SUOMEN PANKKI
EUROJÄRJESTELMÄ
FINLANDS BANK
EUROSYSTEMET

Bank of Finland Data Balance Sheet 2021

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Knowledge-based management is possible if information management is of a high standard

Olli Rehn
Governor

In 2020, we updated the Bank of Finland's strategy. The Bank's mission is both timeless and in tune with contemporary demands: to foster a sustainable economy and stability, now and in the future. Our objective is to maintain price and financial stability in all circumstances with the aim of promoting citizens' wellbeing.

Our strategy also seeks to respond to the major changes currently ongoing in society, such as population ageing, all-embracing digitalisation and the strong accumulation of debt.

As one of our strategic priorities we have selected knowledge-based management. By knowledge-based management we mean that we root our decision-making in high-quality, up-to-date information. This may seem to be an easy, straightforward objective, but in practice it means that the fundamental requirements for knowledge-based management must be properly in place in order for them to support decision-making.

These requirements can be divided roughly into four. Firstly, we must create an organisational culture that supports and facilitates a culture of knowledge-based management that is both open and systematic. Secondly, drawing benefit from data and information requires the skills and capacity of the staff and the organisation to be at such a level that expertise can be translated into practice. The foundation is a strong competence in each area of substance, a good knowledge base and skills in using the relevant tools. Thirdly, the tools and technology must support and facilitate the exploitation of knowledge and its use in the management process. Fourthly, the data and information must be of good quality and such that it can be easily put to use. It is clear that the digitalisation of work and operations as well as growth in the volume of data will call for ever better planning of information management.

Photo: Jussi Nukari, Lehtikuva

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Consequent to the Act on Information Management in Public Administration, which entered into force in 2020, an extensive development programme was launched regarding information management at the Bank of Finland. The programme's purpose was not only to implement the requirements of the Act, but also to engage in development work in a manner that would most benefit the organisation. We had previously already launched a data and analytics development programme for developing a data platform and other aspects of information management necessary for this.

Controlled access to information is possible by using shared information pools and clear management models, while taking into account the requirements of e.g. data protection, information security and other information processing responsibilities.

The Bank of Finland's first Data Balance Sheet is an example of our information management development work, where in this case we are providing details about our information management activities more extensively and openly to the general public.

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The Bank of Finland itself also functions as an information provider by gathering economic data on society. In the Governing Council of the European Central Bank, the Bank of Finland is responsible for providing specified statistics on Finland that relate to monetary financial institutions (MFIs), financial accounts and the balance of payments. The Bank of Finland itself produces European System of Central Banks (ESCB) statistics on MFIs, investment funds, securities and payment traffic. Statistics on the balance of payments and financial accounts are produced by Statistics Finland.

This statistical output is guided by regulations and instructions regarding the content and quality of ESCB statistics. The ESCB's statistical data published via the Bank of Finland's online services can be freely used by outside entities in their own analyses. Access to the data is being expanded via an open data portal. You can acquaint yourself with our extensive statistical output on our website at www.suomenpankki.fi/en/Statistics/.
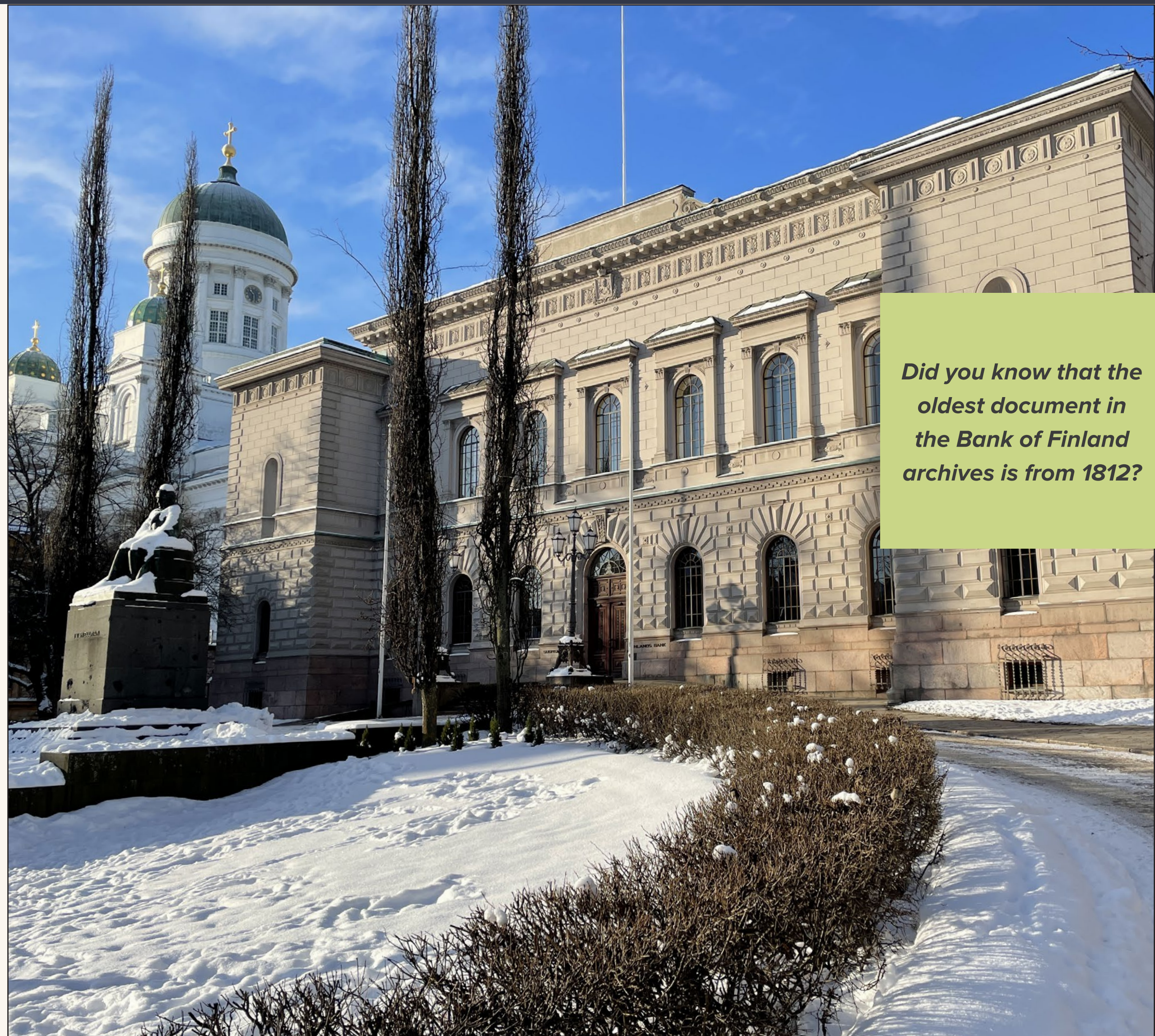
Did you know that the oldest document in the Bank of Finland archives is from 1812?

Photo: Bank of Finland.

Central banking relies on data, information and knowledge

Tuomas Välimäki
Member of the Board of the Bank of Finland

How important is data to the work of a central bank?

Monetary policy and financial stability are at the very heart of a central bank's work, and these rely very much on data, the information derived from it and the knowledge interpreted from that information.

We need data to start with, for example on the prices of individual products. We then process this data to give us the information we need, such as the rate of price increases, i.e. inflation, which is one of the most important variables in monetary policy. By further examining this information and judging it against previous experiences, we can build our knowledge and then put it to use, for instance to make forecasts.

In a world of uncertainties the importance of data, information and knowledge is accentuated. When we base our actions and decisions on knowledge, we can be confident that they reflect the information available at the time of decision-making.

What challenges do you see in information management in the next few years?

The amount of data has always been almost limitless, but the digital transformation has brought greater efficiency to data handling in recent years. The collection and processing of data no longer take an excessive amount of time or require an overwhelming level of financial resources.

Nevertheless, in the midst of a trillion trees, it's almost impossible

to see the whole forest. This can be done, though, if you rise to cloud level. With digitalisation, giant leaps have been made in data analytics, too, and we may soon witness even a quantum leap. If we wish to have the most effective of tools, then in practice this will call for a widespread shift to cloud services. This will be challenging for organisations which are used to operating their own data centres and regarding this as vital to information security.

Continuing with the forest analogy, when you eye the trees from above, this also reveals the state of the forests, allowing those in their natural state to be distinguished from commercial forests. Diversity of course has its place, but when it comes to data, we have to aim for a well-managed, clearly distinguishable commercial forest where the trees we need are easy to find and use. Such forests do not simply appear by themselves but require considerable management.

The greatest near-term challenges in information management at the Bank of Finland lie in the need to acquire new expertise, to change attitudes, and to ensure information security and continuity of operations in a situation where we are increasingly reliant on external service providers.

How much attention is the Bank of Finland giving to developing information management in the coming years?

Knowledge-based management is one of the strategic priorities we have highlighted for the Bank of Finland for the immediate years ahead. The idea of this is to boost our ability to produce ready-to-use

Photo: Karoliina Vuorenmäki.

information and make it easier to put such information to beneficial use in everyday management as well as in our analytical work.

We aim to do this by, for instance, improving our up-to-the-minute awareness of the Bank's current data resources and of the needs associated with these. We also need to improve our data analytics capacity. With this in mind, we are creating a new kind of data and analytics platform that supports good information management practice and offers data products and analytics tools to users.

Information management will increasingly be part of our everyday work, and the responsibility for this is not something that can be 'contracted out' to just a single part of the Bank. Indeed, we must all make sure our expertise is up-to-date and that there is broad collaboration in this field as in others.

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Data Balance Sheet brings together key elements of information management and information security

The Bank of Finland's first Data Balance Sheet. Its purpose is to highlight the importance of data – plus the information derived from it and the knowledge interpreted from that information – to the work of the central bank. The Data Balance Sheet brings together details of the development work undertaken in information management within the Bank during 2021 and focuses on various aspects of information security and data protection. It also presents interesting facts and figures concerning central bank functions, information management and analytical work. The Data Balance Sheet will be published after the publication of the Bank of Finland's Annual Report. It serves to complement the Annual Report from an information management perspective.

The Act on Information Management in Public Administration, which entered into force at the start of 2020, obligates information management entities to organise sufficient supervision of compliance with the legislation, regulations and guidelines on information management. The Data Balance Sheet will serve in future as a key component of the Bank of Finland's reporting on information management. It presents more extensive information than before to stakeholders on the central bank's operating environment in regard to data and its use.

Composition of Data Balance Sheet

The Data Balance Sheet starts with a contents list, an introduction and articles from the Bank's senior management. It then deals with the following broad themes: a) analysis, development and data utilisation; b) information management, information resources and information flows; c) information security and data protection; and d) monitoring and key figures. The Data Balance Sheet also includes some interesting historical perspectives taken from the extensive archive material.

You may also wish to take a look at the statement on public access to documents and the privacy statements on the Bank of Finland website.

Today's data for tomorrow's uses

Creating value from data

Fredrik Löfman
Strategy Specialist

The Bank of Finland creates value from data for its own activities and its entire operating environment.
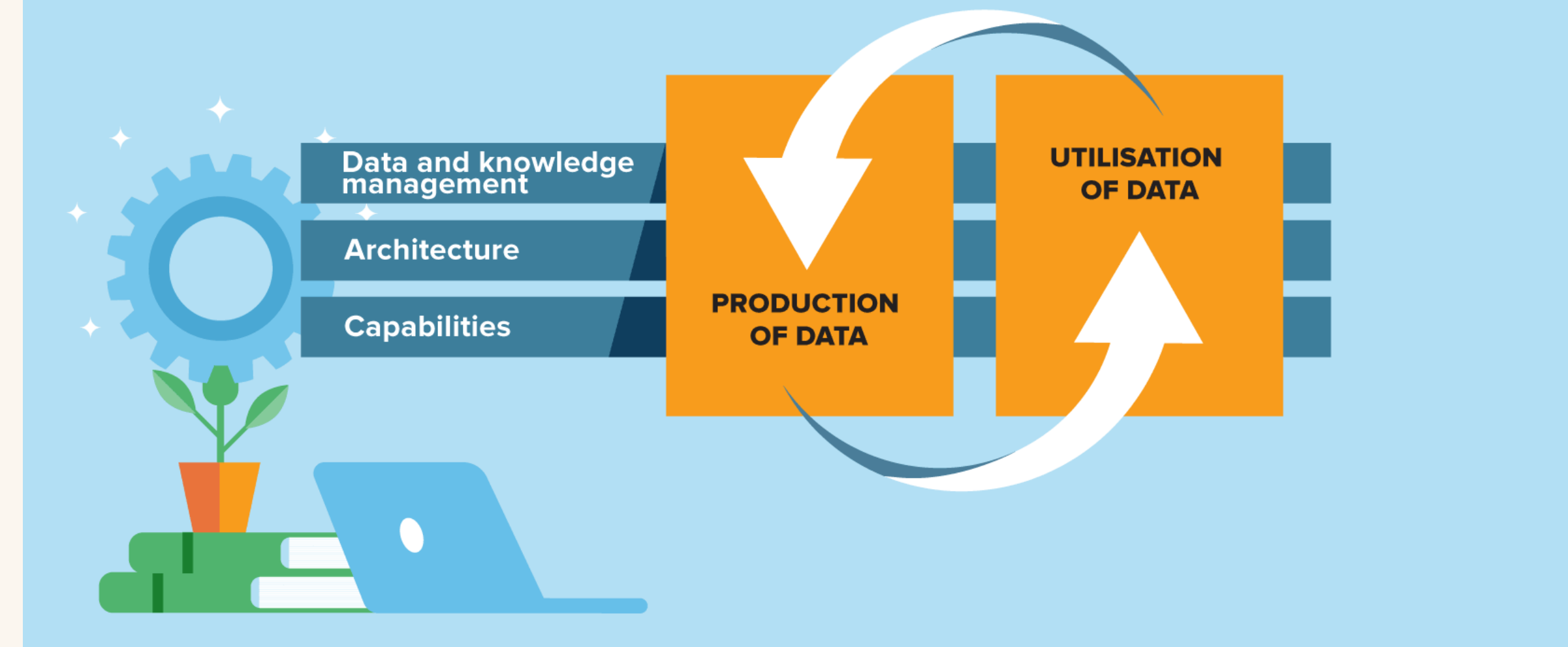
Data and knowledge management is an area of management aimed at increasing an organisation's ability to create value from data and expertise. It provides a favourable framework for the production and utilisation of data.

Data and knowledge management at the Bank of Finland is centred on the use of data to create value for the Bank's activities and for its entire operating environment. **Value creation is based on the production and utilisation of data, enabled by data and knowledge management.** Data itself is worthless if it is not utilised effectively.

The purpose of efficient data and knowledge management is to support decision-making, facilitate the utilisation of data and enable employees to gain a better experience from their work. Improved data will benefit the Bank of Finland, its stakeholders and society. Creation of value from data is possible when the Bank has at its disposal high-quality, fit-for-purpose and ready-to-use data in support of decision-making and operations.

The Bank of Finland is building a support structure for its data and knowledge management through the TARMO project, which was begun in late 2021. The project's purpose is to determine the current and target state of data and knowledge management at the Bank, and to create a data architecture, a data-related operating model and a plan for achieving the target state. The TARMO project is strongly linked to the development of knowledge capabilities and the provision of services needed for their development.

Source: Bank of Finland

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The Bank of Finland produces information for use in decision-making and for the country's needs in general

Jenni Hellström
Head of Communications

Transparency and dialogue: cornerstones of the Bank of Finland's communications

As set out in the Bank of Finland's revised strategy, its communications have a strong emphasis on transparency, stakeholder dialogue and promotion of financial literacy among the general public. The Bank's decisions and statements are always based on information and research. The information and analyses used in decision-making are made public and communicated as widely as possible.

The Bank of Finland draws up twice a year a forecast for the Finnish economy and once a year an assessment of financial stability. On its websites, the Bank also publishes analyses on issues concerning economics, monetary policy and the international economy.

We actively provide information on the activities of the Bank of Finland and the Eurosystem using channels such as the internet, social media, various events and webinars, and the Bank of Finland Museum.

COVID-19 pandemic increased the demand for economic data and information

For the credibility of central bank policy, it is essential that our various stakeholders have confidence in our activities. An understanding of central bank activities and adequate information help the public to assess decision-making.

The Bank of Finland measures the efficiency of its information provision and citizens' confidence in the Bank through surveys. The general public has a very good understanding of the Eurosystem, and 86% consider the euro as beneficial for Finland.

The Bank of Finland regularly measures how well its key publications' messages reach their audience and has set targets for the impact and influence of its publications. In 2021, readers were particularly interested in the economic effects of the COVID-19 pandemic and in the application of macroprudential instruments. On the whole, the pandemic has increased the need for information provided by public authorities, including economic and financial information, and the number of visitors on the Bank of Finland's websites remained high. Visitors were particularly interested in information on the Eurosystem's monetary policy operations, on financial market prices and on payments.

Reader-friendly texts and data visualisations make communications clearer

One of the Bank of Finland's guiding principles is to contribute to the public debate on key issues in Finland and internationally. Our staff members give presentations at various events on a wide array of topics. We regularly cooperate with higher education institutions in matters related to teaching of economics and financial market issues. We also actively engage with stakeholders across Finland, and during the pandemic we have conducted this work with the aid of webinars.

Social media provide an effective channel for dialogue on topical economic issues. The Bank of Finland encourages its staff to use these channels, and in 2021 approximately 23% of our staff used social media in their work. The Bank of

Finland's social media channels gained over 3,000 new followers in 2021. The Bank posted a total of 1,900 times on social media, reaching almost 2.5 million users. Dialogue helps us to assess the success of our communications and to adjust its focus.

The comprehensibility of communications was further improved in 2021. With the European Central Bank's new monetary policy strategy, Europeans are provided with key information on monetary policy decisions in a more easily readable format.

In line with its communication objectives, the Bank of Finland prepared an accessible summary in all its main publications. On average, a blog written by one of the Bank's experts was posted at least once a week in 2021. The Bank further increased its visual representations of information and used infographics to illustrate the economic impacts of the pandemic, in particular. The easily readable content was often accessed directly from social media sites.

Promotion of citizens' financial literacy is an important part of the Bank of Finland's sustainability programme. The Bank of Finland Museum serves as the Bank's Financial Literacy Centre, opening doors to the world of money and central banking for young people and everyone interested. In 2021, the Bank of Finland Museum was revamped to better serve citizen's needs in issues related to personal financial management.

Figures:

- The Bank of Finland had almost 2 million website visitors in 2021.
- The engagement rate for social media publications was 1.9% (up 0.7% from 2020).
- 23% of the Bank's staff members communicate about their work on social media.
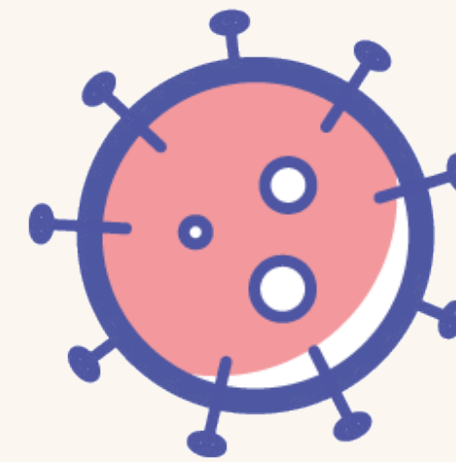
Pandemic causes exceptional turbulence in inflation
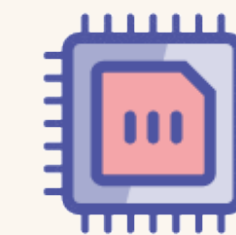
REOPENING OF THE ECONOMY speeds up inflation temporarily...

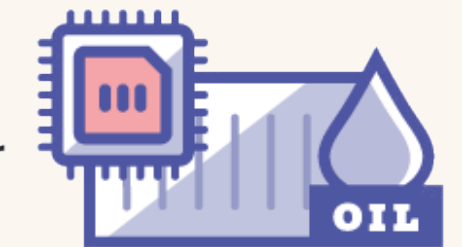- Rising prices of energy and raw materials
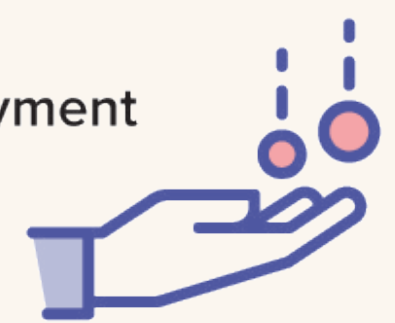- Logistical bottlenecks
- Supply problems

...BUT inflation is forecast to slow in 2022 to below 2%

- Temporary factors no longer influencing
- Lower employment
- Weaker development of wages and salaries
- Moderate inflation expectations

Source: Bank of Finland

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Data and analytics in support of payment system policy, when assessing the impact of the shift to instant payments

Kasperi Korpinen
Senior Economist
Matti Hellqvist
Adviser

One task of central bank oversight is to promote the development of more secure and efficient payment systems. Instant payments have recently been a major theme in this field. In Europe, systems have been put in place in which money is transferred between banks from one account to another in seconds and there is no longer any need to wait until the next banking day for the funds to arrive. Instant payments have been found to be beneficial for society, as noted in the work of the Finnish Payments Council, for example, and their widespread introduction is included in the objectives of both the Eurosystem and the European Commission. It is therefore also worth examining whether there are any barriers to their introduction.

During 2021, the Bank of Finland studied the impact of the shift to instant payments on the amount of funds that banks must have available in central bank accounts in order to enable the large-scale execution of instant payments made by end customers. Traditionally, retail payments have been processed in batch runs, where a large number of individual payments sent within a certain period of time are executed together. In this way, execution of the payments only requires each bank to have funds equal to the difference between outgoing and incoming payments. Naturally, if the value of incoming payments is higher than outgoing payments for a bank, then the bank does not need any money at all in that batch run. In the case of instant payments, the payer's bank must have the full amount of

the payment available for each outgoing payment separately. Of course, funds brought in by incoming payments can be used immediately, but outgoing payment orders coming from customers must also be executed immediately, so there is no possibility to influence the sequence in which payments are made. In the case of instant payments, the need for money is also inevitably always at least equal to or greater than in batch runs – but how much greater? And is this increase in the money required a barrier to the widespread use of instant payments?

To answer the question, transaction level data for Finnish retail payments were required. The Bank of Finland does not have such precise data; the only data available were monthly statistics – numbers, values and value distribution – on the retail payments sent and received by different banks in batch runs. The solution was to generate transaction data with characteristics matching the availbale statistical aggregates. By generating data on notional, but potential, payment flows corresponding to thousands of days of payment transactions, the money, i.e. liquidity, required by banks in different situations could be calculated.

Based on the results obtained, it appears that the shift to instant payments will ultimately increase rather modestly the total amount of money that the banks together will need to have available to process the payments. The increase will be unevenly distributed, however, and some banks may require significantly

Kuva: Gerd Altmann, Pixabay.

more money than before relative to the value of the payments they transmit. This is particularly true if the total values of outgoing and incoming payments at a bank have been close to each other in batch runs, i.e. the net need for liquidity has been small. For the increase in liquidity needs, the study developed a forecast model with which the probable scale of the need for additional money can be assessed at the level of an individual bank. Payment and settlement system simulator software (BoF-PSS) developed by the Bank of Finland was also used in the analysis. The software enabled analysis of the impact that the number of daily batch runs have on the need for liquidity. The simulations showed that most of the netting benefits are already lost with a fairly low amount of daily batch runs.

We know from everyday life that no matter how fat your wallet is, you are still in a predicament at the payment point in a shop if you happen to have left the wallet at home. In payment systems, this same phenomenon applies to banks, particularly in instant payment systems, where a need for liquidity may arise unexpectedly. If a bank does not have sufficient funds available in the right place, this might become rapidly evident externally, even if the bank is otherwise fully solvent and in good shape. Visible

delays in payments caused by the bank may raise doubts and harm the reputation of the bank. The widespread use of instant payments will therefore mean that more money is likely to be committed to the transmission of payments. Even if an instant payment system itself would not require significantly higher funds, the buffers required for contingencies and to manage liquidity risk will be higher with instant payments.

The study outlined in this text is presented in more detail in the Bank of Finland's Economics Review series, publication 7/2021. Although the analysis has been carried out on the basis of statistics describing the Finnish market, some of its results are equally suitable for assessing the effects of similar situations elsewhere.

Robot economist filters mass of data for overall picture of the economy

Annika Lindblad
Economist

Monitoring the economy is an intrinsic part of the work of many economists. A huge volume of statistics is regularly collected about the economy, and economists use this to assess the current state of the economy and attempt to forecast its future path. Monitoring and continuously analysing a large volume of statistics is a time-consuming task, but this can be automated nowadays. An example of such automation is the nowcasting model introduced by the Bank of Finland in 2017, more commonly known as the robot economist, which collects information from numerous different sources and endeavours to filter from the mass of data an overall picture of the economy.

In practice, the model summarises the information obtained from monthly and quarterly indicators and produces a forecast of Finnish GDP growth for the previous, current and following quarters. As it takes time to compile statistics — in Finland, for example, GDP figures are published around two months after the end of each quarter — it is also important to assess the current state of the economy on the basis of rapidly updating indicators.

The robot economist is based on a Bayesian Vector Autoregressive (BVAR) model, which is a time series model estimated using Bayesian methods. The model is highly suitable for processing a large and constantly updating mass of data. The robot economist uses more than 40 statistical publications to update the model, which is always updated when new data become available. Many statistics fluctuate according to business cycles, but not necessarily at the same time or to the same extent. The advantage of a large set of variables is that the random variability of individual statistical publications is dampened and this allows us to examine the aggregate variability of the set of variables, which tells us about the state of the economy as a whole. The different series of statistics used describe both the Finnish economy and the wider economy outside Finland, as the situation in the global economy also affects Finland's economic growth. The model's data input consists of broadly five different categories: demand components of the national accounts, confidence indicators, labour market figures, price indices and sector-specific volume and sales revenue indicators.

Updates of the robot economist's forecasts will show how new data affect the model's output. It is typical of nowcasts that they are revised as the amount of data available for the quarter increases. In the nowcasting model, this revision of the current picture is monitored in real time. The model can also be used for news analysis, i.e. to assess how relevant particular sets of data are. Only data that is surprisingly positive or negative will change the previous forecast of the model.

Statistical information comes to the robot from several different sources, such as Statistics Finland and the European Commission, but what they have in common is that all the data are updated in the Bank of Finland's time series database. The statistics are then seasonally adjusted if necessary. Next, the robot economist, operating to a schedule, updates the forecast model with these new statistical data. After completing the analysis, the robot automatically publishes its forecast in a Power BI Report and tweets the outcome on its own Twitter account.

In 2021, the robot economist continued to analyse data and has helped economists assess the pace of recovery of the Finnish economy from the COVID-19 pandemic. The robot economist had around 2,200 followers on Twitter in 2021, and it tweets around 10 times a month, i.e. more than 100 times a year!

More detailed information about the robot economist and its forecasts can be found at www.suomenpankki.fi/en/research/forecasting-models/.

New information on non-bank lending

Antti Alakiuttu
Risk Specialist

An increasingly large share of funding obtained by households and non-financial corporations comes from outside the banking sector. As a result of digitalisation, the number of different companies providing consumer credit and corporate finance services in Finland has increased. This has raised concerns about the accumulation of debt among households and non-financial corporations.

Until spring 2021, statistical data on non-bank financial intermediation and the role of different operators was limited. Since part of household and corporate funding had fallen outside the scope of regular statistics, the Bank of Finland began to collect data on companies providing household and corporate finance outside the credit institutions sector.

The new data collection has provided a better understanding of household and corporate indebtedness. It has also enabled a greater insight into the evolution of funding channels and the macroeconomic and social impacts of this transition.

The Bank of Finland's data collection on other financial institutions (MURA data collection) was launched at the beginning of 2021, when 58 companies reported their balance sheet data for the end of 2020. The data collection covers a diverse group of institutions and operators providing household and corporate finance, ranging from government-owned export credit companies to pawnshops. Data from the largest institutions concerning their loans to households and non-financial corporations and the related interest rates is collected on a quarterly basis. Data from smaller operators is gathered on an annual basis.

The new data collection has provided a more comprehensive picture of consumer credit developments and of SMEs' access to and need for funding. The aggregate balance sheet of the other financial institutions sector is about EUR 35 billion, of which EUR 25 billion consists of loans granted. EUR 13 billion of the loans are granted to

non-financial corporations and EUR 5 billion to households. Of the loans granted to households, EUR 4 billion is vehicle financing. The rest of the loan receivables consist of intra-group finance.

The statistics on other financial institutions serve internal and external decision-makers and stakeholders as well as the information needs of the general public. The Bank of Finland uses the data to analyse financial stability and to monitor and analyse the structure of financial intermediation and extent of digitalisation within it. The data can also be used to assess, for example, the adequacy and accessibility of funding and the growth of indebtedness in Finland. Furthermore, the data provides a clearer view of the Finnish economy in the context of the financial accounts and balance of payments figures compiled by Statistics Finland.

Non-bank lending

Source: Bank of Finland

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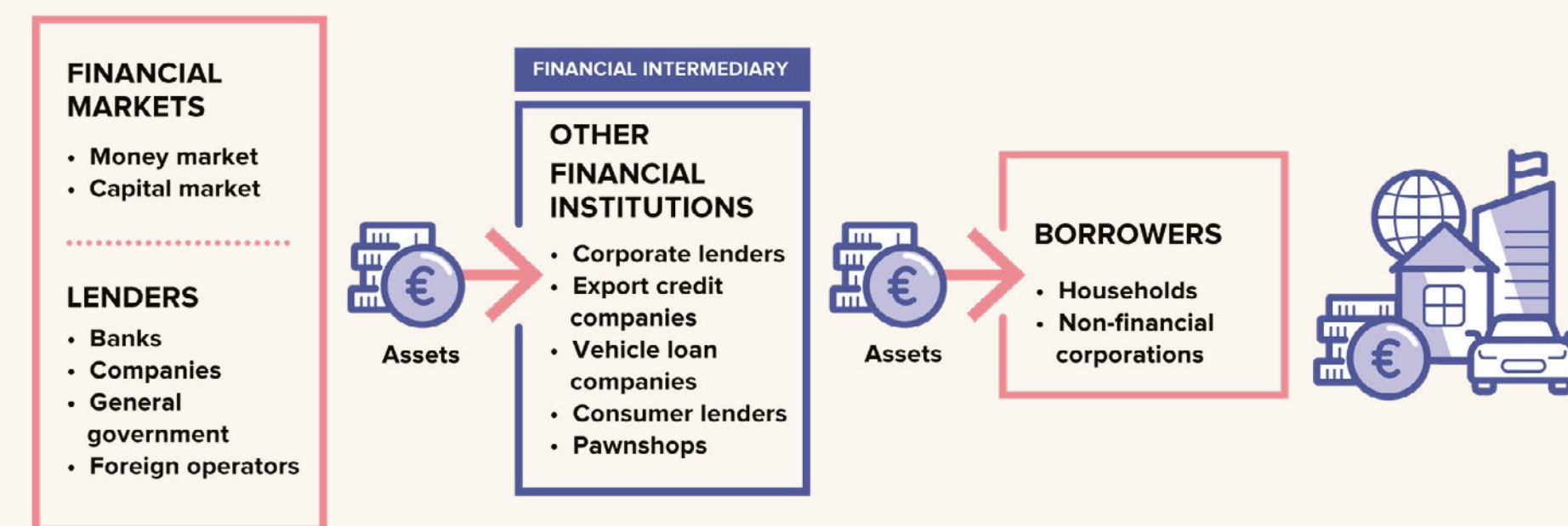
Data for analysing monetary policy counterparties and collateral

Marjaana Hohti
Head of Division
Nea Karenius
Financial Economist

The Bank of Finland implements the ECB's monetary policy by ensuring that credit supplied to financially sound banks is granted against collateral that fulfils the Eurosystem's uniform eligibility criteria. The collateral may be, for example, government bonds, corporate bonds, covered bonds or bank loans granted to companies. The central bank monitors on an ongoing basis the eligibility and financial position of the counterparty banks as well as the quality of the collateral and the risks related to the collateral.

The monitoring of banks and collateral requires large volumes of data from various sources, and the data also needs to be combined, analysed and reported. High-quality, well-organised data is needed for the tasks related to the implementation of Eurosystem monetary policy and for the participation of Bank of Finland experts in monetary policy preparation. Counterparty-specific data on credit and collateral can be obtained from various IT systems, the most important of which is the Bank of Finland's collateral management system. National central banks (incl. the Bank of Finland) and the European Central Bank exchange information required for the implementation of monetary policy.

The Bank of Finland's Market Operations department has in recent years been developing the department's data warehouse, which contains data used in the monitoring of banks and collateral, risk management and related analyses. The data warehouse includes data from several Bank of Finland systems. Data from various external data sources is also transferred to the warehouse via the Bank of Finland's internal systems. The data includes issuance data provided by the Finnish central securities depository and data from the Business Register maintained by Statistics Finland, as well as data obtained from banks via regular credit data collection. The data warehouse has been developed actively in recent years to ensure that data is of a more uniform quality and easier to combine, find and use. The range of data transferred to the data warehouse will also be expanded to include other bank-specific data.

Due to the confidentiality of bank, company and debtor-specific data stored in the data warehouse, the user rights are restricted and the level of information security is high. The Bank of Finland uses the data warehouse for generating various regular reports in a pre-determined format required internally, as well as ad hoc analyses. The aim is also to have interactive reports that can be used by management and other specified internal users.

Staff expertise in managing, utilising, visualising and analysing data has been built up through on-the-job learning, i.e. by participation in various IT projects, and internal and external training. The Bank of Finland has various data user networks at organisation and department level. Power BI and Tableau competence is important for all experts working with data, and SQL expertise among data warehouse users was also enhanced in 2021.

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What should the inflation target be? Views from 600 economists

Esa Jokivuolle
Head of Research

The recent reviews of the European Central Bank's monetary policy strategy and that of the Federal Reserve have reignited the debate about the optimal inflation target central banks should pursue, and more generally about their objectives. With near-zero interest rates hindering the effectiveness of monetary policy, one proposal to limit the repeated occurrence of policy rates getting near their effective lower bound in the future is to raise the central bank inflation target.1 However, a higher inflation target also carries costs associated with more volatile and higher average inflation. Moreover, recent events and long-term trends have raised questions about the right balance between price stability and other possible goals of monetary policy, such as financial stability, inequality and even climate change.

Our research contributes to this debate by analysing the answers to an extensive survey of leading researchers in economics and finance from around the world, eliciting their views on the optimal inflation target and on other issues related to monetary policy. Although not widely used in economics and finance to date, an expert survey of this kind is a useful method to assess the balance between the benefits and costs of a higher inflation target.

We circulated the survey at the end of 2020. From a sample of approximately 6,000 individuals, we received 613 responses, of which 591 (96%) came from inflation-targeting countries or regions. Most respondents were from the euro area (159 responses) and the US (241 responses). The survey was conducted anonymously using the Webropol survey program — providing both a mobile and an online response option — so that individual respondents cannot be identified.

The survey contained four background questions and twelve substantive questions, some with multiple sub-questions. The background questions asked about a respondent's country of residence, fields of expertise, and experience in academia, the public sector and the

private sector, and included a self-assessment of the respondent's familiarity with issues pertaining to monetary policy. There were eight questions related to the inflation target from different angles, two questions related to central banks' objectives and targets at large, and two questions related to the equilibrium level of the real interest rate and its relationship with the inflation target. Most questions included an invitation to provide written comments. On average, 19.3% of respondents used this option per question.

We obtained a rich set of results both in terms of the distribution of responses for each individual question and the cross-analyses between questions. We used the Power BI program to gauge the response distributions per question and R-programming and Excel for producing final graphs for publication. We mainly relied on R-programming and an econometric program called EViews to statistically analyse the responses. We also ran basic textual analyses on text comments. This provided information on, for instance, other objectives that central banks should have in the views of some respondents but that we did not explicitly ask about.

The first point to highlight is that most respondents (79%) think the central bank should have an inflation target, while 17% maintain the central bank should not have an explicit inflation target, and 4% have no opinion. Focusing on respondents from inflation-targeting countries or regions, more than half (54%) support the central bank's current target, about 30% would prefer a higher target, and 16% would choose a lower target. The median preferred deviation from the current target is one percentage point in either direction.

More detailed results are available in Bank of Finland Research Discussion Paper no. 7/2022 (helda.helsinki.fi/bof/bitstream/handle/123456789/18405/BoF_DP_2207.pdf?sequence=1).

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[1] *In line with this view, the ECB slightly raised its inflation target in July 2021 from "close but below 2%" to 2%.*

Data science practices are becoming an established element in central bank activities

Ville Voutilainen
Economist

Data science is an interdisciplinary field that aims to understand and analyse phenomena on the basis of data. Over the past few years, the importance of data science in support of decision-making has increased exponentially in response to the evolution of information technology and the ever greater mass of data. Central bank activities are no exception: banks are registering, collecting and analysing larger volumes of data than ever before, and the methods to analyse the data are getting much more sophisticated.

Data science has many interlinkages with both core business activities and traditional application development. In fact, data science can be imagined as a bridge between these two. The old era, where business operations and IT activities were often separate functions, has practically gone. The challenge of processing data into information and knowledge is shared, and finding suitable solutions in this area has brought central bank analysts and developers closer together. The Bank of Finland has always had strong analytical experience, providing impetus for the adoption of practices required in this new era.

Data science culture and practices are supported at the Bank of Finland as part of its strategic priority of knowledge-based management. In practice, the work encompasses both official development projects and grassroots projects and suggestions. Some of the most recent steps forward are as follows:

- introduction in 2021 of several tools supporting the day-to-day work of the Bank's data scientists
- successful testing of cloud-based platform solutions for productised analytics
- a common internal reporting platform enabling cross-departmental data sharing
- enhanced distribution of data outside the Bank of Finland via an open data portal (portal.boffsaopendata.fi) and the supporting code libraries (github.com/SuomenPankki)

Bank of Finland data science community 'r.kioski'
Data science culture at the Bank of Finland is fostered by the active data science community r.kioski, which has over a hundred members. The community's main objective is to share information and proven best practices among its members. It organises presentations by members and external experts, thus providing easy learning opportunities. The data science community has achieved wider recognition for itself at the Bank by, among other things, winning the 2019 innovation competition.

Come and learn with us!

- replacement of manual work by several automated solutions, for example in the provision of statistics published on the Bank's website.

Data science practices are constantly evolving, so work to promote them continues. The Bank of Finland's objectives for the near future in this area include incorporating data science work into the Bank's internal application development framework and engaging in external communication concerning data science, which will allow the Bank's competence to be shared in an even wider arena. Increasing cooperation with actors and institutions outside the Bank of Finland is important, as progress is rarely made in a vacuum.
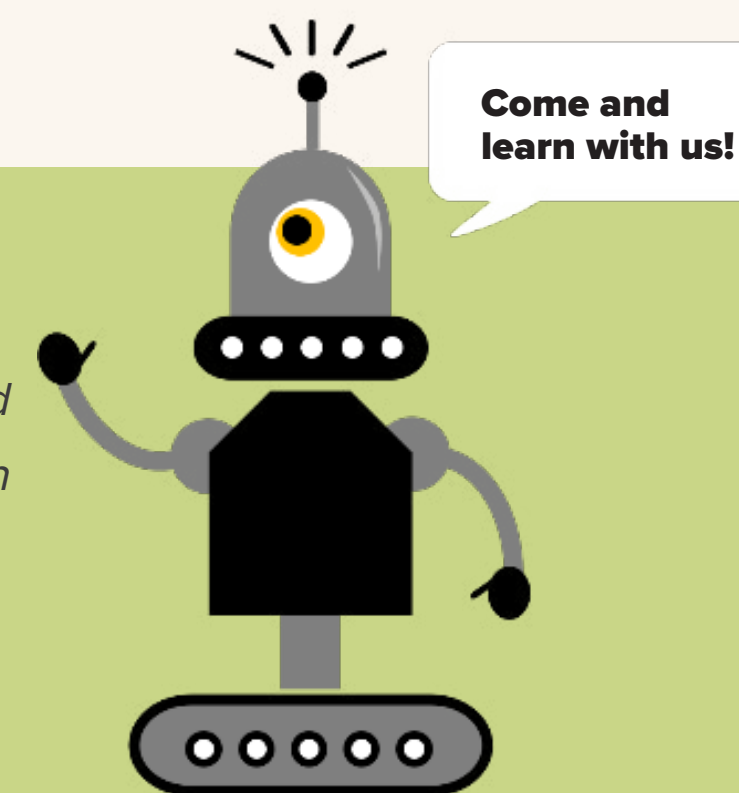
The community is named after the R programming language.
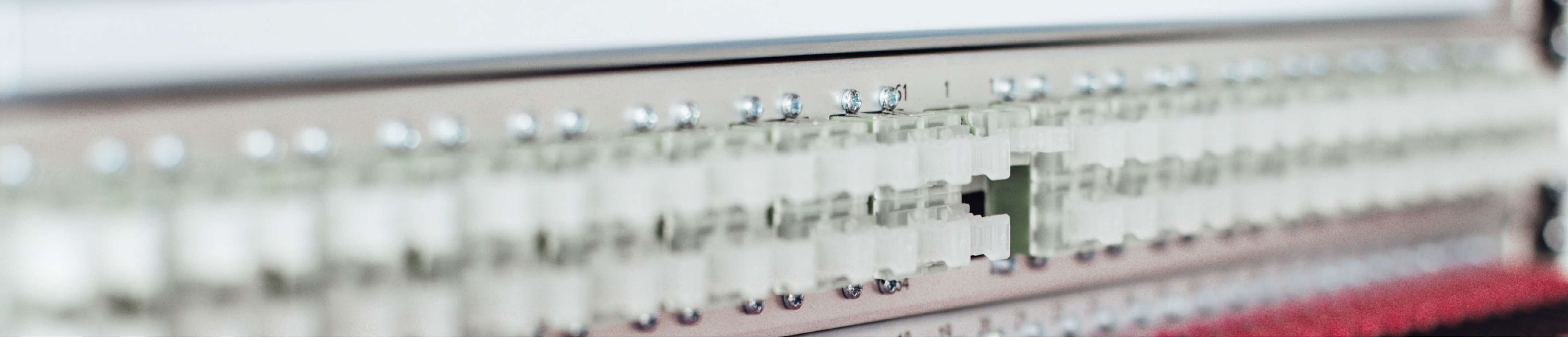
Data collected - what and why

Photo: Lars Kienle, Unsplash.

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Components of information management

Jaana Helsing
Project Manager

Information management and information governance are among the most important factors for success in any organisation that strives to build value on the basis of data, information and knowledge. They enhance the effectiveness of the organisation's activities and the work satisfaction of employees.

The volume of data is growing and so too is the importance of data, information and knowledge to the work undertaken. Data needs to be organised in a way that makes it easier to use, and it also needs to be better managed. If data is inaccurate or incomplete, it may lead to inappropriate decisions or unnecessary work. The task of information management is to ensure that this does not happen, but that instead data is of a high quality and can be readily used.

Information management consists of various elements that contribute towards ensuring the provision of ready-to-use data. In developing its information management work, the Bank of Finland makes use of the DAMA information management framework.

New kinds of expertise are needed in information management and regarding data, information and knowledge resources. Building up expertise is a continuous process. Training of different kinds has already been provided, including material on the information management framework and its components. In 2022, training on the main aspects will be provided for all members of staff. An information management model was created to guide the process of information management. The information management model is made up of specific guidelines and a set of information on actions, data and system architecture. Work on producing an information management framework, guiding principles and management models at the Bank of Finland has begun in connection with an information management development programme.
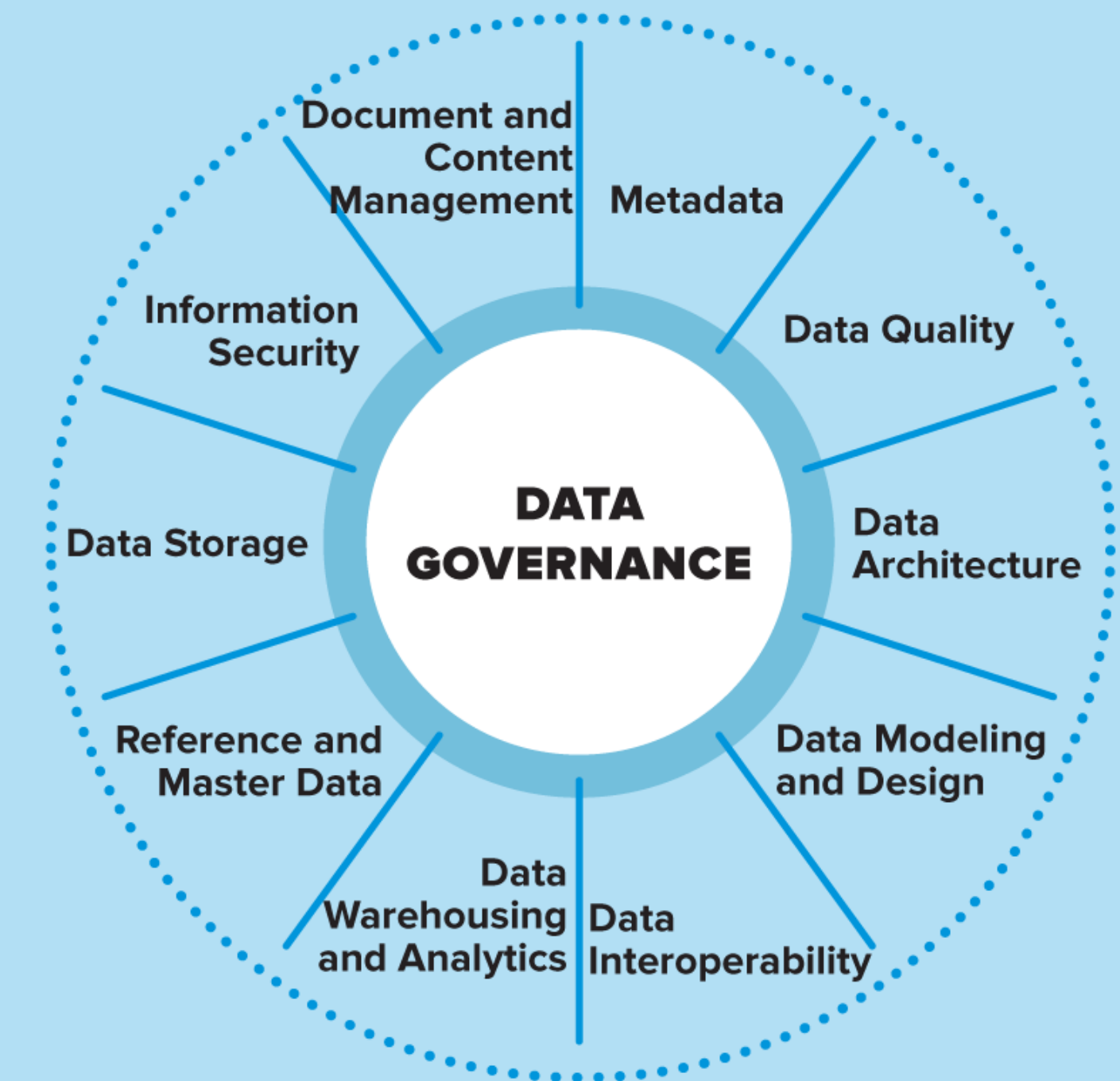
More than 50 information management training events were held in 2021 (see key figures).

Information Management Framework

DATA GOVERNANCE

Document and Content Management · Metadata · Data Quality · Data Architecture · Data Modeling and Design · Data Interoperability · Data Warehousing and Analytics · Reference and Master Data · Data Storage · Information Security

Source: Bank of Finland

Data lifecycle – Importance of metadata

Jaana Nuortia-Kujanpää
Senior Information Specialist

Data lifecycle and metadata

Data created; received/ compiled

Data saved

Data stored

Data archived or destroyed

Metadata submitted and saved

Looking for and utilising datasets
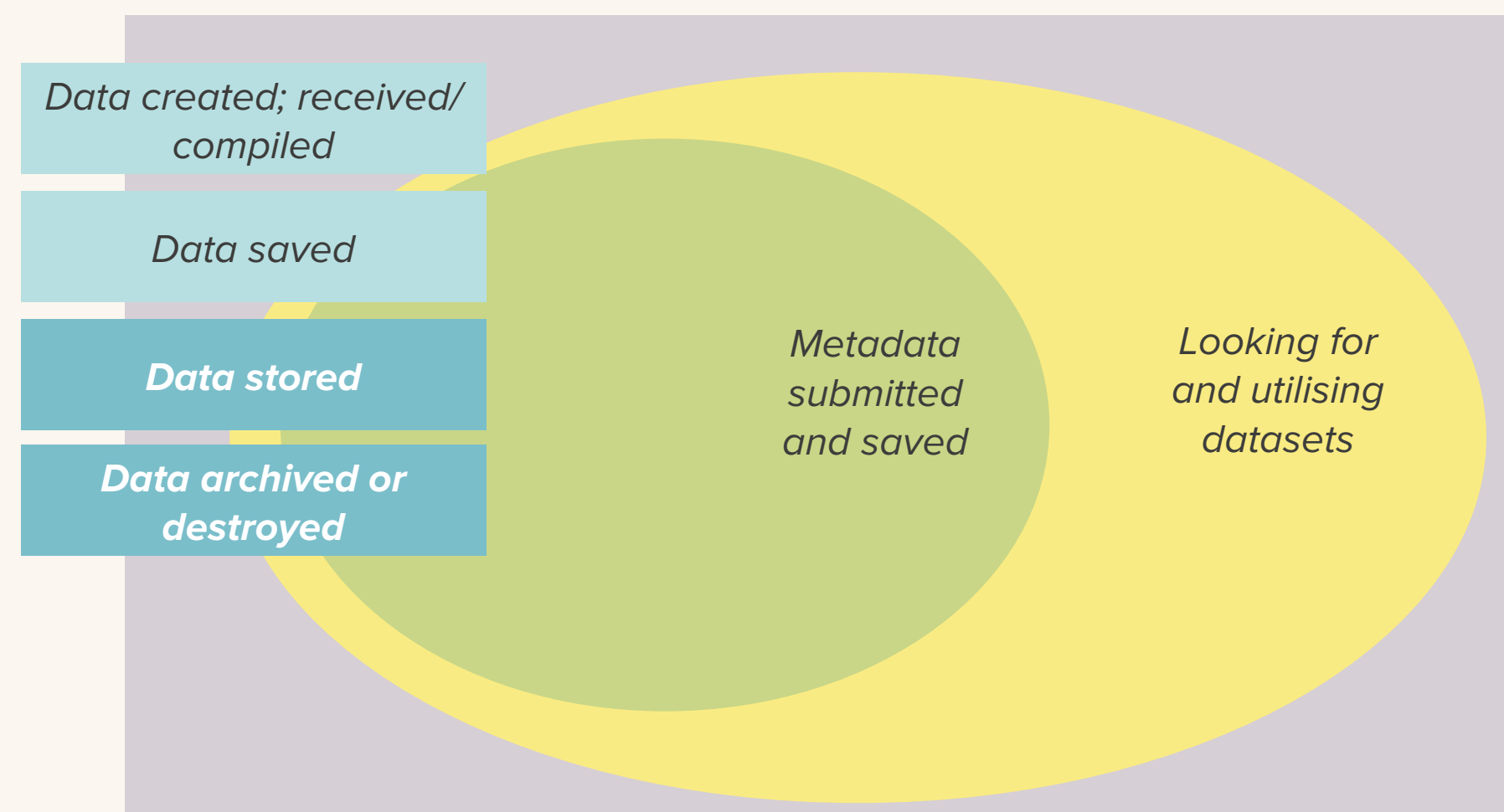
Source: Bank of Finland

Dataset metadata

Metadata are invaluable for helping ensure data availability and ease of use, and are also needed in the later retrieval and utilisation of the data. The Bank of Finland's traditional document administration has long employed such metadata. Printed documents have been filed under their appropriate document series headings in the records storage location and in the permanent archive, where they can been found by means of the identifying metadata. The same administration of metadata-equipped datasets was also later extended to register entries and task management systems.

Task management systems and filing and archiving systems are good examples of how metadata is used in dataset searches and in different types of reporting. In the future, the concept of datasets will focus much less on traditional document-based material and instead more on data materials, where new demands and purposes will be set for the ways in which data is saved, retrieved, used and processed. Metadata will be central to this, too.

Metadata are recorded manually in part and/or automatically in the computer system. Default metadata values for task classification and for document types from the electronic records management system are also put to use. Besides traditional document-based material, electronic records management plans will in future have to take into account data material as well. The aim in further technological advances should be that metadata can be searched and stored automatically for a dataset, allowing it to be used in information searches. In turn, this will enable reports, statistics and documentation to be prepared in standardised ways and data will be easily and readily available.

Besides basic metadata, other key data defining a dataset may include the storage period, confidentiality status, personal data type and user rights. This data must be transferred with the dataset when transfers are made between systems.

Digitalisation is creating new kinds of needs. There is a desire to retrieve and use data in ever greater amounts and in ever finer detail. Development work on this is continuing at the Bank of Finland, focusing on advances in the use, storage and automation of metadata.

Metadata are data that classify, describe and define other data. Metadata are needed throughout the data lifecycle, and are conveyed with the dataset irrespective of how this is later filed, archived or used. Datasets can be documents of all kinds as well as facts and figures. Typical metadata are title and date information, confidentiality status, agent (sender/recipient) and any tags.

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Development programmes accelerate change

Mia Ristimäki
Head of Information Management

In 2019, a group of anxious officials met a number of times to consider what the new Act on Information Management in Public Administration ('Information Management Act') might mean for the Bank of Finland and the Financial Supervisory Authority. Legislative drafter Tomi Voutilainen was invited to present his views. His first visit was made the previous year, when the drafting work began. In autumn and late 2019, the Ministry of Finance circulated for comments the first draft recommendations for facilitating the implementation of the new Act. These recommendations provided the concrete input necessary for the interpretation of the Act. After a few sessions, the anxious officials had transformed into a 'tiger pack' whose mission was clarified towards the end of 2019: to clear a way through the legal jungle with the least possible damage. An information management development programme was launched on 1 March 2020, and the information management tiger pack has been working on the development programme since then. The task of the programme is to implement the Information Management Act, including descriptions of the information strategy, processes, datasets and systems, as well as system development work.

Even before the new Information Management Act, a data and analytics development programme had been established, the purpose of which was to build the data and analytics system platform of the Bank of Finland and the Financial Supervisory Authority and to develop the management and utilisation of analytics data. The development goals for analytics data management were subsequently included in the general information management development goals, and so the data and analytics development programme will focus in the future on developing the system platform and promoting its use. Further information on the data and analytics development programme and the development of the platform solution is provided in Antti Komonen's article 'Building a system platform for data and analytics' elsewhere in this publication.

The key tasks of the information management development programme in 2021 were the development of an information management model, the planning of a data architecture project, the renewal of the task management solution, the development of a change impact assessment process and a preliminary study on a secure communication solution. In addition, this Data Balance Sheet was designed and implemented.

Both development programmes support the Bank of Finland's strategic priority concerning knowledge-based management.

Photo: Joshua Lee, Unsplash.

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Building a system platform for data and analytics

Antti Komonen
Project Manager

One of the cornerstones of knowledge-based management consists of the IT systems that support the management and utilisation of data. Without support from IT systems, it is impossible to efficiently fulfil the basic requirements for sound data management. The utilisation of data, in turn, is not possible without tools that meet user needs. Even if individual systems were to reasonably meet the needs of a specific activity or data domain, it would be difficult to build and introduce shared and integrated processes for managing data in an entire organisation if the system architecture is very fragmented.

Analytics is not a single area of activity or a function at the Bank of Finland, but instead a fixed and integral part of a range of functions. System development at the Bank has long been guided by the needs of its different functions, which has led to the differentiation and fragmentation of system solutions in the area of analytics. The fragmented system architecture for analytics that has resulted over time does not meet the increased – and in part entirely new – needs regarding the management and utilisation of data.

Under the data and analytics development programme, the Bank of Finland is building a shared system platform for data flows, data stores and reporting solutions for the needs of analytics in the Bank's different functions. The various components of the platform are being built partly in the Bank's own data centre and partly in a cloud environment, guided by data confidentiality requirements. The system platform under construction also includes an environment for data scientists to experiment with and develop advanced analytics tools and methods.

The Bank of Finland is also continuously engaged in many other system development projects important for the different functions. However, the data and analytics development programme plays a particularly important role in fostering knowledge-based management at the Bank, as the system platform under construction will be widely used across several functions and data domains. The new platform will act as an enabler but also as a catalyst for the development of data management at the Bank: as a shared system platform, it will reveal the areas where data management processes need to be further developed and unified. In late 2021, to support the development of the new platform and activities on the platform, the Bank of Finland set up a Data and Analytics IT group, which will assume responsibility for the tools and technologies of the new platform.

In 2021, the main tasks under the data and analytics development programme were to promote the use of the shared reporting platform already introduced earlier, to further develop the data science environment and to run a pilot project for testing a data catalogue tool. A project was also prepared to be launched in 2022, with the purpose of building the first version of the shared platform for analytics data stores and data flows.

Photo: Gerd Altmann, Pixabay.

Assessment of financial sector climate impacts requires new kinds of data and consistent definitions

Anu Karhu
Economist

Climate change increases risks to the financial sector, and the measurement, management and pricing of the risks require new kinds of data. According to the global -Network for Greening the Financial System (NGFS), there is a need for forward-looking and more granular data. At the same time, the data should be more reliable and comparable, which means the creation of uniform international reporting standards, methods and control mechanisms, and improved access to data. One example of progress made towards uniform international standards is the IFRS Foundation's creation of a new standard-setting board, the International Sustainability Standards Board (ISSB).

Reliable and comparable data on the impacts of climate change is important for financial sector stakeholders. Data is needed for -credit and investment decisions, assessing new business opportunities, risk exposure quantification, and pricing. Financial market and macroprudential supervision, stress tests and reporting also require new kinds of data.

Forward-looking and more granular data refers to, for example, reliable and comparable reporting of companies' greenhouse gas emissions and emissions targets. Various emissions metrics, such as carbon footprints, describe from the perspective of lenders and investors the transition risk of companies that may materialise in the transition to a low-carbon and more sustainable economy. Forward-looking data on emissions targets is needed as the transition to a more sustainable economy requires financing.

Data is also needed for the assessment of physical risks caused by climate change. Physical risk refers to threats caused by sudden and long-term weather and natural events. Assessments can be made of, for example, the likelihood of floods, rising sea levels, wildfires, prolonged droughts and storm damage in a certain location, and this data can then be combined with the locations of, for instance, particular real estate collateral, forest holdings or a company's supply chain.

There is already information available on the climate impacts and sustainability of economic activities, but it is defined on the basis of many different criteria and sometimes lacks transparency. A report published by the NGFS notes that the quality of the available data cannot be easily assessed and compared. Despite progress on the availability of data in recent years, the disclosure and measurement of climate impacts differ across economic sectors, which makes comparison difficult.

Since the availability of new data that is comparable and more transparent is still limited, the use of existing data sources should be increased. Opportunities for more advanced usage are possible through the creation of tools based on artificial intelligence, machine learning, digitalisation and open data. One example is to turn images into data by applying a combination of machine learning and satellite technology to create data on climate change and its impacts. The data created from image sources can be utilised for filling in data gaps on climate change.

The objective of the NGFS workstream on bridging the data gaps is to identify the data needs and gaps related to the assessment of climate-related impacts on the financial sector, and to review the accessibility of key data. In the next phase, the workstream will expand its engagement with international stakeholders ranging from the financial sector to companies, data providers and rating agencies. In the first half of 2022, the workstream will publish a final report, which will include international recommendations for bridging the identified data gaps.

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Statistics tree

MEDIA   RESEARCH   ANALYSIS

ECB
- **Banks' balance sheet and interest rate statistics**
- **Minimum reserves**
- **Securities issue statistics**
- **Securities holding statistics**
- **Investment fund statistics**
- **Statistics on other financial institutions**
- **Insurance corporation statistics**
- **Payment statistics**

BIS
- **Banking statistics**

IMF
- **Reserve assets**
- **Stability indicators**
- **SDDS Plus**

STATISTICS FINLAND
- **Balance of payments**
- **Financial accounts**
- **Government finance statistics**

BANK OF FINLAND
- **Statistics releases**
- **Dashboards and information service**
- **Tables and charts**
- **Open data**
- **Researcher services**

- Loans and deposits
- Market shares
- Saving and investing
- Crowdfunding and peer-to-peer lending
- Payment statistics
- Securities and funds
- Other financial institutions

DATA RESOURCES AND STATISTICS FOR USE IN ANALYSIS

Banks
Other financial institutions

Funds
Custodians and asset managers

Securities register
Counterparty register

Insurance corporations and pension funds
Social security funds

Payment institutions and payment services providers
Crowdfunding and peer-to-peer lending platforms

Source: Bank of Finland

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'Statement on public access to documents' provides an overview of the information resources held by a public authority

Mia Ristimäki
Head of Information Management

Under section 28 of the Act on Information Management in Public Administration (906/2019), an information management entity is required to maintain a statement describing both the information resources and the register of matters that it manages, to ensure that the principle of openness is observed. The statement must be published in a public data network in respect of information that is not to be kept secret.

The Bank of Finland and the Financial Supervisory Authority together constitute an information management entity, which is why they have published a joint statement on public access to documents. Although both organisations have their own mandates, they share administrative services and the associated information resources. These include the resources of personnel administration and information management.

How was the statement produced?

The Act on Information Management in Public Administration specifies the minimum information content for the statement on public access to documents, but it does not stipulate the procedure or format for producing it. The statement was put together mainly in autumn 2020, because the time of transition and publication was specified as being the turn of 2021. The requirement to produce a statement on public access to documents was new, and so there were very few published versions that could be used as a template. Nevertheless, the working group was able to examine a few published statements, and the Ministry of Finance had published its recommendations on preparing statements on public access to documents.

[1] *julkaisut.valtioneuvosto.fi/handle/10024/162149*.

The structure used for the statement is based on descriptions set out in a draft information management model and also, in the case of the Bank of Finland, the applicable parts of the ECB's functional framework and, in the case of the Financial Supervisory Authority, the electronic records management plan. It was not possible to fully utilise the information management model, because it was being prepared at the same time as the statement on public access to documents.

The updating work on the statement was included in the new process for assessing impacts of change, which considered the changes made in both the information management model and the statement on public access to documents. The process for assessing the impact of change will be further developed.

The Ministry of Finance's recommendation states that the information management entity can add to the information content advised in the recommendation for the purpose of ensuring that the information continues to better serve people's needs. The working group on the information management development programme is monitoring other organisations' published statements on public access to documents. New ideas that benefit those making data requests will be taken from the benchmark work and put on to the development list. When the information architecture work moves on further, the working group will review the possibilities for adjusting the description of the different data groups.

You can find out more about public access to documents at

www.suomenpankki.fi/fi/yhteystiedot/asiakirjajulkisuuskuvaus/.

Photo: Ron Dyar, Unsplash.

Archives of world's fourth oldest central bank cover seven shelf-kilometres

Vappu Ikonen
Historian

The Bank of Finland's oldest document is the minutes of the board meeting held on 1 April 1812, the date when the world's fourth oldest central bank started operations in Turku. The Bank was relocated to Helsinki in 1819 and moved into its newly completed main building in 1883. Until then the Bank and its archives had been operating in the House of the Senate, today known as the Government Palace, overlooking Senate Square.

During the first few decades, the archive material was held in various basements and other locations. Appropriate archive facilities were built in the early 1960s in an annex to the main building in Rauhankatu. Today, the Bank's historical archive of printed material and paper documents occupies seven shelf-kilometres and is stored in archive facilities in Helsinki and Vantaa.

The Bank of Finland's archive is an exceptionally old and extensive central bank archive even by international standards. Given that the Bank of Finland was the only bank in Finland for decades during the 1800s, its archives provide a lot of unique information on the 19th century economy. The archive also includes material on, for instance, the period of foreign exchange controls from the 1940s to the end of the 1980s, allowing a closer look at the internationalisation of the Finnish economy.

Most of the documents stored in the Bank's historical archives are public material. The archival material can be studied by appointment in the Bank of Finland library at Rauhankatu 19.

Digitisation of the archival material was begun a few years ago. In part, digitisation focuses on historically interesting bodies of material, such as minutes of the meetings of the banking supervisors, while some of the work focuses on protecting material in poor condition. Some of the digitised material has been published.

Archival material (helda.helsinki.fi)

Archive facilities of the main building in the early 1960s.
Photo: Bank of Finland.

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Ethics of managing data

Pertti Ukkonen
Senior Specialist

Justification for acquiring and processing data

As a public authority, the Bank of Finland has two reasons to collect data. On the one hand, data is needed to carry out the tasks assigned to the Bank and, on the other hand, data is needed to organise the Bank's activities efficiently and appropriately. The Bank makes decisions that affect people's daily lives and their ability to engage in economic activity, so these decisions must be based on accurate and up-to-date information on the state of the economy and society, as well as the potential impact of planned measures.

In order to function, the Bank also uses society's resources, so it is important that these resources can be allocated to activities efficiently and effectively. To guide its actions, the Bank's abstract goals and the targets derived from them are expressed in terms of observable and measurable variables, and data is collected on these variables. By analysing this data, it is possible to judge whether the Bank's actual actions and resource use are producing the desired progress towards specified targets and goals.

Ethics of using data

Data will have an impact on reality only when decisions concerning reality are made on the basis of that data. Principles governing the use of data are therefore key ethical guidelines in knowledge-based management. If the outcome is determined first and then information sought to support or defend it, this will make a mockery of knowledge-based management.

In scientific research, there are recognised and widely accepted practices that are also well suited to knowledge-based management. These principles include honesty, general diligence and accuracy in producing data, deriving information from it and presenting the results.

Some of the data collected or otherwise obtained relates to natural persons and their private financial activities. In these cases, the protection of privacy must also be taken into account when processing the information. In Finland, activities are based on the European Union's General Data Protection Regulation, which prescribes the rights of individuals to determine the processing of data concerning them, the grounds on which processors of data are permitted to process such data and the procedures for safeguarding privacy when the data is processed.

Photo: Denise Jans, Unsplash.

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Bank of Finland's IT development began in the 1940s when workload was increased due to foreign exchange controls

Vappu Ikonen
Historian

The Bank of Finland's archives include document series that extend back over 200 years without interruption. These include sets of minutes and incoming and outgoing letters.

As the Bank of Finland is a bank, bookkeeping has also been carried out since the very early days. The series of bookkeeping documents has changed radically over the decades, however.

In the Bank's early decades, its activities took place within particular funds, which had their own separate accounts. These series of accounts were consolidated in the 1880s, but bookkeeping continued to be done by manually recording account transactions in documents and transferring them to bound ledgers (e.g. bills of exchange, mortgages, etc.) and also adding up the day's transactions for inclusion in bound journals and general ledgers.

The first calculating machines and typewriters eased the work of the Bank's bookkeepers from the 1910s onwards.

The Second World War and foreign exchange controls increased the Bank's bookkeeping work enormously. At the same time, information technology took its first steps into the world during the War. The first IT-based developments at the Bank of Finland accordingly took place in the late 1940s. The Bank switched to the Taylorix duplication method. Account transactions and payment orders were made using the duplicate method, and copies and receipts were sent to various parties as tissue paper copies. The tissue paper copies multiplied the work rate of the bookkeepers, but gave rise to a few grey hairs in archivists decades later.

The "great hall" of the Accounting Department in the late 1940s.
Photo: Bank of Finland.

Bank of Finland Clearing. Ms. Rutanen sorting cheques using the National Central Control and Bank Proof machine in 1952.
Photo: Bank of Finland.

In 1948, the first bookkeeping machines were introduced. The difference from before was that while a manual machine was used in the Taylorix, the National bookkeeping machines combined a typewriter and several calculating machines. Bookkeeping was therefore initially carried out on account cards, and from 1959 on punched cards. Account entries had to be made for 10 main accounts, because the machines' maximum capacity was only 10 accounts.

The Bank of Finland introduced the first IBM-brand computer in 1964, just a few years after Post Bank. In 1977, the Bank switched to a DEC-brand computer and in the 1980s to a Burroughs. In the 1980s, the first PCs (personal computers) also began to be used in the Bank.

The main impetus for the technical development of bookkeeping was therefore the enormous increase in workload following the start of foreign exchange controls during the Second World War. Fortunately, information technology also began to evolve at the same time. The Bank of Finland quickly implemented reforms and continued to keep pace with developments.

The Data Processing Department and the Burroughs B6900 computer in the Vantaa 'cave'.
Pictured, from the left: Laila Kaikko and Kari Hannukainen. Taken in early 1983.
Photo: Bank of Finland.

How we manage information security and data protection

How to ensure top-level information security and data protection

Pasi Hänninen
Head of Information Security
until 12 November 2021
Mikko Itävuo
Information Security
Specialist

The requirements for information security at the Bank of Finland are high because of the data-intense nature of the Bank's activities and the level of criticality of the data processed. The Bank's information security policy therefore applies right through the organisation: responsibility for implementing information security rests with the Member of the Board to whom this responsibility has been allocated, while the Head of Information Security and the data protection officer are responsible for the information security and data protection work carried out at the Bank of Finland and the Financial Supervisory Authority. In all its activities, the Bank of Finland complies with information security and data protection legislation, the requirements of the European System of Central Banks (ESCB) and best practices in the field. In addition, the Bank of Finland's information security management is structured in accordance with the ISO 27001 standard.

Information security constantly assessed and tested

Information security work supports and promotes the activities of the Bank of Finland and the Financial Supervisory Authority by preventing possible security breaches and ensuring that, in the event of incidents or emergencies, recovery is rapid and work continues.

Information security risks are therefore regularly assessed in accordance with the risk management practices of the ESCB, and identified risks are subject to risk management measures, the effects and implementation of which are monitored. Accepted risks are monitored and reassessed on a regular basis.

Security measures are implemented with up-to-date solutions based on ESCB requirements and best practices, the national information security authority's recommendations, and best practices in information security. Security audits performed by third parties are an integral part of the Bank of Finland's information security measures.

Information security includes staff training

Mandatory information security training for Bank of Finland staff includes training in the classification, processing and data protection of documents. In addition, information security training is arranged for staff on a regular basis, and security incidents are actively communicated on the intranet. All training material can also be accessed at a later date.

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Information security in banking services

Jari Toivonen
Market Infrastructure Adviser

The TARGET2 payment system is a real-time gross settlement system jointly owned and operated by the Bank of Finland and the other Eurosystem central banks. In 2021, the TARGET2-Suomen Pankki system handled payments with an average daily value of EUR 41 billion. At the end of 2021, the Bank of Finland had as TARGET2 customers a total of 24 credit institutions and ancillary systems operating in Finland and the Nordic countries.

Information security plays a key role in the provision of TARGET2 payment system services in order to guarantee the integrity of the payments and data processed and to ensure the confidence of customers and, ultimately, society in the functioning of the payment system. It is often said that the weakest link in information security is the human factor. Information security training at the outset of careers is, however, an important part of the personal orientation programme for the experts in charge of payment system operations. This competence is also regularly developed and maintained at the Bank of Finland.

Concrete examples of various information security incidents and threats are reviewed with the payment systems staff. The staff analyse cases and discuss how the Bank of Finland can, through its own actions and processes, prevent corresponding incidents from arising in its own environment. In addition, the Bank regularly organises for its experts various exercises involving cyber and information security incidents.

It is important that experts gain a concrete understanding of the importance of information security for their own work, and that best practices become part of daily routines. This will help support the reliable functioning of payment systems in all situations.

Photo: Ronald Carreño, Pixabay.

Towards better cyber resilience through testing

Jussi Terho
Head of Division

Financial sector's exposure to cyber risks

Financial sector services make extensive use of the opportunities brought by digitalisation. At the same time, the use of electronic channels exposes participants to cyber risks, as systems handling money and other assets are of interest to criminals. Financial sector services are based on a large number of different systems that form a network, for example through payment and settlement systems or trading in financial instruments. An attack on a bank or payment system could, in addition to the direct effects, cause widespread mistrust in the financial system. The interconnectedness of companies in the sector and the importance of the network they form for the functioning of society as a whole underline the fact that cybersecurity is not a competitive factor but is instead in everyone's common interest.

Common penetration testing framework improves cyber security

Financial sector companies are constantly working to protect themselves from threats. Tests are one tool by which financial sector organisations can appraise their protection and operating practices. These tests can target the organisation with attacks that mirror real threats and the methods employed by attackers.

Last year, the Bank of Finland introduced to the Finnish financial sector the pan-European TIBER framework, which uses testing to support improvement of the protection of individual participants and thus also the incident resilience of the entire sector. In the TIBER framework, testing always focuses on the financial sector's critical services. The Bank of Finland provides the banks and other financial sector participants performing TIBER tests with the framework's documentation and testing support services. The acronym TIBER comes from 'threat intelligence-based ethical red teaming'.

Bank of Finland also tested itself

Shortly after the publication of the TIBER-FI implementation guide, the Bank of Finland decided to conduct its own TIBER-FI test. In accordance with the framework, the Bank, including top management, committed itself to the test. Managing the stages of the test was the responsibility of a special white team and its leader. To ensure realistic results, knowledge of the test was shared with as few people as possible. The test ended in spring 2021, and the Bank reported its testing experiences to other financial sector participants in the TIBER-FI cooperation network.

The Bank of Finland found its own test to be very useful. The test revealed how an attacker could exploit information on social media, for example. The test also yielded useful findings to prepare for cyber threats. The test findings were handled appropriately and the corrective actions identified have been taken.

Monitoring and key figures
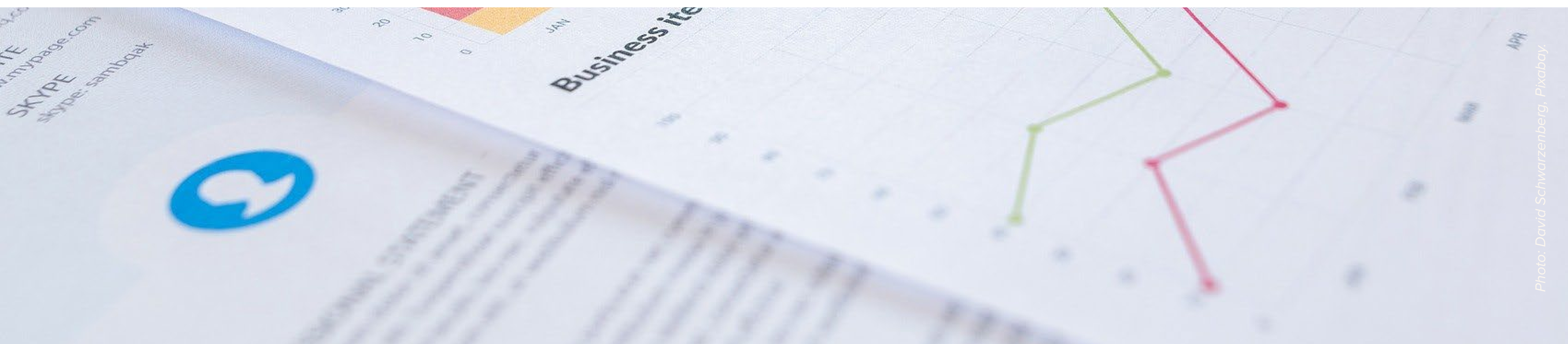
Data Balance Sheet key figures 2021

Task management and documents

Matters entered in task management system	378
Documents stored in task management system	1 925
Documents transferred to digital archive	7 816
Extent of historical archive in shelf-kilometres	7
Documents in digital archive, total	427 140
Number of visitors to historical archive	9
Duration of visits, total hours	30

Data and statistics assets

Statistical data collections performed	11
Regular reporters of statistics	1 578
Statistical data collection reports received 2021	28 967
Statistical data storage capacity	> 1 TB
Time series entries in the time series database	9 787 655
Statistics dashboards in external network	35

Communication channels

Social media

BoF Facebook followers	582
BoF Museum Facebook followers	1 064
BoF Twitter followers	11 502
BoF Instagram followers	1 475
BoF Museum Instagram followers	693
BoF LinkedIn followers	17 290
BoF experts on Twitter	84

Digital services

Visits 2021

Suomenpankki.fi	1 520 038
Eurojatalous.fi	191 403
Rahamuseo.fi	16 403
BOFIT	69 441
Helda digital repository	25 992
API calls in open data service	181 560
Publication files and archive files loaded into Helda during year	460

Digitised material for archiving and publication	(estimated in pages)
external digitisation:	294 000
own digitisation:	80 000
	Total. 374 000

Publications

Blog posts published in Bank of Finland Bulletin	60 (fi + en)
Articles and analyses published in Bank of Finland Bulletin	106 (fi + en)
Published research	26

Requests for experts, statements and information

Requests for experts	30
Requests for statements	55
Requests for information	28

Data Balance Sheet key figures 2021

Emails

The email figures comprise emails of the Bank of Finland and the Financial Supervisory Authority (FIN-FSA).

Emails received	5 664 705
Emails blocked	12 634 974
Spam emails and emails with attachments quarantined or links removed	82 094
Blocked viruses	5 003
Total.	18 386 776

Capabilities and expertise

Several internal training sessions on information management were organised at the Bank of Finland during the year. In addition, it was possible to seek departmental approval to take part in external information management training. This included training in the use of data and analysis tools and software. Most of the internal information management training is jointly provided for Bank of Finland and FIN-FSA staff.

Mandatory online training for all has been given on document classification and handling rules and on the General Data Protection Regulation.

The task management training covers the task management system, document handling and processes. Training in document management focuses on the handling of official documents in the electronic workspaces. Training given to content managers covers the electronic workspace functions and user rights administration, and forums present new developments and discuss future needs. General training in information management includes current topics in information management and also a review of e.g. document classification and processing rules, data protection or systems use.

Through the development programme for information management, advanced-level training was arranged in information management, and the enhancement of expertise in data and process modelling is continuing.

The data science community (r.kioski) is organising presentations on data science issues. Subjects covered in 2021 were open source environments and productised analytics in cloud services.

Task management training (1 hr)	6
Document management training (1 hr)	22
Content manager training (1 hr)	17
Content management forums (1 hr)	3
General training in information management (1.5 hr and 1 hr)	2
Knowledge-based management workshop (2 hr)	1
Data modelling (2 days)	1
Data science training events (1 hr)	2
Power BI efficient reporting (2 days)	1
Advanced DAX (2 days)	1

Other events related to data, data use or information management:

In October 2021, the Bank of Finland held a full day's Techday seminar coordinated by information management and focusing on e.g. Azure DevOps, GitHub, cloud strategy, Low code, knowledge-based management, data factory and productised media visibility data.

A campaign on everyday safety and security was launched in October 2021 in collaboration with data protection and security. At the end of the year the campaign focused on teleworking and email use. The campaign will continue in the early part of 2022.

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