IMPACT OF THE DIGITALISATION OF FINANCIAL SERVICES ON SUPERVISORY PRACTICES IN THE PRIVATE PENSION SECTOR

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IMPACT OF THE DIGITALISATION OF FINANCIAL SERVICES ON SUPERVISORY PRACTICES IN THE PRIVATE PENSION SECTOR

Project Background

1. As a part of the IOPS 2017-2018 Programme of Work, the Members decided to launch a new project looking at the impact of the digitalisation of financial services on supervisory practices in the private pension area.

2. Innovative technologies are being widely used in all sectors of economy. The financial sector is seen as the largest user of innovative technologies and a major driver of the digital transformation occurring in economies[1]. Extensive work to understand disruptive role of innovative technologies in financial sector and related regulatory and supervisory approaches has been undertaken at the regional, European level, by the European Commission[2], the European Supervisory Authorities (ESAs) and the European Parliament. At the international level this work has been carried out by the G20 and a number of international organisations, among them leading standard setting bodies, such as the OECD (with its horizontal project on the digitalisation of the economy and society), the Basel Committee on Banking Supervision[3], the FSB[4], the IOSCO[5], the IAIS[6] in their respective domains of competence. It is therefore an opportune time for the IOPS to also investigate the topic and share its results with its peers.

3. This paper briefly reviews the most significant applications of digital technologies for the private pension sector and concentrates on the assessment of the current and foreseen impact of digitalisation/new technologies on pension supervision. The paper is based on IOPS Members' experiences and also presents a few specific countries' case studies (Hong Kong, Kenya and Mexico).

4. The paper addresses three key areas pertaining to the main theme of the project relating to the impact of digitalisation/new technologies on pension systems and on supervisory practices, namely:

- a brief overview of major FinTech developments taking place in the pension sector, some of them being prompted by the supervisors (see Section I);
- a review of existing and evolving supervisory approaches and practices to the most significant FinTech developments in private pension sector (see Section II);
- the ways supervisors themselves use innovative technologies to make oversight and communication with stakeholders more cost-effective and efficient (see Section III).

[1] European Commission, *FinTech Action plan: For a more comprehensive and innovative European financial sector*, 8 March 2018, https://ec.europa.eu/info/publications/180308-action-plan-fintech_en

[2] EU Blockchain Observatory and Forum; EU FinTech Laboratory (forthcoming); EU Blueprint with best practices on regulatory sandboxes (forthcoming); EU rules for crowdfunding platforms

[3] *Sound Practices: Implications of fintech developments for banks and bank supervisors*, https://www.bis.org/bcbs/publ/d415.pdf

[4] FSB, *Financial Stability Implications from FinTech: Supervisory and Regulatory Issues that Merit Authorities' Attention*, http://www.fsb.org/wp-content/uploads/R270617.pdf

[5] IOSCO, *IOSCO Research Report on Financial Technologies* (FinTech), February 2017

[6] IAIS, *FinTech Developments in the Insurance Industry*, 2017

5. This project has been developed by the IOPS Members. The Team Members for this project include supervisory authorities from: Australia; Austria; Hong Kong (China); India, Kenya, Maldives, Mauritius, Mexico and Turkey. The Mexican supervisor, CONSAR, is the Team Leader of the project. Bilateral requests for information and replies to the questionnaire as well as desk research (IOPS Members' web-sites and publications IOPS members and other IOs provided the primary source of information on the most significant applications of digital technologies for the private pension sector and supervisory approaches to these developments. Twenty four (24) IOPS Members[7] replied to the questionnaire (short survey) elaborated by Team Members and approved by the Membership.

6. The key findings of this paper could serve as a basis for the development of IOPS Good Practices, e.g. on the use of (innovative) technology to supervise pension entities as well as supervisory approaches and practices applied to the most significant innovative technological developments taking place in the pension sector.

Introduction

7. Technological innovation is a major development affecting the whole financial sector, including payment services, banking, funding, insurance, investment, advice and private pensions.

8. A broad range of developments in the finance sector is prompted by such technologies as Internet, distributed ledger technology (DLT) – block chain, innovative mobile technologies, Artificial Intelligence, Big Data, cloud computing, crowdfunding platforms, use of technology-based customer data, etc.[8]

9. At present, these innovative technologies are more used in banking services (means of payment), lending business and fundraising (crowdfunding, peer-to-peer and peer-to-business funding), insurance, financial analysis, securities trading and portfolio management. There also some developments are observed in the private pension sector. The OECD recent publication reviewed the trends in financial technology (FinTech) and their application in financial sector, including private pensions, and also looked at the regulatory approaches to FinTech[9].

10. It is worth underlining that in IOPS jurisdictions the digitalisation and technological innovations in the private pension area are still in a nascent and experimental stage, touching only certain areas of pension service providers' activities as well as their interactions with supervisors. This quite a cautious take-up of innovative technologies in the pension sector could be explained by a large variety and complexity of pension arrangements and optionality embedded in pensions (such as choices of providers/schemes, level of contributions, investment funds and pension products). Moreover, pension markets tend to be highly regulated in most of jurisdictions, products standardised and fees controlled. However, despite some slow start compared to other segments of financial sector, many innovative concepts and services are embracing pension sector such as: digital identification/authentication, development of pension mobile applications, digital web-platforms, online consolidators (dashboards) of pension savings, robo-advisers and robo-investment managers, use of cloud computing services in pension administration, big data analytics, artificial intelligence, etc. Supervisory authorities are also in the process

[7] AL, BR, BG, CAPSA Canada, CO, GG, HK, JM, IS, IN, LT, LI, MA, MU, MX, NA, NG, RO, RF, RS, SK, TR (Undersecretariat of Treasury and the Pension Monitoring Center), UG.

[8] See a brief overview of new or emerging technologies used in finance sector: OECD, *Financial markets, insurance and pensions: Digitalisation and Finance*, 2018; http://www.oecd.org/finance/financial-markets-insurance-and-pensions-2018.htm

[9] OECD, *Financial markets, insurance and pensions: Digitalisation and Finance*, 2018; http://www.oecd.org/finance/financial-markets-insurance-and-pensions-2018.htm

of reviewing how to use more technologies in a structured way to increase efficiency and cost effectiveness of the oversight activities.

11. Financial innovation driven by technological developments (FinTech) presents a range of opportunities for financial industry, including private pensions, and more generally for economy, government authorities and consumers. For financial industry, innovation is seen as a catalyst of growth through the use of new channels to reach a wider range of individuals. It may favour greater market efficiency through increased competition and diversity through the creation of new business models, "smart" products and services. Moreover, innovation can also bring greater transparency of records ownership, speed up payments and transactions, improve security of data and assets, reduce number of intermediaries, contribute to the optimization of administrative and operational processes and therefore reduce costs. It can also facilitate access to markets and financing, in particular for SMEs. For the government authorities, FinTech can offer opportunities in the areas of data collection, registration (delivery and record of licenses; record of digital identity, etc.) and analysis, more efficient services delivery, streamlining and automating reporting and compliance. Benefits for consumers may include: increased trust and confidence in financial (private pension) system, delivery of more personalised (customer tailored) products and services, easier access to information/use of financial services and products, better services offered at potentially lower cost through automated processes.

12. However, innovations also bring risks. They may accentuate already existing risks or create new ones – for firms which business models may have changed and for consumers – with the emergence of new product and services which are not yet well understood or controlled. From the financial or pension supervisory perspective, the following risks require close attention and monitoring: financial risks, technology risks, operational risks related to outsourcing, concentration risks (present whenever one or more Big FinTech parties start dominating specific segments of the value chain), information asymmetry between consumers and service providers, cyber-related risk, data security and privacy risks, consumer protection issues (e.g. on-line consent issues, complaints resolution mechanisms, possible occurrence of various forms of financial or digital exclusion, etc.). Therefore, proper understanding of the developments and adequate controls on the part of governmental authorities are needed.

13. Innovations occurring in the financial sector, including private pensions, become an area of increased supervisory attention. In this regard, in a growing number of jurisdictions[10], *regulatory and supervisory authorities have adopted a dual approach* towards financial innovation. They aim in the first place *to offer support* to financial innovation, through provision of guidance to FinTech innovators (on regulatory requirements and supervisory approaches), establishing a framework for testing innovative ideas and products – through creation of innovation hubs or related Sandboxes. Secondly, they aim in parallel to *closely monitor* and subsequently *address any emerging* (potential) risks involved with FinTech for the financial sector and consumers. It is also observed in a number of jurisdictions that *pension supervisory authorities* together with other stakeholders *are at the forefront* and *initiate or drive the take-off of innovative technologies in the private pension sector*. Such actions, among others include creation of mobile applications, financial ecosystems, information storage or centralised pension databases, e-pension systems/consolidation of e-pension services, etc. Their aim is to further strengthen private pension systems, enhance protection of users and their retirement savings, favour the improvement of quality and facilitate access to pension services, eliminate deficiencies in commercial practices and gather more and better information for supervisory purposes. Such data enables more efficient supervisory oversight through analysis of more accurate and real-time information.

14. With respect to the use of innovative technologies in financial sector, it is also critical to keep in mind the international and cross-sectoral dimensions of financial services. Financial innovations contribute

[10] AU, BE, FR, NL, UK

to making financial markets and sectors even more interconnected and global. Therefore they call for a co-ordinated supervisory approach domestically and internationally.

15. There are currently numerous existing working definitions of financial technology (FinTech) elaborated by international organisations[11] or the supervisors themselves. The FSMA, Belgium refers to it as to '*start-up or established firms that use technology to offer innovative processes, products or services in financial sector'*[12]. The European Securities and Market Authority (ESMA) defines FinTech '*as a type of financial innovation that relies on Information Technology to function, e.g. internet, cloud and that can result in new business models, applications, processes, products or services with an associated effect on financial markets and institutions and the provision of financial services*'[13]. The recent report of the European Parliament highlights that the term "FinTech" includes a broad range of companies and actors, with different legal status, posing different challenges and therefore are subject to different regulatory treatment and supervisory practices.

16. Different analytical approaches have been developed to analyse FinTech developments. The OECD Committee on Financial Markets (CMF)[14] proposes a comprehensive framework to guide policymakers when addressing the topic of the digitalisation of financial services. In our analysis we will draw on some key elements of this framework[15].

I. Use of digital technologies in the private pension sector

17. The purpose of this section is to stocktake the most important applications of innovative technologies observed by IOPS members in their private pension sectors and highlight the developments/areas where supervisors had a role to play.

18. The responses to the IOPS short survey and the desk research of selected Members' experiences[16] has shown that new digital technologies are exploited in the following areas for the purposes:

To increase coverage

19. Low pension coverage and insufficient pension savings, especially in voluntary pension systems, are among key policy concerns in many jurisdictions (OECD, Munnell et al. 2012). Research shows that with respect to coverage, number of young workers contributing to private pension arrangements is declining[17], with the main reasons behind being lack of knowledge and myopia. Considering that emerging

[11] For instance, the Basel Committee on Banking Supervision (BCBS) adopted the FSB's working definition for FinTech: "technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services". [FSB, June 2017].

[12] Source FSMA web-site**:** http://www.fsma.be/en/Supervision/finbem/FinTech.aspx

[13] www.esma.europa.eu, (speech at the Stock exchange and Securities conference, 18 January 2017)

[14] OECD, *Financial markets, insurance and pensions: Digitalisation and Finance*, 2018.

[15] OECD, *Financial markets, insurance and pensions: Digitalisation and Finance*, 2018.

[16] Review of selected Members' web-sites and annual reports

[17] In Ireland, the number of 25-34 years old in employment with private pension plans fell from 49 percent in 2009 to 36 percent in 2015 (CSO 2015). Similarly, in the Great Britain the savings rate fell from 43 percent to 31 percent for those aged 20-40 between 2001 and 2011 (ONS 2011), source JPEF article under review JPEF-18-1076. In the United States, about 66% of people between the ages of 21 and 32 have not saved anything for retirement according to the National Institute on Retirement Security (Census data collected in 2014).

FinTech phenomena attracts in particular the attention of young generations (millennials) and other digital natives, use of new technologies may contribute to extending the coverage of private pensions, in particular in voluntary pension systems. This can be the case especially for certain categories of the population such as youth, self-employed, working in informal sector, etc. In this regard, a number of jurisdictions offer a valuable experience,

20. In Kenya, more than 80 percent of the working population is in the informal sector and is not covered by a registered retirement plan. To address this problem, a new retirement saving vehicle – Mbao Pension Plan was created to help members of informal sector save for retirement (Box 1, see Kenyan case study). This is a joint initiative between the Retirement Benefits Authority of Kenya (RBA), the financial industry and a telecom company. The Mbao pension plan is based on mobile companies' money transfer platforms[18], known as M-Pesa or Airtel Money– in which Kenya is a world leader. The Mbao plan allows users to deposit, withdraw and transfer money easily using a mobile device. The experiment attracted much interest from other supervisory authorities and similar initiatives were launched in Tanzania and India to address the gap in terms of coverage for the informal sector.

Box 1. Mbao Informal Sector Pension Plan, Kenya[19]

Objective: to provide a cost effective, flexible and efficient savings vehicle for the informal sector

Regulatory framework: RBA for the purposes of regulation and Kenya Revenue Authority in case of tax

Target population: informal sector workers (although formal sector workers also joined the plan)

Members: in December 2014 – 66,228 (about 45% of total membership of individual pension plans)

Awareness: through informal sector associations, Open Days organised by RBA, service providers stations

Stakeholders: RBA – Supervisory Authority, Kenyan Commercial Bank – legal owner and Trustee & Custodian, Co-Trust Investment Services – Investment manager; Eagle Africa Insurance Brokers – Fund Administrator; Safaricom (M-Pesa) and Airtel (Airtel Money) – *mobile money transfer platforms*

Minimum contributions: 20 Kshs or 0.20 USD per day, 500 Kshs per month and 6000 Kshs per year. Contributions paid by members through either M-Pesa or Airtel Money transfer services are managed and invested on their behalf by service providers appointed by Mbao Trustees and approved by the RBA.

Source : ppt, by Ms Patricia Odera, RBA, Kenya, RBA web-site: http://www.rba.go.ke/index.php/en/mbao-pension-plan-faqs;

21. [include short information on results and a number of challenges of Mbao Pension Plan – to be further developed]

22. Technological innovation via the mobile money transfer services, which is changing the way financial and pension services/products are distributed, plays a pivotal role in the Kenyan economy. Information technology driven by financial innovation in mobile money transfer services stands for about 0.9 percent of GDP in 2015, with 1.1 billion transactions amounting to Ksh 2.8 billion made through the system in 2015[20].

[18] There is a considerable growth of mobile payment systems in Kenya such as M-Pesa and BitPesa in Kenya. M-Pesa is not blockchain-based, while BitPesa is.

[19] For more details, see in Annex, Kenyan case study

[20] Kenya, *2017 Budget Policy Statement*

23. Issues for the attention of public and possibly supervisory authorities relate to the fact that mobile payment services providers may be levying excessive and undisclosed fees. The government review process stated the requirements that telecommunication companies must disclose all hidden charges in mobile payments and ensure transparency of mobile payment services.

To engage individuals with private pensions and encourage voluntary retirement savings

24. Development of ***mobile apps, web-platforms, self-service kiosks (customer portals), online consolidators and simulators*** by pension providers and companies is a common development in the IOPS jurisdictions. Pension supervisory authorities are also active players in this field developing their own digital instruments for pension members and beneficiaries. Use of such tools is seen as a possible way to help to engage individuals with private pensions, e.g. support decision-making and foster understanding and knowledge about private pensions, and also facilitate saving for retirement. Across the jurisdictions, private pensions are perceived a highly complex matter, involving difficult decisions and risk-taking. Complexity and comprehension are regarded as central issues in relation of retirement saving problem[21]. Innovative technologies could offer solutions to address some of the challenges.

Mobile technology and on-line platforms

25. In a growing number of jurisdictions, pension scheme providers and pension funds are adapting their online services into *mobile applications* (apps) to enhance their custom services, offering a possibility of making pension contributions through digital payment solutions (e-banking or mobile money transfer services) but also to receive the real time information about their accounts, news, personal messages[22] – a development believed to encourage retirement savings. Through *mobile apps* or *on-line platforms*, pension companies are enabling members to access more easily and check information on contributions paid, accumulated savings, switching and investment options, etc. In Hong Kong, some trustees start using artificial intelligence Chatbox for answering enquiries.

26. In province of Ontario, Canada, many single employer pension plans provide access to pension information on intra-nets or websites, or through the websites of their third party plan administrators (especially in the case of defined contribution pension plans). Large public sector pension plans have developed mobile apps for all aspects of member communication and plan administration. Some members can even apply for their retirement benefits through the plan app.

27. In Chile, *an on-line service* (PreviRed) [23] was set up to facilitate the payments of pension and health insurance contributions. The service concentrates around 96% of the pension payments in the country (the remaining 4% use traditional banking system). It implies no cost for the users (including employers or independent workers) and was designed in a very user-friendly format. PreviRed has formed the most important network of pension institutions operating in mandatory and voluntary pension systems in the country. Once contributions are paid through PreviRed, the users can print the summary and detailed information, with the respective payment stamp indicating the date and time when the payment was made, valid for the Directorate of Labour as proof of such payment. Users access PreviRed with their unique national identity number (RUN) and a personal password. The on-line system offers a valuable opportunity for the users to view retirement contributions within a wider context: mandatory and voluntary contributions as well as healthcare and thus facilitate financial decisions.

[21] JPEF article "Supporting decision-making in retirement planning: Do diagrams on pension benefit statement help?, 2018, under review.

[22] In Turkey, SMS and emails are widely used to encourage auto-enrolment process.

[23] www.previred.com

28. Often, *mobile apps* or *on-line platforms* include pension calculators[24]. As an example, in Uganda, the NSSF Go App[25] has a savings calculator which, in addition to computing the required monthly member contribution, can be used to project and establish an estimated accumulated retirement benefits savings for individual members at any future point in time.

29. Another important development is creation of *comparison web-site* and *the industry-wide pension dashboard* to access retirement savings in one place (due next year in the UK[26]).

30. In the context of digital disruption in private pension sector, it is also worth highlighting the role and efforts by pension supervisory authorities in creating awareness and developing digital tools to allow members to keep track of their current retirement contributions and savings as well as better plan for retirement. Most prominent examples are AforeMóvi (mobile app) created by CONSAR and mobile apps developed by MPFA, Hong Kong, China. [See case studies Hong Kong and Mexico in Annex]

Digital Ecosystems

31. Another emerging trend is development of *financial ecosystems*[27] involving a wide range of participants, e.g. traditional players, telecommunication operators, commercial entities, FinTech companies, and supervisory authorities. It is worth noting here a far-reaching innovative strategy developed by the Mexican pension supervisory authority (CONSAR) in creation of *digital ecosystem* [see Mexican case study in Annex for more details]. In a way, such approach suggests the move away from traditional activities, including supervisory oversight towards the promotion of a new type of relationship or interconnectiveness in the financial system between supervisor, incumbents and new players, particular through technological innovation and third party services providers. CONSAR is currently working on the regulatory changes that should enable full implementation of this digital ecosystem.

32. Innovative digital ecosystem under construction in Mexico provides financial inclusion in four areas:

- Security: *Customer Knowledge / Consumer Protection / Paperless*
- Accessibility: *Easy / Anywhere / Everyone is included*
- Diversity: *Access to savings / Multiple channels / No cost*
- Comprehensiveness: *Location of Afore / Pension Education / Control of Savings*

Figure 1: Innovative digital ecosystem under construction in Mexico

[24] HK, HU, IN, MA, MU, UG

[25] Available on Google Play store and accessible on https://nssfug.org/nssfgo/go_app.html

[26] *Pensions Dashboard Project, Reconnecting people with their pensions*, October 2017

[27] CO, MX

Source: CONSAR, Mexico

33. Several key elements form part of the Mexican digital system for private pension sector:

- Creation of a ***digital ID file with biometric elements*** (fingerprints, voice and digital signature) that collects all documents and personal information of every person with an individual pension account[28]. By December 2017, around 30 percent of the registered Mexican workers had an Electronic ID file including biometrics (around 12 million files).

- Creation of the ***national centralised database***

- Promotion of financial inclusion through payment aggregators (loyalty programmes)

- Launch of ***Mobile Application for smartphones*** (AforeMóvil). In addition to "AforeMóvil", other technologic platforms offer new channels to engage people with their individual account and facilitate making contributions to their pension account (for example "Millas para el Retiro", "Transfer" and "uLink" for Mexicans living overseas) in compliance with pension regulation.

- ***e-SAR***[29]***: web portal*** to provide services related to the pension funds

34. Other IOPS jurisdictions (Australia, Chile, India, the Netherlands[30], Russian Federation, Turkey and others) have already introduced or are pursuing similar work of creating digital identification number to access generally governmental services and in particular pension accounts.

[28] Presentation by Mr. Carlos Ramirez Fuentes "*Impact of digitalisation of financial services on supervisory practices: Mexican case*", IOPS Technical Committee meeting, Dublin, Ireland, 22 February 2018.

[29] On-line platform e-Sar (www.e-sar.com) aims to improve the way pension fund services are provided.

[30] http://www.digid.nl/en/about-digid/

To improve administration, operational efficiency and pension services

35. Innovative technologies are increasingly used in private pension sector to simplify administrative procedures, improve users' experiences and reduce administrative costs.

36. In Hong Kong, China, over the past years, measures were taken to centralise and automate MPF scheme administration. Already in the past, pension supervisor MPFA undertook several initiatives. In 2012 it introduced an electronic system (ePASS) as a secure platform for the automatic transmission of data on transfers of MPF benefits between trustees. In 2014 the MPF, in joint initiative with other Hong Kong authorities, launched an E-payment[31] to automate the payment and settlement of transfers of MPF benefits between trustees to further shorten the time needed for transfers, enhance efficiency and accuracy of transfer processes. The MPFA is currently exploring ways to develop a centralized electronic platform (eMPF) to standardise, streamline and automate MFF administration and to enable the provision of all major member-related services via electronic means and online channels[32]. With the help of technology, e.g. eID, mobile app and electronic payment systems, it is expected that this new platform will bring significant and fundamental change to the administration of the MPF system.

37. In Mexico, on the initiative of CONSAR the electronic file was introduced in 2015 to improve administration as well achieve greater security and better processing of individual data. The *electronic file* captures the following documentation: official ID, address document, biometric information (fingerprints, voice and digital signatures) and all members' interactions with a pension fund. All data is stored in a central database. Previously, paper documentation resulted in high storage cost, capture (filling) mistakes, lack of control and time to process the information. Introduction of the electronic file allowed to achieve a number of gains such as better service provision to members due to accurate contact information; greater security and control in the management of members' information, which inhibits the risk of any improper practice; better validation (avoidance of duplication, lost or filling mistakes in personal information) and faster processing of personal information, resulting in lower administrative and operational costs. Electronic file needs to be created with respect to the major administrative procedures[33].

38. In Mauritius, there is a notable interest among pension services providers to invest in data sharing, investment management and administrative software (a document management system, web-based platforms) to enable information sharing between shareholders, web-based investment portfolio analysis platforms and online platforms for transacting in mutual funds or collective investment funds.

39. Another emerging trend observed consists of the use of *cloud technology*[34] in pension administration[35]. This permits to free up physical office space, as there will be no need to keep IT hardware, lowers IT expenses (including expensive software upgrade costs), moves towards paperless process with the hard paper files and boxes scanned into images and uploaded into the administration

[31] The Hong Kong Monetary Authority and the Hong Kong Interbank Clearing Limited.

[32] Mandatory Provident Fund Authority, *Annual Report* 2014/2015

[33] E.g.: registration, switching, recertification, updating data, accounts unification, pension fund choice, partial or total withdrawals, resources reintegration, purchase of a programmed withdrawal.

[34] Cloud hosting (the Cloud) refers to software applications, platforms and infrastructure that are based remotely (usually outside the company's own infrastructure) and accessible through internet. The storage of data in the Cloud could facilitate the processing, management and recovery of data. The most predominant Cloud providers are Google, Amazon and IBM service providers.

[35] Cloud computing is used by pension funds mainly to improve operational and administrative efficiency and in some cases for pension asset management in AL, CO, IS, HK, JM, MU and NG.

system. Also, cloud technology gives access to administrators and member to scheme documents any time and from anywhere in the world, and enhances security.

40. The 2017/2018 Rewards and Employee Benefits Association (REBA) Technology survey shows that in the UK pension schemes are adopting cloud-based platforms in the run of auto-enrolment[36]. The survey shows that three quarter of employers use cloud based pension platforms or off-site hosted software. The report highlights that pension schemes are looking now to adopt now more advanced technologies to improve income modelling, encouraging staff to increase contributions and guide them through retirement.

41. In Iceland, the use of cloud solutions by pension funds has been increasing steadily since 2015. Already nine pension funds have been using cloud solutions[37] to a different extend whereas others are looking into this solution. Some pension funds are using cloud solutions for the purposes of setting up management portals for board members and portals for beneficiaries; others are using for email servers and a few are placing filing systems (data storage) in cloud. Those entities who wish to implement cloud solutions have to fill in the form[38] (check-list) available on the FME web-site and send it to the supervisor. The check list, created by the FME, covers the following categories:

- Information regarding the type of cloud services
- Third party access
- Risk assessment
- Security and security measures (such as ISO/IEC 27018, encryption of sensitive data etc.)
- Backups
- Contingency planning (including exit strategy)
- Outsourcing

42. The FME is looking at the applications on a case by case basis to decide whether to grant its approval. The supervisor can make objections if it considers the cloud solution is not comparable with the legal requirements. The Icelandic supervisor believes that some supervised entities may have implemented cloud solutions without being aware of the FME form and intends to investigate on this matter in the near future. Among key risks the FME highlighted the issues of possible data loss if pension funds were allowed to store all backups in cloud solutions and possible data breaches. In this regards, the FME requires that the contract between a pension fund and a provider of cloud solution includes a provision regarding access and auditing rights through the service provider. Regarding access and auditing rights, the FME demands that the contract between the regulated entity and the cloud solution provider have a provision granting the FME access if needed. Auditing rights in this respect are with regard to the external auditors of the regulated entity, and the principle that outscoring should not limit the scope of the audit. To that point, the audition function is carried out by external auditors but the access rights are reserved for FME staff if the authority deems it necessary to utilize it for the purpose of retrieving data.

[36] By the end of December 2017, over 9.1 million employees were automatically enrolled into a workplace pension and over 983,000 employers had met their auto enrolment duties (Source: DWP, the UK).

[37] In general terms, the Icelandic government has devoted attention towards the development of cloud computing data storage projects, including through FDI initiatives. Efforts have been taken to attract data storage companies to locate cloud computing storage centers in Iceland. Although Iceland has imposed stricter data privacy laws than those generally required by the EU, no specific performance requirements have been introduced on data storage centres. Moreover, there are no other specific impediments to such projects, such as requiring them to be located in specific areas or to allow government access to data for surveillance purposes. For more information, see the Invest in Iceland webpage: http://www.invest.is/key-sectors/data-centers, source US Department of State, *2017 Investment Climate Statements, Iceland*, 2017.

[38] https://www.fme.is/media/leidbeiningar/Gatlisti-vegna-innleidingar-skyjalausna.pdf

43. In Turkey, cloud computing is not allowed for security reasons – personal information protection law and other policies prohibit the storage and transfer of confidential data abroad.

Other potential areas where innovative digital technologies may appear in private pensions

44. Investment and robo-advice are other active areas.

Investment process

45. Fintech is impacting almost all stages of investment process – research, analysis, portfolio construction and management, trading, risk monitoring and settlements. Artificial Intelligence (AI) is becoming an emerging technological trend in investment. AI technologies could support the investment decisions of asset managers (e.g. auto portfolio rebalancing and algorithmic securities trading) and are foreseen to be increasingly used by retail investors, especially among young people. The results of IOPS survey show, however, that at present AI technology is not yet used for pension asset management in the responding jurisdictions, with the exception of Turkey.

46. One of the issues that is currently debated in the international fora like G20, OECD, ESAs, and which is closely monitored by financial supervisors relates to the rapid emergence of crypto-currencies[39]. Potential issue of concern for pension supervisory authorities could be investments by pension funds in crypto-currency (indirectly, for example through hedge funds). The experiences of IOPS jurisdictions show that at present time, such investments (direct or indirect) are either not regulated (Turkey) or are not allowed in Bulgaria, Colombia and Nigeria. Certain supervisory authorities informed that they are not aware of such investments by pension funds. The Financial Market Authority (FMA) of Liechtenstein is not excluding, depending on future developments, that pension funds could invest in crypto-currency in the future.

47. In Canada, an Ontario pension plan, OMERS, as the first in Canada is stepping in rapidly expanding cryptocurrency business through the creation of an Ethereum-focused public company that is planning to raise $50 million.

48. In general, supervisors recognize that developments in this area must be closely followed and regulatory restrictions carefully examined. In this direction, the UK Government has announced a plan to establish a special taskforce[40] for crypto assets as a part of a larger FinTech sector strategy to help to understand and manage any potential risks, as well as harnessing potential benefits of the underlying technology. Similarly, in 2017, the Financial Services Commission of Ontario, established a FinTech Working Group to identify and address any emerging market conduct concerns in relation to the adoption and introduction of new technologies by regulated entities.

Investment via robo-adviser

49. Robotic technology has many real world applications, including in finance. In recent years, 'robo-advisers' (understood as a software, rather than physical robots) are gaining in popularity as an investment tool that offers automated and low cost services and therefore makes advice accessible to more people. The operation of robo-advice is based on digital technologies such as cloud computing, big data, intelligent algorithms, mechanical learning, etc. According to the forecast by KPMG, the AUM by robo-

[39] OECD, *Financial markets, insurance and pensions: Digitalisation and Finance*, 2018.

[40] The Taskforce will include the Bank of England, the Financial Conduct Authority and the UK Treasury.

advisers will increase from 300 bn USD in 2016 to 2.2 trn USD in 2020[41]. Most of the investment portfolios currently compiled by robo-advisers are made of ETFs due to their lower fees.

50. Pension robo advice market is still very small and no much data is available through IOPS jurisdictions. Only few examples were collected[42]: use of robo-advice related to retirement savings in Australia, in Colombia, where one of the pension funds is implementing a project with a robo-adviser that will support the construction and follow up of clients' savings plans. Also in Turkey – a robo-advising apps have been developed in recent years. One of the pension providers in the private pension sector (Garanti Emeklilik ve Hayat A.Ş.) provides a Robo Fund Advising System. However, Pension Monitoring Centre has no information about algorithm that the platform uses. Also, AddVICE (a trade mark by a Turkish Fintech company) is another sample of Robo-Advice platform in Turkey.

RegTech – early stage of development

51. 'RegTech' or 'SupTech' combining terms 'regulation' or 'supervision' and 'technology' refer to the use of innovative or new technologies that may facilitate the interaction between the supervised entities and financial regulators or supervisors. Technologies are expected to ultimately automate and improve compliance as well as reduce the cost of compliance for both the authority and the entity.

52. The EU Commission interprets RegTech as "regulatory technology" and a business model where technology enables firms to better comply with regulations. RegTech could also enable government bodies to implement, monitor, or enforce regulation in a more effective, more efficient, or in a more user-friendly manner[43].

53. Blockchain technology and artificial intelligence (machine learning) are emerging technological trends[44] that could enable industry to develop such techniques. Some financial institutions are already experimenting with an objective to enhance their regulatory compliance. As shown by the FSB report[45] on the example of asset management firms, machine learning tools could help to interpret "regulations into a common language […] analyse and codify the rules for automation into the integrated risk and reporting systems", allowing firms to better comply with the regulations. Such techniques should also contribute to reducing cost, time and efforts put into interpretation and implementation of new or updated regulations. 'Know your customer" (KYC) is other area highlighted by the FSB report where artificial intelligence could be applied.

54. Review of the IOPS Members' experiences show only limited experiences in this area. In Hong Kong (China), some MPF trustees use compliance monitoring system to keep track of administration status for client's MPF instructions and anti-money laundering (AML) system to support Know Your Customer (KYC) compliance. [add Kenyan RegTech examples, see Kenyan case study].

55. In Mauritius, in the case of non-occupational pension schemes, the only kind of RegTech solutions being used at the moment is "wordcheck" to assist in counterparty/ALM/CFT due diligence and

[41] MPF Express, *Robo-Advisors: The Future of Wealth Management?*, Q-1, 2017

[42] Examples of robo-advice in relation to private pensions: CO, TR, UG.

[43] Communication from the Commission to the European Parliament, the Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions: Consumer Financial Services Action Plan: Better Products, More Choices, 23 March 2017.

[44] IBM Institute for Business Value, Building trust in government, Exploring the potential of blockchains

[45] FSB, Artificial intelligence and machine learning in financial services: Market developments and financial stability implications, November 2017

KYC screenings[46]. Also the FSC of Mauritius and the Bank of Mauritius are working to set up a centralised KYC platform as a repository and main administrator for KYC related matters. [Nigeria case to be further expanded or researched].

56. Inputs collected by the FCA, UK[47] through discussions and written responses in relation to the development and adoption of RegTech in the financial sector, provided by established financial firms, technology suppliers and FinTech start-ups show that technology may offer benefits in the following areas[48]:

efficient information sharing through:

- alternative reporting methods – technology that allows the provision of regulatory data in a different or more flexible way, permitting to reduce the cost and the burden of regulatory reporting
- shared utilities – technology that allows firms to share services via cloud or on-line platforms, permitting to reduce the burden and regulatory costs
- online platforms – technology that allows for better communication between firms and regulators/supervisors
- the cloud/cloud computing – on-demand computing services on Internet that can allow firms to achieve greater efficiency and reduce costs

achieving better understanding of regulatory requirements through:

- technology that converts regulatory text into a programming learning [machine-readable regulations would allow for more automation and will reduce cost of change]
- robo-hand books – technology that allows firms to interact with regulation and understand its impact on their systems and processes
- use of Application Programme interface – technology that allows systems to interact with one another

making better decisions and creating automation

- Big Data – advanced analytical solutions that allow to interpret sizable volumes of data to support more informed decision making both for firms and supervisors
- risk and compliance monitoring – technology that allows for surveillance of transactions, behaviour and communications
- modelling/visualisation technology that could help understand impact of regulation before its adoption

[46] https://risk.thomsonreuters.com/en/products/world-check-know-your-customer/about-world-check.html
[47] https://www.fca.org.uk

[48] FCA, *Call for input on supporting the development and adopters of RegTech*, July 2016

- cognitive technology – technology that learns from data and pattern recognition to change algorithms (AI)

new ways (directions) to look at regulation and compliance processes

- blockchain/DLT – can allow to record securely data that can be safely shared across a network, contributing to the improvement of system integrity and transparency

- biometrics – technology that measures and analysis people's characteristics to verify identity

- inbuilt compliance - system that can automatically apply the 'regulatory programme' code and therefore improve compliance and reduce regulatory and staff costs, etc.

II. Supervisory approaches to FinTech

57. Advancements in digital technologies in the financial sector in recent years have become an important focus for financial sector supervisors. The FCA, UK, 2016 Business plan identifies innovation and technology as its key priority. Emergence of a new, previously unknown range of financial products and services, as well as new players competing with incumbent and challenging the usual delivery channels of financial services poses a number of challenges for supervisors and makes it essential for supervisors to understand and respond to these developments in a timely manner.

58. First of all, the rapid pace of technology advancement makes is critical for supervisors to closely monitor developments in entire financial industry. It is also important that supervisors build and develop appropriate supervisory skill sets and resources to understand/detect changes in the market at an early stage and anticipate future developments. Another important element is the reflection and introduction of right-size regulation that does not impede (or limit) innovation and gives appropriate powers to supervisors for timely interventions.

Regulatory developments in relation to FinTech in private pensions:

59. Disruptive potential of innovative technologies in financial sector in general and private pension in particular raises the issue of the need of comprehensive adaption of regulation to address FinTech developments.

60. As highlighted by the FSB report[49], the regulatory approach taken will depend on whether the current legal frameworks cover developments and any emerging risks resulting from FinTech activities. The approach that is followed by a number regulatory and supervisory authorities[50] consists in adhering to *technology neutral regulatory framework*. The main goals of financial regulation, e.g. safeguarding financial security, ensuring access to financial services and consumer protection, imply a risk-centred and technology neutral regulatory approach. This approach assumes that the existing regulatory frameworks address (encompass) the current FinTech activities: therefore regulatory obligations applying to the provision of traditional or digital services are the same. Entities and issues are treated according to the risk they pose and not according the technology per se. Similarly, the supervisory approach remains neutral with respect to FinTech and should be appropriate and proportional to the nature and risk level. At this early stage of FinTech development, it appears prudent to avoid precipitation and introduction of new legislation which may lead to a distorted playing field and hinder market forces. In contrast, adopting

[49] FSB, Financial Stability Implications from FinTech: Supervisory and Regulatory Issues that merit Authorities' attention

[50] AU, DE, LT

special regulations or relaxing certain rules during the experimental phase allowing for a gradual adjustment to regulatory requirements seems to be more suited for the risks that FinTech could pose. Future pace of innovation in financial sector may require search for more suitable long-term solutions that may include adaption or enhancing financial regulation or creating new sphere of regulation[51].

61. Drawing on IOPS Members' responses to the survey, recent regulatory changes introduced in some countries mainly covered issues such as authorisation for pension funds to use digital platforms or mobile applications to enrol members in pension plan (or cancel enrolment) as well as require digitally the portability of benefits - example of Brazil; to deliver information to individuals via web based or electronic platforms (Guernsey and Turkey), signature of pension contracts via e-secure means (Turkey).

62. In Hong Kong, to facilitate the launch of the ePass, the Mandatory Provident Fund Schemes Ordinance was amended empowering the MPFA to designate an electronic system for the purpose of transfer of accrued benefits. The amendments also empowered MPFA to charge a fee to be paid by trustees for the use of electronic system.

63. In India, a draft on proposed amendment to Point of Presence (POP) Regulations, 2015 which are meant for the distribution channel of the new pension system in India (NPS) for private sector has been released. The draft seeks to include payment banks as one of the distribution channels. Payment banks are independent FinTech companies or subsidiaries of banks or joint ventures of FinTech companies and Banks which utilise IT and ITeS to the extent that they may operate through their websites or mobile apps only.

64. A number of countries are planning to adapt legislation to allow for creation of such regulatory Sandboxes (CONSAR, Mexico; Bank of Lithuania – consideration to introduce blockchain Sandbox platform).

65. The FSC Mauritius has been mandated to "set rules for regulating FinTech activities" with a view of promoting Mauritius as a regional Fintech centre, such as peer-to-peer lending and funding, as well as mobile wallet. These regulations are under discussion (although does not touch specifically private pension industry).

66. In Mexico, already some regulatory changes were introduced to allow the use of: biometric authentication methods, unique electronic identification files to substitute paper files, mobile application and a web-portal (e-Sar). In 2018, CONSAR is working to develop a consolidated regulatory framework for the Mexican Pension Funds System in order to support the implementation of digital ecosystem and to facilitate regulatory compliance (RegTech), allowing the use of technological innovations and the participation of third parties (like FinTech). On March 9th 2018 the new Law to regulate financial technology companies was published (Ley para Regular las Instituciones de Tecnología Financiera). This new law provides a regulatory framework respecting FinTech on the Mexican financial sector, including pension regulations.

67. The survey carried among IOPS Members shows that as for now FinTech is not yet defined in private pension regulations.

[51] Banque de France, Financial Stability Review, Financial stability in the digital era, Beyond technology – adequate regulation and oversight in the age of fintechs, Adreas R. Dombert, N°20, 2016

Supervisory approaches to FinTech in private pensions

68. IOPS Members responses to the survey and a review of some supervisory authorities' experiences[52] towards innovation taking place in the financial sector allows for identification of some general principles and main trends in supervisory approaches:

Learning more and understanding better FinTech…

69. ...through intelligence gathering and market monitoring to better understand and evaluate market trends, new players, the way they operate, in particular the new business practices, potential impact on other players, on the distribution channels, on the products being distributed and to identify potential risks and issues for consumers. For example, FSMA Belgium has launched a systemic 'market watch' to keep informed on the developments both domestically and internationally. The market watch is also expected to identify the annual priorities for supervision[53]. Also, FMA, Austria is currently conducting a market survey to gather information on recent market trends.

70. Supervisors are using the results of market monitoring and findings from the reports commissioned or prepared by the authorities[54] as well as analysis of complaints received to build their supervisory strategies and come with new supervisory initiatives.

Maintaining close contact/active dialogue with the industry and other stakeholders…[it can be also done through innovation hubs, depending on the innovations developments]

71. …to encourage the exchange of knowledge and insights in particular through:

- organising meetings and offering guidance to the industry (e.g. UK FCA organising 'hackaton' gathering with the market players)

- offering an opportunity to start-ups or established companies to enter into direct contact with supervisors via Authorities' web-site (e.g. example of the FSMA and the NBB in Belgium, FME in Iceland, etc.)

Creating an environment to test innovative ideas/products or services and improve the industry's understanding of regulatory requirements and compliance…

72. …through creation of a secure environment where FinTech companies can securely test tools, ideas, products and services:

- FinTech Innovation Hubs. For example, ASIC Innovation Hub; DNB and AFM have launched a joint innovation hub to support market operators and create room for financial innovation[55]. Another examples involve the UK FCA, the Guernsey FSC, and Uganda RBRA, etc. The Innovation Hub created by ASIC, Australia, provides assistance to FinTech start-ups developing innovative financial products and services to understand legislative and regulatory requirements.

[52] AU, BE, European Securities and Markets Authority, HK (HKMA), KE, NA, NL, SA, the UK

[53] FSMA, Annual report 2014.

[54] DNB report: Technological innovation and the Dutch financial sector: Opportunities and risks for financial institutions, new market participants and supervision

[55] DNB web-site: https://www.dnb.nl/en/

Entities can receive guidance on licensing process and other key regulatory issues, other on-going support and meet with the international equivalents.

- FinTech Supervisory Sandboxes[56] or regulatory laboratories to create an environment to test innovative concepts with the approval of supervisory authorities and support FinTech initiatives[57].

  The Government of Mauritius launched the Regulatory Sandbox Licence (RSL) on 20 October 2016, offering the possibility for a person or a company to conduct a business activity for which there are no adequate legal provisions. This is as a result of the government's vision to promote creativity and innovations through the application of technology. The RSL falls under the aegis of the Economic Development Board Mauritius (EDB). It is issued to eligible companies willing to invest in innovative projects. As per the indications of EDB, so far, 5 RSLs (4 FinTech and 1 Biotech projects) have been issued. The FSC Mauritius is not involved with the issue of an RSL.

  Based on countries' experiences, supervisory approach with respect to products tested in sandboxes would usually consist of*:*

  - Compliance with regulatory requirements may not be temporarily required. Supervisors could offer exemption on a case by case basis or apply individual waivers (experience of the NBB, Belgium);
  - Introduction of additional protection measures to protect consumers;
  - Offering restricted activity permit or license;
  - Right to approve no enforcement actions;
  - Ability to withdraw provisional license.

Other supervisory measures directed to facilitate financial innovations:

Organising publicity and educational programmes

During and immediately after the launch of a digital initiative, publicity and educational programmes are essential to make targeted users aware of benefits from digital initiatives put in place by supervisors [example HK MPFA, to be further developed].

Setting up supervisory guidelines

- in particular with respect to the establishment and operation of new entities, planning to offer FinTech solutions [example: ASIC, Australia, Regulatory guide 255 on Providing digital financial product advice to retail clients[58]].

[56] The concept of "sandbox' has different interpretations in various countries. The AFM and DNB understand a regulatory sandbox as '*a "safe space" in which business can test innovative products, services and models without immediately incurring all the normal regulatory consequences of pilot activities*', AFM and DNB interprets it as '*More room for innovation in financial sector*.'

[57] FinTech Supervisory Sandboxes were created by ASIC AU, SEC Brazil, ID, IR, HK, HKMA – banking supervisor; KZ, MU, MY, NL, TH, SG, UAE, the UK FCA; etc. A number of authorities are working on the establishment of an innovation hub and/or sandbox: CO, LT, MX, PL, and RF.

- MPFA issued guidelines to trustees with respect to transmission of data in respect of transfer of accrued benefits through the designated electronic system.

Building appropriate supervisory skills and resources

73. The survey showed that a number[59] of IOPS Members have created dedicated (FinTech) units, a joint unit between several authorities (France), or a department to assist with authorisation process and organise supervision. As an example, the SFC Colombia has created a unit dedicated exclusively to Fintech matters. This unit is responsible for the development and setting forth of the SFC's Fintech strategy and is utterly committed to the adequate and responsible implementation of a Fintech culture within the SFC. In addition, this unit is in charge of the Fintech training programs and is the channel established by the SFC to maintain a dialogue with the industry.

74. Special attention is also being devoted to development of appropriate supervisory skill sets and internal resources to better understand and monitor innovation occurring in the financial sector. This is done through organisation of training sessions of supervisory staff[60]. Some Authorities have facilitated participation of their staff members in seminars organised by industry or by international organisations (example of Jamaica).

Maintaining close dialogue and co-operation between supervisors

75. Development and launch of digital projects requires close co-operation between regulatory and supervisory authorities. For example, development and implementation of ePayment for MPF Transfer makes use of the Hong Kong Monetary Authority's Central Management Unit to automate payments for transfers of benefits between trustees. The MPFA had to liaise with the HKMA and trustees regarding the mode of co-operation, system requirements, implementation schedule and other preparatory work.

76. Another example could be setting up or participation of supervisory authorities in FinTech working groups or other committees together with other regulators and supervisors at national level (examples offered by the Brazilian supervisor, PREVIC and the FSC, Mauritius). The FSC, Mauritius, has set up the FinTech and Innovation-driven Financial Services Regulatory Committee to guide all stakeholders in further developing Mauritius as a regional hub for FinTech[61]. [Add other examples offered in the Hong Kong and Kenyan case studies].

77. Examples of international co-operation in the area could be a signature of bilateral agreement for co-operation, as reached by the Bank of Lithuania and Monetary Authority of Singapore to work together to support development of FinTech ecosystems and encourage a greater financial innovation in two countries[62]. As part of the agreement the authorities will exploit joint innovation projects, share information on emerging market trends and FinTech companies may seek support from respective supervisory authorities. Also the UK-Australia 'FinTech Bridge' signed by the respective representatives

[58] http://download.asic.gov.au/media/3994496/rg255-published-30-august-2016.pdf

[59] CO, HK, HU, LI, LT, MU, MX, RF, UG.

[60] CO, GG, HK, JM, LI, RF, SK.

[61] https://www.fscmauritius.org/media/4279/fsc-communiqué-in-relation-to-regulatory-comittee-on-fintech.pdf

[62] www.lb.lt

of the UK and Australian government on 22 March 2018 aiming to deepen collaboration between governments, regulators and industry bodies and fostering FinTech business expansion internationally[63].

Areas of supervisory attention/oversight in relation to FinTech in private pension area

78. In view of relatively small scale of current FinTech activities in private pension sector, it appears difficult at this stage to draw a complete list of key challenges and risks that pension supervisory authorities should be aware of and be prepared to deal with. As the respondents to IOPS survey stated, this task is further complicated by insufficient official data on FinTech developments in private pension area. An important work developed by the FSB outlines the list of key areas that merit financial supervisory authorities' attention with respect to implications from FinTech[64].

79. Drawing on the FSB work and the responses collected through the IOPS survey, a tentative list of areas/issues that require (or may require) supervisory attention or oversight in relation to FinTech developments in pension sector are listed below. A number of them require a close co-operation and consultations among supervisory authorities:

- oversight of entry of new players that fall outside regulatory perimeter;

- authorisation (provisional, subject to limitations and conditions, or full authorisation) of non-regulated entities;

- close monitoring of the business activities taking place in a regulatory sandbox or in the market;

- monitoring business conduct;

  Regardless of technology used, the focus of supervisors should be on the board of directors/senior managers of a company planning to offer or already offering FinTech services or products. As an example, the UK, FCA Senior Management Regime (SMR) captures a number of issues surrounding the adoption of new technologies in financial sector. The aim of the SMR is to increase the accountability of senior management within financial services. The SMR tries to incentivise appropriate risk-taking and good decision making with regard to all aspects of firms activity, e.g. the deployment and operation of systems, cyber-security and operational resilience.

- monitoring operational risks related to the outsourcing by authorised firms of activities such as process and information management.

  For example, complex technology as AI, blockchain and cloud computing is increasingly offered as a service by third parties;

- controlling whether the use of automated platforms and e-systems used by employers/providers complies with regulations, if any, and in the case that there are no rules, setting up procedures for the monitoring of such systems;

- malpractice and fraudulent activities;

[63] https://treasury.gov.au/fintech/

[64] FSB, Financial Stability Implications from FinTech, Supervisory and Regulatory issues that merit Authorities' attention, June 2017

- supervision of robo-advisors [*to be researched further*: performance of checks or controls of algorithms used before entering in production phase; requirements for explanation of (investment) outcomes to participants; introduction of any new training requirements for 'hybrid robo-advisers'];

- monitoring consumer protection issues (settlement of disputes arising due to unclear liability allocation, collection and analysis of complaints' data in relation to FinTech; avoidance of any forms of financial exclusion, etc.).

Issues requiring consultation and enhanced co-operation between supervisory authorities at national and international levels:

- cyber security and IT risks

  Evolution of cybercrime, use of digital channels to steal assets and data, attacks on IT systems [to be further expended, as regarded as one of the most critical issues for supervisory attention]

- controlling data protection (prevention of information misuse);

- cross-border issues

Issues that may arise in the future:

- controlling concentration risk (if one or more parties start dominating specific segments of the value chain or BigTech companies start dominating the market);

80. Conclusions of the section:

***General principles could be summarised as follows**:*

Supervisors should consider
- Maintaining neutral stance (position) with regard to technological advances;
- Enforcing harmonised set of rules, covering all parties;
- Developing better understanding of FinTech developments though trainings and dialogue with the industry (build and develop appropriate supervisory skill sets and resources to detect at early stage and understand changes);
- Keeping prudential supervision flexible and vigilant. Special supervisory treatment could be given at the experimental phase, when experimental phase is over, it is essential to ensure that same rules apply to same activities, regardless technology used – supervision should be risk-oriented and technologically neutral.
- Placing focus on protecting consumers (members and beneficiaries) from new risks posed by a new financial environment.

III. Use of innovative technology by supervisors

81. This section aims to review how supervisors themselves are using innovative technologies to make their communication and oversight (i.e. monitoring, on-site/off-site inspections, reporting requirements) more cost-effective and efficient. Attention will be also given to understand potential or already achieved gains with the implementation of technology to supervise pension services providers. The section will try to identify the main challenges that supervisors are encountering during the implementation process and how they are being tackled.

82. On this stage of analysis, it is also important to keep in mind the past experiences with technological developments and changes they brought in the society and economy. Some of innovative technologies, which are associated with high expectations, may fall flat, other can become really transformative. Only in long-time scale it will become clear which of the new technologies will revolutionise the delivery of public (supervisory) or financial services.

83. At present, some prominent use of innovative technologies by the governmental authorities, especially blockchain technology, could be observed. A recent IBM report[65] reviews experiences of a group of pioneers, public authorities in a selected number of jurisdictions that are looking into applicability of blockchain technology in a number of domains such as regulatory compliance, contract management, identity management and delivery of better services for citizens. Based on the findings of the report, 90 percent of government authorities surveyed believe that blockchain will have the largest impact on regulatory compliance as current systems and infrastructure established to enforce regulatory compliance may appear inefficient in terms of time, cost and human labor involved. Government experiences in using innovative technologies include: recent work by the government of Honduras to move their land registers into blockchain; similar developments to register property transfers on blockchain technology are observed in the United States; developments in Australia (Govpass in Australia[66]) and the Russian Federation to create digital identification systems with biometric elements for the use of governmental services on-line, as well as the experience of Estonia with a creation of digital identity-based blockchain services (e-Residency). The latter gives access to a large range of online services, including banking and registering/managing business in accordance with Estonian law. Other experiences relate to work undertaken by the Central Bank of Sweden and the Reserve Bank of India to incorporate blockchain technology in their processes; use of cloud services to serve workload and host data from the Australian Government (Microsoft announced the creation of a new facility in Australia 'a new Azure region in Canberra Data Center' to serve the workload of the Australian Government[67]).

84. Responses to the IOPS survey highlighted quite different stages of adopting technology by pension supervisors. Generally, it could be stated that the majority of supervisory authorities are still at a quite an early stage of adoption/integration of innovative technologies. However they are expressing interest to learn more about such experiences from jurisdictions that have advanced in this direction.

85. Supervisory authorities in a number of jurisdictions are considering emerging technologies and some are already exploring the use of those to enhance interaction and improve practices and services offered to all stakeholders as well to support supervisory processes and strengthen supervisory oversight. Below are some examples:

- *putting certain regulatory or supervisory services on-line*, e.g. on-line licensing[68] or on-line plan registration and amendments, examples by Province of Ontario and of Alberta, Canada. The DNB in the Netherlands is currently developing a digital portal for submitting documents and forms for market entry (process for authorisation of applications). The MPFA, Hong Kong (China) is working on an online platform for application for registration of MPF intermediaries. Online business licensing service (OBLS) was created in Singapore to improve license process(ing) and

[65] IBM Institute, 'Building trust in government: Exploring the potential of blockchains'

[66] The Govpass platform in Australia is currently in testing phase. See http://www.zdnet.com/article/australian-government-details-govpass-digital-id/

[67] https://www.forbes.com/sites/justinwarren/2018/04/10/microsoft-makes-clear-play-for-mission-critical-cloud/

[68] BR, JM, LI, LT, MU, NI, TR, UG (consider to introduce)

interoperability between several governmental agencies that issue licenses[69]. Several authorities[70] provide online facilities for lodging complaints on their own web-sites.

- innovative technological solutions can support *supervisory information management: collection; storage; processing* and use of large volumes of data and information to *proactively respond to supervisory mandates*;

  "Business process management tool" is used in Chile to help to organise, process and control the information within the Superintendence of Pensions and also information/requirements provided by external parties (government, ministries, AFPs, etc.). It is an intranet tool, where every request is saved and followed until the parties involved have finished it.

  The Superintendence of Pensions uses Business Intelligence (BI) software in its surveillance work with the AFPs. The Superintendence of Pensions receives massive structured data from the AFPs on a large variety of topics, and BI technologies help to handle these data and to put an alert in case of risk/mistakes. The use of BI started just ten years ago, therefore the potential for improving the supervision is still significant.

- -*use of IT solutions to streamline regulatory reporting*[71]. In a number of jurisdictions, returns from supervised entities are filed mostly by electronic means through electronic files or electronic platforms[72].

  The MPFA, Hong Kong, China has already put in place systems to collect annual returns and automatically verify the compliance of registered MPF intermediaries, also for trustees to submit business data to the MPFA. There is also a plan to put in place electronic collection of data for statutory returns from MPF trustees. Development and implementation of eMPF initiative will likely make more significant advancement in this respect, allowing achieving more straightforward compliance.

  - *creation of a fully automated data collection* (an electronic system which enables supervised entities to submit data/reports electronically) and *standardisation of the process* (formats used by providers) – can allow collection and use granular data essential for effective supervision. This will require supervisors and providers to co-ordinate more closely and invest in the right technology. The example is Austria's Central Bank automating the collection of granular prudential bank data and eliminating the report templates: in a new system, the granular data is collected automatically by banks systems and, subsequently, sent to AuRep, a company owned by banks. AuRep

[69] *Digitalising Governmental payments*, Kenya Study, 2013

[70] Examples: AL, Province of Alberta (Canada) – emails are routed to the central in-box for analysis and reply, GG, HK, JM (as a part of integrated regulatory system), IN (the Central Record Agency (CRA) platform supports centralised grievance management system to ensure smooth and speedy resolution of complaints), LI, MU (OSP interactive platform), NA, MX (current e-SAR system allow for lodging pension complains; work is undertaken to extend the platform to include new services); NI, RF, SK, TR, UG.

[71] In February 2016, the IOPS jointly with COVIP, Italy hold a Technical Workshop 'Reporting by pension funds to supervisory authorities: IT opportunism and challenges'; *further information could be gathered from the presentations made at the Workshop*.

[72] AT, BG, Province of Alberta, Province of Québec (in place in 2019), Canada, CO, GG, JM (as a part of integrated regulatory system), IN (under development), LI, MU, MX, NA, NI, RF (?), RO, SK, TR, UG.

automatically prepares granular datasets using standard formats, which can be accessed and used by the Central Bank and financial supervisors any time[73].

CONSAR, Mexico supervisor, reported that the Authority is currently interconnected with supervised entities through *ConnectDirect* system, and has a defined *EDI* protocol to collect data from the supervised entities. In addition, the Authority has an online connection with the central pension database which allows monitor critical processes online and in real time.

- *on-line platforms* or *other technological solutions to facilitate remote on-site supervision* (Examples of Mexico, Provinces of Alberta, Ontario and Quebec (in place in 2019), Canada, Colombia, Guernsey (currently under development), Jamaica (as part of the IRS systems); India; Liechtenstein, Mauritius, Mexico, Nigeria, Slovak Republic, Turkey (PMC), Uganda.

  In recent years, CONSAR, Mexico, has been working to develop technological platforms to improve efficiency in monitoring AFOREs. The creation of electronic files that AFOREs need to generate during their interaction with members is the initial stage in this process. The electronic files are stored in the central database through an Electronic Data Interchange (EDI) tool. Information cubes and report analysis tools have been implemented to facilitate interaction between the supervised entities and CONSAR. The system allows CONSAR to have an on-line view of the operations performed by AFOREs. [*to be potentially expanded further*]

  Also, the MPFA, Hong Kong (China), plan to put in place by phases starting from 2019 systems that maintain and automatically analyse information and data collected from MPF trustees to identify new issues and risks.

  In Liechtenstein, e-Service platform (web-based channel) was introduced in mid-2015, through which financial intermediaries submit their supervisory reports. On the basis of these reports, the FMA checks the compliance with regulatory requirements, evaluate risks and follows the business development of companies nearly in real time. The system meets the requirements of the European Supervisory Authorities (ESA) in regard to the exchange of reporting data. The FMA works to steadily expend and optimise the system.

  In Mauritius interactive platform was recently created, allowing for the collection, compilation and analysis of data (statutory submissions and surveys) through online submissions. This system provides a secured and user-friendly online platform, with SSL certificate, for licensees to submit their respective data.

- *creation of a single centralised pension database (Belgium, Province of Alberta (Canada), Finland, Guernsey, Mexico).*

  Another interesting development is the creation by supervisory authorities in a number of countries/territories of the centralised national database on private pensions (Belgium, Province of Alberta in Canada, Finland, Guernsey, Mexico), with the help of which individuals could view their retirement savings or in some cases, as in Belgium, coming both from public and private sources. Interconnectivity of the database with other governmental agencies allows use the data for supervisory purposes as well as for other governmental activities, such tax payment controls.

[73] The Consultative Group to Assist the Poor (CGAP), *Why Digital Finance Supervisors should automate data collection*, January 2018

In Finland, following the adoption of the Law on the incomes information systems, enacted in January 2018, a centralised national database – Incomes Register – will be operational from 2019 onwards. It will contain a comprehensive data on earned income, pensions and benefits. Data providers will report information in real time, at the level of individual payments.

Likewise, a centralised single pension database[74], called 'DB2P', covering occupational pensions of employees and independent workers (self-employed and company managers) was recently launched[75] in Belgium. The database's primarily purpose is to allow access to individual pension information. Such information covers: personalised account statements (overview of pension rights: annual and in case of major events such as employment exit, retirement, death); contributions paid and pension payments (still in the pipeline). Since 2016, individuals can have a full overview of their pension rights (both public and occupational pensions) via web-application[76], which could be accessed by ID card or via smartphone. Registered data also offers a major source for monitoring compliance with the social occupational private pension legislation by the FSMA and have prompted the shift towards more proactive and structural mode of supervision. Interconnectivity of DB2P data with other governmental databases in Belgium makes possible for the updates of the data and its use for other public purposes (checks on pension premium deductively by tax authorities and others). Work is currently undertaken to progressively expand the registered data to meet the different purposes both of governmental authorities, pension institutions and members/beneficiaries (information of voluntary personal pensions) and adequately reflect on-going and forthcoming pension trends.

Mexico example [see country case.]

- *On-line whistleblowing mechanisms or platforms* (examples from Province of Alberta, Canada, Hong Kong (China) MPFA receipts information from customers sent by email, Liechtenstein, Lithuania, Nigeria, Slovak Republic, Turkey (PMC), Uganda)

86. The *efficiency gains achieved through the use of technological tools* (Mexican case study and desk research):

- Direct and on-line access to information that have resulted in a more focused supervision, eliminating the time needed to ask, search and wait for specific information, that on some occasions would take two or three weeks to receive, thus allowing supervisors to improve supervision response times and achieve better results for the costumers.

- Real-time information on service availability and number of transactions that have helped to detect and prevent possible malpractices or fraud.

- More controls that allow early detection (such as inconsistencies in the collected/generated information).

- In the case of Mexico, complete visibility on the sales agents' activity that has resulted in a decrease of commercial expenses and malpractices. Using these technologies (Biometrics, cubes, EDI), illegal transfers have been reduced to a historical minimum. Since the implementation of biometric elements CONSAR has detected only one case which is being already prosecuted.

[74] http://www.db2p.be/fr/home

[75] Source: FSMA presentation at the IOPS Technical Committee meeting in Dublin, Ireland on 22 February 2018

[76] www.mypension.be

- Analysis tools that provide early alerts on behaviour of the AFORE have prevented misbehaviours or possible collusion problems between AFORE.

- Financial and operational fact-sheets provide opportune information on the system as a whole, allowing visibility, opportunity and transparency of the processes.

- On-site supervision has been improved by focusing efforts with the use of the information provided by the tools described above.

- Possibly stimulate policy reforms for heterogeneous population.

- Some Authorities highlighted importance of assessing cost of possible RegTech and SupTech solutions

IV. Draft conclusions *[to be further developed]*

87. Digital transformation advanced by innovative technologies embraces all sectors of the economy. Technological innovation is also a major development affecting the whole financial sector, including private pensions. Compared to other segments of financial sector, technological innovation in the private pension area is still in a nascent and experimental stage, touching only certain areas of pension service providers' activities as well as their interactions with supervisors. This could be explained by large variety and complexity of pension arrangements and optionality with pensions.

88. Despite some slow start, many innovative concepts and services are reaching pension sector and are started to be considered or used by supervisory authorities in a structured way so that to increase the efficiency and cost effectiveness of supervisory oversight. As a part of the project it was found that in a number of jurisdiction pension supervisory authorities together with other stakeholders are at the forefront and are initiating or driving the take-off innovative technologies in the private pension sector.

89. Use of innovative technologies such as mobile money transfer services, pension apps, setting up of online platforms and development of financial digital ecosystems may help to address some of the challenges pertaining to the private pension industry. They may help expand private pension coverage in particular in voluntary pension systems for certain categories of the population such as youth, self-employed, informal sector, help engage individuals with private pensions, and facilitate making pension contributions and access to their personal pension information at any time and irrespective of geographical location. Adoption of biometrical, cloud computing and other innovative technologies by pension funds and schemes appear to bring more efficiency and simplify their operations, allow for better storage and processing of the users information, achieve greater security, improve administration and reduce cost. New technologies may also facilitate interaction between the supervised entities and financial regulators or supervisors and ultimately automate and improve compliance as well as reduce the cost of compliance for both the authority and the entity. Although at present it seems that the adoption of RegTech in the pension area is still at very nascent stage, there may be significant developments in future.

90. Innovations occurring in the financial sector, including private pensions, become an area of increased supervisory attention. In this regard, in an increasing number of jurisdictions *regulatory and supervisory authorities have adopted a dual approach.* Supervisors in these jurisdictions aim in the first place *to offer support* to financial innovation, through provision of guidance to FinTech innovators, establishing a framework for testing innovative ideas and products –creation of innovation hubs or related sandboxes, and in parallel to *closely monitor developments* and subsequently *address any emerging* (potential) risks involved with FinTech for the financial sector and consumers. In view of rapid technological developments, supervisory authorities are committed to enhance their knowledge on FinTech

developments though training programmes for their staff and maintain a close dialogue with the industry. In a number of Authorities a dedicated unit/department or a joint unit between several supervisory authorities were established to better follow and address issues arising from FinTech activities.

91. The project also shows that pension supervisory authorities are starting to use innovative technologies/implementing technological platforms and other essential tools to enhance the efficiency and cost effectiveness of supervisory oversight. Several work areas could be identified: achieve greater automatization in their operations and services offered - putting on-line some supervisory key services – as licensing/registration, complaints management or handling; development of single centralised pension database that offers members access to key pension information and their savings and due to interconnectivity of the database with supervisory and other governmental authorities could allow use of the data for supervisory purposes as well as for other governmental activities; development of technological platforms to facilitate remote on-site supervision.

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ANNEX 1. USE OF DIGITAL TECHNOLOGY TO FACILITATE ADMINISTRATION AND SUPERVISION OF MANDATORY PROVIDENT FUND SCHEMES IN HONG KONG, CHINA

I. Overview of the MPF System

1. The MPF System is a defined contribution, mandatory, employment-based, privately managed and fully funded system. All employees and self-employed persons (SEPs) aged 18 to 64, except for exempt persons, are required to join an MPF scheme. Established in 1998, the Mandatory Provident Fund Schemes Authority (MPFA) is the regulator of the MPF System.

2. The MPF System adopts a decentralised administration model. MPF schemes are offered and managed by trustees. Each trustee operates its own scheme administration system that is independent from others. Under the MPF System, employers choose schemes offered by trustees and employees choose funds from the scheme(s). As at end March 2018, there were a total of 17 trustees (among which 14 were active trustees), 32 schemes and 469 funds.

II. Objectives of Digital Initiatives Undertaken by the MPFA

3. The administration of the MPF System involves a large volume of transactions, which includes handling monthly collection of numerous contributions, following up default contributions and payout of benefits on eligible grounds. According to the consultancy study conducted in 2012, there were more than 30 million transactions yearly, and about two-third involved some degree of paper-based transactions or manual processing.

4. Over the years, the MPFA has introduced different digital initiatives, including the Electronic Portability Automation Services System (ePASS), the ePayment for MPF Transfer, the Default Contribution (DC) and Personal Account (PA) (Data) Submission Using TrusNet[1] Platform, the eService for Intermediaries, MPFA Mobile Apps and the e-Enquiry of Personal Account (ePA). These digital initiatives aim to:

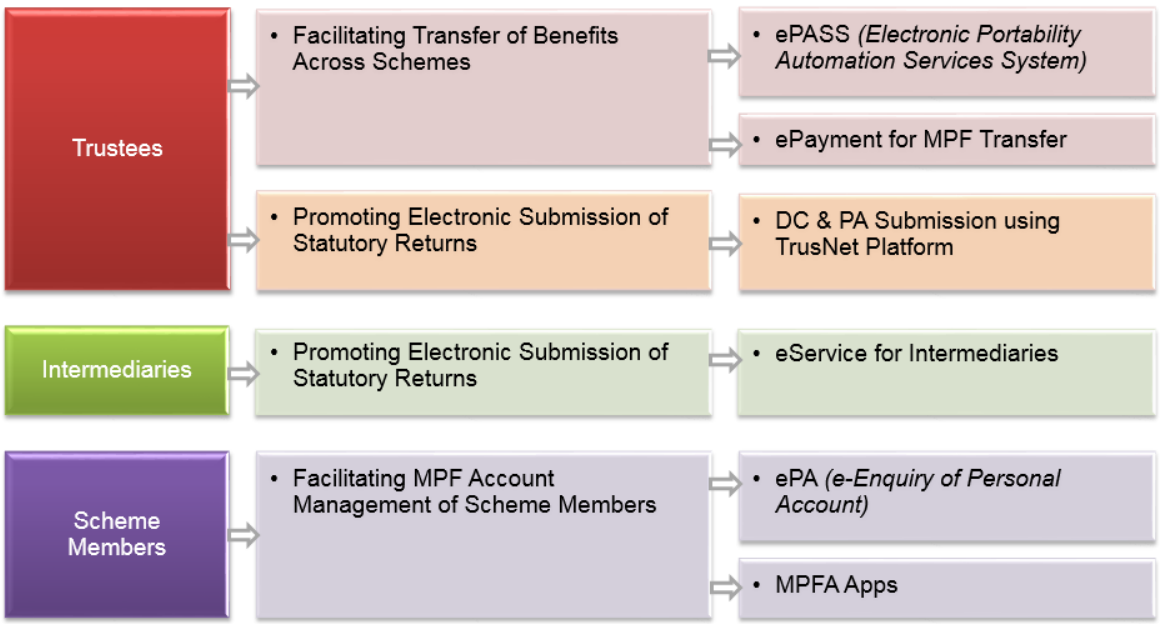
   - enhance operational and cost efficiency of the MPF System;

[1] The TrusNet is a secured private network platform connecting the MPFA and trustees.

- improve accuracy and reliability of processes and transactions;
- facilitate supervision of trustees and other service providers; and
- strengthen the knowledge and engagement of scheme members.

5. Each of these digital initiatives has one or more specific target groups. In respect of trustees, the ePASS and ePayment were introduced to facilitate transfer of benefits across schemes, while DC and PA (Data) Submission Using TrusNet Platform were launched to promote electronic submission of statutory returns by trustees. In respect of MPF intermediaries, eService for Intermediaries was launched to promote electronic submission of statutory returns and payment by them. In respect of scheme members, MPFA Mobile Apps and ePA aim to facilitate their management of MPF accounts.

Target Groups of MPFA's Major Digital Initiatives



III. MPFA's Digital Initiatives in a Nutshell

A. Digital Initiatives to Facilitate Transfer of Benefits across Schemes

6. Under the MPF System, scheme members have the right to transfer benefits from one scheme to another under certain circumstances (MPF transfer). There are around 600,000 transfers a year. Processing of transfer requests used to be primarily manual, requiring substantial manpower and longer processing time of trustees. Transfer payment was also made using paper cheque.

Electronic Portability Automation Services System (ePASS)

7. The ePASS was launched in 2012 to facilitate transfers of benefits across schemes with the following objectives:

   - streamlining MPF transfer processes by electronic data transmission;
   - enhancing accuracy and control;
   - enhancing customer experience by shortening the processing time; and
   - improving management information (e.g. facilitating analysis and monitoring).

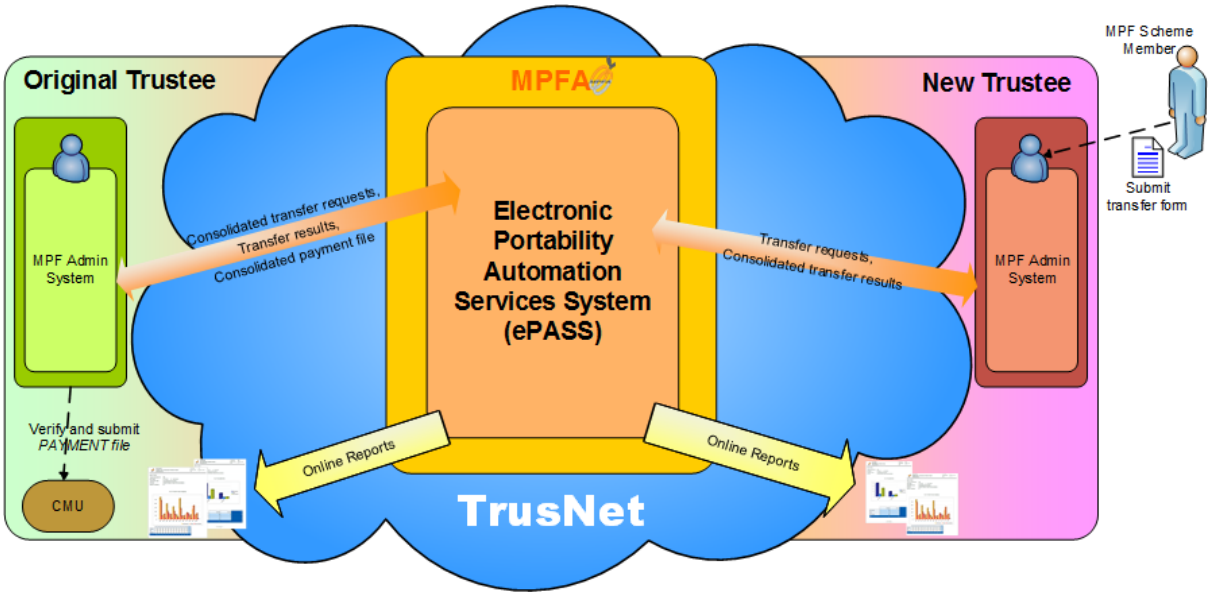
8. Building on the infrastructure of the TrusNet, a secured private network platform connecting the MPFA and individual trustees, the ePASS performs the following functions:

   - collecting the data of a member's election for MPF transfer from the new trustee (i.e. the trustee who will receive the transfer proceeds of the member) and delivering the data to the original trustee (i.e. the trustee who will pay out the transfer proceeds);
   - collecting the reply data from the original trustee and delivering the data to the new trustee; and
   - providing management information to trustees regarding the usage of the ePASS.

9. After the launch of the ePASS, when the new trustee receives a transfer application form from a scheme member, it verifies the information on the form and transfers the request to the original trustee via the ePASS. The original trustee then checks the information and redeems the fund units for the scheme member. After the completion of the fund redemption process, the original trustee informs the new trustee of acceptance of transfer application and the transfer amount via the ePASS. The new trustee buys fund units according to the scheme member's instructions upon receiving the transfer payment. The ePASS has contributed to shortening the average processing time to three to four weeks, compared to the original estimate of six to eight weeks.

10. The ePASS won the FutureGov Award 2013 (in the Government Cloud category), an information technology award for the public sector in the Asia-Pacific region, in recognition of the deployment of cloud computing technology.

Electronic Portability Automatic Services System



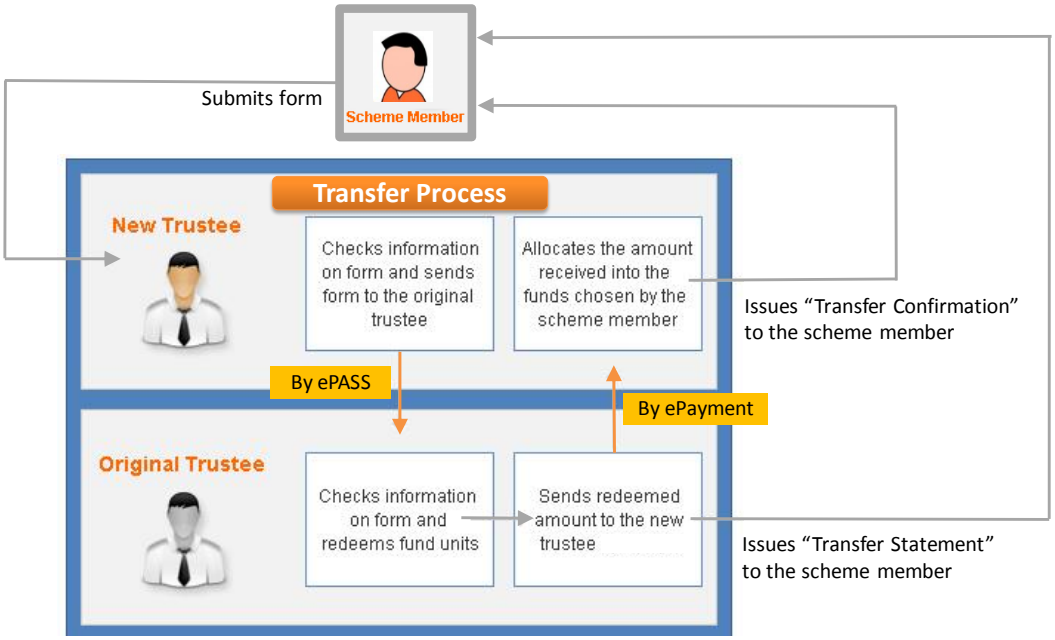
ePayment for MPF Transfer

11. As a supporting measure to the ePASS, the ePayment for MPF Transfer facilitates electronic payment of MPF transfer between trustees. The ePayment was launched in 2014. It helps further shorten the processing time of payment transfer by about one week, saving the costs of trustees in handling payments by paper cheque (i.e. issuing, mailing, verifying and chasing), and reducing the out-of-market risk of members during transfer of benefits.

12. The ePayment for MPF Transfer makes use of the Hong Kong Monetary Authority's Central Moneymarkets Unit (CMU) to automate payments for transfer of benefits between trustees.

13. With both ePASS and ePayment in place, on average, the overall processing time of transfer of benefits has shortened to about two to three weeks.

ePayment for MPF Transfer



B. Digital Initiatives to Promote Electronic Submission of Statutory Returns

14. For various purposes, trustees and intermediaries are required to submit regular and ad hoc returns to the MPFA. Promoting electronic submission of returns is an important initiative to achieve cost efficiency, and ensure timeliness and accuracy of data.

<u>DC & PA (Data) Submission using TrusNet Platform</u>

15. This digital initiative enables trustees to perform electronic data submissions to the MPFA regarding the notice of default contribution (DC) of employers and SEPs, and information of new, updated and terminated personal accounts (PAs)[2]. Its major objectives are as follows:

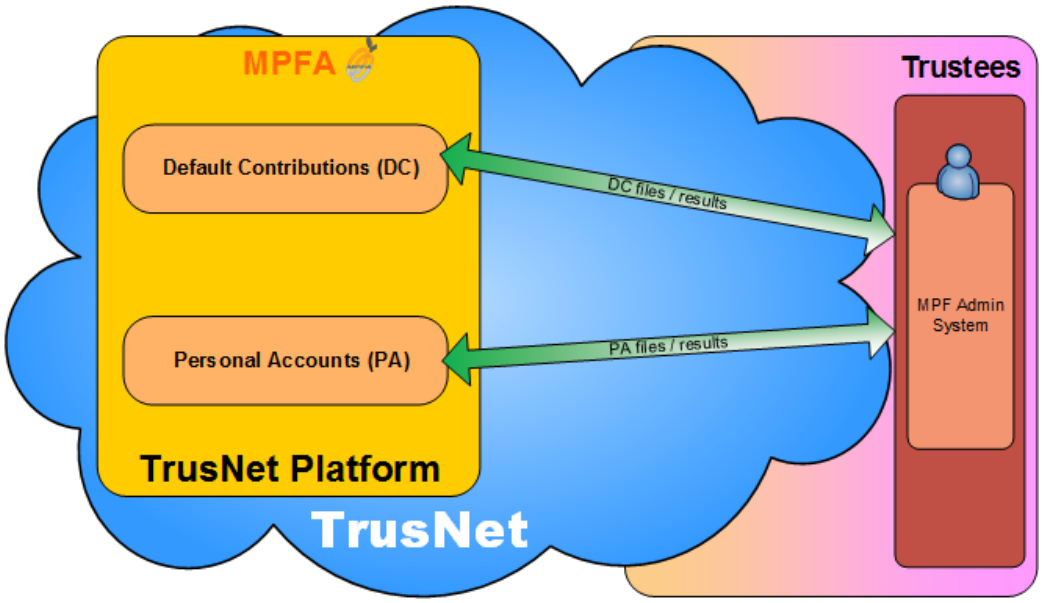
- to automate and streamline the workflow for operational efficiency;
- to standardize data submission in a prescribed format via a dedicated platform; and
- to enhance control, accuracy, security and timeliness of submissions from trustees.

16. Under the MPF legislation, if an employer or a SEP fails to pay mandatory contributions in full to the trustee by the contribution day (i.e. default contribution), the trustee has to submit

[2] When a scheme member changes job, a personal account will be created to hold the accrued benefits accumulated by the scheme member during his/her former employment unless the member elects to transfer such accrued benefits to be held under the contribution account of his/her new job.

a written notice to the MPFA within 10 days after the contribution day. The trustee has also to report the new, updated and terminated PAs on a monthly basis and a comprehensive list of PA holders to the MPFA annually. Before the DC & PA (Data) Submission, trustees submitted the data manually via email or diskettes, and the MPFA needed to save the data to MPFA's systems manually and perform backend validation. With the launch of this digital initiative, trustees submit the required information to the MPFA electronically in a standardised and prescribed format using the TrusNet Platform, and they will be automatically validated and uploaded to MPFA's systems.

DC and PA Submission using TrusNet Platform



eService for Intermediaries

17. Under the MPF System, there are two types of MPF intermediaries:

    - Principal intermediary (PI) – a business entity registered by the MPFA as an intermediary for carrying on regulated activities; and
    - Subsidiary intermediary (SI) – a person registered by the MPFA as an intermediary for carrying on regulated activities on behalf of the PI.

    As at end March 2018, there were 411 registered PI and 32 369 registered SI.

18. PIs are required to submit an annual return on business information (e.g. names of schemes marketed and statistics on MPF transactions) and a quarterly return on complaints to the MPFA, while SIs need to submit an annual return relating to their continuing professional development activities. Both PIs and SIs are required to make annual fee payment to the MPFA.

19. The eService for Intermediaries was launched to facilitate intermediaries to submit returns and payments to the MPFA promptly and accurately. It allows PIs and SIs to perform online submission of returns through the MPFA's website (for PIs and SIs) and mobile apps (for SIs only). It also allows them to make annual fee payments electronically (by e-Cheque via MPFA's e-cheque Collection Portal, PPS (a popular means of electronic payment in Hong Kong) or visa/master card (to be available in the second half of 2018)). PIs and SIs can also view their registration information via eService for Intermediaries.

C. Digital Initiatives to Facilitate Account Management of Scheme Members

20. Similar to many other mandatory, private pension systems, member engagement is a key issue in the MPF System. Digital initiatives have been introduced by the MPFA to "nudge" scheme members to take care of their MPF investments and accounts.

e-Enquiry of Personal Account (ePA)

21. Under the MPF System, when a scheme member changes job, a PA will be created to hold accrued benefits accumulated by the scheme member during his/her former employment.

22. Over time, many scheme members have maintained more than one PA with different trustees. The ePA includes an electronic platform available on the MPFA's website and an mobile app to provide an easily-accessible channel for schemes members to look up their own PA at any time anywhere. It also facilitates scheme members' consolidation of PAs and provide other useful information for scheme members to manage their accounts (e.g. MPF news, trustee contact list, fees of funds (available in MPFA mobile app only) and default investment strategy fund list (available in MPFA mobile app only).

23. Scheme members can fill in an online application form available on the MPFA's ePA website or MPFA mobile app to apply for the ePA service. The application for ePA service is a one-time process. Scheme members once successfully applied as ePA users will enjoy lifetime service. Scheme members may look up their own PAs via ePA. The MPFA may also issue email notifications to scheme members on the latest report of their PAs.

MPFA Mobile Apps

24. In tandem with the increasing use of smart phones, the MPFA launched its first mobile app in 2013, serving as an easily-accessible platform for useful information about MPF. It also aims to enhance scheme members' engagement with MPF.

25. MPFA's mobile app provides background information about the MPF System; the missions and roles of the MPFA and the services it provides to scheme members; MPF educational materials; and some useful links to relevant organizations. It makes available two MPF calculators to help users estimate retirement needs and project MPF accrued benefits. An apps portal is also available in MPFA's home page, providing relevant links to all MPFA mobile apps.

D. Challenges and Risks in Relation to the Development of Digital Initiatives

26. During the development of various digital initiatives, the MPFA has encountered some challenges and risks which needed to be addressed so as to ensure smooth launch of these projects.

Keeping Regulation Abreast of Digital Development

27. Existing regulatory and supervisory regime needs to stay abreast of the development of digital technology. To facilitate the launch of the ePASS, the Mandatory Provident Fund Schemes Ordinance (Cap 485) was amended, empowering the MPFA to designate an electronic system for the purpose of transfer of accrued benefits. The amendment also empowered the MPFA to charge a fee to be payable by trustees for the use of the electronic system. Guidelines were also issued to trustees on transmission of data in respect of transfer of accrued benefits through the designated electronic system.

User Acceptance and Engagement

28. To achieve the benefits of digital technology, one of the major challenges is to encourage users to change their behaviors and migrate to paperless transactions. Before launching a digital initiative, substantial effort is required to conduct engagement activities with trustees, employers and scheme members to understand their needs and concerns. During and immediately after the launch of a digital initiative, publicity and educational programmes are essential to make targeted users aware of the benefits they can obtain from the initiative. In the development of the ePASS and ePayment for MPF Transfer, the MPFA had set up working groups with trustees to discuss issues like standardization of data requirements and operational procedures, etc. Relevant training was provided to the staff of trustees so as to ensure the proper and efficient operation of the systems.

29. To encourage the use of the ePayment for MPF Transfer that facilitates transfer of benefit payment electronically between trustees, trustees were given a fee waiver for the initial years of their use of this new payment settlement model.

Security of Data Transmission

30. Security of data transmission is a major risk faced by a private pension system with decentralized administration. One way to contain the risk is to set up a secured electronic platform connecting the pension supervisory authority with each trustee through a private network in which trustees need to follow specified security measures to connect to the platform. Under the ePASS, data transmission process is conducted through the infrastructure of the TrusNet, an existing secured private network platform connecting the MPFA and individual trustees to prevent data leakage. To further protect data privacy, data files are encrypted before transmission through the ePASS.

31. A registration system needs to be set up to deal with any digital devices that involve viewing and management of personal records. While online registration is available to end-users (e.g. scheme members), stringent identification verification procedures need to be put in place to avoid shams. During the online application process of an ePA account, for example, a scheme member is required to upload his/her identity card and a valid proof of address issued within the last three months for identity verification. Further verifications via phone or in person at the MPFA offices may be required for any suspicious cases.

Collaboration with Other Regulators

32. On some occasions, a digital project may involve more than one regulator and proper collaboration between regulators are pivotal to a smooth launch of the project. For example, the ePayment for MPF Transfer system makes use of the HKMA's CMU to automate payments for the transfer of MPF accrued benefits between trustees. The MPFA needed to liaise with the HKMA and trustees regarding the mode of co-operation, system requirements, implementation schedule and other preparatory work for implementing the digital initiative.

IV. A Major Digital Initiative Underway: the eMPF (a Centralized Electronic Infrastructure)

Background and Objectives of the eMPF

33. The MPFA has, for years, endeavoured to simplify and automate administration of the MPF System and to find ways to help scheme members manage their MPF more effectively. The MPFA's next priority is to develop a centralized electronic platform, called the eMPF, which is expected to bring significant and fundamental changes to the administration of the MPF System.

34. The objectives of the eMPF are to improve accuracy, reliability and efficiency of the MPF System with the help of digital technology, enhance user experience by bringing higher

quality services, lower costs and fees by centralizing and automating MPF scheme administration, and enable future reforms of the MPF System.

The Conceptual Model of the eMPF

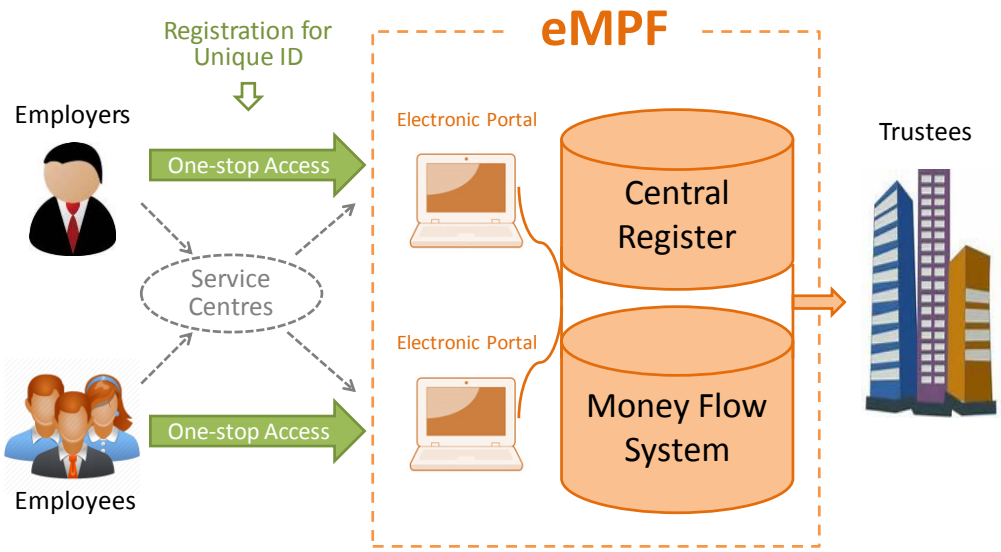
35. The eMPF is still at its preliminary planning stage, and its mode of operation and functionalities have not yet been finalized. Information provided in respect of the eMPF below will be subject to change as the project evolves.

36. According to its conceptual design, the eMPF will consist of a centralised electronic administration platform that interfaces with trustees' systems for data transition so as to provide a one-stop electronic portal for employers and scheme members to access relevant information about their MPF accounts with different trustees.

37. The eMPF would assist employers in automatically calculating the amount of contributions in respect of each employee, manage centralized collection of MPF contribution payments and transfer necessary information from employers to trustees through an electronic channel.

38. Scheme members could register with the eMPF for a unique identity. The eMPF would provide a one-stop electronic portal for scheme members to access all relevant information about their MPF accounts with different trustees and to manage these accounts.

39. During the transition period, service centres will be operated to assist scheme members and employers with lower computer-literacy in managing MPF issues through the eMPF.



Progress to-date

40. The Government and the MPFA have jointly set up a Working Group on eMPF (Working Group) in June 2017 to steer the development of the electronic platform. Members of the Working Group comprise representatives of trustees who are operating MPF schemes.

41. The Working Group aims to develop the high-level technical specifications of the electronic platform by end August 2018 for initially estimating the costs of building the infrastructure for the Government to seek funding from the Legislative Council. A User Committee on Digital Take-up and Centralized Electronic Platform (User Committee) has been formed to collect views of employers, human resources practitioners and scheme members from the perspective of users on key functions of the eMPF.

Key Challenges of the eMPF

42. It is anticipated that changing behaviour of employers and scheme members will be one of the key challenges that needs to be addressed so as to achieve the intended benefits of the eMPF. At present, many employers are still reluctant to use electronic services provided by trustees for payment of contributions. The MPFA has met with trustees to understand the current electronic services offered to employers and scheme members by them as well as engaged the User Committee to understand employers and scheme members' usage and experience of trustees' electronic services. The MPFA has been analysing the findings and mapping out strategies for rolling out publicity and educational programmes to promote digital take-up in the second half of 2018.

43. Under the retirement protection framework of the World Bank, the second pillar model is a privately managed retirement savings. This means that in the context of the MPF System, all along, both the scheme administration and investments into funds are performed by the private sector. They adopt varying degree of IT system sophistication, data standards, data privacy matrix and business rules and logic. Merging all these into a centralised platform demands a huge overhaul on various parties involving standard convergence, process alignment, business rules writing and technological expertise.

44. If cost efficiency and effectiveness is to be gained in the second pillar setting, some common functionalities, like scheme administration, need to adopt a more aligned and centralised model. Therefore, to pursue this major digital initiative, it is inevitable that there will be an overhaul of the existing legislative framework and changes in operations, roles and responsibilities of trustees. The MPFA will continue to work closely with the Government and trustees on these fronts.

45. As a supervisory body, the MPFA would like to see what lessons can be learnt from other

jurisdictions that have undergone such reform of scheme administration of this scale and the view of pension experts like the World Bank and OECD on whether the model of second pillar needs to be reviewed in light of the challenges experienced as in the case of the MPF System.

ANNEX 2. IOPS PROJECT ON DIGITALIZATION: COUNTRY CASE STUDY, KENYA, BY THE RETIREMENT BENEFITS AUTHORITY (RBA)

IOPS project on Digitalization: Country case study

KENYA

BY

Retirement Benefits Authority

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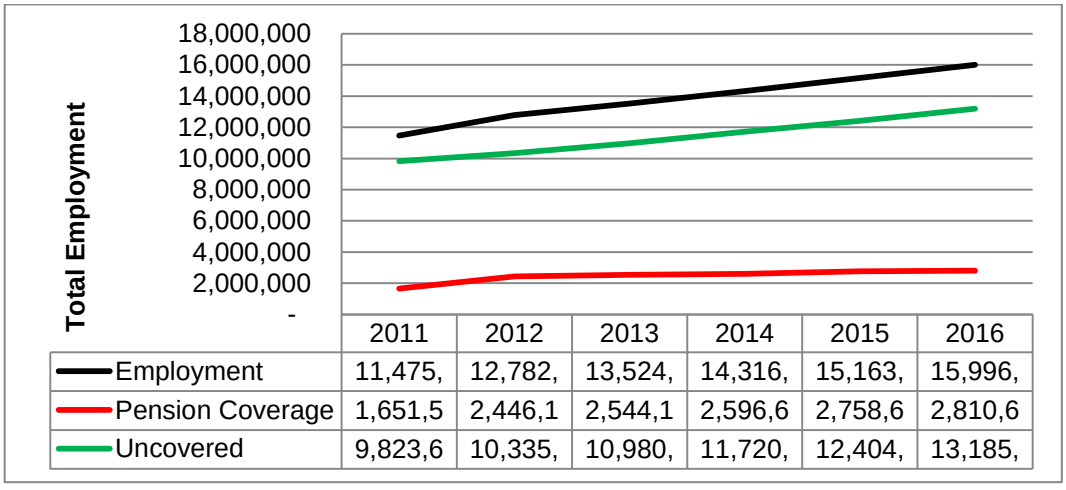
1. Retirement Benefits Sector in Kenya

The pension system in Kenya largely covers the working population in the public and the private sector. It thus favors formal sector workers who enjoy access to the existing formal pension arrangements to the exclusion of the self-employed and the ever-increasing informal sector workers. Three pillars support the system. Pillar Zero is state funded for citizens beyond age 65 introduced in 2009 on a pilot basis. The age has been revised to 70 years with a monthly payment of Kshs. 2000, equivalent to about $US 20. Pillar One is contributory and mandatory represented by the National Social Security Fund (NSSF). However, an element of voluntary contribution was introduced through the NSSF Act, 2013. Pillar Two is employer based and contributory except for the Civil Service Scheme. The latter, however, is undergoing conversion following the enactment of the Public Service Superannuation Act, 2012. The Individual Pension Schemes, on the other hand, are established and operated by independent financial institutions.

2. Pension Coverage

The graph below shows Kenya's labor force verses pension coverage over a six-year period from 2011-2016. Coverage falls far below total employment indicating that most of the workforce is not covered. The national pension coverage is about 20% of the labor force (RBA Statistical Digest, 2017). The majority of those covered, however, work in the formal sector – public or private. The informal sector, which



	2011	2012	2013	2014	2015	2016
Employment	11,475,	12,782,	13,524,	14,316,	15,163,	15,996,
Pension Coverage	1,651,5	2,446,1	2,544,1	2,596,6	2,758,6	2,810,6
Uncovered	9,823,6	10,335,	10,980,	11,720,	12,404,	13,185,

employs the majority of workers (83.4%), remains generally unreached by pension services. Given the low pension coverage, new initiatives to extend pension coverage became profound. The Retirement Benefits Authority (RBA), working together with other stakeholders in the industry, has had to come up with initiatives to expand pension

coverage, especially to the informal sector where nearly all workers are not covered by any form of pension arrangement.

3. Case for Digitalization in Kenya – Skewed Labor Market

Kenya's labor market as observed above is dichotomous and highly skewed towards the informal sector, which employs 83.4 percent of the workforce and continues to create most jobs. In 2017, it created 787,800 jobs compared to 110,000 created by the formal sector (Economic Survey 2018). Besides, it is also a significant contributor to GDP at about 23 percent. The sector, though generally unregulated, is competitive and key to economic development. Nevertheless, it is quite low on pension coverage, which needs to be developed. One of the mandates of the Retirement Benefits Authority (RBA) is to promote development of the pension sector. Its pension coverage development, nonetheless, cannot be adequately enhanced by the existing pension system because of the unique attributes of its workers. Workers in the sector earn generally low incomes, which are irregular. Further, the workers change jobs and economic activities frequently thereby experiencing high labor mobility. These attributes, amongst others, cannot enable them to participate in existing pension arrangements that serve workers in the formal sector who earn regular and stable incomes and can therefore afford to make predetermined monthly contributions towards their retirement savings. Because of their low and irregular earnings and high labor mobility, innovation became paramount to design new plans to help them regularly save towards their retirement. RBA and the National Federation of "Jua Kali"[79] Associations[80], therefore, entered into a collaboration to establish a suitable retirement savings plan that would cater for the sector's workers.

4. Birth of Digital "Mbao" Pension Plan.

"Mbao"[81] Pension Plan was set-up as an independent pension plan in 2011 to specifically target workers in the informal sector, majority of whom are self-employed and run micro, small and medium enterprises (MSMEs), commonly referred to as "jua kali" in Kenya. It is a voluntary defined contribution provident fund. It began as a successful Corporate Social Investment (CSI) initiative. The Authority collaborated with Ear, Nose and Throat specialists under the Operation Ear Drop Kenya initiative to undertake a Hearing Conservation Program (Kwena and Turner, 2013). It was designed to provide free ear check-up for artisans particularly targeting welders and tinsmiths at a Nairobi estate called "Kamukunji." During the event, RBA conducted pension education and

[79] "Jua Kali" is a Kenyan terminology for economic activities undertaken under the open sky and subject to the hot sun. Although some now operate under sheds, the term still applies to these as well.

[80] An umbrella body for workers in the informal sector.

[81] "Mbao" is a Kenyan colloquial word for Kshs. 20, which was the equivalent of one Sterling Pound (locally pronounced Mbao) just at independence in 1963. Today it is the equivalent of US$ 0.2.

awareness campaigns to the artisans on the importance of saving for retirement. Subsequent meetings held with their representatives discussed ways of forming a pension scheme to enable them save for retirement. The Scheme began operations in Nairobi and today has spread to all 47 counties in the country.

The pension scheme requires members to make daily minimum Kshs.20 contribution using their mobile phones. They use the mobile money transfer services offered by the two leading mobile phone networks in Kenya, namely, Safaricom and Airtel. They can therefore make their payments through M-PESA and Airtel Money transfer services in real time 24 hours a day and from anywhere within the mobile phone network coverage. They can do this from the comfort of their homes or businesses without the need to visit a financial institution. The contributions are reflected instantly on the members' phones as receipted by the Administrator of the scheme. They can also check for their contribution balances online. The transaction fee charged by the service providers was initially subsidized. This helped address low incomes and made it affordable to most workers to also send the largely affordable contribution rate of Kshs. 20 a day. Besides, when one cannot afford to send the daily contribution due to seasonality of incomes in the sector, they are allowed to accumulate the contributions and send in weekly, monthly or annually as is suitable. Thus, when one has income flows, contributions can always be sent in to cover arrears or paid in advance to cover for periods of no income flows. This flexibility addressed many concerns of the sector's workers occasioned by their unique attributes.

The ubiquity of mobile phones and experience of most Kenyans from mobile money services, which commenced with money transfers in March 2007 when Mpesa was introduced, greatly aided the quick uptake of the Mbao product. The plan is fulfilling its objectives of extending pension coverage to informal sector by enabling workers to enroll and save for their retirement in order to live dignified livelihoods in old age.

5. Mbao Pension Plan Performance

The Plan has provided an opportunity for workers in the informal sector to save for their retirement. A number of formal sector workers even those who belong to other pension savings arrangements have also been attracted to save in the scheme to boost their retirement incomes. In 2017, its membership had risen to about 100,000 with a fund value of nearly Kshs. 130 million. However, over the period annual enrolment numbers have been declining going by the number of active membership (See table below). Both active membership and amounts contributed in 2016 dropped by more than 50 percent of the peak realized in 2014.

Active membership by contributions

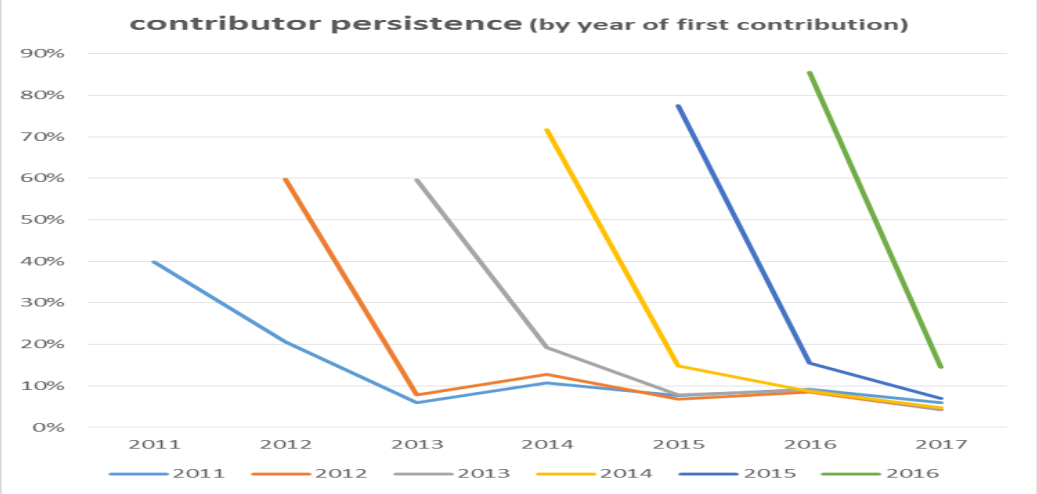
Year	No. of active*	No. of	Total amount

	members	Contributions	(Kshs)
2010	164	477	117738
2011	5233	17732	2829297
2012	23949	122451	22614201
2013	18123	148053	28929914
2014	24550	203818	32520793
2015	17685	117938	24762972
2016	11684	73733	17965648
Total		**684202**	**129740563**

Source: Contribution Database, Eagle Africa 2017.

*Active member means the member made at least one contribution in the year

Only a few contributors do so persistently over time as shown in the chart below. For example, of nearly 40 percent of members who joined in 2011, just about 6 percent were persistent contributors and the story is consistent over the years. This kind of performance can be attributed to a number of challenges the scheme faces, most of which are operational.



Source: Computations from contribution database, Eagle Africa 2017.

One such challenge stems from the current institutional arrangement, which relies heavily on voluntarism and its continued treatment as a corporate social responsibility (CSR). Thus despite the existence of a team of individuals who are committed to the success of the scheme, CSR should not be the only driver for its sustainability. It now needs a team with clear roles and responsibilities that is effective and efficient to run the promotion and administration of the scheme.

Secondly, the platform on which the Scheme runs is prone to frequent down time challenges and in certain cases fails to update on member contributions and balances on

real time. This, however, is due for overhaul to have a smooth and seamless provision of the updates on real time. It is important to have an efficient system running treasury and financial planning of the scheme and have a better information exchange with the Administrator.

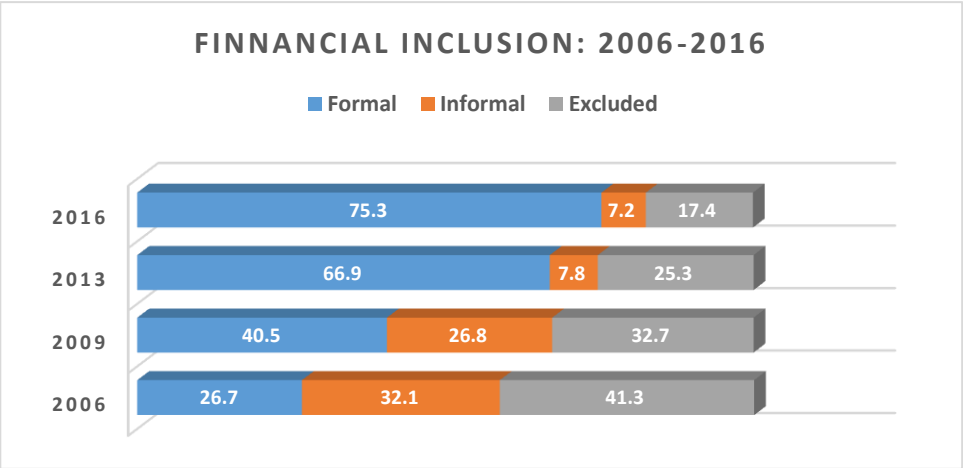
Although the scheme has not drawn in numbers by membership as initially thought, stakeholder consultations tend to agree that the scheme has drawn membership from different trades in the informal sector. The scheme treats all informal sector workers in the same manner and does not address their peculiar needs. For example, motorcyclist taxis, fishermen, tailors, roadside vendors, etc., do not always have similar interests. Existence of a number of "Mbao" schemes segmented by different economic activities found in the sector may be useful in terms of boosting enrolment.

In addition, observations over time indicate that workers will not join the scheme unless they are confident about it. Unless they fully and correctly understand the concepts, its features, processes including complaints handling and their own rights and responsibilities, they would not join. This requires an education toolkit and an effective segmented delivery of the same to establish uniform knowledge and understanding of the scheme across persons with different demographics (age, gender, occupations) and different locations (rural, urban). Mbao has demonstrated that voluntary schemes based on mobile phone technology can be an important instrument to promote savings among workers in the informal sector. However, it needs to have the right institutional arrangements and a very responsive platform in place.

6. Advent of Digital Financial Services.

The Mbao Pension Plan, which runs on a digitized mobile phone based platform, is a latecomer to the digitized financial services space. The space commenced with the launch of Mpesa money transfer service in March 2007 when Mpesa was introduced. It began as a money transfer service but has over the past 11 years contributed to the evolution of mobile money services to include payments systems and currently the provision of inclusive formal financial services such as credit, savings, insurance, investment and pensions. Its impact has been great and came with a tremendous reduction on geographical distances between services providers and their customers in fact to zero – all you need is your mobile money wallet in your mobile phone; significant reduction on transitions costs and a rapidly expanded financial access to majority of consumers who before had no access at all (Shem, et al., 2012). Before launch of Mpesa in 2006, formal financial inclusion was only 26.7 percent, but steadily rose to 40.5 percent in 2009, 66.9 percent in 2013 and 75.3 percent in 2016 according to financial access surveys

conducted over the years. It also lead to a reduction in informal financial access and those totally excluded from formal and informal financial services (See chart below).



Source: Financial Access Surveys – Various Issues.

Digitization of financial services

Today many financial services are offered digitally. They include those listed in the chart above: Money Transfer Services (Mpesa, Airtel Money, PesaLink, etc.); Retail Payments Services (Lipan na Mpesa, Mpesa Playbill, Airtel Playbill, etc.); Credit (Mshwari, Mkopa,

etc.); Services (eCitizen); Government (M-Akiba, Treasury Mobile Direct (TMD), M-tiba, etc.); Pensions (Mbao Pension Plan), etc.

7. Regulatory and Supervisory framework.

The regulation and supervisory framework for digitized financial services was not envisaged. The existing frameworks were therefore not suitable for them. Nevertheless, this is understandable since regulators are naturally laggards. The markets have to innovate and regulation then follows to ensure fair play amongst market players and the protection of consumer interests. Nonetheless, if the regulators are not flexible enough to provide for innovation and apply their frameworks as is, the innovations will be stifled. To ensure new products and services and systems of operation are realized, they are required to be innovative as well in terms of how they regulate and supervise. The experience with Mpesa showed that this is the process that enabled its creation. It emerged as a product of technology and the primary regulator was the Communications Authority of Kenya (CA). However, it was used to deliver a financial service, which should be regulated and supervised by a financial sector regulator, in the case the Central Bank of Kenya (CBK).

Realizing this development, the two regulators engaged in dialogue to find out how best to deal with it. Led by CBK, they adopted a wait and observe approach. It served the innovation well for within a short span of time, it brought forth more benefits than threats. Studying the threats on the other hand enabled the regulators to come up with the regulations to supervise its operations effectively. Such regulations included limitations on limits that can be sent and received by phone, which still applies although the limits have gone up; and how much to keep in the phone; setting up of Trust bank accounts with major banks; and a host of requirements to deal with the massive network of Telco agents in terms of licensing their operations.

This worked and it has been akin to the Sandbox approach, which allows businesses to test innovative products, services, business models and delivery mechanisms in the real market, with real consumers. This is done under rules that allow innovations to develop under a controlled environment where some regulations and supervisory measures are relaxed in order to understand them well and develop regulations that are suitable for them. Where innovations cross boundaries of different regulators, supervisory cooperation is desirable like was the case between CA and CBK.

The digitized financial services have enabled expanded access by users by reducing geographical distances, transactions costs and under a 24/7 framework of operation regardless of the time of day or night. These are all positive, but they have also come with various risks that must be addressed. Such include how to deal with the myriad of many small depositors and borrowers. For service provision, it does not matter a small

or large transaction, costs tend to be similar and providers would be making more money from large transactions compared to the small. Technology again comes in handy because all this can be provided, monitored and corrective actions taken online. Service providers have to submit transactions records, statutory returns, levies, etc., online. The submissions can be analyzed at regular intervals depending on regulators' capacities to do so. Indeed, some regulators like the CBK do this for some transactions on real time basis. RBA is building capacity towards real time operations and monitoring of the digitized pension service, the Mbao, but monitors its operations by the week, month and on a quarterly basis.

In addition, domestic financial sector regulators have, since the global financial crisis of 2008, developed a framework of collaboration amongst themselves. The framework allows them to share information, undertake financial stability and literacy programs jointly among other activities. The collaboration has allowed them to operate a somewhat SupTech technology, which helps them digitize data, operational procedures, and automate their regulatory processes. This enables the proactive monitoring of financial transactions and clients data across board to prevent non-compliance and respond to any violations in the shortest time possible if not real time.

For example, the RBA returns portal, which was launched in June 2016 allows supervised entities to submit contribution returns, audited accounts, investment returns, actuarial and custodian reports online. RBA, therefore, proactively supervises. In addition, RBA has a separate channel targeting scheme members, which allows them to file Complaints and Whistle Blow online and allow prompt redress.

Going forward regulatory technology (RegTech), where companies, that use innovative technology to help businesses comply with regulatory challenges efficiently and inexpensively, are starting to show up. The RegTechs work collaboratively with regulatory bodies by utilizing cloud computing and big data to share information. This is a low-cost technology with the ability to share data in real time and securely with various entities. The technology is demand driven and has emerged to solve challenges arising from a technology-driven economy and introduction of digital products, which have increased incidences of data breach, cyber hacks, money laundering and other fraudulent activities. Regtech tools monitor online transactions real time in order to identify irregularities in the digital payment sphere that are quickly relayed to concerned financial institutions for analysis and determination if fraudulent activities are going on.

RegTechs are emerging as the police in the digitized financial services sphere. Examples of such RegTechs commencing operations in Kenya include:

Direct Pay Online - provides a real time, cloud-based processing platform, which supports multiple transaction types including mobile money, all cards, all currencies, mobile apps and card readers;

Lipisha - offers mobile payment solutions with features, including enhanced security, integrated payment networks, payment alerts, and more;

Esacco - a local product designed to manage needs of saving and credit cooperative organizations (SACCOs), Matatu Saccos, Welfare groups, Pension schemes, Housing Cooperatives and other Microfinance organizations and prompts accountability, transparency thus enhancing efficiency. Esacco adheres to the SASRA SACCO Information Management guidelines. The company enables production and hosting of in-depth reports and financial statements from anywhere in the world, etc.

The future of regulation and supervision globally will emerge in this arena. How best this is exploited will depend on the speed of innovation by FinTechs and collaboration between Regulators and the RegTechs.

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ANNEX 3. THE DIGITALIZATION OF MEXICO'S PENSION SYSTEM, APRIL 2018

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Acronyms and abbreviations

AFORE	Pension Fund Providers
VS	Voluntary Savings
DB	Defined Benefit
IADB	Inter-American Development Bank
DC	Defined Contribution
CONSAR	National Commission of the Retirement Savings System
CUO	Operational Regulation
CURP	Population Register Code
PBS	Pension Balance Statement
IDF	Individual Digital File
IMSS	Mexican Institute of Social Security
INE	National Electoral Institute
ISSSTE	Institute for Social Security and Services for State Workers
LSAR	Retirement Savings System Law
PROCESAR	SAR National Database
RENAPO	Population National Registry
SAR	Retirement Savings System
RBS	Risk-Based Supervision
SIEFORES	Investment Funds

THE DIGITALIZATION OF MEXICO'S PENSION SYSTEM

I. Context of the Retirement Savings System (SAR)

1. Mexico introduced a new mandatory DC system of individual accounts in 1997 for private-sector workers (IMSS) and in 2007 for public-sector workers (ISSSTE)[82], both of whom replaced old DB systems that had been in place since the 40´s and 50´s.-

2. The new system has been relatively successful in creating a big pool of pension savings, as well as providing savers with more transparency and choice.

3. The system started out with 11.2 million accounts and $6 billion USD, inherited from the old DB system. Today the AFOREs handle 60 million accounts and invest 180 billion USD (15% of GDP).

4. Pension funds providers (AFOREs) are in charge of the administration and the investment of the workers' pension savings. They are also in charge of:
    - Handling of the contributions made by workers, government and employers
    - Handling of the voluntary savings made by workers
    - Registering workers
    - In case the worker request it, transferring the money to another pension provider
    - Sending the pension balance statement to savers three times a year
    - Hand over money back to savers when requisites are met

5. The investments carried out by the AFOREs are distributed among several Investment Funds named SIEFORES. Each AFOREs have five SIEFORES' in which savings are allocated with different risk levels according to the workers' age.

6. The AFOREs are regulated by the National Commission of the Retirement Savings System (CONSAR), an administrative body of the Ministry of Finance.

7. The operating infrastructure of the System relies heavily on the existence of PROCESAR, the institution that centralizes the data base of the pension system and regularly collects and disseminates individualized information to the AFOREs. It is owned by the AFOREs, but has a concession title granted by the Federal Government.

II. Operational diagnosis in 2013

[82] OECD Reviews of Pension Systems: Mexico, OECD 2016

8. In 2013, CONSAR carried out a diagnosis regarding the non-financial, operational framework of the pension system. The diagnosis identified several concerns and challenges as well as many opportunity areas: the quality of the customer service provided by the AFOREs was poor; there were deficiencies in the authentication processes of savers at the moment of enrolling and transferring to another pension provider; some defective commercial practices prevailed and it was utmost complex to carry out voluntary savings.

9. Part of the problem was how the workers' personal information was obtained and managed. When registering or switching from one AFORE to another, pension providers requested needless paperwork to the saver which was carelessly handled by their own agents, thus substantially rising the risk of misuse of information.

10. Furthermore, AFOREs employed vast resources to try to attract new clients which created a high number of workers switching from one AFORE to another. That in turn encouraged agents to find the way to transfer individual accounts from one AFORE to another, even without the worker's consent.

11. In 2013, the AFOREs invested an average of 50% of their expenses in commercial activities. AFOREs employed a sales force consisting of 42 thousand agents, who carried out 2.1 million transfers that year. 56% of the workers that switched, moved to an AFORE that offered a lower yield (negative transfers).

12. The need of new remote channels of access to the pension system was evident, given the high reliance on physical offices and the high transactional costs for savers who came into such offices –commuting and the time spent in personalized customer service-.

13. Voluntary Savings were nonexistent notwithstanding the fact that expected replacement rates are very low due to low levels of mandatory savings.

14. Finally, Consar's supervision was rules based, with insufficient tools to detect irregularities, in addition to not being strict enough with regards to malpractices during the enrollment and transfer procedure.

III. Operational Strategy

15. Two primary objectives were proposed:

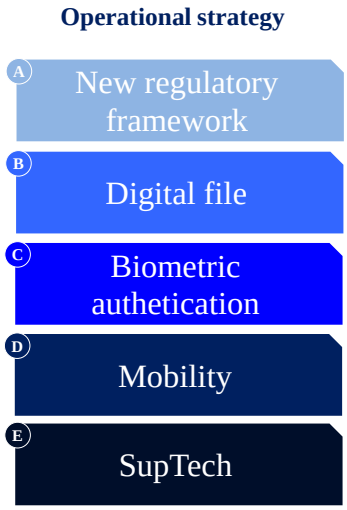
    - *Strengthen the protection framework of the 60 million accounts*
    - *Increase voluntary savings*

16. The strategy centered in the **DIGITALISATION** of the pension system. A new and more efficient regulatory framework was needed to protect the workers' savings, to improve the services as well as to eliminate poor commercial practices. The new regulatory framework

would allow the creation of a more open system, widening its scope with greater channels and state-of-the-art electronic means accessible to the whole population, implementing operational intelligence to provide transparent, high-quality and timely information for savers.

17. Also, the DIGITALISATION of the system would enable to gather more and better information for the supervision duties of CONSAR. With the new regulatory framework, the supervision would be transformed into one based on regulation compliance to other focused on the detection and prevention of potential risks (Risk Based Supervision - RBS).

18. The strategy was set out in five steps:



A. Create a new Regulatory Framework

19. In 2014, a comprehensive revision of the Operational Regulations (CUO) began in which the premises for the technological and operational transformation of the system were established.

20. The first amendments included in the new regulatory framework were:
    - The creation of an Individual Digital File
    - The mandatory incorporation of Biometrics as an authentication factor of savers and sales agents
    - New operational rules for attracting voluntary savings through Commercial Networks.
    - Stricter fines to be paid by the AFORE to savers for wrongful transfers

21. Additional measures were adopted in relation to service improvement:
    - The launch of a new website dedicated exclusively to on-line services, www.e-SAR.com.mx
    - On-site visits to evaluate the quality of services of pension providers

- The creation of a new index "AFORE Services comparative index", which allows service comparison between the pension providers and offer workers additional information to choose an AFORE

22. During this time of regulatory overhaul, CONSAR had an open and continuous dialogue with the industry, aiming to find common solutions and to resolve divergences.

B. Individual Digital File (IDF)

23. Since the start of the pension system in 1997, all the information of savers was collected through a paper file.

24. The Individual Digital File (IDF) arises as substitute for the traditional paper file, which generated high costs, elevated operational risks and was common ground for malpractices. The introduction of an individual and portable file throughout the worker's life would reduce costs, lower risks and avoid information inconsistencies.

25. In May 2015 the procedures that were to compose the IDF became mandatory.
    - The obligation to digitalize the worker documents, including a digital picture and voice recording of the saver
    - The digitalized information of the commercial agent who provided such service, as well as the place and time of the enrollment.
    - All the information gathered would rest in a central data-house with specific security features.

26. A factor that was critical for the creation of the IDF was PROCESAR. It certifies each and every transaction and legitimizes every operation comparing and validating it with the information it already had of all savers and with the database of the AFORE agents. This validation allows foreseeing potential problems, monitoring every action carried by AFORE agents in each operational process and gathering standardized and centralized information.

C. Biometric Authentication

27. Although the IDF represented a meaningful progress towards improving the recognition or identification of workers, sales agents and service officers of the AFOREs, it was deemed necessary to add biometric authentication features as an additional security element for the workers' accounts and for the future improvement of the services offered to them.

28. Prior to the entry of the Biometric Authentication for savers, CONSAR created a digital file of every agent and service officer of the AFOREs with biometric information, digital picture and their ten fingerprints. That process served as a pilot previous to launching it for workers.

29. In 2016, the process of capturing biometric information (fingerprints and voice) of savers began. Once the biometric information of the worker is captured, the AFORE has to send it online to PROCESAR, complying with predetermined standards to make the information comparable and verifiable. The rules include parameters that impede the AFOREs to retain information on the registered prints. Furthermore, it is mandatory that each proceeding is registered and validated with temporality and geolocation factors, to impede that the agent poses as the worker.

30. The fingerprint information, as well as the digital identification file is stored and handled by PROCESAR, who certifies that all operations carried out by the industry are executed according to defined guidelines and who preserves such information in line with the highest security standards.

D. Mobility

a. Strategy to increase Voluntary Savings

31. Saving voluntarily in an AFORE had historically been a complex and inefficient task. A worker had to go to a banking branch, fill up a document, wait in line to deposit and wait up to 6 months to receive information from his AFORE regarding that deposit. No surprise then that in 2013, 15 years after the system was created, only a very small fraction of people had saved a very small amount of money, 15 billion pesos (800 million USD).

32. So the first part to the "mobility" strategy focused on opening more deposit channels for voluntary savings through synergies with commercial networks in Mexico that could accept, on behalf on the AFORE, small workers' contributions (from 3 dollars) in an effortless, but in a secure manner.

33. CONSAR together with PROCESAR, developed the outlines and operational procedures that would allow such commercial networks to undertake the following actions:
    - Collect worker information using the Population Register Code (CURP)
    - Receive the savers money in all the branches of the commercial entity
    - Once the deposit is made, transfer such funds to PROCESAR, who will then distribute them to each AFORE
    - Provide the saver with immediate information on his deposits, as well as establish the limits to comply with the standards to prevent money laundering (all this free for the saver).

34. Thus, in 2014, "7-Eleven" became the first commercial entity to receive voluntary savings in the retirement savings system. By May 2018, the network has been joined by nine other commercial networks which today comprise more than 12,000 spots in Mexico where deposits can be made merely by using the worker ID or his/her Cell Phone Number.

35. Additionally, through the revamped service website, e-SAR, workers can save for their retirement by using their debit card. The saver fixes the amount, the frequency and the auto-escalation plan, if wanted, of savings.

36. Both initiatives were accompanied by an aggressive publicity campaign from CONSAR.

37. Furthermore, CONSAR introduced in 2015 "SARTEL USA", a call center serving as an information channel for 12 million Mexican workers that live in that country, who mostly have lost contact with the pension system. Afterwards, several conduits were opened, so Mexicans could send voluntary savings from abroad (*Uniteller, Unibancard* and *Intermex*). Mexicans living in the US can now send voluntary savings from abroad to their pension account using these new conduits.

38. Along this process, CONSAR has created synergies with other institutions to prompt voluntary savings. CONSAR along with the support of several organizations and foundations, like the Inter-American Development Bank (IADB) Ideas42, Metlife Foundation, and Innovation for Poverty Actions (IPA) has carried out studies and pilot projects to understand the barriers that inhibit people to save in Mexico, and to propose new ways to encourage savings.

b. AforeMóvil

39. The opening of new saving channels revolutionized the conventional operation of the pension system in Mexico. Nevertheless, the process to "democratize" the retirement saving channels in the country required going one step further.

40. Cell phones are massively used in the country and can be used as an inclusive tool for savings. That fact led CONSAR to push for a new project aimed at, on the one side, help savers increase their awareness of their pension account, and at the same time, allow them to save more through their phone.

41. *AforeMóvil*, launched in 2017, is an app for mobile devices created to include and connect Mexican people with their AFORE and to carry out voluntary contributions wherever they may be.

42. In order to develop the app, regulation was modified, and operational flows were outlined. The app is designed to allow any Mexican owning an AFORE account (60 million people), to control their savings through an Android or iOS smartphone.

43. Moreover, any Mexican (adults, children and residents in a foreign country) who currently don't own an AFORE account, can instantly open such account through his/her cell phone.

44. The technology used in the new app included:

- The most popular platforms in the Mexican market (79.1% Android and 12.6% iOS)
- *Push* one-way and two-way notifications for a direct communication between the saver and the AFORE
- Service integration, benefitting from PROCESAR to connect the whole AFORE industry with third-party database connections.
- Authentication and security outline that enables to remotely execute operations
- The use of biometrics through facial recognition to authenticate the saver
- APIs administration. Enables to develop new functionalities boosting savings and services, profiting from secure authentication outline
- Analytics. The study of traffic and patterns regarding the use of *AforeMóvil* to constantly identify improvement factors

45. Multiple connections with different participants were implemented:
    - With institutions like the Population National Registry (RENAPO) and the National Electoral Institute (INE) to validate the consistency of the information and verify the user's identity
    - With Biometric cryptograms verification
    - With the AFORE and PROCESAR to offer services directly to the user
    - With commercial networks to easier locate their 12,000 stores and to show information on the deposits in real time
    - With banks to enable the use of banking accounts for saving through the app
    - With other participants that can propel voluntary savings through loyalty programs

46. The app was officially launched in August 2017 and currently offers the following services:
    - For Mexicans already registered in an AFORE, connect with their pension account
    - For Mexicans without an AFORE, the possibility for the first time of opening an account as an independent worker
    - Parents can open an AFORE account for children
    - Your daily balance
    - Request for a statement (takes 10 seconds to receive it)
    - Detail of monthly transactions, including mandatory contributions
    - Deposits to your pension account through debit or credit card (automatic discount)
    - Geographical location of the 12,000 stores that receive cash deposits
    - Pension calculators to estimate future pension
    - Updating data of your pension account (phone number, address, access code)

E. SupTech

47. Along this process, it has been a complimentary goal to create a more reliable, accurate and real-time information infrastructure of the whole pension system that would enhance CONSAR´s supervision.

48. CONSAR developed a business intelligence dashboard that allows supervisors to verify online each operational transaction in the system. They also include periodic reports with aggregate and disaggregate information, to monitor and identify problems, from interruption of the services in real-time to atypical operations. CONSAR has now available data to validate any operation in the system.

49. As a result, supervision has shifted from a traditional supervision predominantly in-situ and through paper to a technology-based supervision with the support of the new data infrastructure.

50. Finally, CONSAR restructured its supervision and operational inspection areas. An operational intelligence department was created to act as a risk detector. The new department analyzes the control panels, and submits the findings to the other supervision areas so that they can perform a more detailed revision, and where appropriate, impose sanctions.

IV. Preliminary results

51. Preliminary result of the digitalization project has been very positive.

a. With regards to the introduction of the individual digital file
   - More than 13.5 million ID Files in 3 years
   - Complete visibility and audit prints of all operational transactions in the system
   - Greater control over sales agents
   - Commercial malpractices have diminished
   - Better information for workers
   - Higher quality transfers
   - Commercial expenses have decreased

b. Regarding the introduction of biometric authentication
   - 8.2 million workers with biometrics in two years, as well as 84,000 agents and service officers of the AFORE
   - Wrongful transfers have been eradicated
   - Paper-based operations shifted to a 100% digitalized comprehensive system.

c. Regarding the new channels to deposit voluntary savings in a pension account:
   - In four years, depositors have increased by 350%.
   - In four years, voluntary savings increased from 15 billion pesos to 65 billion in 2018

d. Regarding the inception of *Afore Móvil*:
   - Six months after the app launch, 400,000 downloads. Over 14,000 accounts belong to independent workers and 3,000 to children. 8,000 users have carried out voluntary savings through the app

e. Regarding the supervisory overhaul:
   - Through the use of technology, better monitoring of the behavior of the industry and its sales agents
   - Higher effectiveness regarding inspection results, which now are better documented and non-refutable
   - Finally, taking into consideration all the information that CONSAR possesses, new tools like Machine Learning and Deep Learning are being implemented, which will enable CONSAR to massively analyze through algorithms millions of cross-checked records to identify abnormal behaviors, as well as execute behavior predictions based on current and updated information. These tools will allow CONSAR to have a 360º vision on industry performance.

V. Conclusions

52. The DC pension system based on individual accounts will turn 21 years next July 1. During this time, the system has evolved along all of its main pillars –asset allocation, diversification, corporate governance, services-.

53. The operational evolution of the last five years, however, represents a turning point for the system. The aforementioned actions not only have driven the retirement savings system to a new frontier in digital innovation, but they have also transformed habits that seemed entrenched.

54. Mexico's pension system faces immense challenges: it has low level of savings and expected replacement rates, insufficient diversification, decreasing returns, insufficient quality of services, low level of involvement of the Mexican people for their pension account, etc.

55. The actions undertaken in the last few years, nonetheless, offer an unprecedented opportunity to strengthen the pension system. On the one hand, CONSAR has gained greater internal capabilities that will enable it to better supervise the pension providers and its sales agents. On the other hand, the individual digital file and the use of biometrics will generate trust and certainty among the savers regarding their account and will also facilitate the improvement of the services offered by the pension providers. Finally, the new voluntary savings ecosystem within the system creates the opportunity to massively boost additional savings. A lot will clearly depend on the AFOREs and in the continuity of such policies in the future, but the infrastructure to make it happen is ready to be fully exploited.