

DIGITAL CITIZENSHIP, DIGITAL BANKING – DIGITALIZATION PROPOSALS BY THE HUNGARIAN BANKING ASSOCIATION

*From basic banking services to mortgage loans,
or how to apply for a mortgage loan in 15 minutes instead of 15 days*

*András Becsei – Péter Csányi – Attila Bógyi –
Endre Máriás – Márkó Gacsal– Levente Kovács¹*

ABSTRACT

We present through the proposals of the Hungarian Banking Association (the ‘Association’) how further digitalisation of the individual steps of banking processes and the adoption of international good practices would improve customer experience, as well as the tools by which the banking sector could be made more competitive in international comparison. By following up on these proposals, the turnaround time of a standard mortgage loan application could be reduced from the current 15 days to only 15 minutes. Ideally, it would take such a short time for the binding bank offer and the draft loan agreement to arrive in the client’s electronic mailbox. Redesigning processes would simplify the use of other banking products and services, too.²

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¹ *András Becsei* Vice President, Hungarian Banking Association; CEO, OTP Jelzálogbank. E-mail: andras.becsei@otpbank.hu.

Péter Csányi President, Digitalisation Working Group, Hungarian Banking Association; Deputy CEO, OTP Bank. E-mail: csanyi.peter@otpbank.hu.

Attila Bógyi President, Legal Subcommittee of the Hungarian Banking Association Mortgage Banking Working Group; Chief Legal Counsel, OTP Jelzálogbank. E-mail: bogyi.attila@otpbank.hu.

Endre Máriás Head of Department, OTP Bank. E-mail: endre.marias@otpbank.hu.

Márkó Gacsal Senior Legal Counsel, Hungarian Banking Association. E-mail: gacsal.marko@bankszovetseg.hu.

Levente Kovács Secretary General, Hungarian Banking Association; Professor, University of Miskolc. E-mail: kovacs.levente@bankszovetseg.hu.

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1 INTRODUCTION: WHY IS DIGITALISATION IMPORTANT IN BANKING? HOW TO MEASURE IT?

'Digitalisation in banking is important for several reasons. First, it allows for more efficient customer service and administration through online platforms, reducing paper-based processes to a minimum. Furthermore, it improves security, increases efficiency and reduces costs through digital transactions. It supports decision-makers in developing business strategies and coping with competition by analysing the available data faster and more accurately. An indicator to measure digital accessibility and progress in banking is the Digital Economy and Society Index (DESI), compiled by the European Commission. The DESI is a highly significant indicator for banks and other economic operators as it helps assessing the digital environment of countries, and thus of banks in a given market, on the basis of digital progress and accessibility. Countries of a high DESI are better equipped to provide advanced digital services, which are essential for competitiveness and customer service.'

The ongoing digital revolution and the pervasive effect of the current directions of technological progress in all areas of our life are illustrated well by the fact that the answer above was provided to our prompt by an AI language model.

Digitalisation and digital customer service have become the norm in the banking sector. The conditions governing banks' participation in the digital transition influence their competitiveness both domestically and internationally. As a result of the joint digitalisation efforts of the banking sector and legislators, since 2019, Hungary has improved its ranking in the use of online banking services and is now among regional frontrunners with a share above the EU average.

The 2023 eGovernment Benchmark published by the European Commission also shows that Hungary has made extraordinary progress in the last five years. It is one of the five countries in the EU which achieved at least 20 percentage points improvement, partly due to the upgrade of the magyarorszag.hu portal in late 2021 and the continuous extension of its functionalities. While Hungary stands out in Central Eastern Europe for its e-government performance, regional examples suggest that its e-government portal (magyarorszag.hu) should be used more efficiently in the future in – primarily digital – banking by households and businesses.

To promote the digital transformation and to strengthen the competitiveness of Europe at a global scale, the European Commission and the Member States have formulated ambitious objectives for digitalisation, followed up in the Digital Decade 2030 policy (European Commission: Europe's Digital Decade) and with the DESI. Hungary has drafted its own National Digitalisation Strategy for 2022–2030 (2022) along the lines of the pan-European strategy. The aim of the document is *to make digital infrastructure, digital economy and digital public services*

the drivers of competitiveness and modernisation objectives in Hungary. As banks play a significant role in the operation of the economy, one of the main objectives of this study is to illustrate how the banking sector could contribute even more to improving Hungary's digital competitiveness – and indirectly its DESI rank.

When analysing digitalisation in the banking sector and the role of banks in digitalisation, we should take into account the important lesson learned from process development in recent years, namely that the digitalisation of a process means a real breakthrough for bank clients only if paper-based administration, unnecessary data provision and personal interaction are eliminated from it completely. Any compromise solution in the output due to the organisation of banks' processes or regulatory provisions would prevent genuinely end-to-end online customer service in banking.

Our study presents how further digitalisation of individual process steps and the adoption of international good practices would improve the efficiency of administration in a wide range of banking services, from access to banking services to consumer and mortgage loans. The study started with the brash statement that the turnaround time of a standard mortgage loan application could be reduced from the current 15 days to 15 minutes by implementing the proposals. Ideally, it would take such a short time from the submission of the loan application for the bank's binding offer and the draft loan agreement to arrive in the client's electronic mailbox. Redesigning bank processes would simplify the use of other products and services, too.

In the first section of our study, we present the achievements of digitalisation initiatives from recent years and new directions in EU legislation that fundamentally define the operation of the banking sector. In the second section, we set out proposals for improving the efficiency of the mortgage loan application process. Finally, we provide a summary and an outlook on ongoing innovations that could shape banking in the future.

2 MAIN ACHIEVEMENTS OF RECENT DIGITALISATION INITIATIVES

The Hungarian Banking Association presented its proposals concerning legislation and the management of data assets in two previous studies. The framework for a digital banking which is faster, more user-friendly and fosters economic development even better (Havas et al., 2018) could be established by acting upon these proposals.

Our *22-point digitalisation proposal package* (Becsei et al., 2019), published with a sense of visionary timing prior to the outbreak of the COVID-19 pandemic,

highlighted focus points for digitalisation paving the way for the widespread use of online banking services. The proposals became even more relevant once previously in-person administration forcibly moved to an online venue due to the pandemic, and banks faced the tasks of ensuring a smooth transition from paper-based to digital administration overnight.

In the Association's 2021 study *Ten Points of Sustainable Banking* (Becsei et al., 2021) the proposals were updated to include sustainability and data management considerations. Increasingly significant ESG³ proposals – in addition to shaping banking and bank portfolios – have directed attention to the importance of paperless operation and current data access obstacles to green lending. The banking proposals made it clear that green considerations and digitalisation efforts go hand in hand, and are promoting and strengthening each other.

In recent years, many components of the Association's proposals have been adopted, which, in combination with corresponding government and central bank measures, has promoted more widespread use of digital banking services. As a result of the forced educational process set off by the pandemic, even those who had not used digital banking before have started using these solutions (Demirgüç-Kunt et al., 2022). Back testing results indicate a turning point in digital banking trends, which is supported by bank survey data showing that the number of registered mobile banking accounts have doubled and the pool of digitally active clients⁴ has increased by over 41% between 2020 and 2022. Among the long-term benefits of digital progress, digitally advanced countries and businesses operate more cost-efficiently and are also more resilient to external shocks (McKinsey, 2022).

In the following, we provide an overview of the legislative measures, digital developments and initiatives for the digitalisation of the banking sector that we considered the most important in the recent period and also affect the financial sector.

- 1. Electronic payment solutions have become an efficient alternative to cash use which entails considerable extra cost for the economy.** In this context, Section 5/F of Act CLXIV of 2005 is an important milestone, which lays down an obligation for retailers operating an online cash register to offer their cus-

3 ESG is an acronym for Environment, Social and Governance. It is an umbrella term for complex social, regulatory and investor expectations for the functioning of economic operators. ESG criteria pertain to the environmental effects of business operation, corporate responses to social issues and requirements for corporate governance.

4 Clients are considered digitally active if they access their online or mobile banking user interface at least quarterly.

tomers at least one electronic payment solution as of 1 January 2021. The effects of that provision were reinforced by the introduction of the instant payments system in March 2020, making electronic payments even more user-friendly just at the right moment.

2. **The electronic alternative to paper-based private documents of full probative force to be signed by two witnesses has accelerated lending considerably.** Pieces of emergency legislation (Bógyi et al., 2023) were passed that enabled declarations of will made by clients via electronic systems to be considered private documents of full probative force, subject to appropriate safeguards. The rules applicable to electronic documents in a private law context have been established on the basis of the provisions for the financial sector in Section 46 of Act XCIX of 2021 on transitional rules related to emergencies and by amending and supplementing the E-administration Act (Act CCXXII of 2015) and Act V of 2013 on the Civil Code (hereinafter ‘the Civil Code’). Regarding the new legislative provisions, the Association advocated first and foremost that it should support sectoral digitalisation efforts by upholding competitiveness and neutral conditions for competition. In addition, it should ensure continued use of the already existing solutions of Hungarian institutions for electronic declarations of will.

The Association is of the view that government initiatives should also include an assessment of whether the requirement to make client declarations in the form of a private document of full probative force is justified in all cases and formal requirements should be relaxed accordingly.

3. **The digital services framework agreement has opened up new horizons in client relations.** A new point (q) added to Section 7(3) of Act CCXXXVII of 2013 on Credit Institutions and Financial Enterprises as of 26 December 2020 has extended the scope of activities that financial institutions are authorised to pursue on a commercial basis. It allows for the creation of a flexible platform for the provision of digital services between banks and clients which provides a secure space for communication, simplifies client identification and application processes for bank products, and also serves as a digital repository for contracts and agreements.
4. **The digitalisation of land registration procedures is expected to speed up banks’ lending processes from 2024.** The banking sector has high expectations for the entry into force of Act C of 2021 on the Land Registry, which may reduce the time and costs of mortgage lending processes once automatic decision-making is generally applied. The new procedure requires extensive

preparations on the side of banks. The procedure can be deemed successful if it offers advantages also to clients over the current paper-based procedure, making mortgage application and lending cheaper, simpler and faster.

- 5. Property valuation using statistical models is now available also for new loans.** As a result, more time-consuming on-site valuation is required less often, and clients can be informed precisely about the value of their property and the loan amount they can apply for right at the beginning of the process. For typical residential property meeting pre-defined criteria and being involved a high number of transactions, on-site inspection can be replaced by statistical methods as the basis of appraisal, reducing the number of time-consuming on-site valuation procedures. The two-year period that has passed since the extension of the scope of application of statistical property valuation methods to new loans provided proof that the provisions laid down in the Ministerial Decree and the 2021 MNB recommendation (MNB, 15/2021) ensured the prudent introduction of the new service and form a sound basis for including other types of real property in statistical valuation.
- 6. Simplification of the involvement of public notaries under family support schemes.** The amendment to Decree No 22/2018 of the Minister of Justice on notarial fees, published on 31 December 2020, introduced a uniform unilateral declaration of commitment form, to be used under family support schemes. The form simplified the task of public notaries as the unilateral declaration of commitment is to be prepared with the statutory content by banks. By easing the administrative burden on public notaries, the amendment reduced the costs of clients as well. Questions regarding the practical application of the form have been clarified by now, and the practice of notaries as well as banks have become more coherent. Based on that positive experience, the Association supports the government objective to extend the scope of application of the form even further.
- 7. Comprehensive cooperation for the security of digital finance under the KiberPajzs (CyberShield) Programme.** Digitalisation offers apparent advantages in numerous areas of life, but it is not without (sometimes substantial) risk. To raise awareness of the new threats accompanying digitalisation, the Association and MNB have launched an educational and communications programme in 2022 in cooperation with the National Media and Information Communications Authority (NMHH), the National Cyber Security Institute of the Special Service for National Security and the National Police Headquarters (ORFK). It has become a public programme with the Ministry of

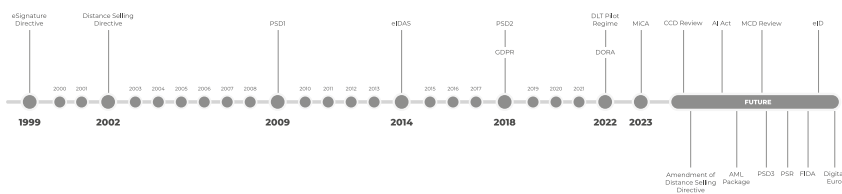
Justice, the Hungarian Financial Arbitration Board, the Supervisory Authority of Regulated Activities (SzTFH), the Ministry for Economic Development and the Hungarian State Treasury (MÁK) joining later. Under the initiative, the participating institutions and market operators have implemented a comprehensive educational and communications programme to promote responsible digital finance among the population. The campaign calls attention to the importance of Internet user awareness, privacy and having basic knowledge of digital security, allowing clients to protect their assets also in the online space.

Additional priorities of the programme are the analysis of trends and developments concerning cybersecurity in the public and private sector, and knowledge transfer with a view to maximising the strength and efficiency of cybersecurity in finance.

HOW DIGITALISATION IN BANKING IS AFFECTED BY EU LEGISLATION

EU legislation on digitalisation is gathering pace. The timeline provided below demonstrates how digitalisation as well as the regulation of digital access to banking services have become a legislative priority in recent years. Legislators put an increasing pressure not only on Member States for speedy implementation, but also on banks which have to cope with the complex and costly task of adjustment to the new requirements.

Figure 1
Timeline of EU legislation affecting digitalisation in banking



Source: authors' elaboration

Although the European Commission will set priorities for the 2024–2029 period only after the European Parliament elections of 2024, it is obvious

that several files having a major impact on banking are foreseen for the period of Hungary's EU Presidency. The most important upcoming legislative proposals are presented below briefly.

I. Payment Services Package (PSD₃, PSR)

In accordance with its objectives laid down in the digital finance package, the Commission put forward new legislative proposals in June 2023 for the revision of PSD₂ (**PSD₃**, Commission proposal 2023/0209/COD) and the adoption of a new directive on payment services (**PSR**, Commission proposal 2023/0210/COD). The proposals aim, among others, at improved protection against fraud (e.g. by stricter rules on customer authentication), broadening consumers' rights further and fine-tuning the operating conditions for open banking. Highlights of the proposals:

- **Reinforcing fraud prevention.** In addition to diverse proposals for awareness raising and Strong Customer Authentication, the proposal that provoked the most vigorous debate was that payment service providers should compensate their clients for losses incurred as a result of the criminal act of masquerading as the client's account servicing payment service provider.
- **Minimising regulatory arbitrage.** Some Member States may apply stricter rules on payment services than others, giving rise to a phenomenon called 'forum shopping', where providers choose as their 'home country' Member States where the regulatory conditions are laxer. To contain the phenomenon, part of the rules will be incorporated in the future in a Regulation instead of a Directive.

II. The Framework for Financial Data Access (FIDA)

At the same time, a new legislative proposal for a framework for financial data access (**FIDA**, Commission proposal 2023/0205/COD) was put forward to promote data sharing. The framework will define the rules of sharing clients' financial data and allows financial institutions and other data users access to a wide range of client data.

- In accordance with the proposal, financial institutions must create an easily accessible online interface (financial data access permission dashboard) informing clients in a clear and transparent manner about the respective data permissions given to external providers. The interface should enable clients to withdraw permissions without limitation or to grant new ones.

- Financial institutions must join a self-regulated financial data sharing scheme, the conditions of which are to be specified by the participants subject to the criteria laid down in the FIDA Regulation.
- Financial institutions are granted the right to transfer data to external operators for a fee. Hungarian banks have proposed to include the services currently provided under the PSD2 among the services offered for a fee.
- One of the legislative objectives pursued by FIDA is to establish a European Financial Data Space which would enable more innovative and personalised financial products and services (e.g. financial services tailored to the sustainable finance needs of clients or automated credit rating that may facilitate access to finance for SMEs).

III. Regulation on artificial intelligence (the ‘AI Act’)

Due to its expected impact on the banking sector, the regulation on artificial intelligence (hereinafter ‘AI’) should also be mentioned. The need for an appropriate common regulatory framework has been emphasised in several EU documents (Communication from the Commission, 2018; Ethics Guidelines, 2018; White Paper, 2020). The Commission’s 2021 legislative proposal specifies a set of rules based on a risk-based approach, directly applicable in all Member States. Although tripartite discussion is under way at the time of writing this overview, the banking sector will certainly have much to do after the adoption of the proposal if we consider only the strict criteria to be met in respect of high-risk AI-systems (e.g. banks’ credit rating systems).

IV. The digital euro

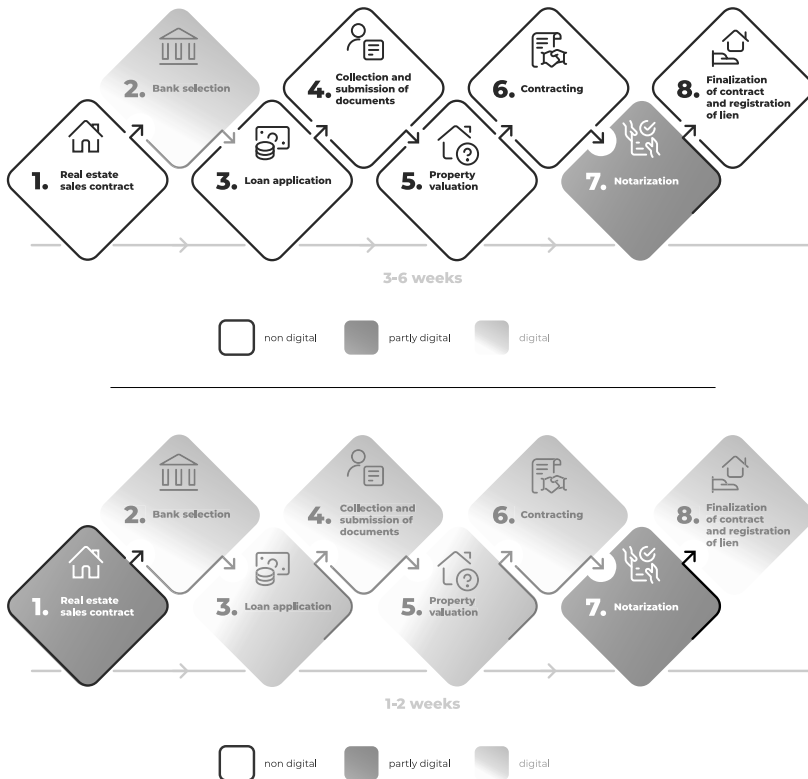
The package of legislative proposals for a central bank digital currency (Commission proposal 2023/0212/COD), put forward in June 2023, aims at establishing the digital euro issued by the European Central Bank and the central banks of Member States whose currency is the euro, and making it available to the general public. In addition to laying down a regulatory framework for the establishment, issuance, distribution and technical features of the digital euro – including privacy considerations and links to anti-money laundering rules – it also includes specific rules for payment service providers established in non-euro area Member States.

In the second section of our study, we discuss proposals for improving the efficiency of the mortgage loan application process.

3 MORTGAGE APPLICATION IN 15 MINUTES? OR THE RECIPE FOR WORD-CLASS MORTGAGE LOAN APPLICATIONS

As a result of the legislative measures presented in the first section, mortgage application and lending processes in Hungary have become much more efficient recently. The average turnaround time of 45 days formerly can now be reduced to 15 days.

Figure 2
Flowcharts of the former and the current mortgage process



Source: authors' elaboration

The improvement is indeed significant, but in the age of instant payments and non-stop online shopping 15 days is still a long time. The question arises: how much shorter the mortgage process could technically be? What is the minimum time required for a client, who is already well-informed about the available mortgage loan products of the bank and familiar with the fair banking regulations to receive the bank's binding offer and the draft loan agreement? We started by claiming that after the property sales contract is signed and countersigned by an attorney-at-law in a standard mortgage loan application process, the bank's binding offer could land almost immediately in the digital mailbox.

Let's take a closer look at the four main components of that claim.

- 1) Why the disclaimer that a standard mortgage loan application process is concerned?
 - 2) When does the turnaround time of a mortgage loan application matter to clients?
 - 3) From when and until when should the turnaround time run?
 - 4) And most importantly, what would make virtually instant mortgage loan applications possible?
- 1) *Why is it made explicit that a standard mortgage loan application process is concerned?*

The reason why we investigate the turnaround time of standard mortgage loan application processes in our study is that, in practice, property loan transactions cannot be expected to become any quicker in some cases because of the extra tasks related to collateralisation or the specific income situation of debtors. In case of issues concerning property title, the application should evidently be rejected. For example, when rights of use to undivided common property are not set out clearly in an agreement on shared use, a loan cannot be granted for only part of the property under a standard procedure. Another case when the offer cannot be sent out immediately is when state support is linked to the mortgage loan and on-site inspection is required. Therefore, we take a simple – or to use industry terminology, a 'plain vanilla' – mortgage loan application as a basis, to be extended to the applicant for the purchase of 100% ownership interest in an existing property, partly from own funds and partly from a loan. We will analyse below the turnaround time of such a standard mortgage loan application, where all of the following conditions are met (and, ideally, banks run an AI-assisted check on the contents of the property sales contract):

- the purpose of the loan is the purchase of used residential property;

- the legislation currently in force permits appraisal of the market and mortgage lending value of the property by statistical methods (typically for apartments of an average value situated in more sought-after neighbourhoods);
- the client applies for only one mortgage loan at market rate;
- not more than two adult debtors of full legal capacity, speaking Hungarian and receiving their income from employment in Hungary only, and no other party will be included in the contract;
- the loan is secured against one real property;
- the applicants will be the exclusive owners of the property to be purchased, it is free from usufruct rights and the only marginal note on the abstract of title concerns the sale, and no other party will be involved in the legal relationship apart from the applicants who are also the mortgagors.

For the optimum operation of the market of mortgage loans, at least half of the transactions should meet the criteria listed above.

Our hypothetical minimum turnaround time of standard mortgage loan applications does not include the personal consultations needed to clarify questions prior to and during the application process. As level of information on bank products and financial literacy varies from client to client, the authors believe that in-person consultation and advice at bank branches will not lose their role as a form of consumer protection and guarantee even in the age of digital processes.

2) *When does the turnaround time of a mortgage loan application matter to clients?*

Clients may need a quick response from banks to their application in the following three cases:

- a) to general queries on whether it would be possible for them to buy a property of average characteristics from the income they earn and bank assistance;
- b) to queries on whether they could take out a mortgage loan for a specific real property, and if yes, what would be the loan amount;
- c) if they want to know after the conclusion of the sales contract if their application based on prior needs is likely to be accepted or not.

Our study is concerned with the turnaround time in the third case, i.e. when the underlying contract has already been concluded, as it is the most complex. For example, in the case of general queries, property valuation is not part of the process, and turnaround time will accordingly be shorter. It is only logi-

cal that once an instant response is ensured in the most complex situation, it should be available in less complex ones, too.

3) *From when and until when should the turnaround time run?*

We have indicated in the previous subsection that the starting point is the date of the property sales contract, i.e. when it is signed by the client as buyer and countersigned by an attorney-at-law. However, the end of the lending process does not depend on how long digital processes take, as the last step in which banks play a decisive role is the transmission of the draft contract on the binding offer to the client. That step is followed by several others in the mortgage process, mainly for the protection of consumers.

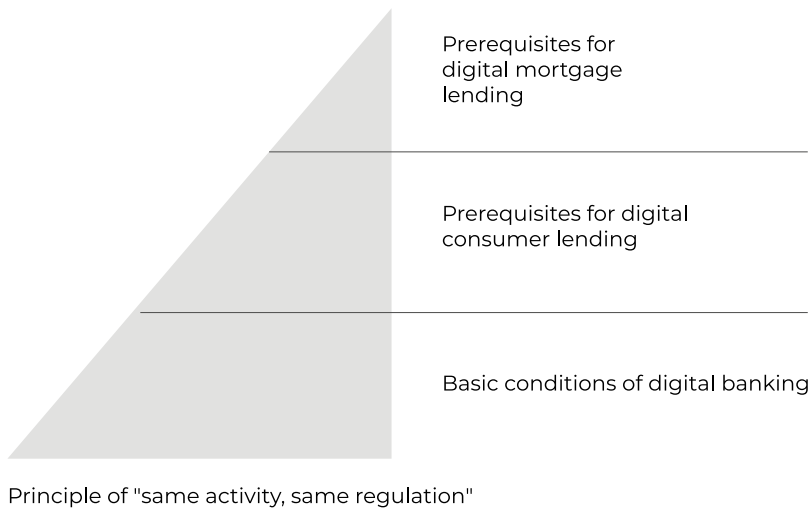
- a) The Mortgage Credit Directive of the EU provides that Member States must specify a 'reflection period' to clients prior to the acceptance of the offer, which entails a delay. Hungary has specified three days for reflection in its national legislation. Nevertheless, this measure, having consumer protection as its main objective, is not regarded as an obstacle to our digitalisation proposals. It is justified for the legislator to provide clients with sufficient time to consider if they really wish to take out the mortgage loan specified in the offer. Our proposals are directed at reducing the administrative burdens of the parties rather than at cutting the time available to clients for reflection.
- b) Mortgage credit insurance: Banks may require debtors to take out a mortgage credit insurance policy that covers at least the loan amount and its fees as a precondition to disbursing the loan. The investigation of how much time that takes could be the subject of another study and is not discussed here.
- c) Then, the client and the bank conclude the mortgage agreement. At this step, the client's availability for contract conclusion is an important factor. Some are more flexible, while others may be in a situation which prevents them from signing immediately.
- d) Clients commit themselves to the agreement before a public notary. Here, availability of the public notary is also a factor to consider.
- e) Disbursement: if the conditions are met, the time required for this closing step depends again on the bank and the payment terms agreed by the parties in the sales contract. However, for the same reasons described above, we did not take this step into account in determining the turnaround time.

4) *What would make virtually instant mortgage loan applications possible?*

To arrive at the most efficient process, it is useful to look at the mortgage application process stepwise, and to identify in each step if there are superfluous tasks, if the relevant documents could be consolidated, and if there is a possibility for digitalisation and further streamlining. The overview of the lending process and the transformation of discrete steps should start from the basis. Just as the portfolio building of bank products goes from simple to more complex, also in the case of lending, an end-to-end digital mortgage lending process will only be possible if the basis for digital access to the underlying banking services is laid first.

To explore the feasibility of mortgage loan applications at a record speed, we approach the digitalisation of bank processes along the threefold division below.

Figure 3
The system of digitalising bank processes

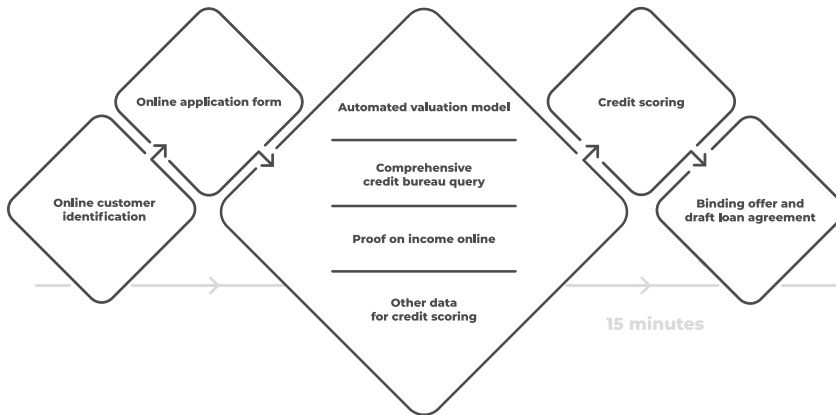


Source: authors' elaboration

'Same regulation for the same activity' is a basic tenet also in this case, as it provides a sound basis for the successive levels of digitalisation. The regulatory and supervisory environment is decisive for successful digitalisation in banking. If regulators are softer on FinTech/BigTech entities than on traditional financial institutions, the process can only be implemented at the cost of unfair conditions of competition and disproportionately high risks to consumers (World Bank, 2021).

Below is a compilation of international good practices and domestic initiatives that could be models for the creation of not simply a regionally competitive but a world-class mortgage process.

Figure 4
Flowchart of an ideal mortgage loan application process



Source: authors' elaboration

- Unsurprisingly, the process starts from the bottom of the pyramid (**Proposal 1**): the client must be identified – of course – online with a quick and presumably mobile banking procedure. The client can realistically choose in 15 minutes which mortgage loan offers the best conditions for them.
- To accelerate selection from the available mortgage loan products, uniform contract terms should be adopted at sector level for standard loans, ensured among others by the common authentic public register mentioned in **Proposal 10**.
- The electronic real property register (**Proposal 8**) would also make it unnecessary for clients to enter information on the property manually, and the scoring system of the bank could easily identify the property by entering a single information, or in the best case retrieve the data directly from the property register.
- **Proposals 5, 6 and 7** are required for swift and automated decision-making. Banks could retrieve the income and other repayment information of an already identified client real-time – the client's consent could be obtained easily through the mobile banking interface – and run an automatic credit scoring.

In this study, instant scoring is reserved for standard loan applications. In practice, there are often more complicated cases where speed is not the most important factor.

- Wider application of statistical property valuation methods and access to energy efficiency data (**Proposals 9** and **11**) would speed up loan security valuation and would promote green lending.
- Concluding contracts electronically (**Proposal 3**) is a possibility that is more likely to become widespread first in the case of contracts for other bank products. However, after the new procedure of real property registration becomes applicable in 2024, the electronic signing of declarations required for mortgage loan applications will become more prevalent.
- During the term of the loan, client experience can be improved by **Proposals 2** and **4**: clients would have it easier if they no longer had to notify changes in their data (Proposal 2), and paper-based correspondence could also be replaced by electronic messages, which are not only greener but also easier to store and retrieve.

Devoting increased attention to fraud prevention, data protection and information security aspects is a general principle and requirement for the process steps outlined above. This is already ensured in the banking sector by advanced fraud-detection systems, internal lines of defence and solutions for Strong Customer Authentication.

In preparation for this study, we have researched country-specific lending practices and innovative solutions already in use in other credit markets that could contribute to the implementation of an optimum mortgage loan application process. Among international good practices, we also discuss further examples from the EU. We wish to express our special thanks to McKinsey & Company for their expert assistance in the preparations and major contribution to the collection and analysis of those examples. The results of our research show that Northern European countries and the Baltic States are the frontrunners in digital banking services, while Western and Central Eastern European countries are sluggish followers rather than trendsetters.

To illustrate the gap between countries' processes, in certain countries, clients are required to provide data, approve declarations and perform clicks more than two dozen times for online personal loan application and disbursement, while in other countries, existing-to-bank clients may arrive at loan disbursement by less than half a dozen clicks after signing in to their online banking interface. The basis for the latter, much simpler process are not less prudent lending terms, but mainly the use of integrated national databases allowing for more efficient client

identification and wide access to other databases assisting credit scoring. That difference in process efficiency illustrates well that significant efficiency gains can be achieved by unlocking the full potential of digitalisation and the parallel fine-tuning of the lending process.

4 PROPOSALS

4.1 Level 1 – conditions of access to banking services, the basics

1) An efficient and free client identification and customer due diligence process should be established

There have been positive developments in customer due diligence and client identification in Hungary recently. Act LIII of 2017 on Preventing and Combating Money Laundering and Terrorist Financing (the new ‘Money Laundering Act’) and the MNB Decree laying down specific anti-money laundering rules for the financial sector⁵ have made the application of several innovative solutions possible which can be used for the remote identification of clients, in addition to ones requiring the presence of clients. Direct identification via an audited electronic communications equipment (the so-called ‘videobank’) has been supplemented by novel solutions for indirect client identification based on international models, including selfie identity verification (Szegefű, 2020). These new solutions may be assisted also by reading the storage unit integrated into new Hungarian identity cards and passports by NFC-enabled mobile devices.

A regulatory measure regarded especially useful by the banking sector was the entry into force of Section 42/B of Act CCXXII of 2015 on the General Rules on Electronic Administration and Trust Services (the ‘e-Administration Act’) on 1 January 2022. The provision made available government identification services (the Central Identification Agent (KAÜ) service, the Data Link Register, the Central Government Service Bus (KKSZB)) free of charge to financial institutions performing a public duty in combating money-laundering for the purpose of due diligence under the Anti-Money Laundering Act. The scope of application of that provision could be extended further, and thereby the efficiency of the bank pro-

⁵ MNB Decree No 26/2020 of 25 August 2020 on the detailed rules concerning the implementation of the Act on the Prevention and Combating of Money Laundering and Terrorist Financing, as applicable to service providers supervised by the MNB, and concerning the minimum requirements for the development and operation of the screening system under the Act on the Implementation of Restrictive Measures Imposed by the European Union and the UN Security Council Relating to Liquid Assets and Other Financial Interests

cedure and client experience could be enhanced, if financial institutions could also use strong client authentication under Act LXXXV of 2009 on the Pursuit of the Business of Payment Services (the ‘Payment Services Act’) in addition to the Central Identification Agent for the identification of clients under the due diligence process. If that solution would be available, client identification could be performed on the bank’s interface, embedded in the administrative process.

Banking could be even more competitive and customer-friendly if comprehensive central client identification, already implemented successfully in several countries, could be applied also in Hungary. The Ukrainian and Scandinavian models presented among international good practices below could provide a good basis.

International good practices

Regarding digital progress in the neighbouring countries, we should mention the significant achievements in Ukraine in recent years, partly implemented out of necessity due to COVID-19 and subsequently by the pitiful Russian invasion. The government of Ukraine launched its next-generation e-government portal, the Diia in 2019 (Motkin, 2023). After further developments to the portal, it now enables Ukrainian citizens to run their administrative errands with the authorities fully digitally. Ukrainian citizens no longer have to carry around their official documents in hard copy. Instead, they can present their fully credible identification data and other official documents from the integrated systems – altogether 12 documents – for verification on their smartphones by scanning a unique QR-code generated by the Diia application. In addition to the comprehensive administrative service provided to the population, including fully digital instant access for parents to the official documents of their newborn child, the portal also offers a fully digital process for setting up businesses.

Of EU Member State’s in Hungary’s vicinity, the e-government solution implemented by Bulgaria should be highlighted. Although Bulgaria was at the rear end of the Digital Economy and Society Index monitored by the European Commission among Member States of the European Union in 2022 (based on 2021 data), the country has recently reached important digitalisation milestones by the implementation of the Registry Information Exchange System (or RegiX)⁶. The system integrates the database of sixty-two different administrative bodies in Bulgaria, which enables au-

6 <https://info-regix.egov.bg/public>

automatic transmission of client data between these bodies, and ‘single data entry’ has become a reality for clients.

Both Ukraine’s Diia and Bulgaria’s RegiX facilitate the creation of digital client pathways to financial services considerably, since local financial institutions can access the digitally available – and reasonably required – personal data of clients, subject to their prior consent. After successful identification, clients’ data such as biographical information, address, marital status, shareholdings, and in Ukraine also their digital ID, can be retrieved by financial institutions easily and free of charge by automatic data transfer from the above-mentioned authentic public registers.

In Norway, Sweden and Finland, a common solution called ‘BankID’⁷ supports citizens in their administrative affairs. This solution is QR-based just like the Ukrainian system and was designed to comply with the requirements laid down in the eIDAS Regulation. It can be used for client identification as well as for qualified electronic signatures. The solution was established in all three countries as a result of interbank-cooperation and has become by now the most widespread identification and e-signature solution for accessing electronic public services. BankID is very popular with the public – virtually every natural person with a link to a bank uses it, and financial institutions also assist prospective users in setting up their BankID.

The most widespread solution in Denmark is MitID⁸ which ensures secure identification through a dedicated application.

Estonia is generally viewed as a pioneer in digital citizenship. The first steps in the so called e-Stonia⁹ programme date back to the last decade of the 20th century, when the first digital banking services were introduced in 1996. This gave further impetus to the establishment of e-administration and built up trust for the introduction of digital citizenship. The compulsory eID and electronic signature service rolled out in 2002 is used by 98% of the adult population. According to Estonian estimates, savings on the electronic signature solution alone amount to 2% of the GDP. Lithuania has established a system similar to the Estonian one, allowing for the signature of contracts with the eID issued by the government.

⁷ <https://www.bankid.no/en/privte/>; <https://www.bankid.com/en>

⁸ <https://www.mitid.dk/en-gb/>

⁹ <https://e-estonia.com/story/>

The two other Baltic states, Latvia and Lithuania are in the frontline of digital citizenship. The regional market of identification services was entered not only by governments but also by private sector providers. The solutions Mobile-ID¹⁰ and Smart-ID¹¹ are also used by a large share of the population.

In Belgium, citizens can use the solution ‘It’s Me’¹² for secure identification and electronic signatures.

A common feature of all the solutions described above is that they were designed not only with technological considerations but also with user experience and ease of use in mind.

2) Tracking changes in clients’ data should be simplified

Keeping contact with clients is usually impeded by a failure of a significant share of clients to notify changes in their data provided earlier. The introduction of the Data Change Management Service (AVSZ)¹³ already in use at telecommunications companies and providers of public utilities – or an equivalent opt-out government service – into the financial sector would help keeping track of changes in clients’ data.

International good practices

Banks operating in Finland can update their clients’ data by mass data transmissions from the Digital and Population Data Services Agency (DDV)¹⁴. Client consent is not required for the service, but clients may opt-out any time if they do not wish banks they are in a contractual relationship with to be notified automatically of their current data by making a declaration to that effect.

10 <https://www.mobile-id.lt/en/for-businesses/>

11 <https://www.skidsolutions.eu/services/smart-id/>

12 <https://www.itsme-id.com/en-BE>

13 Chapter 6 of Act XXII of 2022 on Certain Issues Relating to the Operation of Territorial Public Administration and Amending Certain Acts in the Context of the 11th Amendment to the Fundamental Law of Hungary

14 <https://dvv.fi/en>

3) **Electronic contracts and electronic signatures are the cornerstones of digital citizenship**

Analysing DESI results, it can be established that using the achievements of digital citizenship for managing private and public administrative matters and being a trendsetter are the success factors for countries who want to stay competitive in a changing global economic setting. Hungary has made significant steps forward with its digital public services available through the Client Gate portal. The objectives laid down in the National Digital Citizenship Programme, approved by the Government and coordinated by the Digital Hungary Agency, and the National Strategy for Electronic Public Administration¹⁵ converge with the digital ambitions of the banking sector. One of the aims of the Programme is to implement a digital wallet which can be used for digital identity verification and for signing declarations of will electronically through a mobile application. The objective can be further supported by making digital identity verification and electronic signatures automatically available to all Hungarian citizens as a free public service. In this respect, the Association proposed – in line with domestic and international good practices – that the electronic wallet to be implemented under the digital citizenship agenda should be accessible to all Hungarian citizens automatically, without the need for any administrative steps on their part. It is also proposed that the prospective electronic signature solution should preferably be mobile and cloud-based, and no separate device (e.g. a card reader) should be needed for using it.

In addition to the alternatives provided to clients for electronic signature, the electronic signature solutions of financial institutions should also be reviewed as prerequisites for customisable and non-stop lending. For simple off-the-shelf online loan products available on a 24/7 basis, signing in person by company representatives is not a viable option, but the banking sector considers the electronic seal under the eIDAS Regulation suitable for that purpose.

Furthermore, while the proposed measures are approached primarily from the perspective of retail lending, improving the digital competences of small and medium-sized enterprises (or SMEs) would also deserve special attention as a key to making Hungary's economy more competitive. The fact that Hungarian SMEs are at the bottom range of the Digital Intensity Index (2022), a component indicator in the 2023 DESI, makes that need all the more evident.

15 <https://www.dmu.gov.hu/documents/prod/Nemzeti-Elektronikus-Ko--zigazgata--si-Strategia-2022-2030.pdf>

International good practices

Estonia, Latvia and the Scandinavian countries using BankID that were highlighted in relation to digital identification also implemented forward-looking mobile solution for electronic signatures.

Belgium's above-mentioned 'It's Me' mobile application – the brainchild of banks and telecommunications companies – is suitable for electronic signatures in addition to digital identity verification. Contracts for the use of banking services may be concluded via the internet banking/mobile banking interface up to a certain contract amount, while contracts of a higher amount are signed through 'It's Me'.

4) Paper-based communication should be gradually replaced by digital channels

Current communications between financial institutions and clients in postal letters with advice of delivery should go digital and continue on the authenticated electronic channels of financial institutions. When necessary, this could be supplemented by additional means of communication, such as interactions between Company Gate–Client Gate or Client Gate–Client Gate electronic mailboxes. In principle, that option is already available if the financial institution sets up its own Official Gate, however, it would be important to first lay down rules of delivery (delivery presumptions) for these kinds of communications as well, similar to government–citizen interactions which the law already provides for.

International good practices

A good model for digital client information is provided by Slovenia, where financial institutions can send contracts, regular and *ad hoc* information letters (e.g. amendments to conditions) to clients to the file storage of the client's internet or mobile banking account in the case of most bank products and services. In this solution, automatic system notifications are sent about the delivery and reading of documents. Moreover, a simplified version of the solution is available also to clients who do not have a digital banking contract, making paper-based communication obsolete.

In Scandinavia, most communications are delivered to citizens' digital mailboxes provided by Digipost¹⁶ (Norway), e-Boks (Sweden and Denmark), Kivra¹⁷ (Sweden) or OmaPosti¹⁸ (Finland). To promote digitalization, paper-based correspondence is still available, but priced higher.

4.2 Level 2 – the prerequisites for digital consumer lending

5) Access to real-time income databases should be ensured

In order for banks to provide a loan offer that is best suited to the risk profiles of clients, precise knowledge of the borrower's real income data is indispensable. Obtaining and verifying the employer's salary certificate means a lengthy multi-stage paper-based administrative process for both clients and banks. Therefore, the Income Information System (JIR) established by MNB, the National Tax and Customs Administration (NTCA) and BISZ Zrt. was acclaimed by the banking sector as a significant innovation. The service, which is available since February 2022, allows clients with a Client Gate account to request the compilation and transmission of their income data to the designated financial institutions in a paperless process on the NTCA's website.

Application of the JIR may be further improved by the following proposals:

- a) Clients have to use their Client Gate account to submit the income certification request to the NTCA, and it is also here that they receive the data for verification and specify the recipient credit institutions. This multi-stage process may not be competitive in terms of speed with other currently used solutions (e.g. in personal loan, credit card and household loan applications) where clients can print their bank statement at home and attach it to the loan application (also electronically, using an online channel or Open API for retrieval).

Therefore, a more streamlined process similar to Central Credit Information System (KHR) retrievals should be established also for income data queries, so that credit institutions can obtain income data based on prior consent from, but no further interaction with, the client.

16 www.digipost.no/en

17 <https://kivra.se/en/private>

18 www.posti.fi/en

- b) The launching of the statement of earnings request service was indisputably a significant step towards digitalisation, but currently, credit institutions can request data from the earnings database of the NTCA only for the 12-month period ending 2 months before the date of the request. Because of the 2 months' gap, credit institutions have no information on the income situation of the client at the time of application, which makes scoring problematic. Moreover, the statement does not reveal if the client's employment has been terminated in the meantime. The missing data are collected and verified by banks by direct request to the employers. To the extent possible, the database should contain the most up-to-date data informing of the current situation.
- c) Data on the income of entrepreneurs cannot be requested from the system. We recommend including these in the scope of accessible information so that data on the net income of entrepreneurs can be shared with banks.
- d) Another highly relevant information for scoring is whether the employment relationship is for a definite or an indefinite term. The request form should be revised to include these data in the statement of earnings.

The Verify¹⁹ application, created by Hungarian developers, could be a solution for the deficiencies highlighted above. Using the application, workers whose employer has registered in the system can share their employer's salary certificate with just a few clicks. Use of the service is currently limited by the requirement of employer registration. Banks would actually benefit from a solution combining the features of the JIR and Verify.

International good practices

In Romania, retail clients need only their IDs to apply for a loan since 2015. They do not even have to present a salary certificate from their employer. This is possible because financial institutions can access – subject to clients' prior consent – the real-time income database of the tax authority (ANAF) and consult data two years back. The database also includes information on the clients' employers for the two year period preceding the query. A similar service is provided to financial institutions in Bulgaria by the National Social Security Institute (NSSI). As a difference, requesting banks can obtain the full employment history of clients, which can facilitate well-founded creditworthiness decisions.

¹⁹ <https://www.salarify.hu/verify>

Open banking is of course another possible means available to banks for establishing the income and creditworthiness of new-to-bank clients by accessing their transaction history. As an example, in 2022, the European open banking platform Tink launched a fee-based service for banks operating, among others, in the United Kingdom for the instant verification of their clients' income, if the client consents.

In Norway, Sweden and Finland, income after taxes data for the previous year are publicly available. However, real-time income data requests are not permitted. Banks in Sweden often obtain client income data from the credit informations company Upplysningscentralen²⁰. Clients are not necessarily asked to submit a salary certificate for the assessment of their credit application.

6) Scoring should be supported by more extensive data

As a result of the changing preference for online shopping and stricter regulations for banks, today, FinTech and BigTech companies have more extensive and more detailed data on their customer's payment behaviour than banks have access to, and may therefore set up scoring processes of superior accuracy (Buchak et al., 2018). Access to a wider range of data would not only be beneficial for competition with cross-border service providers, but would also provide banks a more accurate picture of the client's risk profile, based on which they could offer more personalised and generally cheaper loans. Already in earlier studies, the Association called for the extension of the scope of accessible data sources required for the assessment of client's payment discipline, e.g. arrears on utility bills. We continue to consider such an extension expedient. However, the necessary regulatory steps should go hand in hand with a data protection framework ensuring the prudent use of new data sources.

International good practices

We can identify good examples in several neighbouring countries for additional data sources going beyond borrowing from financial institutions, which may contribute to more efficient credit decisions.

²⁰ <https://www.uc.se/>; <https://www.uc.se/om-uc/vara-kallor/>

In addition to Czechia where such databases have been used for a long while, Bulgaria's already discussed e-government solution RegiX provides access also to information on debts to public bodies (e.g. unpaid taxes) or legal proceedings against clients. The SISBON system²¹ in Slovenia also contains data on legal actions and bankruptcy proceedings, as well as on short term loans provided by telecommunications companies – typically for mobile phone purchases – in addition to data on borrowings from financial institutions. The latter kind of information is available in the credit information system of Serbia, too.

Of the excellent solutions found in Western Europe, special mention should be made of Germany's credit information system SCHUFA²². It comprises data not only from financial institutions but also from insurance, energy and telecommunications companies in addition to repayment histories from the e-commerce sector for about 68 million retail and 6 million commercial clients, so that banks and non-bank creditors can rely on a comprehensive view of the applicant for their credit decisions.

7) A mandatory positive central credit information system should be introduced and the scope of accessible data fine-tuned

As currently clients can provide access to their positive data in the KHR on a voluntary basis, creditors may lack transparency about the monthly debt service of their clients. By allowing applicants to choose freely whether financial institutions can have access to data on their debt obligations, the prudent application of debt service-to-income ratio regulations is put to jeopardy. Introducing compulsory and public access to positive credit information would support economic growth and would make Hungary more competitive on the international stage by expediting the administration of loans and through the benefits offered by more precise risk assessment (Béres–Grosz, 2016).

In addition to mandatory positive credit information, a further means by which banks' risks could be mitigated is by granting them continuous access to all the data needed for contacting clients (not only their address, but also their phone number and e-mail address), even in the event of default. Consequently, credit institutions should be allowed to process contact data on a compulsory basis even after the termination of the loan agreement.

21 <https://sisbon.si/o-sistemu-sisbon/>

22 <https://www.schufa.de/schufa-en/about-us/company/how-schufa-works/>

International good practices

Slovenia's central credit information system SISBON provides a positive list of retail debtors to financial service providers for the purpose of credit scoring. SISBIZ offers the same functionality for commercial clients. Therefore, it is not possible that interested financial institutions only see negative data in respect of a client if consent to the transmission of their data to other financial institutions has been refused. A mandatory positive debtor list would not only reduce the number of declarations requested by the client during the loan approval process – improving the quality of clients' pathway to the loan – but would also aid financial institutions in assessing the creditworthiness of applicants more efficiently by having full access to their positive credit data.

In Germany, access to positive data is already ensured by the SCHUFA system, in Finland the positive credit data register has been implemented recently, while Estonia plans to launch its own positive credit data service in 2024/25.

Based on the example of Norway, Sweden, Germany and other neighbouring countries, it should also be considered to provide financial institutions broader access to negative data, which is now limited to more than 90 days continuous default on debt exceeding the minimum wage. In this respect, we should mention Serbia as an example, where transactions overdue for 60 days can be accessed irrespective of the outstanding amount, and Romania, where two credit information systems are available – a mandatory public system and a private one set up by the country's financial institutions – from which practically all late payments of any amount can be retrieved by the stakeholders.

The credit information system in place in Slovakia comprises data not only on disbursed loans but also on loan applications. A similar extension to the scope of available data would potentially improve the accuracy of credit scoring systems in Hungary, too.

4.3 Level 3 – the prerequisites for sustainable digital mortgages

8) Optimum use of the new electronic real property registration process, as proposed by the Association

The new Act C of 2021 on the Land Registry is planned to enter into force in 2024. Automated decision-making as part of the new electronic process which is to replace current paper-based administration may achieve a breakthrough in property registration if it actually reduces the time required for mortgage registration – which is now a lengthier process – to only a few seconds. Nevertheless, the regulation in its current form would require additional resources from banks as it provides for the mandatory inclusion of a legal representative in the mortgage registration procedure, while currently signature by a bank employee suffices for the submission of the registration request. That implies new administrative steps and greater costs in the internal processes of banks. Therefore, the procedure should not only be faster but also cheaper to compensate for the extra work it imposes on bank employees, who will practically take over the tasks formerly performed by the staff of land registry offices. It should therefore be considered to keep the arrangements specified in the current Act on the Land Registry in respect of requests for mortgage registration and cancellation, so that the designated employees of credit institutions could continue to submit them in the electronic system, without the inclusion of a legal representative.

If the inclusion of a legal representative, i.e. an in-house counsel registered with the Hungarian Bar Association is required, we propose that public notaries should be allowed to act alternatively as legal representatives in registering a mortgage or a prohibition of alienation and encumbrance on the property.

Granting that option to credit institutions would allow them to decide according to their operating models whether they use a legal counsel from their own resources or involve a public notary for mortgage registration procedures.

International good practices

Electronic land registration is already adopted in Norway, Denmark and Sweden, while Finland is going to launch it in parallel with Hungary.

In Denmark, rights and facts relating to real property are registered, updated and deleted in the digital property registration system Tinglysning²³.

23 <https://www.tinglysning.dk/tinglysning/landingpage/landingpage.xhtml>

In England, administrative matters related to real property can be handled digitally from 2022 on the Digital Registration Service (DRS) platform²⁴. Leases and encumbrances on the property and the data of the owners can be reported and updated through the DRS.

9) Statistical models of property valuation should be applied more widely

One of the most successful legislative steps made recently towards digitalisation was the extension of the scope of application of statistical valuation methods to new loans. The regulation adopted this way in Hungary is one of the most progressive in the European Union. It did not take long for clients to endorse statistical valuation methods which offer greater speed and flexibility over the more time-consuming on-site valuation procedure. It also ensures that applicants obtain precise information about the value of their property and the loan amount they can apply for right at the beginning of the process. Despite these obvious benefits, due to its relatively strict rules of application compared to the risks involved, the solution can be applied only in a small fraction of credit transactions for now.

To extend the scope of application of the method, it is proposed to limit the exposure amount to 60% of the market value of the property at the date of application, instead of the current 60% of mortgage lending value. If the proposal would be adopted, the statutory maximum loan-to-value (LTV) ratio would still remain much higher than in the case of on-site property valuation, where the current limit – in the case of HUF-denominated loans – is set at 80% of the market value, while the scope of real property valuation with statistical methods could still be expected to grow.

In addition to the proposals above, it would be worthwhile to consider the application of statistical methods not only for apartments but also for single-family houses of equivalent properties. Furthermore, we propose to compile the list of settlements eligible for statistical valuation based on a required number of transactions.

²⁴ <https://www.gov.uk/guidance/digital-registration-service>

International good practices

Statistical valuation methods have a longer history of application in several countries, and proved to be reliable.

In most cases, the scope of application of the method is restricted (e.g. for revaluation), but in Germany, the Netherlands and Denmark the regulatory conditions are similarly progressive as in Hungary and allow for the use of statistical valuation techniques – subject to appropriate safeguards – also for valuation preceding the credit decision (EMF, 2006).

10) Immediate enforceability should be ensured relying on common authentic electronic public registers

In line with the digitalisation efforts of the Government, the possibility of establishing a digital registration system which would ensure a more time- and cost-efficient tracking of liabilities and enforcement should be reviewed. A system similar to the credit collateral register (HBNY) would be the most suitable for that purpose, and could also function as a register for loan and security agreements and letters of commitment. That would represent a completely new system compared to current, predominantly paper-based administration.

11) Free access to the energy efficiency data of real property should be ensured

Based on the DESI, Hungary ranks 24th among the 27 Member States of the EU in respect of open data access. Tapping the full potential in Hungary's abundant data assets would facilitate access to bank loans and would at the same time contribute to the economic competitiveness of Hungary.

Experience from the development of new green mortgage products and the first issue of green mortgage bonds in Hungary also underscored the importance of more efficient data management. The data available on the energy characteristics of the Hungarian stock of residential property are generally linked to individual research projects and may show significant differences according to the methodology used (*Bene et al., 2023*). Providing broader access to energy performance data than the regulations currently allow would be crucial for increasing the volume of ESG bond issuance and for encouraging green lending (*Ritter, 2021*).

To that end

- the most energy efficient 15% of the residential building stock should be determined yearly for compliance with the criteria of the EU taxonomy,

- primary energy consumption data in kWh/m²/year should be made accessible free of charge and mass data retrieval should be enabled (currently only letter grades are published on the webpage of the Lechner Knowledge Center).

Market participants' access to energy performance data is a focal point also in consultations on the ongoing revision of the energy performance of buildings directive (EPBD).

International good practices

In Sweden and Denmark, banks can access the energy performance data of real property free of charge in the state-operated databases Boverket²⁵ and Boligejer, respectively. The Spanish database went live in 2023 and at the moment contains the energy efficiency data of real property in 11 regions Energy Efficiency Database (2023).

Italy's Sistema Informativo sugli Attestati di Prestazione Energetica²⁶ provides free access to aggregated national and detailed region-level data on the energy efficiency of residential property. The database now comprises the data of more than 5 million energy performance certificates.

5 WHAT THE FUTURE MAY HOLD? A SUMMARY

As outlined above, the implementation of the digitalisation proposals presented in our study could further improve customer service at banks and make Hungary more competitive internationally. Nevertheless, technological progress and the consequent changes in consumer habits compel continuous adaptation and innovation in banking. Therefore, to conclude our study, we provide a summary below of possible future developments in lending processes.

Growing importance of personalisation and artificial intelligence. As machine learning and AI-based solutions gain ground, loan offers can become even quicker and more personalised, responding to the individual needs and risk profiles of applicants. Based on the data that can be extracted from clients' growing 'digital

²⁵ www.boligejer.dk

²⁶ <https://siape.enea.it/>

footprint’ – mainly linked to online purchases – more accurate and personalised credit scoring methods can be developed (*Agarwal et al., 2020*) that may boost financial inclusion for classes of society whose access to credit is now limited (*Berg et al., 2019*). Artificial intelligence may assume a key role also in cybersecurity. AI-based cybersecurity systems can adapt to and learn from patterns of criminal behaviour, which makes the detection and mitigation of cyberthreats more effective (*Bagó, 2023*).

The rise of innovative solutions for contract conclusion. Although the regulation currently in force permits the conclusion of mortgage loan contracts electronically – primarily for the protection of consumers – it is possible only in the presence of all involved parties at the same time and place, which means that clients must report at the bank branch at least once, as a sign of their serious intentions. If financial literacy grows in the Hungarian population, the option of concluding contracts in the online space using the channels provided by banks (e.g. videobank or internet banking interfaces) should be revisited.

Smart contracts may revolutionise lending. Integrating solutions using the blockchain technology into bank processes may reinforce the security, transparency and efficiency of mortgage loan application and disbursement. Many expect that revolutionary smart contracts will fundamentally change the way in which contracts are prepared, concluded and stored.

Smart glasses and virtual bank branches may end the hegemony of mobile devices. Artificial intelligence will inevitably penetrate financial services, too. Developments in this area are going in the direction of speech- and gesture-based communication, which may bring about a shift away from the now generally used touchscreen devices (such as smartphones, tablets and smartwatches). Many envision the proliferation AR (augmented reality)²⁷ smart glasses and VR (virtual reality)²⁸ devices in the next decade, which would fundamentally change the mode of access to banking services. Moreover, with the advent of virtual banking the role of bank branches will also have to be redefined (*The Economist, 2023*).

27 Augmented reality is the virtual (apparent) enhancement of reality which works by mapping virtual objects onto a real environment using e.g. dedicated glasses.

28 The computer-generated image or simulation of a three-dimensional space or an artificial environment that seems to react naturally to the individual actions of users using special electronic devices. Frequently employed interactive devices are helmets equipped with an inner screen and gloves with sensors.

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