
IFC-Bank of Italy Workshop on "Data science in central banking"

18-20 February 2025

Gen AI in action: transforming data use in supotech¹

Patrick Hoffmann, Maha El Dimachki
and Sivasubramanian Ramanathan,
BIS Innovation Hub Singapore Centre

Kenneth Gay and Harry Lee,
Monetary Authority of Singapore

¹ This contribution was prepared for the workshop. The views expressed in this publication are those of the authors and do not necessarily represent the official views of the Committee, its members, or the BIS.

Gen AI in action: transforming data use in suptech

Patrick Hoffmann,¹ Maha El Dimachki,² Kenneth Gay,³ Sivasubramanian Ramanathan,⁴ Harry Lee⁵

Abstract

Supervisory activities are fundamentally dependent on data; however, much of these data tend to be based on backward-looking templates, limiting their effectiveness and relevance. To tackle these challenges, central banks and regulatory authorities are increasingly embracing generative artificial intelligence (gen AI) as a transformative solution. For instance, gen AI can streamline the process of summarising financial reports and news articles, as well as evaluating banks' compliance with existing regulations, thereby enhancing the efficiency and accuracy of supervisory activities. This paper delves into a collaborative initiative spearheaded by the Bank for International Settlements Innovation Hub (BISIH) Singapore Centre, in partnership with the Monetary Authority of Singapore (MAS). This initiative empowers central banks and financial authorities to explore and develop shareable code for gen AI applications within the realm of supervisory technology (suptech). Additionally, we present the current use cases being investigated by this community and outline the potential future applications of gen AI in enhancing supervisory practices. Through these efforts, the initiative seeks to modernise supervisory methodologies, ensuring that they remain relevant and effective in an ever-evolving financial landscape.

1. Introduction

Central banks play a crucial role in maintaining financial stability and ensuring sound banking practices. To effectively supervise banks, they need access to accurate, timely and comprehensive data. These data serve as the backbone for assessing risk, monitoring compliance and identifying potential vulnerabilities within the financial system (Araujo et al (2023), Duijm and van Lelyveld (2025)). A major problem that central banks face in banking supervision is that traditional data collection methods have often relied on backward-looking, template-based systems that can limit responsiveness and hinder the ability to make informed decisions. Generative artificial intelligence (gen AI) offers a transformative means for central banks to process new and vast volumes of data more efficiently and effectively (BIS (2024), El Dimachki (2024)). With gen AI, central banks can harness advanced analytics to derive deeper insights from available information, allowing for real-time monitoring of banking activity and more dynamic risk assessments. With its potential to enhance predictive

¹ Corresponding author; Adviser, Bank for International Settlements Innovation Hub Singapore Centre

² Head, Bank for International Settlements Innovation Hub Singapore Centre

³ Chief FinTech Officer, Monetary Authority of Singapore

⁴ Junior Product Owner, Bank for International Settlements Innovation Hub Singapore Centre

⁵ Deputy Director and Head, Data Governance and Transformation, Monetary Authority of Singapore

capabilities, gen AI can help central banks navigate the complexities of modern financial systems across both advanced and emerging markets. Embracing gen AI promises not only to improve operational efficiency but also to strengthen financial oversight, and it promises to enhance overall stability in the banking sector (Ashley and Papenbrock (2023), Avramovic (2023)).

However, emerging technologies such as gen AI necessitate enhanced collaboration among central banks to remain at the forefront of developments (BIS (2024)). Collaboration is also needed to ensure knowledge-sharing of the risks and experiences of using these technologies, and joint experimentation will enhance and accelerate upskilling and learning on how to deploy these tools safely (Crisanto et al (2024)). The Ellipse Data and Knowledge Platform Collaboration Community (EDKP CC) addresses this need by providing a platform for collective innovation. Facilitated by the BIS Innovation Hub (BISIH) Singapore Centre and the Monetary Authority of Singapore (MAS), the community builds on the modular Ellipse Data and Knowledge Platform (EDKP) developed under Project Ellipse – an integrated regulatory data and analytics platform (BIS (2022)). The community offers a unique avenue for central banks and financial regulators to share source code, pool expertise and jointly advance supotech innovation. By collaborating on knowledge, resources (like development capacity) and solutions, the EDKP CC aims to speed up collective progress in these fields. The more impactful use cases discussed in the community may also add to the BISIH's project pipeline (for example, using the digital twin technology for climate risk stress testing).

2. The EDKP CC – innovation through collaboration

In 2021, the BISIH Singapore Centre and the MAS embarked on a new initiative known as Project Ellipse (BIS (2022)). This collaborative venture, which also included the Bank of England, the International Swaps and Derivatives Association, Financial Network Analytics and Accenture, was designed to foster a more proactive, insight-driven and data-centric approach to regulatory supervision. At its core, Project Ellipse focused on the development of an integrated regulatory data and analytics platform. A standout feature of the Ellipse prototype is its innovative capability to seamlessly integrate both structured and unstructured data sources. This integration is crucial for incorporating into supervision real-time information concerning current events that may affect financial stability and market dynamics. Through the application of advanced analytics on these consolidated data sets, regulators gain valuable early warning indicators that empower supervisors to act pre-emptively in response to potential risks (Hoffmann et al (2025)).

Building on the initial achievements of Project Ellipse, the BISIH Singapore Centre and MAS have taken significant strides to enhance this modular platform. This evolution has transformed Ellipse into a foundational supotech tool, positioned to support central banks and financial authorities in their experiments with emerging technologies, particularly in the realm of gen AI. The EDKP CC has since flourished, with membership growing to 19 institutions, including notable entities such as Bank Indonesia, the European Central Bank and the Office of the Superintendent of Financial Institutions in Canada (BIS (2023)). The EDKP CC serves as a forum where members convene regularly to exchange trends in financial supervision and insights

on other contemporary issues. The community's collaborative nature is evidenced by regular hackathons that focus on developing innovative solutions to shared challenges. A dedicated GitHub environment facilitates the sharing of code among member central banks and financial authorities, enabling collaborative development and promoting best practices. The community's collaboration is structured around several key venues:

1. **Virtual meetings**, held bimonthly for one hour, provide members with the opportunity to present their ongoing work in domains like suptech, gen AI and green finance/climate risk. Guest speakers are occasionally invited to share insights and expertise.
2. **An annual virtual workshop** encourages deep exploration of specific topics, such as the limitations and ethical considerations of gen AI. Topics for discussion are determined through member polls, reflecting a participative and inclusive decision-making process to capture the collective interests of the community.
3. **Hackathons** – the community's flagship event – are in-person and held annually. Preparation begins well in advance, from brainstorming potential use cases, to forming diverse teams across various authorities, to establishing the necessary technical infrastructure. All code produced during the hackathon is shared with members through the EDKP GitHub.⁶ Having a common GitHub among the community members facilitates iterative improvement and collective learning, ensuring that innovations are accessible to the entire community. The insights and innovations generated during hackathons extend beyond the community's own interests, as the BSIH Singapore Centre frequently receives inquiries to showcase successful use cases from the hackathon, illustrating how central banks can collaboratively drive innovation.

Through its initiatives, the EDKP CC not only fosters a culture of collaboration and innovation but also underscores the vital role that advanced technologies can play in enhancing regulatory practices and maintaining financial stability in an ever-evolving global landscape.

3. How gen AI transforms data use in suptech

The most recent EDKP CC hackathon was held in June 2024, focusing on harnessing the capabilities of large language models (LLMs) to address prevalent suptech needs. This three-and-a-half-day event drew participation from over 50 individuals representing 15 different central banks and financial institutions, fostering a collaborative environment rich with diverse expertise. Participants worked in mixed teams to tackle four specific gen AI-related use cases that had been proposed in advance by the members of the collaboration community. These use cases were carefully selected based on their relevance and potential impact on financial supervision and regulation. The organisations involved included notable central

⁶ The EDKP GitHub is an access-controlled repository where participants can collaborate on code, track version histories, document best practices and experiment with emerging tools.

banks and regulatory bodies, reflecting a broad spectrum of perspectives and challenges in the field.

To enhance collaboration and outcomes, the facilitators of the hackathon, the BISIH Singapore Centre and the MAS, matched participants with cross-institutional teams based on their individual skills, interests and experience. This approach not only promoted teamwork but also ensured that each group was equipped with the right mix of talents to effectively address the challenges posed by each use case. The use cases were as follows:

1. **AI-powered regulatory insight:** This use case, undertaken by participants from Labuan Financial Services Authority and Bank Indonesia, explored the application of gen AI in summarising and analysing regulatory reports and disclosures. The team aimed to develop a system capable of extracting insights regarding a bank's financial condition and generating automated reports that summarise financial statement assessments.
2. **AI-driven financial newsletters:** A collaborative effort between participants from the Bank of Japan, Swiss Financial Market Supervisory Authority and BISIH London Centre investigated the potential of gen AI in scanning an information feed for anything of interest. The team focused on developing a system that automatically generates and distributes newsletters containing only articles that covered topics of interest (eg credit risk), thereby reducing manual effort and mitigating information overload for recipients.
3. **Navigating supervisory frameworks with AI:** The Bangko Sentral ng Pilipinas team developed the Artificial Intelligence Hybrid Analysis Supervision (AIHAS) system. This system functions as an intelligent assistant for bank supervisors, leveraging supervisory and regulatory data to provide rapid responses to queries and generate comprehensive assessments. The AIHAS system also aims to automate the evaluation of bank documents for compliance with relevant policies and regulations, identifying potential risks associated with banking operations and enhancing productivity by automating repetitive tasks.
4. **Enhancing supervisory reporting:** This use case involved a multi-institutional team comprising members from the Deutsche Bundesbank, Office of the Superintendent of Financial Institutions, Central Bank of Malaysia and Bank of Italy. The team focused on several aspects of supervisory reporting, including the development of systems for answering questions, as well as retrieving and summarising official documents. Additionally, the team explored the application of AI in conducting market analysis of commercial real estate reports.

At the conclusion of the EDKP CC hackathon, the code developed during the event was shared with all community members, allowing them to build on the insights and innovations generated during the sessions.

A prominent theme emerges from the diverse use cases identified for the hackathon: the urgent need to efficiently and accurately extract actionable insights from vast amounts of data. Whether the focus is on analysing complex financial reports, pinpointing relevant information or automating compliance checks, the ability to effectively process and interpret data is crucial for regulatory bodies tasked

with maintaining the integrity of financial systems. Participating institutions represent a global cross-section of regulatory and supervisory authorities, and they are increasingly turning to gen AI as a promising solution to address this pressing challenge. Gen AI's innovative capabilities, especially in analysing unstructured data and generating human-like text, offer significant potential for streamlining a variety of processes. This technology can automate routine tasks, thereby saving valuable time and resources. Furthermore, gen AI can enhance decision-making by providing supervisors with advanced analytical tools to derive insights from complex data sets, improving predictive analytics for risk assessment. As the financial landscape becomes increasingly complex, embracing gen AI could mark a pivotal step towards achieving a more robust and responsive financial supervision and regulatory framework. The EDKP CC looks forward to further exploring these use cases and continuing to innovate in the suptech landscape.

To deepen collaboration, the EDKP CC can build further on its existing mechanisms for collaboration (eg knowledge exchange, common codebase). Putting in place a sandbox environment for members to test solutions quickly can both speed up prototyping and level the playing field for members which may face different technical infrastructural challenges. Having in place a common codebase and common technical infrastructure will also pave the way for common upskilling initiatives, as well as set up a community of mentors within the EDKP CC that will accelerate capacity building. There is also scope to develop central services that support the wider EDKP CC, such as in vulnerabilities management where a central resource manages the codebase to, for example, address unearthed zero-day vulnerabilities, replace deprecated packages or develop standardised technical documentation.

Beyond developments that are primarily technical in nature, it is also essential for the members of the EDKP CC to consider frameworks that guide the responsible use of AI and data analytics. For example, the MAS introduced the Fairness, Ethics, Accountability, and Transparency (FEAT) Principles to ensure that AI-driven solutions in the financial sector maintain robust standards of governance and trust (MAS (2018)). Additionally, MAS partnered with the financial industry on the Veritas Initiative, providing a framework and toolkit to assess AI and data analytics solutions against the FEAT criteria (MAS (2019)). Although the EDKP CC does not focus on formulating policy, it discusses these established frameworks and toolkits to inform the development and deployment of emerging technologies.

4. The path forward: opportunities and challenges

The EDKP CC will continue its discussion on how to benefit from gen AI, with a particular focus on banking supervision. During the hackathon, the members of the EDKP CC expressed a strong interest in further exploring the potential use of gen AI in the following areas:

1. **Data analysis and reporting:** GenAI can automate the analysis of large data sets from financial institutions, helping supervisors quickly identify trends,

anomalies and potential risks. This can streamline the preparation of reports and improve the speed and accuracy of data interpretation.

2. **Risk assessment:** Gen AI can model complex risk scenarios by simulating various economic conditions and their impact on banks. This can help supervisors assess the resilience of financial institutions under stress and evaluate capital adequacy.
3. **Fraud detection:** Gen AI could play a significant role in combating financial crime, including anti-money laundering (AML), countering the financing of terrorism (CFT), fraud detection and scam prevention. For example, gen AI can assist in identifying suspicious activities that may indicate fraud or money laundering by analysing transaction patterns and behaviours. This can improve the effectiveness of AML efforts in real time.
4. **Enhanced communication:** Gen AI can assist in generating clear and concise communication materials for stakeholders, including regulatory guidelines, policy updates and supervision outcomes, ensuring clarity and consistency.
5. **Supervisory tools development:** Central banks can use gen AI to develop predictive tools that provide early warnings about potential failures within institutions. These tools can assess financial health indicators and trigger alerts if certain thresholds are breached.
6. **Stress testing:** Gen AI can enhance stress testing frameworks by creating more sophisticated economic scenarios and modelling how banks would respond to various shocks, thus improving the reliability of these exercises.
7. **Sentiment analysis:** By analysing news articles, social media and market reports, gen AI can help supervisors gauge the sentiment and perception of financial institutions, which can serve as an additional indicator of stability or risk.
8. **Regulatory compliance monitoring:** Gen AI can assist in monitoring compliance with regulations by analysing transaction data, enabling proactive identification of non-compliance issues. Moreover, gen AI could be used to enhance compliance monitoring by automatically checking internal guidelines against sanctions lists, regulatory requirements and legal frameworks. Additionally, gen AI could be deployed to analyse transaction-level data and related textual content to identify suspicious patterns and potential illicit activities (Araujo et al (2024)).
9. **Training and education:** Gen AI can be used to create training simulations and educational content for bank supervisors, helping them stay up to date on best practices, emerging risks and regulatory changes.
10. **Scenario analysis:** By generating various hypothetical scenarios, gen AI can help supervisors test the resilience of banks against a range of economic conditions and events, aiding future-proofing efforts.
11. **Climate risk:** Climate change has severe implications for central banks and financial authorities (Ramanathan et al (2024)). However, gen AI offers powerful tools for analysing and visualising climate risk. For example, multi-modal foundation models could be used to process large data sets, including satellite data, to assess climate-related financial risks and inform the

development of climate-focused suptech tools, such as digital twins (Hoffmann et al (2025)).

By adopting gen AI in these ways, central banks can enhance their supervisory capabilities and knowledge, making the oversight of banking institutions more responsive to rapid changes in the financial landscape. While the potential of gen AI in suptech is significant, it is crucial to acknowledge the inherent challenges and risks. Ensuring the accuracy, reliability and explainability of AI-driven systems, addressing potential biases and navigating the ethical implications of AI use in financial supervision are all critical considerations. Further joint research and development, coupled with robust governance frameworks, will be essential to harness the power of gen AI while mitigating potential risks. By collaborating with international partners and tapping into global knowledge networks, central banks and supervisors can accelerate their gen AI learning and adoption while ensuring these solutions have incorporated best practices to mitigate risks.

5. References

Araujo, D, G Bruno, J Marcucci, R Schmidt and B Tissot (2023): "Machine learning applications in central banking", *Journal of AI, Robotics & Workplace Automation*, vol 2, no 3, pp 271–93.

Araujo, D, S Doerr, L Gambacorta and B Tissot (2024): "Artificial intelligence in central banking", *BIS Bulletin*, no 84, January.

Ashley, J and J Papenbrock (2023): "Modern computing platforms as key technology for central banks, financial supervisors, and regulators", *IFC Bulletin*, no 59, October.

Avramovic, P (2023): "Digital transformation of financial regulators and the emergence of supervisory technologies (suptech): a case study of the UK Financial Conduct Authority", *Harvard Data Science Review*, no 5.2, spring.

Bank for International Settlements (BIS) (2022): *Project Ellipse: an integrated regulatory data and analytics platform*, March, www.bis.org/publ/othp48.pdf.

——— (2023): "Ellipse and DKP Collaboration Community: terms of reference", 31 May, www.bis.org/pdf/EDKP_License_Agreement.pdf.

——— (2024): *Annual Economic Report*, June. www.bis.org/publ/arpdf/ar2024e.pdf.

Crisanto, J C, C B Leuterio, J Prenio and J Yong (2024): "Regulating AI in the financial sector: recent developments and main challenges", *FSI Insights*, no 63, December.

Duijm, P and I van Lelyveld (2025): "Data science for central banks and supervisors: how to make it work, actually", *Harvard Data Science Review*, no 7.1, winter.

El Dimachki, M (2024): *Fintech regulation in practice: navigate the complexities and opportunities of regulation*, Kogan Page.

Hoffmann, P, M El Dimachki, K Gay, L Grisey and Z Bossert (2025): "Introducing the work program of the BIS Innovation Hub Singapore Centre on green finance and climate risk data", *IFC Bulletin*, forthcoming.

Monetary Authority of Singapore (MAS) (2018): "MAS introduces new FEAT Principles to promote responsible use of AI and data analytics", press release, 12 November, www.mas.gov.sg/news/media-releases/2018/mas-introduces-new-feat-principles-to-promote-responsible-use-of-ai-and-data-analytics.

——— (2019): "MAS partners financial industry to create framework for responsible use of AI", press release, 13 November, www.mas.gov.sg/news/media-releases/2019/mas-partners-financial-industry-to-create-framework-for-responsible-use-of-ai.

Ramanathan, S, P Hoffmann, K Gay and H Lee (2024): "Project Viridis: a blueprint for managing climate-related financial risk", *OMFIF SPI Journal*, Q3.



BIS Innovation
Hub



Monetary Authority of Singapore

GenAI in Action: Transforming Data Use in SupTech

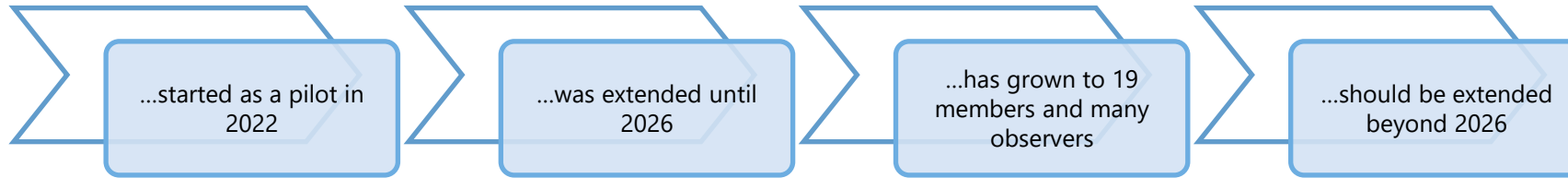
Dr Patrick Hoffmann, Maha El Dimachki, Kenneth Gay, Sivasubramanian Ramanathan, Harry Lee
February 2025

EDKP CC: Innovation through collaboration

- Supervisory activities heavily rely on data, but this data is often template-based and outdated.
- Therefore, central banks and regulatory authorities are increasingly turning to **Generative Artificial Intelligence (GenAI)** to address these challenges.
- The EDKP Collaboration Community, facilitated by the **BISIH Singapore Centre** and the **Monetary Authority of Singapore**, offers a unique way to jointly experiment with new technologies, for instance through knowledge-sharing and pooling of expertise.



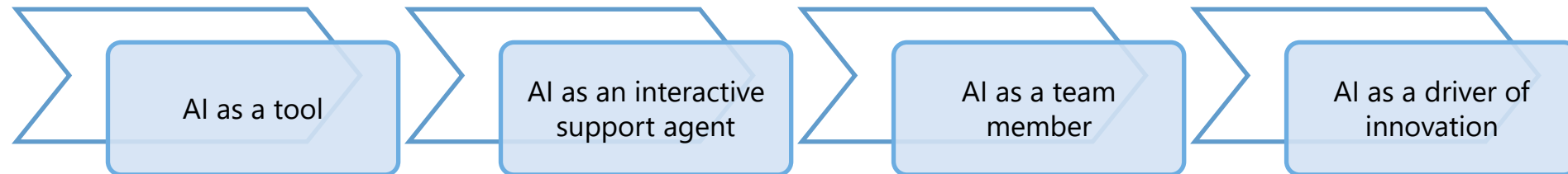
Introducing the EKPD Collaboration Community



Currently, most central banks use AI...

- ... as an innovation tool, or
- ... as an interactive support agent.

The role of AI in central banking will develop over time with increasing capabilities of AI.



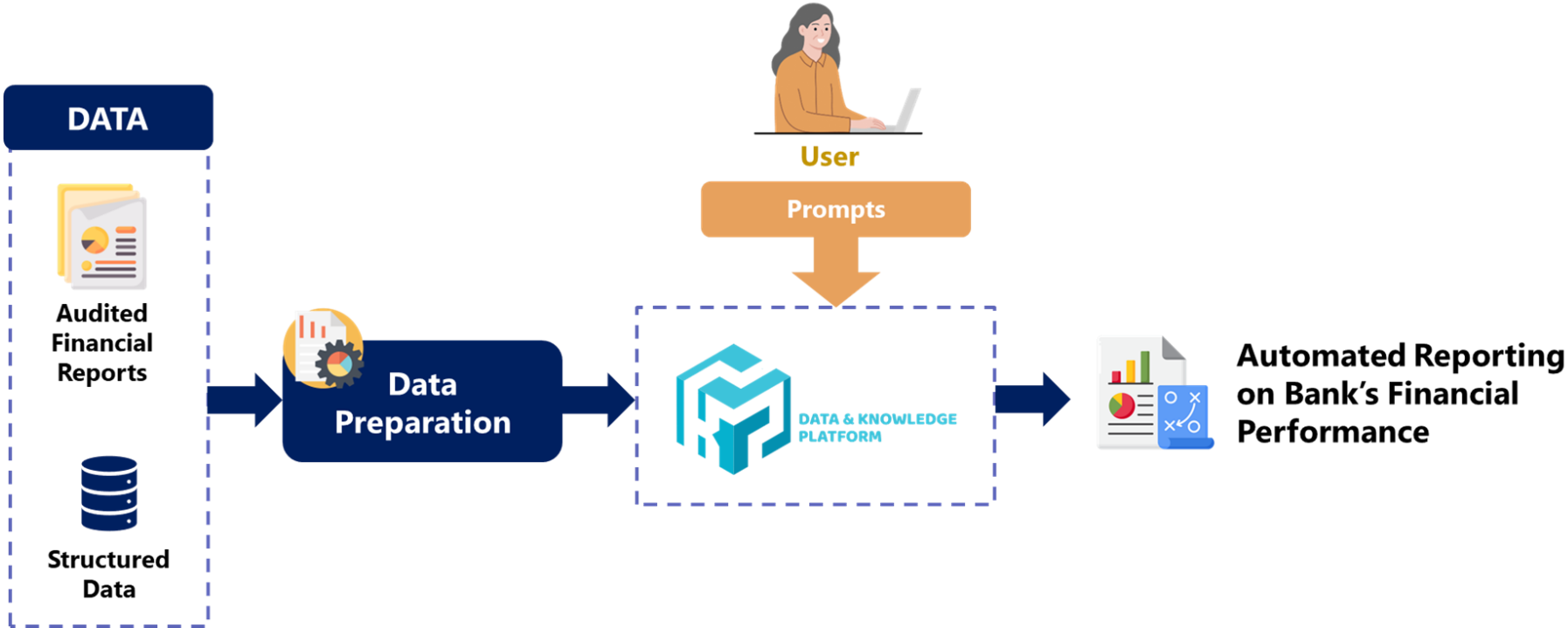
In June 2024, the EDKP CC met for a hackathon in Singapore...

- ... Round about 50 people participated in cross-institutional teams to work on six use cases, four of them on GenAI.



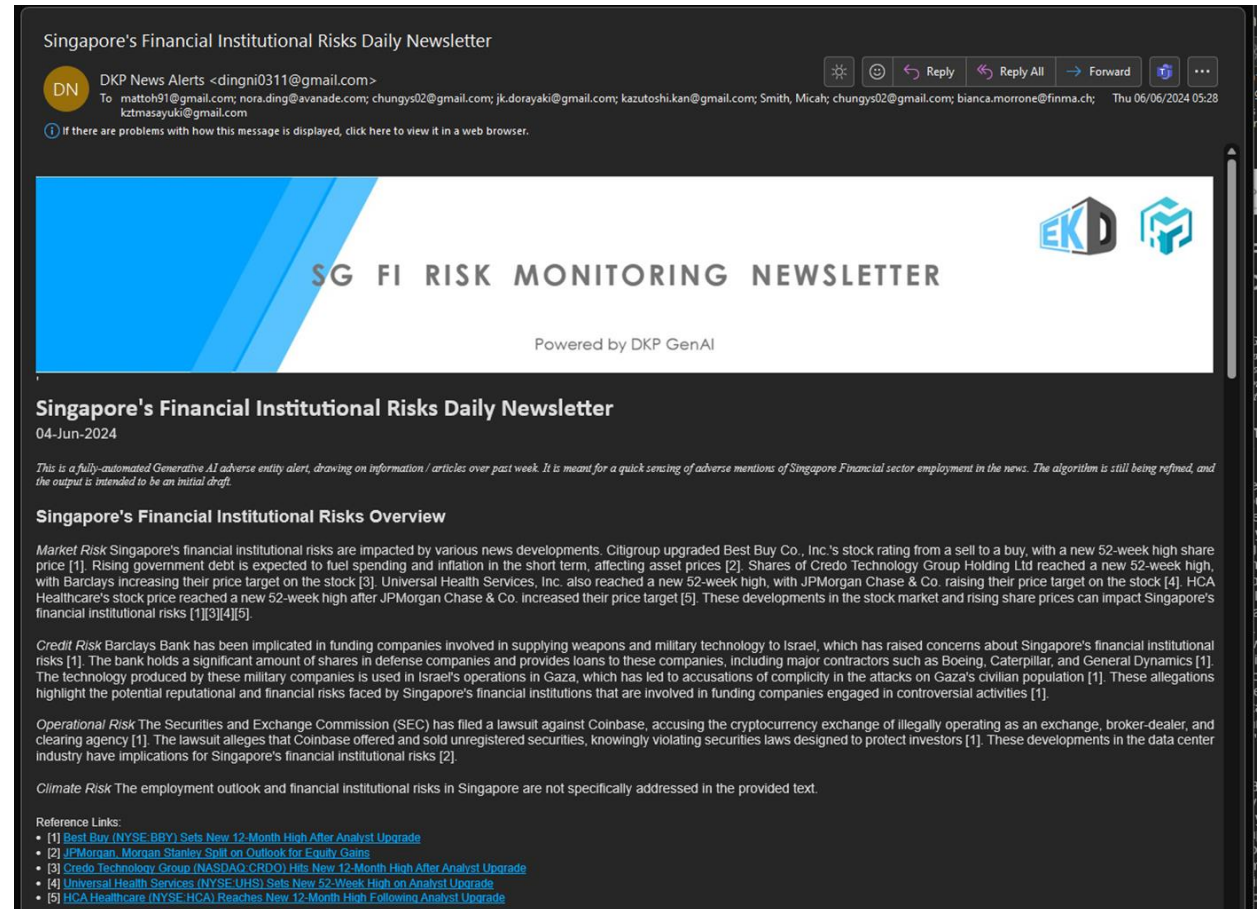
EDKP CC Hackathon - GenAI use case 1

- **AI-Powered Regulatory Insight:** Team 1 explored the application of GenAI in summarizing and analyzing regulatory reports and disclosures. The team aimed to develop a system capable of extracting insights regarding a bank's financial condition and generating automated reports that summarize financial statement assessments.



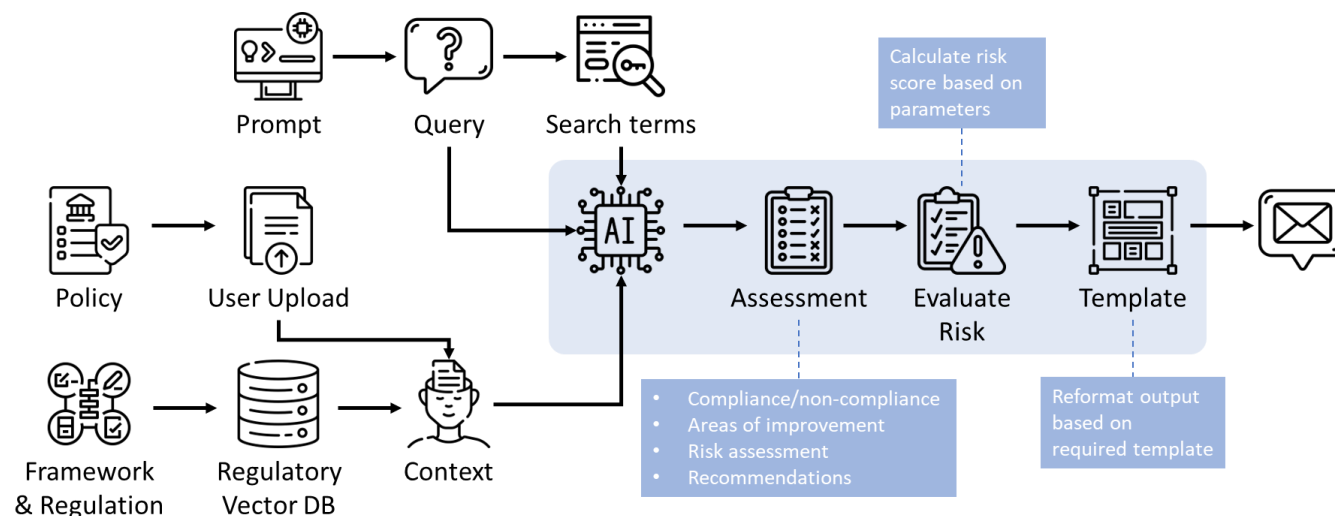
EDKP CC Hackathon - GenAI use case 2

- **AI-Driven Financial Newsletters:**
Team 2 investigated the potential of GenAI in scanning information feed for information of interest. The team focused on developing a system that automatically generates and distributes newsletters containing only articles that covered topics of interests (e.g. credit risks), thereby reducing manual effort and mitigating information overload for recipients.



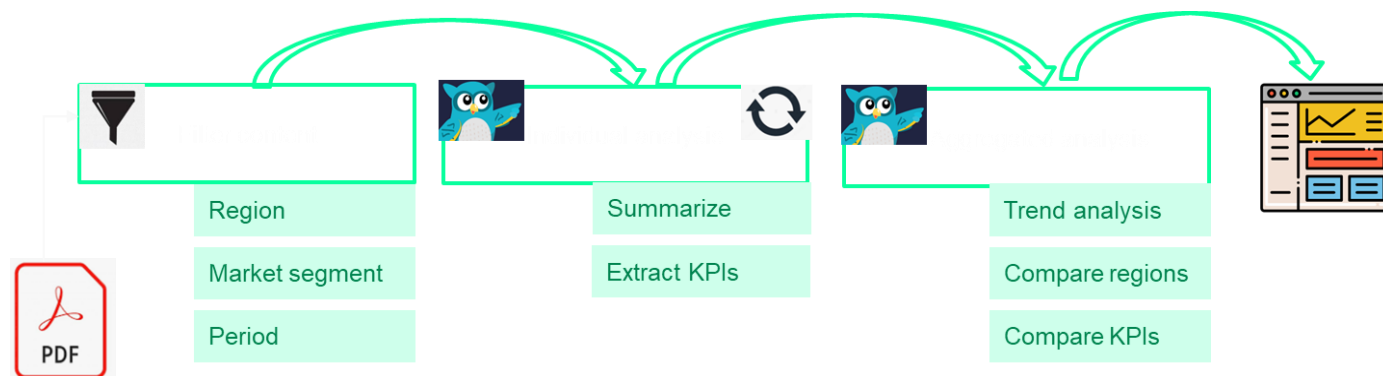
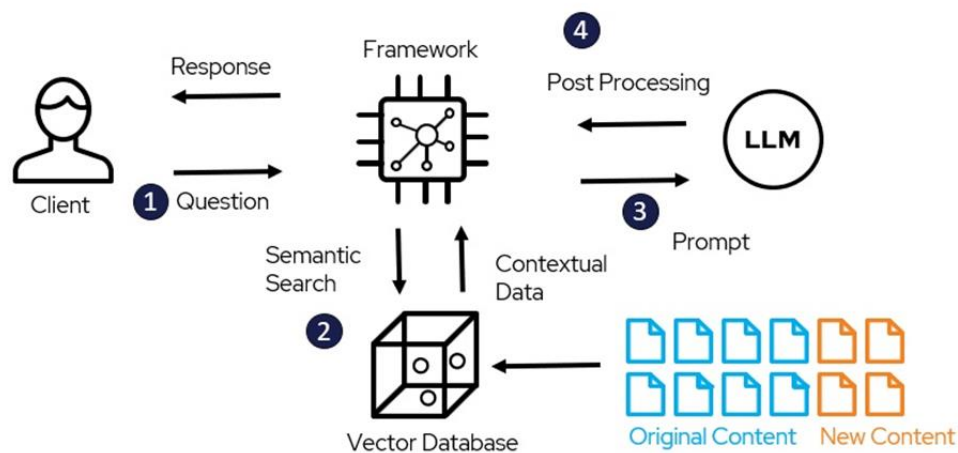
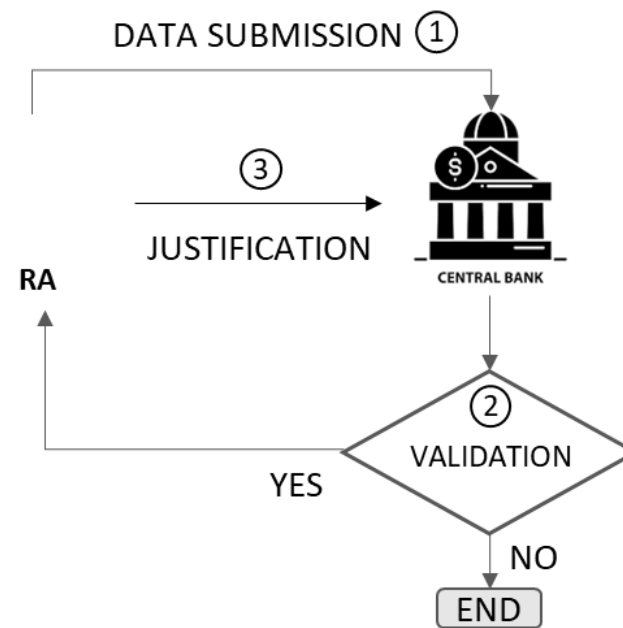
EDKP CC Hackathon - GenAI use case 3

- **Navigating Supervisory Frameworks with AI:** Team 3 developed the "Artificial Intelligence Hybrid Analysis Supervision" (AIHAS) system. This system functions as an intelligent assistant for bank supervisors, leveraging supervisory and regulatory data to provide rapid responses to queries and generate comprehensive assessments. AIHAS also aims to automate the evaluation of bank documents for compliance with relevant policies and regulations, identifying potential risks associated with banking operations, and enhancing productivity by automating repetitive tasks.



EDKP CC Hackathon - GenAI use case 4

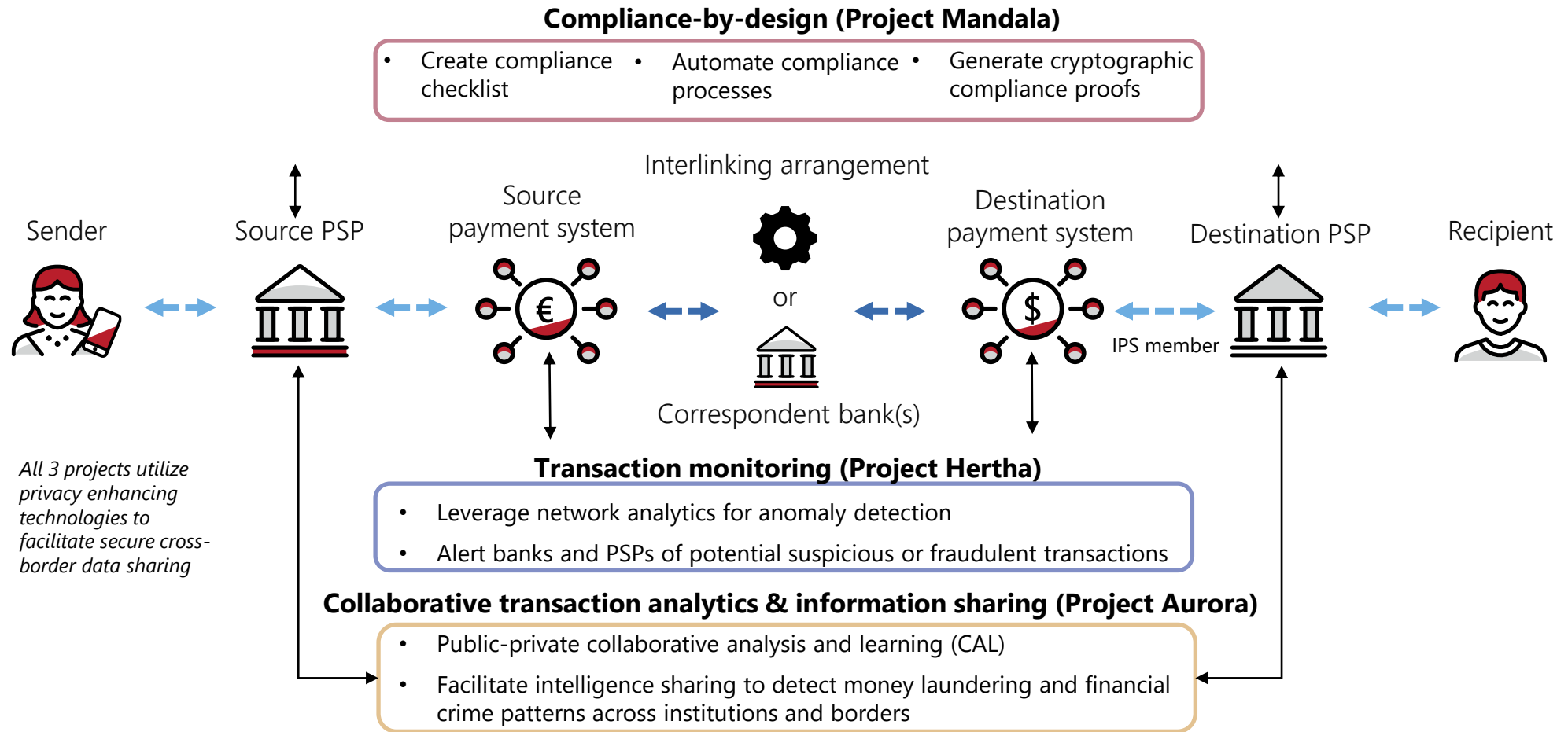
- **Enhancing Supervisory Reporting:** Team 4 focused on several aspects of supervisory reporting, including the development of systems for question answering, retrieval and summarization of official documents, and automation and scaling of text similarity assessments in regulatory reporting to streamline compliance analysis. Additionally, the team explored the application of AI in conducting market analysis of commercial real estate reports.



EDKP CC Hackathon - Lessons learned

- **A common theme emerges from these diverse use cases:** the need to efficiently and accurately extract meaningful insights from large volumes of data.
- Whether it is analyzing financial reports, identifying information of interest, or automating compliance checks, the ability to process and understand data is paramount in financial supervision.
- The participating institutions, representing a global cross-section of regulatory bodies, are increasingly looking towards GenAI as a potential solution to this challenge.
- GenAI, with its capacity to analyze unstructured data, and generate human-like text, holds promise for automating tasks, improving decision-making, and ultimately enhancing the effectiveness of financial supervision.

The path forward: Potential and challenges for GenAI in SupTech – Combating financial crime



The path forward: Potential and challenges for GenAI in SupTech – Analyzing and visualizing climate risk



- Supervisors face challenges accessing and analyzing unstructured, underutilized environmental data impacting financial institutions.
- **How AI Helps:**
 - Processes unstructured environmental data at scale
 - Identifies patterns and correlations in complex datasets
 - Generates initial risk assessments and automated reports
 - Provides actionable insights as a foundation for deeper analysis
- **BISIH's Goal:**

Develop a Digital Twin MVP that leverages AI to enable supervisors to interactively assess physical climate risks using the most up-to-date data, enhancing decision-making.



BIS Innovation
Hub



Monetary Authority of Singapore

Thank you very much for your attention.
Any questions?

Dr Patrick Hoffmann, Maha El Dimachki, Kenneth Gay, Sivasubramanian Ramanathan, Harry Lee
February 2025

References

- Alonso-Robisco, A., Marques, J. M. (2024). Finding the balance with technology. OMFIF SPI Journal.
- Araujo, D., Doerr, S., Gambacorta, L., Tissot, B. (2024). Artificial intelligence in central banking. BIS Bulletin (84).
- Ashley, J., Papenbrock, J. (2023). Modern computing platforms as key technology for central banks, financial supervisors, and regulators. IFC Bulletin (59).
- Bank for International Settlements (BIS) (2022): Project Ellipse: An integrated regulatory data and analytics platform. www.bis.org/publ/othp48.pdf.
- Bank for International Settlements (BIS) (2023): Ellipse and DKP collaboration community – Terms of reference. www.bis.org/pdf/EDKP_License_Agreement.pdf.
- Bank for International Settlements (BIS) (2024): Annual economic report. <https://www.bis.org/publ/arpdf/ar2024e.pdf>
- El Dimachki, M. (2024). Fintech regulation in practice: Navigate the complexities and opportunities of regulation. Kogan Page.
- Hoffmann, P.; El Dimachki, M.; Gay, K.; Grisey, L.; Bossert, Z. (forthcoming). Introducing the work program of the BIS Innovation Hub Singapore Centre on green finance and climate risk data. IFC Bulletin.
- Ramanathan, S., Hoffmann, P., Gay, K., Lee, H. (2024). Project Viridis: A blueprint for managing climate-related financial risk. OMFIF SPI Journal.