk, defined by the International Monetary Fund and the Financial Stability Board as the risk of "disruption to the flow of financial services that is (i) caused by the impairment of all or parts of the financial system; and (ii) has the potential to have serious negative consequences for the real economy."[1]

Given the focus on risks associated with transformation across the financial services system, the risks highlighted differ from traditional risk taxonomies. For example, conduct risk is split from operational risk to show its relative importance. This taxonomy can be used as a starting point for national authorities to build their taxonomies on, taking into account nuances within each country.

Materiality framework: Assessing the materiality of identified risks is important for prioritizing and allocating the appropriate resources. However no developed approach currently exists to assess the materiality of risks introduced by technology-driven innovation. During work on FSIEG, a preliminary framework of materiality lenses was developed and tested against significant transformations. Using a framework of lenses allows for flexibility in the materiality assessment: while each lens should be considered for every risk type, the relative importance of the lenses will vary, allowing for a tailored materiality assessment.

Table 2: Proposed Systemic Risk Taxonomy

Liquidity	Funding / Maturity Concentration	Overseas Funding	Market Liquidity	
Conduct	Customers, Products & Business Practices	Anti-Money Laundering	Compliance & Regulatory	
Market	Interest Rate	Investment Portfolio	FX / Hedging	
Credit	Consumer Credit	Counterparty Credit	Concentration	
Insurance	Underwriting: Attrition	Underwriting: Catastrophe	Reserving	
Operational	Vendor (3rd & 4th Party)	Infrastructure	Cyber	Employment Practices & Workplace Safety

Source: World Economic Forum and Oliver Wyman

Proposed materiality lenses

Value at stake: The direct financial impact if the risk event occurs, considering the current environment and existing state of controls. For example, while marketplace lending platforms have attracted much attention in terms of business model, the total value at stake relative to total new credit origination remains low in most markets /segments.

Likelihood: Consideration of the probability of the risk event occurring, as well as the impact of that event. This is vital to reasonably allocating focus between risk types.

Reputational effect: The degree to which the risky activity will affect consumer and business confidence. For example, a high-profile loss of even a relatively small client data set from a core retail bank could severely affect trust in the financial system.

Interconnectedness: The degree to which the risky activity is connected with other parts of the financial services system. For instance, if an organization providing crucial infrastructure services to multiple financial services institutions were to suffer a cyber-breach, the effects could be broad reaching across the system, and difficult for regulators to assess in advance.

Speed: The rate at which risk is likely to materialize. Risks associated with algorithmic trading, for instance, are likely to occur far more quickly than those associated with retail lending. Additionally, the relative speed of development in quantum computing compared to the system's ability to design regulation and risk management tools can introduce concerns around cyber resilience.

Opacity: The degree to which regulators or operators can understand the implications of the risky activity. For example the risk associated with some forms of shadow banking could be greater due to the lack of data on where risk resides.

The roundtable discussions and interviews from the FSIEG work revealed that significant research is underway in many jurisdictions to understand specific risks and their materiality, or specific sources of materiality, such as interconnectedness. However, hardly any jurisdictions have a holistic framework developed that allows innovations to be assessed for materiality or compared with each other.

Developing this framework is necessary, but it is not a simple exercise. Ease of measurement differs between the lenses: modelling techniques are most advanced for value at stake and likelihood, though their sophistication varies by risk type and industry segment. While significant work has been done to develop techniques for modelling the reputational and interconnectedness lenses, modelling the indirect aspects of both remains difficult. Moreover, modelling the speed and opacity of risks requires substantial subjective judgment.

Once this framework has been developed, regulators should determine thresholds beyond which a platform, product, or service provider merits special attention.

"Our customers and clients are leading us toward the innovations we are making to better serve them. Our job is to continue to make the investments in the technology and the talent to serve them in all the ways they choose to do business with us"

Brian T. Moynihan, Chairman of the Board and Chief Executive Officer, Bank of America Corporation

"Financial technology innovation can bring great benefits to economic growth and inclusion. At the same time, it requires a comprehensive analysis of the risks that these advances introduce into financial systems. The World Bank Group is promoting innovation as a way to make secure, reliable and cost-effective financial services more available in emerging markets and developing economies. We strongly applaud the launch of this initiative by the World Economic Forum"

Joaquim Levy, Managing Director and Chief Financial Officer, World Bank Group

Managing legacy books is a major consideration associated with innovation

Juan Colombas, Chief Risk Officer and Member of the Board of Directors, Lloyds Banking Group

Innovation is a positive force that will change banking for the better. The innovation process, though, is by its very nature uncertain. For every successful innovation that scales, there are hundreds of failed experiments. This is the case among fintech companies as well as established providers.

We need to match our ambition for innovation with a determination to avoid detriment to customers of failed or abandoned innovation experiments. Managing resultant legacy books is a major consideration.

Institutions that launch new customer propositions and then down the line choose to stop, are left with an architecture that is more complex and costly and a need to provide ongoing servicing for contracted propositions. Customers of fintechs that subsequently fail are potentially left stranded.

Executives and supervisors need to ask, "What do we do if it fails?", seeking at the outset to minimize the impact. At Lloyds Banking Group we ask ourselves this question at the start of every innovation project. In practice, this means that very early stage experiments are time-bound from the start and delivered through the innovation sandbox, ensuring that the services can seamlessly be rolled in and out. In effect, we design in end-of-life management from the outset.

For experiments that mature to initiatives that we want to roll out to a broader set of customers on a more sustained basis, we have clear "launch requirements" that need to be met. These are akin to requiring a "resolution-regime" for the initiative – a clear plan for, were the initiative to fail, what the bank will do to minimize customer detriment and technical and organizational debt.

Given the breadth and pace of innovation in the banking system, supervisors should consider adopting a similar approach at the system level through a form of proportionate resolution regime.

Regulatory approaches to fintech should be engaged, accommodating and coordinated

Eric Jing, Chief Executive Officer, Ant Financial Services Group

Fintech has great potential. It could revolutionize access to financial services, improve the functioning of the financial system, enhance financial inclusion, and promote economic growth. Therefore, fintech needs to develop in a way that maximizes the opportunities and minimizes the risks.

To reach the potential and address the challenges, global regulators may take consistent regulatory approaches across jurisdictions. Specifically, global regulatory efforts in the following three fronts would promote the healthy development of fintech:

Engagement

- Understanding these emerging technologies and the risks as well as opportunities they present
- Engaging with fintech companies to identify areas for collaboration and reduce regulatory uncertainty
- Discussing novel approaches in regulation and supervision that will promote the safe and responsible application of these technologies without stifling innovation

Accommodation

- Ensuring existing authorization processes do not unnecessarily block new business models and approaches
- Creating innovation space, such as, sandboxes, to allow businesses to test innovative products, services, business models and delivery mechanisms in a live environment
- Initiating policies that can effectively differentiate between the bad and good fintech players to enhance the healthy and sustainable development of the industry

Coordination

- Looking across borders for examples of how others are engaging with the fintech industry
- Encouraging the information sharing and knowledge exchanges among regulators and market players to promote a gradual endorsement of globally accepted regulatory approaches and standards
- Reducing regulatory arbitrage through international coordination to ensure that the fintech activities are regulated in a simpler, more flexible and more cost-efficient way

4 The financial services system would benefit from certain tools to achieve greater enablement and risk management

During the course of work on FSIEG, the following tools were identified as important to helping the financial services (FS) system reap the benefits of technology-enabled innovation, while managing the associated risks:

FS Industry Innovation Council: Participants in FSIEG agreed that insufficient dialogue and poor communication are currently hindering progress in the sector. A multinational, public-private incumbent/fintech body to support change on an ongoing basis would help to address this challenge, ensuring the most innovative markets and market participants are front and center. This body could manage dialogue of the sort discussed during work on FSIEG on a more continuous and structured basis, in an environment of trust and candor. In particular, this body could look at new innovations, discuss and assess benefits and risks, and consider how the public and private sectors can collaborate to enable the benefits while managing the risks. Supporting cross-border development would also be an objective of this body.

A repository of information on emerging new innovation and its impact: Supervisors and regulators could benefit from support in coping with the pace, change and volume of innovation. Continuous data on existing fintech companies and what they are doing would help the public and private sectors to better understand and monitor fintech as it evolves. This could be extended to benchmarking data on the techniques various actors in the system use to drive innovative change to their service offerings or business models. It could additionally allow for a comparison of investment and R&D spending in financial sector innovation in different markets. This could take a number of formats, ranging from a standards-setting body for participants in the financial system (including non-regulated entities) to a regular survey carried out under a public-private joint initiative.

Improved assessment tools for the systemic risks introduced by innovation: The current insufficient and underdeveloped frameworks hamper the public sector's ability to manage resources, hinder private-sector innovators from getting clear signaling on likely regulatory treatment, and stifle cross-border innovations. The public sector needs to develop and share best practices in terms of assessment of innovation-driven systemic risks. The two areas identified, and for which outline proposals have been made, concern developing a consistent risk taxonomy, and a framework for risk materiality assessment. Such tools should allow jurisdictions to set their own particular standards within a global framework to account for significant structural differences.

A more standardized regulatory treatment framework for new competitors across jurisdictions: Both fintech companies and incumbents need to better understand ex ante how they will be treated from a regulatory perspective, depending on the kinds of activities and risks they introduce; moreover, there should be more international alignment on this. Currently, many different treatments are used between jurisdictions for the same activities. An example identified from the work on FSIEG is marketplace lending, where myriad approaches exist in different countries, ranging from prohibition to bespoke legislation to a total lack of regulatory definition. Differing adoptions of sandbox approaches is another example cited, from very supportive in some jurisdictions to not attempted in others. While a one-size-fits-all approach across jurisdictions would be neither achievable nor desirable, removing stark differences should be the aim and would result in less inefficiency in the system.

An improved mechanism for public private cooperation to combat cyberattack: Cyber-risk was identified through the FSIEG work as perhaps the main risk to the financial services system. The collective need to protect the system from attack can be supported by sharing resources and expertise between the public and private sectors. While some jurisdictions are increasingly taking up this sort of collective endeavor, greater effort is required to establish it more systematically in order to protect the system.

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