IOPS Working Papers on Effective Pensions Supervision, No.40

# HOW CAN DIGITALISATION MAKE THE SUPERVISION OF PENSION PLANS EASIER AND MORE EFFICIENT?

Nina Paklina July 2023



© OECD 2023

# **IOPS WORKING PAPERS ON EFFECTIVE PENSIONS SUPERVISION**

As the proportion of retirement income provided by private pensions becomes increasingly important, the quality and effectiveness of their supervision becomes more and more crucial. The IOPS Working Paper Series, launched in August 2007, highlights a range of challenges to be met in the development of national pension supervisory systems. The papers review the nature and effectiveness of new and established pensions supervisory systems, providing examples, experiences and lessons learnt for the benefit of IOPS members and the broader pensions community.

IOPS Working Papers are not formal publications. They present preliminary results and analysis and are circulated to encourage discussion and comment. Any usage or citation should take into account this provisional character. The findings and conclusions of the papers reflect the views of the authors and may not represent the opinions of the IOPS membership as a whole.

# IOPS WORKING PAPERS ON EFFECTIVE PENSIONS SUPERVISION are published on www.iopsweb.org

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

The views expressed herein are those of the author and do not necessarily reflect those of the IOPS or the governments of IOPS Members. The author is solely responsible for any errors.

# HOW CAN DIGITALISATION MAKE THE SUPERVISION OF PENSION PLANS EASIER AND MORE EFFICIENT?

# Nina Paklina<sup>\*</sup>

#### ABSTRACT

The present report is part of IOPS workstream on digitalisation. It aims to collect and share experiences related to the development and use of innovative technologies (SupTech) by pension supervisors to enhance and support supervisory practices and processes. The report also aims to identify new developments and areas of interest specific to the private pension sector. The key findings are drawn mainly from the responses of Members to the IOPS Survey on "How can digitalisation make the supervision of pension plans easier and more efficient?" Authorities from thirty-eight IOPS Members' jurisdictions participated in the survey.

The report reviews state of adoption of the range of supervisory technologies (e.g. machine learning, natural language processing, artificial intelligence (AI), cloud computing, etc.) and the areas of financial supervision in which these innovative technologies are used (or considered to be used), including data collection, storage and processing, analysis of supervisory data, supervisory monitoring, digital communication, consumer protection, etc. The report also contains some examples of initiatives specific to private pensions such as building of a single and integrated digital platform (e.g. eMPF Platform, Hong Kong, China) to standardise, streamline and automate the existing pensions schemes administration processes. This should enhance efficiency of pension schemes operation, administration, quality of pension services, and allowing to achieve cost savings for pension schemes and members.

The report includes supervisory views and assessment on the main implementation challenges (such as supervisory capacity and skills to utilise current and future SupTech tools, resources, quality of data, integration of new tools in workflows and existing IT infrastructure, legal, operational, including cyber security issues, etc.) in the process of adoption of SupTech tools.

Finally, the report offers insights and key findings from the development and implementation stages of the adoption of innovative SupTech technology to daily supervisory work in the area of private pensions. This could serve as the learning experience among pension supervisory authorities.

Keywords: pension supervision, private pensions, risk management

**JEL codes:** J-32, G-38, G-28

<sup>\*</sup> International Organisation of Pension Supervisors (IOPS).

# Contents

How can digitalisation make the supervision of pension plans easier and more efficient?	5
Executive Summary	5
Project Background	8
Introduction	8
1. SupTech as supervisory priority	9
2. Current status of adoption of SupTech by pension sector supervisors	11
3. Practical experiences in developing and adoption of SupTech applications	28
4. Key findings derived from practical experiences and future considerations	33
Glossary of Terms	36
References:	

Figure 1 Use of SupTech Tools by pension supervisors	10
Figure 2 Main areas where SupTech solutions are used by supervisors	12
Figure 3 Areas where new technologies are used by pension supervisors	13
Figure 4 Adoption status of SupTech tools in selected IOPS jurisdictions	25
Figure 5 Development of SupTech tools in selected IOPS jurisdictions	26
Figure 6 Investment in ICT capabilities by pension supervisors	27
Figure 7 Evaluation of SupTech tools by pension supervisors	27
Figure 8 Capacity building by pension supervisors	

Table 1	Benefits	of SupTech	•••••••••••••••••••••••••••••••••••••••	
1 abic 1	Denejus	<i>y Sup I cen</i>	•••••••••••••••••••••••••••••••••••••••	······

Box 1 Modernising prudential architecture by APRA, Australia	15
Box 2 EBSA, the United States, pilot program	19
Box 3 eMPF Platform	23

# How can digitalisation make the supervision of pension plans easier and more efficient?

Members of the International Organisation of Pension Supervisors (IOPS) have for some time examined the implications of digitalisation of finance for the private pension funds sector and supervisory activities, a key objective included in the IOPS Strategy for 2019-2024. The present report is another in the series on digitalisation. In this context, IOPS Members have sought recently to collect and share information and experiences related to the development and use of innovative technologies by supervisors (SupTech<sup>1</sup>). A wide range of inputs support IOPS research efforts, including the collected learnings and experiences of IOPS Members, the interactions of supervisors with supervised entities, as well as information obtained from other regulatory and supervisory authorities and other sources. The present report is no exception. It makes use of multiple sources but draws mainly from the responses of Members to the IOPS Questionnaire on "How can digitalisation make the supervision of pension plans easier and more efficient?"

The report consists of four main sections. Following a brief introduction on SupTech, the first section in the main body of the report focuses on SupTech as a priority for pension supervisors. This discussion is followed by an exploration of the current status of adoption and implementation of SupTech tools by Member Authorities. Section three of the main body of the report reviews some of the practical experiences of Members in developing and adopting specific SupTech applications. The fourth section identifies key understandings and learnings obtained from the various efforts of Members as regards the use of SupTech tools on an ongoing basis.

# **Executive Summary**

Supervisory authorities widely agree that expanding the use of data, technology and digitalisation of supervisory tasks and processes is a fundamental priority. Authorities enhance their operations by continuing to invest in and embed data and are increasingly using advanced technologies, data-based and science-based solutions to support supervision. Adoption of innovative technologies (SupTech) is viewed as a necessity for efficient supervision and also as a catalyst for development of electronic (e-) Risk Based Supervisory (RBS) systems.

Despite the fairly widespread agreement in principle on the potential benefits of this approach, there is considerable variability among jurisdictions in the actual pace of development and scale of adoption of advanced technologies by supervisors. That said, the process does appear to be gaining momentum in an increasing number of jurisdictions and only a few authorities report that they do not as yet have specific plans to do so in the near future.

Thirty-eight member Authorities responded to the IOPS survey from July 2022. Their responses suggest that innovative technology, thus far, is used by supervisors mainly for the collection of regulatory data and for data management (transformation, visualisation and validation) and storage. The use of advanced analytics by supervisors in the pension sector is still quite limited at present. Authorities have only just begun to explore the benefits of introducing new data science and analytical software, mainly for the analysis of supervisory data. In a few cases these tools are being used to evaluate the quality of services and complaints management procedures. In this process, Authorities use or plan to use Artificial Intelligence, Natural Language Processing (NLP)/text (data) mining, machine learning, webscraping and Business intelligence (BI) solutions. The application of these tools is intended to support on-site inspections, supervisory interventions, and enforcement actions, with the goal of achieving better consumer protection.

The benefits to be derived from the use of innovative technologies apply to various sectors of the financial system. Respondents to the survey identified a few that are specific to the pension sector.

<sup>&</sup>lt;sup>1</sup> The Bank for International Settlements (BIS) defines SupTech as the 'use of technology for regulatory, supervisory and oversight purposes', <u>https://www.bis.org/about/bisih/topics/suptech\_regtech.htm</u>.

Among these is the high potential for innovative technologies to simplify and improve the efficiency of pensions schemes' administrative procedures (see, for example, the eMPF Platform developed by MPFA, Hong Kong, China).

In a large number of respondent authorities, new platforms and IT system portals built on innovative technologies were created to support or automate supervisory operations, including licensing and authorisation and registration processes, as well as to facilitate digital communication and to automate elements of the complaints management process. Virtual assistance and communication with members are increasingly promoted through the creation of dedicated dashboards and chatbots on authorities' websites.

While the use of innovative technologies is not yet widespread, almost all respondents report taking initiatives to achieve greater automation/digitalisation of internal procedures and working tools, with the aim of streamlining work processes to increase operational efficiency and meet expectations and needs of stakeholders.

The adoption of new technology and data collection solutions have important practical benefits for supervisory authorities, supervised entities, other regulatory agencies, and users of financial services. These benefits include greater accuracy, quality and security of data; increased efficiency and reduction of costs; easier and more streamlined interaction and communication; and greater transparency and ultimately promotion of trust in the financial system and among financial agents.

Respondents note, however, that there are hurdles to be overcome in order for the potential for SupTech to help make supervisory operations more efficient, precise and fast paced to be realised. They include data quality issues; specific technical issues relating to the use of legacy IT systems and outdated technologies; problems entailed in the integration of the new SupTech tools into the existing IT infrastructure; operational challenges including cyber risks; lack of digital capabilities and skills among staff; alongside budgetary constraints; political risk, etc. These challenges may be factors contributing to the relatively slow uptake of SupTech thus far.

The successful development and adoption of SupTech tools not only requires significant investments in data, technology, and infrastructure but also in supervisory staff (digital and data competencies and skills). The survey responses indicate that SupTech tools are usually developed internally within authorities, in collaboration with external providers and software companies. Some specific digital development activities might be outsourced to third parties, but supervisors retain the control of the process.

Where applied, supervisors use various approaches and techniques to measure the efficiency of digital tools. These include conducting evaluation surveys on the use of SupTech applications; and assessing on a case-by-case basis the development of specific criteria, including the degree of acceptance by business, time and cost savings, technical performance, data quality, integration with other tools, etc.

Drawing on the experiences IOPS Members have reported in their responses to the survey, some useful insights emerge (more details are provided in the section on key learnings in the full report):

- (a) **Adoption of SupTech** should ideally be included and developed in accordance with the strategic supervisory plan and/or well-defined digital transformation strategy.
- (b) **Senior management engagement and encouragement** is critical in the development and implementation process of SupTech. Their support is also essential in creating a culture of creativity and innovation within authorities.
- (c) **Change management** is perceived as one of the key determinants of the successful implementation of SupTech projects.
- (d) Realising digital transformation requires considerable investment in **education and training programmes** for supervisory staff.
- (e) Development and implementation of SupTech tools should be based on **strong crossteam and interdepartmental collaboration** within Authorities. In the development process, **agile ways of working** promote continuously evolvement and improvement

of SupTech tools according to the supervisory needs and business feedback. Close engagement with regulated entities and other main stakeholders is also key to develop SupTech solutions in line with business expectations and needs.

- (f) **High-quality data** are an essential condition for proper application of SupTech tools. Authorities should continue to enhance data quality as part of their reporting practices and improve methodologies and technology systems for collection and processing of data.
- (g) Authorities need to work to **update/upgrade current IT systems** to assist in digital transformation. In the development of SupTech solutions they should select technologies that best match available supervisory resources and capabilities, with a view towards upgrading the latter in time.
- (h) **Close co-operation** with domestic peer regulators and supervisors and at the international level will allow for continued learning and the exchange of knowledge and expertise.

# **Project Background**

The project on digitalisation and the supervision of pension funds builds on the previous IOPS activities developed within the work stream on digitalisation<sup>2</sup>. The IOPS Strategy for 2019-2024 identifies work on digitalisation among key Organisation's priorities that should help Members to foster exchanges and learn from innovative technological ideas and experiences across the world. The project results may be used for development of new guidelines or good practices and be considered when updating existing IOPS instruments (e.g., IOPS Principles of Private Pension Supervision and other guidelines and good practices).

An important body of literature analysing the application of digital technologies by financial sector regulatory and supervisory authorities has been produced in recent years by international standard-setters. These outputs include working papers and reports by the Bank for International Settlements (BIS), the Basel Committee on Banking Supervision, the Financial Stability Board (FSB), OECD, FinCoNet, IAIS, IOSCO, and EIOPA. However, these recent reports offer very few examples of the use of supervisory technology (SupTech) in the private pensions sector.

The present report aims to fill this information gap in the existing body of research by offering new experiences of SupTech application from the perspective of private pension supervisors. It also attempts to identify new areas of interest specific to the private pension sector.

Research methods for developing the project included desk research, surveys, and the collection of country-specific examples. A survey was developed by the project Team Members<sup>3</sup> in July 2022 and sent to Members. Thirty-eight IOPS Members<sup>4</sup> participated in the survey, which represents approximately half of the IOPS community. The project is also informed by Members' responses to the questionnaires submitted as part of two other on-going IOPS projects: Data collection by pension supervisors<sup>5</sup> and the Risk-based supervision project<sup>6</sup>.

# Introduction

Rapid technological developments are affecting numerous aspects of financial markets, presenting opportunities but also risks and challenges for participants, financial institutions, and supervisory authorities.

In response to technological advancements in the financial sector, individuals are relying increasingly on digital finance, a process that was further accelerated by the Covid-19 pandemic. Digital technologies facilitate the use of and access to financial goods and services and ultimately alter consumers' expectations and behaviour. Customers look for simpler, faster and lower cost services. Technological innovations also force financial institutions to review their business models. Innovations accelerate the entry of new types of financial service providers, drawing financial institutions into a broader digital ecosystem, in which different parties (incumbents, FinTech firms, big tech platforms, etc.) interact, compete and collaborate to create and offer new products and services.

The very recent emergence of Artificial Intelligence (AI) tools such as ChatGPT by OpenAI and the Bing AI chatbot by Microsoft are examples of incipient technological developments that may have a profound effect on various aspects of daily life. These new technologies are also likely to change financial services, raising various consumer protection and regulatory issues<sup>7</sup> and – in the context of

<sup>&</sup>lt;sup>2</sup> See IOPS web-site: https://www.iopsweb.org/iopsworkingpapersoneffectivepensionsupervision.htm

<sup>&</sup>lt;sup>3</sup> Hong Kong, China; India, Mexico, Türkiye, Uganda and Zimbabwe

<sup>&</sup>lt;sup>4</sup> Within the text, jurisdictions' names represent supervisory authorities, IOPS Members

<sup>&</sup>lt;sup>5</sup> See IOPS Working Paper N°39, Report on Data Collection by Pension Supervisors, www.iopsweb.org

<sup>&</sup>lt;sup>6</sup> See IOPS documents on Risk Based Supervision, including IOPS RBS Toolkit, <u>www.iopsweb.org</u>

<sup>&</sup>lt;sup>7</sup> See also: <u>G20/OECD, G20/OECD High-Level Principles on Financial Consumer Protection</u> (updated 2022).

this report – affecting the nature of interactions among intermediaries, pension fund advisors, pension funds, and supervisors.

To keep pace with technological developments in the financial sector supervisory authorities have begun to deploy innovative supervisory tools to enhance their operations and decision making. Authorities are also adapting regulation and supervision to the new digital business transformations. In addition to these developments, the global Covid-19 pandemic prompted supervisors to consider developing new supervisory technology (SupTech) tools to support supervision. Monitoring of Members efforts to address the consequences of Covid-19<sup>8</sup> and Members' responses to surveys, showed that the Covid-19 pandemic accelerated the use of digital and contactless collaboration and communication with supervised entities and individuals and urged financial supervisory authorities to use more SupTech tools for day-to-day oversight of companies.

Although the pace of development and scale of adoption of SupTech tends to differ among jurisdictions at present, the process is gaining momentum. In most jurisdictions worldwide, supervisory authorities, including IOPS Members, are giving high priority to digital transformation and data-driven innovation in their supervisory strategies.

The project:

- offers an overview of recent experiences of Members in the use of SupTech tools to enhance and support supervisory practices and processes. It reviews the range of supervisory technologies (such as machine learning, natural language processing, artificial intelligence (AI), cloud computing, big data, etc.) and the areas of financial supervision in which these innovative technologies are either currently being used or considered, with a focus on private pensions arrangements.
- informs on implementation challenges (such as resources, supervisory capacity and skills to utilise current and future SupTech tools, improvement of data systems, integration of new tools in workflows and existing IT infrastructure, legal, operational issues, etc.) in the process of adoption of SupTech tools in front-line supervision and, based on Members' collective experiences, identifies some practical considerations.

The related topic of regulatory technology (RegTech<sup>9</sup>) developed and applied by supervised entities will not be covered in this first stage of project development. This work could, however, be part of a subsequent report, should it prove to in IOPS Members' interest.

# 1. SupTech as supervisory priority

The responses of Members to the questionnaire indicate that expanding the use of data, technology, and digitalisation of supervisory tasks and processes represents **a fundamental priority** for supervisory authorities (hereafter Authorities) in a large majority of respondent jurisdictions.

The adoption of innovative technologies is viewed by many respondents as an opportunity to enhance the capacity and efficiency of supervision and is generally developed and implemented in line with these Authorities' SupTech strategies.

The survey shows that twelve jurisdictions have developed dedicated SupTech strategies. In about half of the respondent jurisdictions (sixteen Authorities) SupTech strategies are combined with or are part of digitalisation or data supervisory strategies. In some cases, the use of innovative technology is covered under other strategic supervisory documents such as: corporate plans, supervisory priorities and visions documents, (seven Authorities). Eleven jurisdictions stated that such strategies are under development and are expected to be in use within two to three years. By means of continuous investment

<sup>&</sup>lt;sup>8</sup> <u>IOPS statement on pension supervisory actions to mitigate the consequences of the Covid-19 crisis</u>, Paris, 26 May 2020.

<sup>&</sup>lt;sup>9</sup> FSB definition (ibidem): any range of applications of FinTech for regulatory and compliance requirements and reporting by regulated institutions.

in digital data and technology, several Authorities aim to continue expanding their own use of technology while fostering increased digitalisation by the industry. Their goal is to become world leading digitally engaged practitioners and respected peers in terms of digital know-how. They plan to achieve this goal by developing advanced technologies, alongside data- and science-based solutions for all stakeholders in the sector (France, Germany, the Netherlands, and Türkiye).



Figure 1 Use of SupTech Tools by pension supervisors

Source: Members' responses to the SupTech questionnaire 2022

It should be noted that while the pace of development and scale of adoption of SupTech<sup>10</sup> is gaining momentum, at least for most supervisors that have responded to this questionnaire, not all respondents are currently on board. The responses show that three respondents do not currently use such tools and have no explicit plans to do so in the near future.

For supervisors that do use innovative technology, the responses to the IOPS survey show **that innovative technology is used by supervisors mainly for** collection of regulatory data (data reporting), data management (data validation and visualisation) and for data storage. These responses are in line with the findings of other studies. A few respondents stated, however, that they have started to explore the use of advanced analytics solutions in supervision. These approaches include, in particular, Artificial Intelligence, solutions for data analysis (e.g.: text analysis/scoring of risks, non-compliance, investment portfolios) and to support supervisory monitoring, including real-time monitoring in some cases.

Innovative technology has also been used in other ways. In a large number of respondent authorities, for example, online platforms built on innovative technology were created to support or automate licensing and authorisation and registration processes, and to facilitate interactions with as well as the submission of statutory information by supervised entities. Virtual assistance and communication with members are increasingly promoted through the creation of dedicated dashboards and chatbots on authorities' websites. Specific to developments in the pension sector, supervisors in some jurisdictions foster the adoption of new technologies to automate and standardise existing pension scheme administration processes with the aim to enhance cost-effectiveness and efficiency of pension schemes operation and administration. Several authorities use technology in the area of consumer protection and oversight of the processes used to manage consumer complaints. Among other things, almost all authorities report ongoing work or plans to increase automation of internal supervisory processes (of the more routine and repetitive tasks) to enhance operations and achieve greater efficiency.

<sup>&</sup>lt;sup>10</sup> SupTech: Supervisory Technology is a sub-set of FinTech that relates to the use of innovative technology to support supervision. FBS definition (ibidem): any application of FinTech used by regulatory, supervisory and oversight authorities.

Survey respondents cited gaining greater efficiency and driving more consistent, proportionate, and targeted supervision to be among the key high-level benefits that digital transformation can bring to supervisors. The investment in innovative technologies is tightly connected to Authorities' other strategic objective to improve data collection (e.g., collecting more granular and detailed data). Better data collection supports decision-making and guides forward-looking supervisory activities. Members' responses also indicate that the use of technology is regarded as a catalyst for development of electronic (e-) Risk-Based Supervision (RBS) systems.

The adoption of new technology and data collection solutions also has important practical benefits for supervised entities, other regulatory agencies, and users of financial services (Table 1).

Table 1 Benefits of SupTech

For supervisory authorities	<ul> <li>Enhanced accuracy, quality and security of collected data</li> <li>More in-depth investigations and continued monitoring</li> <li>Increased time effectiveness and scale and scope of supervisory activities (e.g., reduced response time to requests and applications, timely supervisory interventions, ability to interact with a large number of supervised entities, timely supervisory interventions)</li> <li>Reduced cost of supervision</li> <li>Efficiency of operations through automation of recurring processes and streamlining of work procedures</li> <li>Easier and more streamlined digital interaction with supervised entities</li> <li>Improved security and transparency of members/beneficiaries' information</li> <li>More flexible and diligent processing of complaints</li> <li>More efficient data-sharing with other agencies</li> <li>Promotion of trust in financial system and among financial agents</li> </ul>
For supervised entities	<ul> <li>Streamlined and optimised licensing/authorisation process</li> <li>More accurate and timely submissions</li> <li>Reduced reporting and administrative burdens</li> <li>Greater engagement and compliance with regulatory obligations:         <ul> <li>Easier access to supervisory requirements</li> <li>Entities informed earlier and with higher frequency</li> <li>Faster communication of supervisory assessment results allowing for time savings for entities to take corrective actions</li> </ul> </li> <li>Reduced operational risks</li> <li>Reduced regulatory compliance costs</li> <li>More timely and effective communication with members/beneficiaries</li> </ul>

# 2. Current status of adoption of SupTech by pension sector supervisors

#### 2.1 Key areas where pension sector supervisors use SupTech

Responses to the survey also help to identify the **main areas where SupTech solutions are currently used** or are considered for use by Authorities. These areas include:

- data collection with data storage (building data warehouse), data processing, and data analytics (risk assessment and checking compliance),
- supervisory monitoring,
- digital interaction with supervised entities and consumers,
- consumer protection and
- automation/digitalisation of supervisory processes (see Figures 2 and 3).

These results are in line with the findings of studies conducted by other international organisations. However, respondents to the IOPS questionnaire also provided some examples of **solutions that are specific to the private pension sector**. Respondents cited, in particular, the enhanced efficiency of pension schemes operation and administration (e.g., smart/automated platforms/digital interfaces interlinking IT systems of Authorities and supervised entities) derived in part from the use of innovative technologies. (See the section below on enhancing efficiency of pension schemes operation, administration, quality of pension services and achieving cost savings).

Figure 2 Main areas where SupTech solutions are used by supervisors



Source: Adapted based on responses to the survey Graph 5 of FSI Insights on policy implementation No 19, The suptech generations, October 2019

#### Figure 3 Areas where new technologies are used by pension supervisors



Source: Members' responses to the SupTech questionnaire 2022. Multiple responses were allowed

In which areas of your supervisory activities and supervisory support processes are new technologies used by your Authority?

	[											/			s China					/	/ /						s	7	/	7	/	/	ublic	7	1	//	es
	Angola	Australia	Austria	Botswana	Bulgaria	Canada	Chile	Colombia	Costa Rica	Croatia	France *	Georgia	Germany	Hong Kons	Hungarv	India	Indonesia	Ireland	Kenya	Lithuania	Macao	Malawi M	Manut.	Mexico	Morocco	Netherland	Nigeria	Peru	Poland	Portugal	Romania	Seychelles	Slovak Rep	Suriname	Turkey	Uganda United C	Culted Stat
Digitalising (machine-readable) regulations		X											X					X								Х											7
Data collection		X	X	х	X		Х	х	X	X	X		X	х	Х		X	X	X Z	K 2	K   X	X X	X	X	X	X	Х	X	X				х		X	ς	7
□ Data reporting		Х	Х		Х		Х	Х	Х	Х			Х	Х	Х		Х	Х	Х	2	( )	к х		Х	X	X	Х	Х	Х				Х		Х	C .	
Data storage via cloud computing		Х						Х	Х					Х				Х				X														X	
Data management		Х	Х	Х	X		Х	Х	Х	Х	Х		Х	Х	Х		Х	Х	X Z	ς Σ	ζ Σ	C		X	Х		Х	Х	Χ				Х		X X	۲.	
□ Automated data validation checks		Х	Х		Х			Х		Х			Х	Х	Х		Х	Х	Х	2	K .		Х	Х	Х		Х	Х	Х				х	1	X X	( X	
□ Data consolidation		Х	Х					Х		х			Х	Х	Х		Х		х	2	٢			Х	X			Х	Х						х х	٢	
Data analysis		Х	Х	Х				Х	Х	Х			Х	Х	Х		Х	Х	X Z	K	3	x x		Х	X	X	Х	Х	X				Х	1	X X	٢	7
□ Data publication		Х	Х					Х	Х						Х		Х	Х		2	۲.			Х			Х	Х	Х				Х	1	X X	٢	
□ Supervisory monitoring				х	Х			Х	X				X		х		X	X	X	- 2	κ.		X	X									х		X	2	
Real-time monitoring					Х			Х												3	٢				Х										Х	5	
□ On-line monitoring				Х	Х			Х	Х						Х		Х	Х		2	ζ.		Х	Х											X X	c 🛛	
□ Supervisory support processes		X	X	х	X			X		X				х	Х		X	X	X		Х	ζ.	X	X	X			X	X				х	1	X X	۲.	7
Consumer protection				х	X			X							х		X	X	X		Х	κ.		Х	X			X	X				х		X	2	
□ Supervisory services				х			Х	х	X						х		X											Х							X	2	
□ Virtual assistance programmes for							Х	Х	Х						Х													Х							Х	( X	
members/beneficiaries/consumers							Х	Х	Х						Х													Х									1
□ industry							Х	х	Х						Х																						
Digital interaction/services provision to supervised entities		Х		Х	X			Х	Х	х				Х			Х	Х	Х							Х	Х						Х		Х	5	
□ authorisation		Х		Х				Х	Х														X			Х	Х	[					Х		X	c 🛛	-
□ registration		Х		Х	X			Х	Х	Х				Х				Х	Х							Х	Х						Х		Х	۲.	
□ licensing				Х	Х			Х	Х					Х			Х		Х				Х			Х							Х		Х	۲.	
☐ fit and proper testing				Х				Х	Х								Х						Х			Х							Х		Х	٢	
□ approval of transferring of technical provisions or pension liabilities;				Х																							Х						Х	1	x		
Contributing to enhancing the efficiency of pension schemes operation and administ								X						х					X										X								

Source: Members' reponses to the SupTech questionnaire 2022

France has provided responses to the use of SubTech in the private pension sector.

In addition to the findings discussed above, the survey responses provide country-specific examples regarding the use of SupTech applications and the underling technologies supporting them. Although digitalisation of the supervision of pension funds remains a high priority for most authorities, the process of transformation is nonetheless still work in progress, with some aspects showing further advance than others, The following sections help to illustrate the differences, drawing on the experiences highlighted by Members in their responses to the questionnaire.

#### Machine-readable (and machine executable) regulations

Thus far, only a few Authorities stated they are exploring the potential of converting rules into machinereadable format (rewriting legislation into a software code) to help achieve greater consistency and improved compliance. The implications of this work are far-reaching. This change could provide considerable operational benefits: e.g. 1) speed up interactions between supervisors and service providers, 2) increase transparency, 3) allow supervisors to test the effects of policies before they are implemented, and 4) save costs in time and money that financial institutions currently have to spend to interpret the laws with which they need to comply.

Four (4) respondent Authorities (Australia, Germany, Ireland and the Netherlands) commented on work underway in this context. As an example<sup>11</sup>, APRA (Australia) is currently reviewing its prudential framework<sup>12</sup>. (See **Box 1**)

Box 1 Modernising prudential architecture by APRA, Australia

# APRA initiative to modernise the prudential architecture

Initiative on modernising prudential architecture is part of APRA core strategic priorities. It is planned to be a multi years project which will comprise different work streams and stages.

The project will involve work towards better regulation, consisting in improving the design of the regulatory work. This will include:

- consolidation and simplification in the structure and approach to standards and guidance
- adapting standards and practices to emerging risks and industry practices
- enhancing existing requirements and providing more clarity on supervisory expectations

In this process, APRA intends to use digital technology (RegTech and SupTech), to make it quicker and easier to access and navigate through the regulatory framework, for both readers and coders.

At the initial stage of the project, APRA has conducted an internal review of the framework, established an advisory panel and is working on improvements on its web-site and development of internal digital handbook prototypes, with functionality to search, navigate and analyse standards and guidance.

In 2023, APRA intends to engage closely with regulated entities and industry association to discuss opportunities for improvement of the current framework. It will also work on key building blocks for design and development of digital platform that will house prudential framework in future. The end goal of the project will be to set a digital framework (digital handbook) that brings together all prudential standards, guidance, information papers and supporting advice into a more cohesive format which is easy to understand, access and navigate and for APRA to supervise and maintain.

<sup>&</sup>lt;sup>11</sup> Examples also of Estonia's digital services, and the initial work of the UK's: <u>Government Digital Service</u> and developments in New Zealand <u>https://apolitical.co/solution-articles/en/new-zealand-explores-machine-readable-laws-to-transform-government</u>

<sup>&</sup>lt;sup>12</sup> APRA, Information Paper – Modernising Prudential Architecture, September 2022

In the European context, Authorities' work to develop machine-readable regulations goes along and in support of the EU plan<sup>13</sup> to amend its legislation to require financial institutions to disclose and report supervisory data by 2024 in machine-readable electronic formats, which should ease data consolidation and processing.

#### Data collection, data storage, data management and data analysis

Good data quality and proper data management processes are essential both for financial institutions and supervisors. The IOPS report on data collection by pension supervisors<sup>14</sup> shows that the improvement of quality of collected data is a strategic priority for many Authorities.

Supervisors worldwide are shifting towards a data-driven supervisory approach. They work to improve their methodologies and technology systems of data collection to obtain high-quality data, which should in turn allow for more meaningful analysis and transparency of data. ACPR (France) is a case in point. The Authority aims, as part of its Strategic plan 2024 to improve the governance and exploitation of collected data<sup>15</sup>. The Authority is working to address cross-business data governance, and the ways in which it shares and exploits its supervisory data. The Authority aims to make the most of new technologies such as Artificial Intelligence.

HANFA (Croatia) is also currently updating its existing supervisory methodologies. This process includes an upgrade of data sources and data management tools with the aim of enhancing the efficiency of supervisory practices, especially in further developing risk-based supervision practices.

Elsewhere, the Pensions Authority of Ireland is developing industry standard Business Intelligence capabilities that will serve as the foundation for more advanced analytics and use of SupTech systems.

More generally, across jurisdictions, data are becoming more widely available and more granular and may come from non-traditional sources (unstructured data). Consequently, the use of smart IT tools such as algorithms, Artificial Intelligence (AI), targeted data analytics and process mining techniques has become important in enabling supervisors to analyse the increasing amounts of data from financial institutions more rapidly and in a more transparent and consistent manner. It also enables them to understand risks faster, identify links between risks and use automatic analysis and early-warning signals.

The survey results show that SupTech applications in *data collection* usually focus on reporting, data storage, and data management (validation and aggregation).

About half of the respondents (fourteen Authorities) are using application programming interfaces (APIs) technology to collect automatically and disseminate data. A few examples were provided. In September 2022, in Costa Rica API technology was used to access the data in the pension system. SUPEN, the Costa Rican Authority uses software to generate reports containing the statistics of the main indicators, covering investments, accounting data, and demographic/financial information of the affiliates and pensioners. In Indonesia, the data collection solution, e-reporting, also uses API technology. In addition to e-reporting, OJK is now developing a data collection solution, called APOLO, which will integrate all financial institution reporting to OJK, including pension funds. APOLO uses an online API (web-based) and an offline API (client-based) in the reporting process from financial institutions to OJK (Indonesia). Another example is provided by URBRA (Uganda), which has developed online investment reporting and analysis tools jointly with the Capital Market Authority

<sup>&</sup>lt;sup>13</sup> Digital Finance Strategy for the EU, September 2020

<sup>&</sup>lt;sup>14</sup> IOPS Working Paper No 39, Report on Data collection by pension supervisors, December 2022

<sup>&</sup>lt;sup>15</sup> Building 2024 Together, Banque de France

of Uganda<sup>16</sup>. The tools capture diversification within investments, by geography and maturity periods and are also supported by API technology.

Two other Authorities DNB (the Netherlands) and SBS (Peru), have developed in-house API solutions to gather quantitative and qualitative data from institutions. In the Netherlands, this solution has been successfully piloted and is now being scaled for production and use in 2023. In Peru, SBS uses an in-house software that supports several portals (Sucave, SBSNet, and the Supervised entities portal, among others) to collect data from supervised entities. The data are uploaded in standardised formats for all different datasets established by regulation. The Authority has also developed a web portal through which supervised entities can send unstructured information like investment policies, manuals, procedures, committee minutes and other type of documents. Currently, SBS manages databases using the software Qlik Sense.

In cases involving automated reporting, a large majority (nineteen) of respondents use data input approaches. Eight authorities have started to pull data directly from the IT systems of supervised entities. In comparison, ten authorities use real-time data access. For example, the Smartsupervision programme of the SFC (Colombia) uses real-time access to complaint management by the supervised entities. In contrast to the use of systems developed in-house, several authorities (five Authorities) use open-source tools. At least one Authority, ACAPS (Morocco) plans to develop a dedicated platform for a data input/pull approach and real-time data access.

# Data analysis and visualisation

While supervisors work to improve their data collection tools, they are also seeking to further develop their analytical capabilities through the expanded use of advanced analytics, including artificial intelligence, and its sub-sets, such as machine learning, natural language processing, robotics, etc.

Such technologies enable Authorities to analyse massive amounts of structured data and data arriving from unconventional sources to generate predictive supervisory insights at a greater speed and scale than was possible before. Dedicated SupTech solutions use supervisory data and other data relevant for supervision, which can be qualitative, quantitative, or a mixture of the two.

As shown in a recent FSI report<sup>17</sup>, tools that focus on qualitative data are used for text analysis and summarisation, information classification or sentiment analysis. Tools that mainly look at quantitative data are applied for risk identification. In practice, the application of data analytics technology could help support market surveillance, misconduct analysis, enforcement activities, micro and macro prudential supervision, assessing compliance and increasing the efficiency of enforcement actions.

The potential advantages notwithstanding, Members' responses to the both IOPS data collection survey<sup>18</sup> and SupTech survey show quite limited use of data analytics by supervisors so far. In most of the respondent jurisdictions Authorities are still exploring or only just starting to introduce new data science and analytics software. Some authorities offered interesting experiences in this area<sup>19</sup>.

Responses to the survey show the numbers of Authorities that are currently using or investigating the use of Big Data solutions (nine Authorities), Artificial Intelligence (six Authorities), and – Natural Language Processing/Text (data) mining (nine Authorities) to support supervisory analysis.

<sup>&</sup>lt;sup>16</sup> URBRA Strategic plan 2020/21- 2024/25

<sup>&</sup>lt;sup>17</sup> Financial Stability Institute (FSI) Insights on policy implementation No 37 Suptech tools for prudential supervision and their use during the pandemic, December 2021.

<sup>&</sup>lt;sup>18</sup> IOPS Working Paper N39, Report on Data collection by pension supervisors, December 2022, <u>http://www.iopsweb.org/WP-39-IOPS-Data-collection-by-pension-supervisors.pdf</u>

<sup>&</sup>lt;sup>19</sup> More Members' examples and experiences in the area of use of SupTech for data analysis techniques and data validation could be found in the IOPS data collection report: <u>http://www.iopsweb.org/WP-39-IOPS-Data-collection-by-pension-supervisors.pdf</u>

• Artificial intelligence: APRA(Australia), as part of phase 2 of its multi-year Superannuation Data Transformation project - 'APRA Connect' - plans to increase the granularity of its entire data collection, taking advantage of new data collection solutions to help achieve advanced analytics capabilities within APRA, both of the supervisory staff and in terms of the technology that they use (scoping is now underway)<sup>20</sup>.

The DNB (the Netherlands), as part of its iForum discussions<sup>21</sup>, is exploring opportunities and risks associated with the use of artificial intelligence (AI) in the sector and for supervision, such as the analysis of supervisory data. The Authority also analyses the pros and cons of real-time supervision, using data obtained directly from banks, insurers and pension funds rather than relying solely on data from supervisory reports.

ACPR (France) also sees a large potential for the use of AI for development of supervisory missions and to allow for a more thorough analysis and increased transparency of collected supervisory data. The Authority plans within its RBS framework to use more widely a new artificial intelligence tool for its on-site inspections, with a view towards strengthening the effectiveness of its supervisory oversight<sup>22</sup>.

Natural Language Processing (NLP)/text (data) mining: Natural Language Processing (NLP)/text (data) mining, as a branch of AI is used by ten Authorities<sup>23</sup> mainly for the analysis of documents. BaFin (Germany), has developed a NLP-Tool named HERA, to analyse the risk and solvency situation of companies. This algorithm is preliminary used for the evaluation of narrative reports (e.g., audit reports) with the help of suitable text mining techniques. So far, HERA has not been used in the field of occupational pension schemes (IORPs). In Australia, APRA uses both R and Python programming for data science and NLP to analyse responses to surveys. Other Authorities also plan to use these solutions. For instance, the Turkish Insurance and Private Pension Regulation and Supervision Authority (IPRSA), plans to use NLP solutions to detect anomalities and outliars regarding complaints. Meanwhile, the US Department of Labor (DOL) Employee Benefits Security Administration (EBSA) is undertaking a pilot program<sup>24</sup> to use data scraping methods and Robotic Process Automation (RPA) to identify Multiple Employer Welfare Arrangements<sup>25</sup> (MEWAs) that have not filed required disclosures. By identifying these particular plans while they are being marketed to employers, EBSA will be able to intervene early enough to ensure that the plans are compliant and mitigate solvency risk. (See Box 2)

<sup>&</sup>lt;sup>20</sup> APRA Discussion paper, Direction for Data Collections, March 2022.

<sup>&</sup>lt;sup>21</sup> <u>iForum (dnb.nl)</u>

<sup>&</sup>lt;sup>22</sup> ACPR, France, Annual Report 2021

<sup>&</sup>lt;sup>23</sup> Australia, Colombia, Germany, Hungary, Kenya, the Netherlands, Peru, Poland, United States.

<sup>&</sup>lt;sup>24</sup> The US Department of Labor Two Year Evaluation Plan 2022-2023, <u>https://www.dol.gov/sites/dolgov/files/evidence/eval-plan-fy2022-2023.pdf</u>

<sup>&</sup>lt;sup>25</sup> The Multiple Employer Welfare Arrangement (MEWA) is a procedure that involves multiple employers to join together to form an association that offers health and welfare benefits for their employees.

# Box 2 EBSA, the United States, pilot program

#### EBSA, the United States pilot program to use data scraping and robotic process automation (RPA)

The initiative is part of research projects included in the DOL Evidence-Building Plan for Fiscal Years (FY) 2022-2026. It is planned to be a one-year project which could be further extended.

The project aims to improve supervisory enforcement actions and better protect consumers. It will involve:

- Use of data scraping methods
- Robotic process automation

to identify non-filing (Form M-1s) Multiple Employer Welfare Arrangements. There is history with some of these arrangements of non-compliance. By identifying these plans while they are marketed to employers, EBSA can intervene early to ensure that plans are compliant and mitigate solvency risks.

In this process, EBSA intends to use digital technology (Artificial Intelligence/Robotic Process Automation and Data Analytics).

Anticipated challenges and solutions:

These are new supervisory tools where EBSA does not yet have extensive experience. EBSA will need to identify terms that would be associated with marketing at risk products and developing the methodology to find these MEWAs.

Source: Members' responses to the SupTech questionnaire 2022

- **Machine learning:** Six Authorities are currently using machine learning tools,<sup>26</sup> mainly to detect faulty or incomplete data, new emerging risks (e.g., risk scoring and risks categorisation), and in some cases to evaluate the quality of services. For example, SFC (Colombia) uses machine learning tools to identify in the declaration of complaints, users' perceptions regarding supervised entities. IPRSA (Türkiye) plans to apply machine learning tools to measure and rate quality of service by pension providers using data from digital platforms and GEV.
- **Business Intelligence (BI) solutions**: More than half of respondent authorities (twenty-one) reported that they are currently using or plan to use visualisation tools (mainly with Business Intelligence (BI) solutions). Supervisors use these tools to transform data into meaningful information. Powerful and user-friendly data visualisation interfaces are required, given the quantity, density, and complexity of data, to present information to supervisors in a readily comprehensible way.

In the Netherlands, the DNB uses MS PowerBI for data visualisation. The Polish Financial Supervision Authority (KNF) is transforming its data sets using SAP Business Object and Microsoft Power BI. SFC (Colombia) also uses tools such as Power BI for data visualisation and Big Data in cases of data analysis from legal reporting and the creation of reports.

In Peru, SBS has automated most aspects of its data collection, which allows standardised formats to be uploaded for all the different type of datasets established by regulation. The Authority has also developed automated data collection tools to store data in the transactional database and is in the process of migrating its database models to BI models to better perform data analytics and visualisation.

ACAPS (Morocco), plans to use Qlik Sense as a BI tool to visualise collected data in the form of graphics and KPIs (key performance indicators).

IPRSA and the Pension Monitoring Center (Türkiye) gather standard data from all pension companies operating in Türkiye and combine this with data from other sources, such as the

<sup>&</sup>lt;sup>26</sup> Australia, Botswana, Colombia, Germany, Poland, Slovak Republic.

Istanbul Settlement and Custody Bank and TURKSTAT, etc. All data gathered are later analysed with the help of Business Intelligence and other tools (e.g., Python and Tableau).

• Web-scraping: In addition, to the methods described above, web-scraping techniques are being used to collect and analyse data from external sources or websites. Six Authorities<sup>27</sup> reported that they are currently using these techniques.

#### Data storage

The increased volumes of data generated and collected for regulatory and supervisory purposes raise questions regarding *storage capacity* and cost. One solution to address this issue is *cloud technology*, which offers a high degree of operational flexibility and facilitates access to advanced data processing technology. Supervisors are increasingly embracing this technology, especially in the current work environment characterised by a shift to increased remote working, a response to the Covid-19 pandemic.

Cloud computing: Nine responding Authorities use cloud computing infrastructure. The examples provided include both private solutions and in-house arrangements. Authorities in the former grouping include APRA (Australia), which uses tools such as Microsoft SQL Server, Microsoft Sharepoint, and Microsoft Azure (Exchange). In Colombia, the investment portfolio information system makes use of Oracle Azure services, while Google's Cloud Platform is used in the Smartsupervision programme. The CMDA (Maldives) is also moving data into a cloud environment and in this process plans to use established cloud security technology as much as possible (e.g., cloud security provided by Google). In contrast, Kenya is among the Authorities using in-house storage systems. The Authority reports using its private cloud, which is stored on the Authority's local servers but is replicated on the Authority's disaster recovery (DR) site. Elsewhere, the MPFA (Hong Kong, China) notes that data consolidation is performed on its private server. In the Netherlands, the DNB recently moved data storage from on premise to the central cloud-based data storage<sup>28</sup>, which should enable better scalability and lower run costs. The Insurance State Supervision Service of Georgia (ISSSG) also uses remote data storage infrastructure and document processing software solution. The services are provided by a dedicated unit established within the Ministry of Finance and are used by several state agencies, ministries and other government institutions.

Several Authorities cited plans to develop a full-scale data warehouse architecture to support the analysis of data. For example, HANFA (Croatia) uses a web portal for data upload. The data are stored in the centralised data warehousing (DWH) and later analysed with the help of Business Intelligence (BI) tools, such as Power BI, R programming, etc. Data gathered in this way are then combined with data from other sources such as web scraping, API systems, and others. OJK (Indonesia) utilises the enterprise data warehouse (EDW) developed by the IT Development Unit to support data analysis process. ACAPS (Morocco) is using an Electronic Document Management (EDM) application to create a repository of information both on the pension system and internal information. Meanwhile, SBS (Peru) is completing the migration of files in the centralised database and data warehouse.

#### Digital supervisory services, digital communication and virtual assistance

In a large number of respondent authorities, **new platforms and IT system portals** that build on innovative technologies were created to support or automate supervisory operations including licensing and authorisation and registration processes, and to facilitate communication as well as the submission of statutory information by supervised entities. The establishment of these online platforms enables supervised entities to trigger supervisory procedures on-line and serves as a channel to interact online and on an ongoing basis.

<sup>&</sup>lt;sup>27</sup> Australia, Hungary, the Netherlands, Peru, Poland, Slovak Republic. India is considering its use in future.

<sup>&</sup>lt;sup>28</sup> DNB Annual Report 2021

For example, in 2021 the DNB (the Netherlands) introduced the My DNB portal<sup>29</sup>, intended to expand and simplify communication with supervised financial institutions. The first web-based services for institutions were installed on the portal in 2022, including access to supervisory applications, space to check and edit organisation details, supervision calendar with planned supervisory activities and qualitative surveys. The portal undergoes continuous improvements along with the addition of new services. For instance, the former Digital Reporting Portal (DLR) is now included in My DNB.

Responses to the survey also outlined Authorities' increasing reliance on advanced technology to automate elements of the **complaints management** process. In result, supervisors gain more operational efficiency, as the cost and time of analysis of usually unstructured data are reduced and customer experiences improved<sup>30</sup>.

In several other IOPS jurisdictions (Botswana, Bulgaria, Indonesia, Morocco, Poland, and Türkiye), digital applications or platforms were established on Authorities' websites for reception and processing of complaints. Some authorities use advanced analytical software such as Natural Language processing tools to analyse complaints (e.g., IPRSA, Türkiye). ACAPS (Morocco) also implemented a complaint management platform dedicated for the pension sector, which allows complaints to be submitted online and processed directly, with the supervised entities having access to the same platform.

In Colombia, the Smartsupervision technology recently implemented by the SFC enables the Authority to have real-time information on all complaint resolution processes carried out by supervised entities. It also makes it possible to store, extract, and analyse the information on complaints using data science tools for root cause identification and consumer perception. The analysis of this information is an important input for day-to-day supervisory work, as well as to help determine the Annual Supervision Plan for supervised entities. By the end of 2022, all supervisory entities were required to implement and have the entire Smartsupervision process in operation.

In Peru, SBS, uses AI-powered sentiment analysis for daily monitoring of social networks to detect any complaints or problems in relation to the private pension system. The authority works to resolve issues on the same day and in coordination with pension fund administrators (AFPs), if necessary.

The SBS (Peru) is also one of the Authorities making use of **virtual assistance** to answer consumer complaints and/or to interact with supervised entities, in particular, to answer day-to-day questions through chatbots. Four Authorities indicated that virtual assistance and communication with members are increasingly being promoted through the creation of dedicated dashboards and chatbots on authorities' websites. In the case of SBS, a virtual adviser, Sebas (chatbot), was created. It provides permanent guidance service to citizens on various basic topics related SBS' competence. The service is available twenty-four hours a day and seven days a week through the inbox (chat) of the Authority's Facebook page. Sebas answers questions using friendly and easy-to-understand language. In addition, it has the option to request a "human advisor" for more complex issues.

In February 2021, the MPFA (Hong Kong, China) launched a Chatbot<sup>31</sup> on its corporate website to provide an online channel to communicate with members of the public using the AI technology.

# Enhancing efficiency of pension schemes operation, administration, quality of pension services, and achieving cost savings of pension schemes

Innovative technologies have a high great potential to simplify and improve the efficiency of pension schemes' administrative procedures, helping them to lower administrative costs and offer higher quality services and user experience.

One of the more insightful learning experiences received from the survey relates to the work developed by the MPFA (Hong Kong, China) in building a digital platform (eMPF Platform) as the single common

<sup>&</sup>lt;sup>29</sup> <u>https://www.dnb.nl/en/login/my-dnb-supervision-services/</u>

<sup>&</sup>lt;sup>30</sup> FinCoNet, SupTech Tools for Market Conduct Supervisors, November 2020

<sup>&</sup>lt;sup>31</sup> <u>https://www.mpfa.org.hk/en</u>

and integrated gateway for scheme administration processes in the MPF System. The Platform aims to reshape the administrative models of MPF system and to standardise, streamline and automate the existing administrative work processes, thereby increasing their operational efficiency and improving user experience<sup>32</sup>. Cost savings arising from the enhanced operational efficiency of the MPF System are expected to lead to further fee reduction for the benefit of scheme members<sup>33</sup>. (See **Box 3**)

<sup>&</sup>lt;sup>32</sup> <u>https://www.mpfa.org.hk/en/empf/overview</u>

<sup>&</sup>lt;sup>33</sup>MPFA Annual Report, 2020-2021.

#### **Box 3 eMPF Platform**

#### Development of eMPF Platform in Hong Kong, China

In Hong Kong, China, the Mandatory Provident Fund Schemes Authority (MPFA) is building a digital eMPF Platform, which will standardise, streamline and automate the existing MPF schemes administration processes. Currently, the administration of MPF schemes operates under a decentralised landscape, i.e. 4.7 million scheme members with over 10 million accounts under 27 MPF schemes administrated by 13 trustees involving 13 scheme administration platforms with different standards. The multiple business models, data standards, process design, administration system infrastructure and high volume of paper-based transactions make it difficult to achieve standardization and economies of scale. The eMPF Platform is therefore introduced to re-shape the MPF scheme administration ecosystem and re-engineer the processes and operations through innovative solutions.

#### Benefits brought by the eMPF Platform

The eMPF Platform represents the most important reform since the inception of the MPF system. When fully implemented, the eMPF Platform will enhance user experiences, drive greater operational efficiency, flexibility and reliability of the operation of the MPF system. It will also reduce overall costs of the system and drive future reform. The possible cost savings are estimated to be in range of HKD 30 to 40 billion over a 10 year period after the full implementation of the eMPF Platform.

In respect of functionalities, the eMPF Platform will serve as a one-stop electronic platform for handling MPF matters, including MPF scheme enrolment, making contributions, and submission of documents and information. Scheme members will be able to manage their MPF accounts across different MPF schemes anytime and anywhere through online and mobile applications. Separately, employers and self-employed persons can also handle their MPF contributions through this electronic payment platform, which will reduce paper work, human errors, inadvertent delay and default contributions.

#### Progress of the eMPF Platform

The enactment of the MPF Schemes (Amendment) Ordinance 2021 in October 2021 provided the legal basis for operation of the eMPF Platform. To take forward the project, MPFA has set up a wholly-owned subsidiary, eMPF Platform Company Limited (Company) to operate the eMPF Platform as a public utility under non-profit and cost recovery principles. Following an open tender exercise, MPFA engaged a contractor for the building and operation of the eMPF platform.

In the process of building the eMPF Platform, MPFA and the Company engage closely with different stakeholders to gauge their views on the front-end portal design of the eMPF Platform. MPFA organised a stakeholder consultation exercise with 104 sessions held from December 2021 to mid-July 2022. About 3,300 representatives from more than 190 groups participated in this exercise. Furthermore, to support implementation of the project, large-scale promotional and education campaigns are also planned to be launched so as to enhance awareness among the working population and employers.

MPFA takes an active role in ensuring MPF trustees' preparation and readiness such that the onboarding to the eMPF Platform is conducted in a timely and orderly manner. A number of dedicated teams have been set up at MPFA to assess MPF trustees' preparatory work for onboarding and supervise the onboarding progress of each trustee. In order to manage risks and ensure a smooth transition, MPF trustees and their schemes will get onboard to the eMPF Platform in an ascending order based on their asset-under-management. Subject to the orderly transition by MPF trustees in sequence upon completion of development, the eMPF Platform will come into full operation in 2025 at the earliest.

Source: MPFA, Hong Kong, China

Additional useful insights can be derived from the submissions of other Authorities. For example, the RBA (Kenya), reported on the transformation opportunities linked with the use of blockchain technology in structuring and registration arrangements for schemes, which helped to provide certainty regarding entitlements, enabling immutable record-keeping and transaction processing, optimising payment structures, and reducing pension claims fraud, etc.<sup>34</sup>

Another example is provided by the Monetary Authority of Macao, China, which is in the process of building an Insurance Intermediary Online Management Platform that will enable all functions such as licensing, continuing professional development (CPD) updates, information updates, renewals, infringement, communications and revocation to be exercised online.

In the United Kingdom, TPR continues its work on the development and implementation of pension dashboards to increase the efficiency of pension scheme administration and, through investment in technology, better prepare and engage savers with pensions. In anticipation of pension dashboards going live, TPR is upgrading its IT system and internal processes for monitoring compliance, as well as enforcement policy<sup>35</sup>.

#### Automation of supervisory workflows

Another important area of work concerns the automation of supervisory workflows.

Almost all respondent authorities indicated they are taking initiatives related to automating/digitalising internal procedures with the aim of streamlining work processes to increase operational efficiency and meet the expectations and needs of stakeholders.

Implementing a higher degree of automation facilitates decision making processes<sup>36</sup> and brings improvements in day-to-day supervisory operational processes and internal administrative procedures. It also improves data sources connection, and the exchange of data and communication with peer supervisors and regulators, supervised entities and consumers through digital channels. Examples were also provided in which automation supports supervisory monitoring of pension plans and service providers.

For example, the DNB (the Netherlands) has harmonised and digitalised key parts of the supervisory cycle, over 60% (in terms of volume) of all applications and notifications received from supervised entities, including assessments, licences and exemptions<sup>37</sup>. This change has allowed the DNB to spend less time on assessment and react more promptly. In the view of the Authority, this shift marks the first step in the process of digital transition to becoming a Smart Supervisor.

In Peru, the SBS has worked to digitalise all documentation issued and received by the Authority, in particular using digital signatures. Similar efforts have been undertaken by URBRA (Uganda), which has also initiated work to streamline workflows that should allow for enhanced departmental collaboration. The Authority is automating most of the existing operations in the Directorate of Supervision & Market Conduct with a target to automate at least 90% of the business processes.

In the United States, the Department of Labor's Employee Benefits Security Administration (EBSA) uses automated computer programmes to search/detect DC plans in terms of their investments or use of service providers in cases of concern over poor performance. The information gathered through this process can help supervisors in deciding which plans warrant an investigation.

<sup>&</sup>lt;sup>34</sup> RBA Strategic Plan, 2019-2024.

<sup>&</sup>lt;sup>35</sup> TPR Corporate Plan 2021-24, May 2021.

<sup>&</sup>lt;sup>36</sup> ECB, Reaping the benefits of supervisory technologies, Speech by Pentti Hakkarainen, Member of the Supervisory Board of the ECB, Supervision innovators conference, Frankfurt am Main, 29 November 2021

<sup>&</sup>lt;sup>37</sup> DNB Annual report 2021

# **2.2 Adoption of supervisory tools**

#### Stage of development

These examples notwithstanding, the responses to the survey indicate that the majority of reported SupTech projects are still in the initial or development stages. Some Authorities mentioned, in fact, that they are still quite heavily reliant on manual and paper-based processing, which is prone to human error and makes it difficult to analyse and share data.

The responses to the survey show that the development and adoption of SupTech tools is a continuous process, with some digital tools having already been adopted or tested while others are still under development. In many cases, supervisors are developing several SupTech tools simultaneously while existing tools are continuously upgraded based on specific supervisory needs. In the responses, Members highlighted the importance of maintaining agile ways of working, i.e., making sure that the tools in question can evolve continuously according to the supervisory needs and business feedback. Several authorities stated that their strategic target is to base all or most of their supervisory activities on digital technologies in the near future (e.g., the Netherlands and Peru).



Figure 4 Adoption status of SupTech tools in selected IOPS jurisdictions

Source: Members' responses to the SupTech questionnaire 2022

0

#### Who develops SupTech tools?

The responses show that SupTech tools are usually developed internally by the supervisory department together with the IT department and/or in collaboration with external providers and software companies. Several authorities (the Netherlands, Germany, and Lithuania) indicated that they develop most of their SupTech tools in-house. In these cases, the supervisory department usually plays a leading role in the development process. Some specific digital activities may be outsourced to third parties, but supervisors retain control of the process. As a common practice, Authorities purchase software (such as PowerBI) from external software developers.

2

4

6

8

10

12



# Figure 5 Development of SupTech tools in selected IOPS jurisdictions

Source: Members' responses to the SupTech questionnaire 2022

# Timeline for adoption of SupTech tools

As for the adoption time, the responses to the survey indicate that the timeline for adoption of SupTech tools depends largely on each specific project, especially its scale and complexity. On average, SupTech tools were developed within one to two years, including the design, pilot proofs, contracting process, and final implementation. Not surprisingly, implementation of more significant projects can take a longer time. For example, APRA (Australia) noted that APRA Connect, its major project to modernise its data capabilities, went live in September 2021 after having been under development for five years. Given the scale and complexity the project, its implementation process included several stages of development before full completion<sup>38</sup>. Colombia's FSC stated that its SmartSupervision project started in 2019 but the tool was not fully adopted by supervised financial institutions until the second quarter of 2022. Elsewhere, the DNB (the Netherlands) notes that the digitalisation of the supervisory review process as a whole is foreseen to take several years, as the process is being developed in the so-called 'agile' way, incrementally with new features being developed and released on a quarterly basis.

#### Investments in data and technology

The digital transformation of pension supervision requires significant investments in organisational time and resources including investments in data, technology, and infrastructure capabilities. Along with investing in new technological tools, it was also noted that significant expenditures for ICT equipment were made to enable remote work for all supervisory staff in response to the Covid-19 pandemic (HANFA, Croatia).

A number of authorities highlighted the importance of investing not only in data and technology infrastructure but also in skilled staff. The aim is to strengthen the digital and data competencies of staff to equip supervisors with the skills necessary to support digitisation.

In addition, authorities in several jurisdictions reported having made significant investments in cyber security solutions to secure internal systems as a response to increasing cyber threats (e.g., RBA, Kenya).

<sup>&</sup>lt;sup>38</sup> APRA Discussion Paper, Direction for data collection, March 2022

#### Figure 6 Investment in ICT capabilities by pension supervisors



Source: Members' responses to the SupTech questionnaire 2022

# How do supervisors measure their efficiency<sup>39</sup> as they rely more on digital tools?<sup>40</sup>

As part of the survey, Authorities were asked whether they have developed and *apply specific criteria to evaluate the benefits and feasibility* of the internal SupTech tools and digitalisation projects. Only about one-third of participating Authorities (twelve) responded positively.

# Figure 7 Evaluation of SupTech tools by pension supervisors



Source: Members' responses to the SupTech questionnaire 2022

For those authorities that do undertake such evaluations, various techniques or approaches are being used. In some cases, digital tools and solutions are being assessed on a **case-by-case basis** (e.g., APRA, Australia). Authorities also conduct **evaluation surveys** on the use of SupTech applications (as in

<sup>&</sup>lt;sup>39</sup> IOPS Working Paper 10 on <u>Governance and Performance measurement of pension supervisory authorities</u> covers the issue of performance measurement by pension supervisory authorities and some performance indicators such as effectiveness: looking at whether the outputs lead to the desired outcomes; efficiency: measures looking at whether the organisation is getting the maximum output for the inputs; economy: looking at the costs of acquiring the inputs, p. 92.

<sup>&</sup>lt;sup>40</sup> Is efficiency measured in financial terms (e.g. IT operating costs, number of supervised entities and value of assets per one staff member), quantitative terms (e.g. number of complaints, time of response to supervised entities and members), qualitative terms (e.g. number of person x hours needed by pension funds to submit supervisory returns, assessment by pension funds), achievement on certain mandates (e.g. increase in coverage, increase in financial literacy) etc.)?

Colombia for Smartsupervision and OJK in Indonesia). In the Netherlands, **lean business cases** are written for bigger innovation initiatives and larger parts of the digitalisation of the supervisory review process. Such cases describe the investment costs, the expected run costs, and the expected time and costs to be saved by the initiative and/or the increases in the effectiveness of supervision.

Several other Authorities stated that they have developed **special criteria**. The ACPR (France) has elaborated a series of indicators intended to assess the effectiveness of the Authority's activities in relation to implementation of its SupTech strategy. The specific criteria to evaluate adopted digital solutions reported by ACPR include the user acceptance of the business, the number of connections, time savings, technical performance, and data quality. Other criteria identified in Members' responses were simplicity to implement, maintenance and daily usage, cost, integration with other tools used in the Authority, scalability (e.g., Poland); technology and staff capabilities readiness; budget costs; percentage of digitalisation in supervisory processes; the number of registered entities using e-services; plus the total time required for the supervisory process, etc.

# 3. Practical experiences in developing and adoption of SupTech applications

The survey also covered the practical experiences of supervisors when introducing and working with SupTech solutions, as well as the challenges encountered in the development and adoption stages.

# 3.1 Legal changes

An important point to note is that digital transformation drives transformation in all areas of the financial sector, including regulations.

The adoption and use of SupTech solutions may require changes in financial or pension regulations and the issuance of special supervisory circulars (reported by eleven jurisdictions). Depending on a jurisdiction's legal system, existing laws and regulations have been (or are being) amended to mirror the new technology requirements for easier compliance of the regulated entities. Uganda is a case in point. It is in the process of amending pension regulations, including licensing, management, and operations of pension schemes to align the data requirements with the SupTech and RegTech solutions. Overall, recent regulatory changes helping to achieve digital transformation have been introduced to support:

- changes in organisational structure of authorities creation of new data or digital technology units/ divisions or committees to facilitate innovation work, as well as new staff positions,
- introduction of digital platforms (Hong Kong, China<sup>41</sup>),
- implementation of new licensing and reporting processes, through on-line applications and channels (Georgia, Croatia, Indonesia, Malawi, and Mauritius),
- introduction of certain technical modalities allowing the supervisor to determine a file format and a transmission method for reporting purposes (Poland), and
- digital communication (Slovak Republic).

# 3.2 Organisational changes and preparing for changes in supervisory culture and mindset

In the process of embracing greater use of technology and data, supervisors are assessing their organisational capabilities and, in many cases, have made changes to their organisational structures to include new divisions or units focusing on technology and data. In some cases, new executive positions, such as the Chief Information Officer, Chief Data Officer, and ICT examiner were introduced to move

<sup>&</sup>lt;sup>41</sup> Introduction of the Mandatory Provident Fund Schemes (Amendment) Bill 2021 (the Bill) by the Legislative Council provided the legal basis to further facilitate the development and implementation of the eMPF Platform project.

forward the realisation of SupTech projects. Such functions are either responsible for the SupTech initiatives themselves or work with other functions to develop and deploy SupTech.

Some authorities implemented Innovation Hubs or dedicated committees responsible for development of specific projects and/or for collecting and working on implementation of supervisory needs in digital sphere. In several authorities as part of organisational changes, separate multidisciplinary innovation teams were established to identify supervisory needs and their technological solutions, manage the activities, test pilot projects with supervisors and learn from new technical possibilities (Australia, the Netherlands, Malawi, and Colombia).

One of the recurrent issues outlined in the responses was the importance in the development stage of SupTech tools to engage as early as possible with supervisory staff involved in operational work/inspections. In this way supervisors could be fully involved in the project development (from the early stage to final implementation and roll out) and contribute by providing the IT developer with their business knowledge, which is deemed necessary to successfully introduce new SupTech tooling.

Other insights gained from the survey include the need to establish intensive cross-team collaboration among supervisors and other divisions responsible for implementation of new supervisory technologies, e.g., the adoption of agile ways of working. Agile ways of working could be interpreted as iterative and incremental project development, involving enhanced collaboration and operation through cross-functional teams (a dynamic, flexible, test-and-learn process whereby the team learns from its results before moving on<sup>42</sup>).

An example provided by APRA (Australia), stems from its experience with implementation of a dedicated project to support introduction of a new data collection system. A separate dedicated team including business subject matter experts was created to manage the activities associated with creating new standards and the data collections associated with the new standards. The project was primarily run as an agile project. Subject matter experts were sourced from the business and fully allocated to the project to ensure that there was appropriate corporate knowledge and dedicated resources (as opposed to having staff work on the project while simultaneously retaining responsibility for performing their regular work assignments). The team working on the initiatives relating to modernising the prudential architecture work has also adopted an agile methodology.

In this respect, views were expressed that SupTech agile development methods are not always fully understood within Authorities, and that it takes time and a learning process to adopt these new working methods and reap the expected benefits.

Responses to the survey also pointed out that realising the full potential of digital transformation is not possible without a change to the organisational culture and the employees' mindsets. In a sense, the organisational culture could be regarded as a foundational pillar for any organisation's success.

Respondent Authorities noted that focusing on the adoption of change management strategies, increasing staff capabilities through internal and external trainings, having exchanges with peer supervisors and external experts regarding the latest developments in the digital ecosystems and sharing information internally were all necessary to promote a culture of innovation<sup>43</sup>, and to build knowledge and understanding of SupTech.

# **3.3 Challenges encountered**

Given this discussion, it is perhaps not surprising to learn that there are many challenges for development and implementation of SupTech solutions. Below are listed various challenges and issues that were most often cited by Members in their responses.

<sup>&</sup>lt;sup>42</sup> An Agile Approach to Digital Transformation (+Principles, Benefits), www.whatfix.com

<sup>&</sup>lt;sup>43</sup> Building an innovative supervisory culture, ECB, February 2022

# Political (funding) risk

Several respondents raised the issue of budgetary constraints in efforts to procure SupTech projects. Inasmuch as some respondent authorities are financed (partly or fully) from the government budget, obtaining additional (necessary) funding can be an uneasy political decision in view of the current unfavourable global economic conditions.

# Sufficient data of good quality<sup>44</sup>

The most important risk and challenge when developing and implementing SupTech solutions reported by Authorities (fourteen jurisdictions) related to the quality of data. This concerns supervisory data as well as data submitted by financial institutions.

Respondents placed particular emphasis on the issues of accuracy and standardisation of submitted data. Data standardisation entails transforming the data to a standard format to correct and harmonise it as well as to remove any duplicates. One authority cited the problem of having a large amount of duplication in the data arising from a historic issue of sub-optimal data validation when registering schemes (Ireland). The MPFA (Hong Kong, China) also stated that data mapping and standardisation were required before the uploading of data to its eReturn system for data analysis, given that the financial data items stated in financial statements are not standardised.

As supervisors implement new systems, they migrate data from legacy systems. Unfortunately, legacy data might not reflect the current status and a lot of effort is required for data cleaning and migration to fit it into the new data structures. To address this issue Authorities are working on the improvement of data quality at the level of financial institutions and, in parallel, on their own assessment tools (as far as possible, to review and correct data within their systems). Several examples were provided.

As part of the priorities<sup>45</sup> of BaFin (Germany), data quality is of significant importance in order to achieve its supervisory goals. BaFin is in the process of developing its own tools and processes to further improve the structure and quality of data. This will allow for the automatic identification of erroneous reports, for example.

Another Authority, the FSC (Mauritius) enforced validations at different levels of the functionalities in the system to ensure that data being fed in are correct.

Several authorities cited the issue of fragmented data. For instance, OJK (Indonesia) mentioned that data within each supervisory application are not interoperable. CAPSA (Canada) also cited concerns about data fragmentation.

One Authority, HANFA (Croatia) also mentioned problems with internal data consistency. Such data need to be further updated and reports to be further adjusted in order to provide a more uniform and usable set of data. At the same time, data validation procedures need to be further updated. As an example of the problem, the Authority indicated that there are reports in which a broad range of data are collected, but the validation rules are not adequate or there is a significant portion of free-entry fields which makes the data manipulation process more difficult.

In a similar context, Poland pointed out the issue of data governance.

# Technical issues

Members were invited to provide their views on specific technical issues entailed in their adoption of SupTech technologies and the ways in which they overcome them. One of the recurrent issues, mentioned above, relates to legacy IT systems and outdated technologies. Any malfunctions of them can result in major disruptions of supervisory operations rendering the data inaccessible. Türkiye cited a related concern regarding possible mismatches between the versions of systems used by the

<sup>&</sup>lt;sup>44</sup> See also IOPS Working Paper N°39 'Report on data collection by pension supervisors', December 2022

<sup>&</sup>lt;sup>45</sup> See BaFin's medium-term objectives, to guide BaFin's actions from 2022 to 2025, <u>https://www.bafin.de/dok/13477858</u>

supervisory authority and supervised entities. This weakness requires authorities and supervised entities to update their current ITC systems and strengthen controls on outsourcing to assist in digital transition.

Smooth integration of the new SupTech tools into the existing IT infrastructure (i.e., not requiring substantial changes in the IT system used) is desirable but not always easy to achieve. While work is underway to create a more integrated IT infrastructure, ongoing progress is still required, and in the short-term, supervisors must adopt interim solutions that work well today, still utilising the existing IT infrastructure.

The responses also indicated that Authorities are putting in place the necessary contractual arrangements (e.g., agreed service contracts) and actively engaging with vendor/service providers to address any technical issues that arise and working on product improvements (Australia).

Members' responses highlighted the necessity to continuously adapt technologies to respond to specific supervisory needs. In some cases, customisations were required from software vendors to comply with supervisory requirements (Colombia).

# Operational security issues, including cyber risk

Respondents also noted operational security issues involved in the adoption of SupTech solutions. Cyber-attacks are reported as one the more significant risks in a highly automated and interconnective environment which could potentially lead to unauthorised access or data breaches.

More than half of respondents (nineteen jurisdictions) reported having put in place measures to address cyber risks and data security as part of the development of SupTech tools.

Some examples of measures taken by Authorities<sup>46</sup> to prevent cyber threat and avert data loss include:

- Protection of relevant systems by multi-layered security controls, installation of web application firewalls network firewall, intrusion detection and prevention systems, antimalware software (Hong Kong, China; Uganda),
- Heavy investment in redundant systems to avert data loss (Kenya),
- Encryptions of information in database and communications with supervised entities
  - Hong Kong, China: A secure private network with data encryption has been set up and maintained between MPFA and MPF trustees to provide a secure channel for data communication and system access.
  - Uganda: All information in the database is encrypted.
- Regular security checks of tools and systems: hardware scans, regular penetration tests, software updates, regular BCP activities are conducted to ensure compliance (Australia, Costa Rica, Türkiye, and the United States),
- Cyber security assessment, including a hack test (the Netherlands),
- Establishing a Cybersecurity Department and appointment of a CIS officer and Data Protection Officer (Poland, Mauritius),
- Training and awareness programmes on cyber security risks carried out frequently (Kenya, Uganda).

The Monetary Authority of Macao, China noted that while the Authority has a Cybersecurity Working Group and the IT Department oversees cybersecurity and closely monitors cyber risks, some special procedures have been laid down for supervisory entities to follow. A cyber-incident reporting platform was adopted in 2019 to monitor pension fund management companies' cyber status in real time and to

<sup>&</sup>lt;sup>46</sup> For more information, please see IOPS Working Paper N37, Supervisory approaches to enhancing cyber resilience in the private pension sector: High-level summary of Members responses to the questionnaire, <u>www.iopsweb.org</u>

prevent security risks in advance. Through logging into the Cyber-incident reporting platform, the Authority can obtain all necessary information relating to the sector and any new risks identified by the Judiciary Police. It also facilitates timely review of cyber-incidents reported and monitoring of the remedial actions taken.

# Capacity building

Another challenge in the adoption of SupTech tools cited in Members' responses relates to insufficient staff resources and a lack of digital competencies within Authorities. Employing highly qualified and talented resources and then retaining them may be difficult as such resources are scarce and "outpriced by the market". In addition, developing internal skills and enhancing the digital capacity of supervisory staff can be a lengthy process. To overcome this challenge, Authorities focus their recruitment procedures on specialists with IT skills, data science backgrounds, training in computer science, etc.

In parallel, Authorities work to enhance digital skills and the digital culture of staff through internal training programmes and externally provided courses or in collaboration with external parties. Such trainings could be aimed at staff of all levels or could be more tailored, focused on specific staff needs or developed for a particular project or type of SupTech tool.

In the Netherlands, the DNB offers courses for various digital capabilities to staff as a separate track of its digitalisation strategy, which evolved into a digital skills framework. As part of this track, a "smart supervisor team scan" was formed with which teams can measure how far they are advancing with their digital transformation. APRA (Australia) is also working to further develop and strengthen its staff's analytical skills through establishment of a "Centre of Excellence" and enhancement of internal training programs. SUPEN (Costa Rica) has made significant investment during the past decade in order to develop and improve the programming abilities of its staff so that they are able to initiate the process of migrating to SupTech. Team members have received international training on FinTech and SupTech, such as the one offered by the Cambridge Centre for Alternative Finance.



# Figure 8 Capacity building by pension supervisors

Source: Members' responses to the SupTech questionnaire 2022

# Other risks

Other risks and challenges highlighted by published reports and through IOPS survey include:

• legal risks which refer to potential data protection issues whenever supervisors start to manage large volumes of sensitive data;

- black box issues caused by unpredictable (unknown) algorithmic ways of producing outputs/conclusions and thus requiring SupTech outputs to be evaluated by a human supervisor<sup>47</sup>,
- various operational and managerial issues such as complexity of overall digital project management,
- lack of readiness from the staff to work on such complex projects,
- risk of failure/outage/glitch of SupTech tools; difficulties in the procurement process,
- lack of contingency arrangements/possible vendor lock-in, etc.
- cost of adapting and changing existing IT systems,
- industry readiness and capacity<sup>48</sup>.

# 4. Key findings derived from practical experiences and future considerations

The aim of the project on digitalisation and pension supervision was to gather insights from the development and implementation stages of the application of innovative SupTech technology to daily supervisory work in the area of private pensions. These experiences could serve as a basis for updating existing IOPS instruments (standards, guidelines and good practices) or - if deemed necessary - the development of new guidelines or good practices in the area of digitalisation.

Members' responses to the survey provided a **checklist of good practices** related to development and use of innovative technologies in their daily supervisory work. They cover several areas:

#### Regulation

• Depending on jurisdictions' circumstances, the adoption of SupTech solutions may entail changes in legislation to mirror the new technology requirements for regulated entities to ease compliance.

#### Strategy and vision

- Strategic planning helps to move forward organisation projects. The adoption of new supervisory technology should ideally be included in the strategic supervisory plan or should be a well-defined digital transformation strategy.
- Have a dedicated budget to develop and deploy SupTech tools.
- Have clear understanding of what are the desired outcomes from the SupTech initiatives including the associated benefits and new risks (consider controls and mitigates).
- Implement a descriptive plan with clear phases, goals and deadlines to help monitor the implementation of new technologies.
- Give clear and prudent timelines to adopt the new technologies.
- Know how to handle the timeframe for adoption of new technologies, as the process can take a long time.

#### Governance/senior management support

• Enlist top management commitment to digitalisation project: Broad support and encouragement from the Board and Senior Executive Committee.

<sup>&</sup>lt;sup>47</sup> FSI Insights on policy implementation No 9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

<sup>&</sup>lt;sup>48</sup> Two last issues were also highlighted by the recent IOPS Working Paper N°39, Report on data collection by pension supervisors, December 2022

- When implementing a SupTech approach, ensure to support staff and industries transition.
- Have support of entire hierarchical chain, otherwise the digital tool will not really be used.
- Change management is one of the key determinants of the successful implementation of ICT projects.
- Ensure effective change management by bringing relevant stakeholders both internal and external, along on the journey from development to implementation of the SupTech initiatives.
- Help staff understand the benefits of new technologies. The new technology must be seen as a means of helping to achieve better efficiency rather than as a threat.
- Create a culture of creativity and innovation, whereby supervisory staff are encouraged to try new things whilst enhancing the learning environment.
- Equip supervisors with the right skills and mind-set to fully engage in digitalisation.
- Embedding digital culture within an authority requires leadership and support from senior management.

# Capacity building

- Improve human resource skills before implementing SupTech tools. Spend time and budgetary resources on ITC training of supervisory staff. Combine innovation initiatives with an extensive training programme aimed at improving data literacy and various technical capabilities of supervisors.
- Provide trainings to supervisory staff and to supervised entities to ensure that they know how to use the systems properly.
- Seek advice from experts with recognised experience (both IT knowledge and supervisory experience), who can be consulted when there is a problem.
- Realising digital transformation requires a change of culture and mindset.

#### Strong engagement

- Develop and implement innovation in SupTech tools based on strong cross-team and interdepartmental collaboration, bringing together supervisors with different perspectives to drive SupTech projects.
- In designing SupTech tools, engage with supervisory teams early in the development stage and ensure that they stay the course from the initial stage to the final implementation and roll out.
- Have an agile approach to digital transformation, i.e. make sure that SupTech tools can evolve continuously according to supervisory needs and business feedback.
- Take a staged approach. It may not be possible to come up with a proper solution that fits all. Take time to develop a solution that will be welcomed by the majority of supervised entities and has been agreed upon.
- Convey to supervisory staff the message that the senior management support a trial/learningfrom-doing approach (i.e., failures/ being wrong are normal occurrences and should support bouncing back) when developing new SupTech tools/projects.
- Engaging with regulated entities and other key stakeholders when developing/introducing new supervisory technologies is key.
- Develop SupTech solutions in line with prospective users' expectations and needs; this will help achieve better user adoption.

- Ensure that innovation creates as much value for the regulated entities as possible. In a similar vein, make sure that the industry understands the benefits arising from the change. If the innovation has no incentive for the regulated entities, they will be reluctant to support it.
- Deepening co-operation with (domestic) peer regulators and supervisors and those at the international level will help facilitate the continuous exchange of knowledge and expertise.

# Data/reporting

- Take care of data quality in a technical (development of SupTech tools) and organizational context (implementing data governance, data stewards and overall staff trainings).
- Continue improving the information reporting system and establishing indicators focused on risk-based supervision, which allows for ongoing monitoring of supervised entities, facilitating supervision and keeping the risk profile of the entities updated.
- Work on improving data processing and the quality of supervisory deliverables.
- Consider data inputs validated upfront resulting in processing improvements, eliminating rework and reducing errors.
- Work on streamlining data and filing collection.
- Master data management, data governance and data democratisation are challenges in the future but necessary for SupTech.

# Technology

- Work on updating current systems to assist in digital transition.
- Develop SupTech solutions that are not necessarily complex but make an impact. Select technologies that best match available supervisory resources and capabilities.
- Consider cybersecurity before implementing SupTech.
- Test, test, test.
- Encourage entities to volunteer to participate in proof-of-concept and pilot activities.

# **Glossary of Terms**

*This Glossary provides some commonly used definitions on digital innovation set in the reports by FSB, BCBS, OECD, IAIS, IOSCO, FATF.* 

Artificial Intelligence (AI) – the theory and development of computer systems able to perform tasks that traditionally have required human intelligence<sup>49</sup>.

Application programming interface (API) – a set of rules and specifications followed by software programmes to communicate with each other, and an interface between different software programmes that facilitates their interaction<sup>50</sup>.

**Big data** – a generic term that designates the massive volume of data that is generated by the increasing use of digital tools and information systems<sup>51</sup>.

Chatbots – are virtual assistance programmes that interact with users in natural language<sup>52</sup>.

**Cloud computing** – an innovation in computing that allows the use of an online network ('cloud') of hosting processors to increase the scale and flexibility of computing capacity<sup>53</sup>

**Distributed Ledger Technology** (DLT) – a means of recording information through a distributed ledger, i.e. a repeated digital copy of data at multiple locations, as in block chain. These technologies enable nodes in a network to securely propose, validate, and record a full history, state changes (or updates) to a synchronised ledger that is distributed across the network's nodes<sup>54</sup>.

**Data-input approach** – Reporting institutions can automate the collection of data in a standard and highly granular format according to specifications by the supervisory authority and send it to a central database<sup>55</sup>.

**Data-pull approach** – Using automated processes triggered and controlled by the supervisor, to collect and standardise raw business data directly from the institutions' operational systems<sup>56</sup>

**Machine learning (ML)** – a method of designing a sequence of actions to solve a problem that optimise automatically through experience and with limited or no human intervention<sup>57</sup>.

**Supervised learning**– involves computers learning from examples of correct input-output pairs. It is a subset of ML in which an algorithm is fed a set of training data with labelled observations. Supervised learning can be used to categorise items (e.g. whether something is a cat) and to predict numerical values (e.g. stock returns). Supervised learning algorithms are invested with human knowledge. Algorithms can, for example, identify relationships with new variables or discover previously undetected interactions among variables<sup>58</sup>.

<sup>57</sup> Idem FSB, October 2020

<sup>&</sup>lt;sup>49</sup> FSB, The Use of Supervisory and Regulatory Technology by Authorities and Regulated Institutions, Markets developments and financial stability implications, October 2020

<sup>&</sup>lt;sup>50</sup> Idem FSB, October 2020

<sup>&</sup>lt;sup>51</sup> Idem FSB, October 2020

<sup>&</sup>lt;sup>52</sup> Financial Stability Institute, FSI Insights on policy recommendation N9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

<sup>&</sup>lt;sup>53</sup> Idem FSB, October 2020

<sup>&</sup>lt;sup>54</sup> Idem FSB, October 2020

<sup>&</sup>lt;sup>55</sup> RegTech and SupTech: Implications for Supervision Report of the A2ii – IAIS Consultation Call, March 2019

<sup>&</sup>lt;sup>56</sup> RegTech and SupTech: Implications for Supervision Report of the A2ii – IAIS Consultation Call, March 2019

<sup>&</sup>lt;sup>58</sup> Financial Stability Institute, FSI Insights on policy recommendation N9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

**Unsupervised learning** – involves computers discovering the hidden structure in unlabelled data. It is a subset of ML in which the data provided to the algorithm do not contain labels. A common method of unsupervised learning is that of clustering, i.e. to find patterns in the data by identifying clusters of observations that depend on similar underlying characteristics<sup>59</sup>.

**Topic modelling** – method of unsupervised learning that lets the data define key themes in the text. Topic modelling can efficiently identify hidden trends in large amounts of unstructured financial information<sup>60</sup>.

**Random forest** – combines multiple ML algorithms, allowing for overall better performance. It is a supervised learning algorithm that can be used in large amounts of unstructured financial information<sup>61</sup>.

**Deep learning** – an algorithm that can, independently, learn new skills. This subset of ML refers to a method that uses algorithms inspired by the structure and function of the brain, known as artificial neural networks. The more computation time it gets, the better the algorithm becomes. The process by which deep learning techniques come to predictions or decisions is  $uclear^{62}$ .

**Neural networks** – are the base concept for deep learning algorithms and can be used for supervised and unsupervised learning. Like a brain, a neutral network contains a large number of nodes and typically learns by training on real data in which the correct answer is already known<sup>63</sup>.

**Image recognition** – a form of deep learning that can be applied to many image-processing and computer vision problems such as categorising handwritten numerals within an image<sup>64</sup>.

**Machine-readable regulations** – regulations issued as programming codes that can be assimilated immediately by supervised entities' operational systems, without the need for a human to interpret them<sup>65</sup>.

**Natural Language Processing** (NLP) – an interdisciplinary field of computer science, artificial intelligence, and computation linguistics that focuses on programming computers and algorithms to parse, process, and understand human language, NLP can be regarded as a form of  $AI^{66}$ .

**Real-time access** – Supervisors can pull or "see" operational data at will (rather than at predetermined reporting periods) by directly accessing the institutions' operational systems, which could include monitoring transactions in real-time basis<sup>67</sup>.

<sup>&</sup>lt;sup>59</sup> Financial Stability Institute, FSI Insights on policy recommendation N9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

<sup>&</sup>lt;sup>60</sup> Financial Stability Institute, FSI Insights on policy recommendation N9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

<sup>&</sup>lt;sup>61</sup> Financial Stability Institute, FSI Insights on policy recommendation N9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

<sup>&</sup>lt;sup>62</sup> Financial Stability Institute, FSI Insights on policy recommendation N9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

<sup>&</sup>lt;sup>63</sup> Financial Stability Institute, FSI Insights on policy recommendation N9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

<sup>&</sup>lt;sup>64</sup> Financial Stability Institute, FSI Insights on policy recommendation N9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

<sup>&</sup>lt;sup>65</sup> Financial Stability Institute, FSI Insights on policy recommendation N9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

<sup>&</sup>lt;sup>66</sup> Idem FSB, October 2020

<sup>&</sup>lt;sup>67</sup> RegTech and SupTech: Implications for Supervision, Report of the A2ii – IAIS Consultation Call, March 2019

Structured data – is information that has a pre-defined data model or is organised in a pre-defined manner $^{68}$ .

**Unstructured data**— is information that either does not have a pre-defined data model or is not organised in a pre-defined manner<sup>69</sup>.

<sup>&</sup>lt;sup>68</sup> Idem FSB, October 2020

<sup>&</sup>lt;sup>69</sup> Idem FSB, October 2020

# **References:**

ACPR, France, Governance of Artificial Intelligence in Finance Discussion document, June 2020

- ACPR, France, Annual Report on ACPR Activities, 2020, 2021
- ACPR, France, Strategic Plan of the Banque de France, Building 2024 Together, 2021

APRA, Supervisory priorities 2022

APRA, Corporate Plan, 2021-2025

APRA, Data strategy: APRA's evolving data capability

APRA, Discussion paper: Direction for data collection, March 2022

APRA, Corporate Plan 2022-2023

BaFin, Supervisory priorities

BaFin, Medium-term objectives, to guide BaFin's actions from 2022 to 2025

DNB, Supervisory strategy 2021-2024

DNB, 2025 Vision and strategy

DNB, Data driven RBS approach

DNB, iforum, iForum (dnb.nl)

ECB, Reaping the benefits of supervisory technologies, Speech by Pentti Hakkarainen, Member of the Supervisory Board of the ECB, Supervision innovators conference, November 2021

EIOPA, Suptech Strategy, Interview with Ana Teresa Moutinho, Head of Supervisory Processes, with the Digital Finance magazine (Vangelis Vangelatos), September 2021

European Commission, Digital Finance Strategy for the EU, September 2020

FinCoNet, SupTech Tools for Market Conduct Supervisors, November 2020

FSB, The Use of Supervisory and Regulatory Technology by Authorities and Regulated Institutions Market developments and financial stability implications, October 2020

Financial Stability Institute (FSI), Insights on policy implementation No 37 Suptech tools for prudential supervision and their use during the pandemic, December 2021

FSI, Insights on policy implementation No 19, The suptech generations, October 2019

FSI, Insights on policy implementation No 9, Innovative technology in financial supervision (suptech) – the experience of early users, July 2018

G20/OECD, G20/OECD High-Level Principles on Financial Consumer Protection, (2022 updated), https://www.oecd.org/finance/high-level-principles-on-financial-consumer-protection.htm

Hong Kong, China, MPFA Annual reports 2020-2021; 2021-22

Hong Kong, China, MPFA, Concerted efforts to drive digital transformation of MPF, https://www.mpfa.org.hk/en/info-centre/press-releases/8870 record

Hong Kong, China, MPFA, A new digital era for MPF, https://www.mpfa.org.hk/-/media/files/empf-platform/articles/20190925/thestandard\_20190925.pdf

Hungary, Supervision and consumer protection strategy (2020-2025)

IOPS, Working Paper No10, Governance and performance measurement of pension supervisory authorities, November 2009, <u>http://www.iopsweb.org/principlesguidelines/43946767.pdf</u>

IOPS, Statement on pension supervisory actions to mitigate the consequences of the Covid-19 crisis

IOPS, Working Paper No 39, Report on data collection by pension supervisors, December 2022

Ireland, The Pensions Authority Statement of Strategy 2022-2024

Kenya, RBA, Strategic plan 2019-2024

Maldives, Capital Market Development Authority, Maldives, Strategic Plan 2021-2023

Mauritius, FSC, Press release, Launching of the FSC One Platform, https://www.fscmauritius.org/media/105913/press-release-launching-of-the-fsc-one-platform-v2.pdf

OECD, Denis, E. (2021), "The promises and pitfalls of SupTech for corporate governance related enforcement", Going Digital Toolkit, N10

OECD, The work of the Corporate Governance division is Chapter 5 of the BFO, The use of SupTech to enhance market supervision and integrity, https://www.oecd-ilibrary.org/sites/ba682899-en/index.html?itemId=/content/publication/ba682899-en

Ontario FSRAO, All Together Now: FSRA, The Innovation Office, and an Innovation Framework for a More Innovative Ontario Financial Services Sector, January 2022

Poland, Strategy of the Polish Financial Supervisory Authority for 2021-2025

TPR, Strategy: Pensions of the future, March 2021

TPR, Corporate Plan 2021-24, May 2021

Toronto Centre, SupTech: Leveraging Technology for Better Supervision, July 2018

Türkiye, PMC 2019-2023 Strategic Plan

Uganda, Uganda Retirement Benefits Regulatory Authority, Strategic Plan 2020/21-2024/25; https://urbra.go.ug/download/strategic-plan-fy2020-21-2024/?wpdmdl=1312&refresh=62fb4f58386371660637016

US Department of Labor, Two Year Evaluation Plan 2022-2023, https://www.dol.gov/sites/dolgov/files/evidence/eval-plan-fy2022-2023.pdf

World Bank, Technical Note, The Next Wave of Suptech Innovation: Suptech Solutions for Market Conduct Supervision, March 2021