OLIVER WYMAN

# DIGITAL MORTGAGE NIRVANA

## CHEAPER, BETTER, FASTER

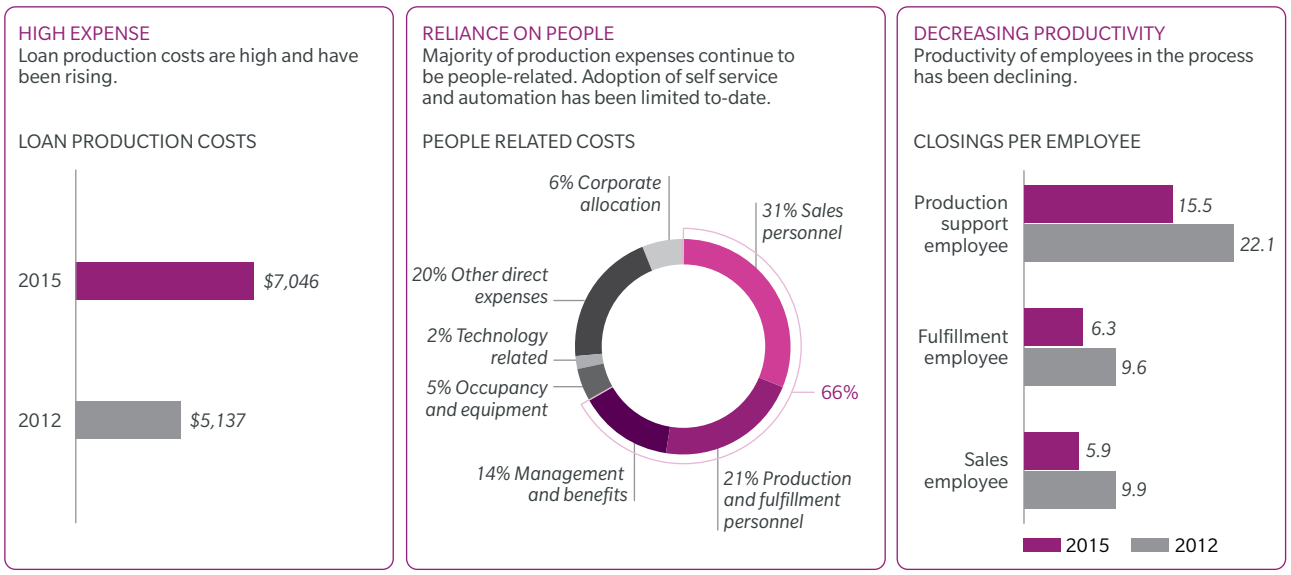
**AUTHORS**
Ahmet Hacikura, Partner
Cosimo Schiavone, Principal

Mobile food-delivery apps offer multiple status alerts when we order a $10 pizza. Shipping companies let us not only see every step in a $40 package's journey but reschedule delivery or redirect the package mid-route. Amazon's "Mayday" button lets us instantly connect with a live support agent when we can't figure out how to rent a $2.99 movie. So why do mortgage lenders think that customers are willing to wait patiently for a month or more to learn whether they will be able to finance perhaps the most significant purchase of their lives? Shouldn't borrowers expect the same level of ease, empowerment, and transparency they enjoy in their more trivial purchases?

Until recently, lenders could plausibly argue that the question was unfair – they couldn't offer better consumer experience because of the regulations that govern them, the documents they must review, the complexity of the decisions they make, and the thin profit margins they earn. Today, however, customers have had a taste of the digital mortgage experience through providers such as Quicken.

Before the financial crisis, lenders could compete based on their willingness to do riskier loans, fund growth through the private-label securitization market, and aim for efficiency through greater scale. Today, thanks to uncompromising regulation and risk-averse investors, the focus of competition is moving to sales effectiveness, customer experience, and efficiency through better technology and operations. But the steps lenders have taken so far haven't worked: mortgages are still a people-intensive business, and its people – specifically sales and fulfillment employees – are less and less productive. Cost per loan continues to rise. Digital capabilities can help reverse this trend by improving productivity and management of operational risk.

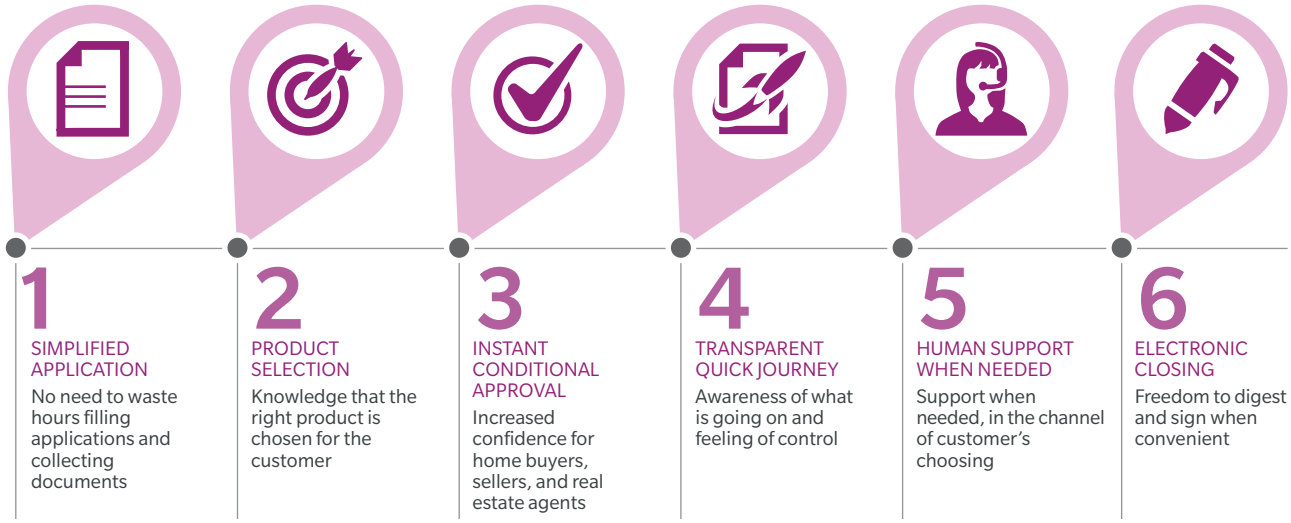
Exhibit 1: Mortgages are a people-intensive business, and the people are becoming less productive




Source: Mortgage Bankers Association

Exhibit 2: What is the digital mortgage experience like?

Digital mortgage customers are in for a reasonably painless and quick mortgage buying experience across six key steps:

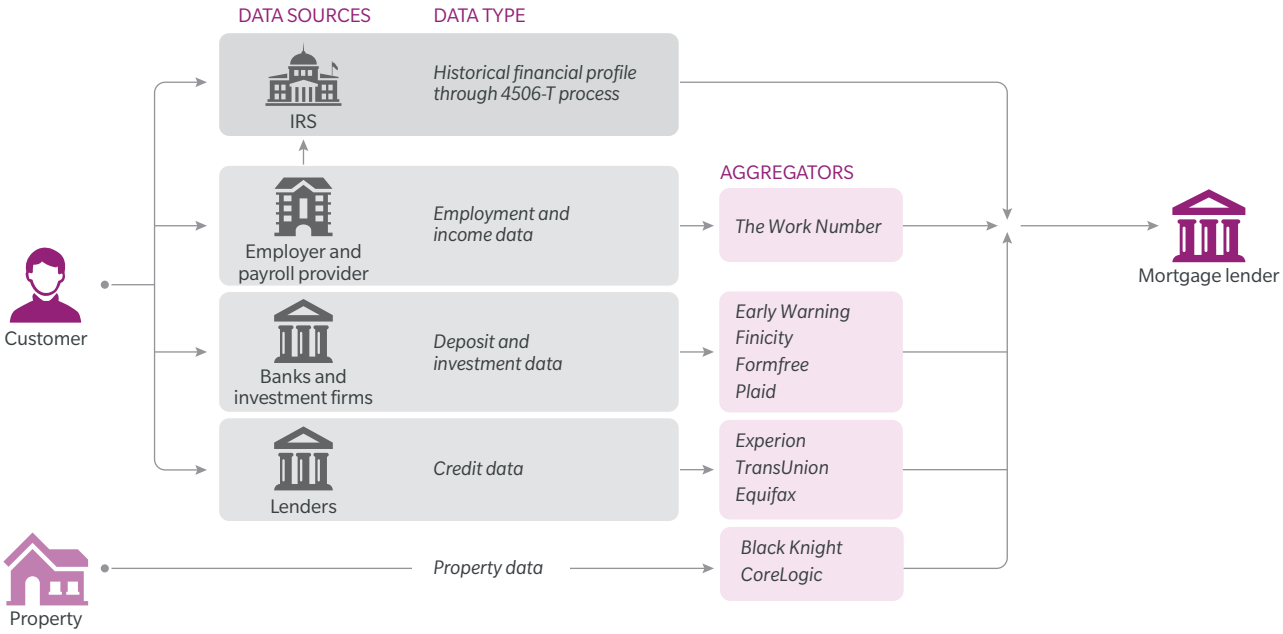



We believe digital capabilities will quickly become table stakes for mortgage lenders, especially as third-party providers emerge to offer solutions for the required capabilities, and as investors and guarantors, led by Fannie Mae and Freddie Mac, accept and encourage their use. Given today's increasing level of competition, we anticipate that digital offerings will quickly evolve to take advantage of already-available technologies in addressing hassles in the application process. (See Exhibit 2.)

## 1. SIMPLIFIED APPLICATION INTAKE

Gone are the days when the only way to properly underwrite a mortgage was with long application forms and tall stacks of documents. The digital mortgage application doesn't require much effort on the part of customers; lenders can now obtain most of the information they need through third-party data providers and aggregators. (See Exhibit 3.) For customers who want a mortgage from their principal financial institution, the data contained in customer records should make the process even simpler. In addition to increased customer convenience, lenders get to enjoy lower processing costs, higher data accuracy, and lower operational and fraud risks. Is it any surprise that both Fannie Mae and Freddie Mac accept the use of approaches that offer such an array of benefits? While this paper was being written, Fannie Mae went further

Exhibit 3: Illustrative diagram of data sources and aggregators in the US (not complete)




with its Day One Certainty program, encouraging the use of trusted-source data by providing representation and warranty relief for the accuracy of such data and calculations made using it by their automated underwriting engine Desktop Underwriter.

When customers do need to provide information, they are presented not with unwieldy forms, but with friendly user interfaces, applications broken up into digestible chunks, and status tracking capabilities to help orient customers and encourage progress. Leading lenders are continuously testing tweaks to their application interfaces to improve customer experience and pull-through.

## 2. PRODUCT RECOMMENDATION AND SELECTION ENGINE

Customers can use product recommendation and selection tools to choose the best loan option for their needs, means, and preferences. After answering a series of simple questions (loan purpose, property type, expected timeframe to keep the property, funds for down payment), they are presented with tailored options. Customers can continue down a self-directed path, or generate comparison sheets for discussion with their advisers. The benefits of these tools for lenders include increased customer confidence and a more efficient sales process.

## 3. INSTANT CONDITIONAL APPROVAL

The moment the customer submits the application, an automated engine can take over and

- aggregate, verify, and analyze information elements across the application and other online data sources;
- identify conditions that may need to be cleared before or after approval;
- provide relevant disclosures;
- conditionally approve the application and lock the rate; and
- set customer expectations about next steps and timelines.

This level of automation is possible mainly for two reasons: machine-readable income and asset data can be obtained from third-party providers and fed into automated decision engines. And current automated valuation models, though not perfect, provide a good enough estimate of property value to enable automated conditional approvals, thereby separating customer underwriting from property underwriting.

Automated approvals give customers a high degree of confidence that they can afford the property they are interested in, and a third-party "seal of approval" that they can show to home sellers and realtors. Unlike the prequalifications and preapprovals of the past, these automated approvals are based on fully validated customer financials. Surprises are uncommon, and there is less anxiety for everyone involved. Some lenders are able to complete the process within mere minutes as opposed to the days and weeks it used to take.

## 4. TRANSPARENT AND QUICK JOURNEY FROM APPROVAL TO CLOSING

After the mortgage is approved, the digital mortgage customer has a relatively brief to-do list: review the relevant disclosures, conduct an inspection, get insurance on the property, review the lender's appraisal, pay the application fee, and e-sign relevant documents. The lender, on the other hand, has plenty to do, and the process can take a few weeks. Digital lenders address customer anxiety and frustration during this period by providing transparency. This often takes the form of digital tracking tools that notify customers about progress and any steps they need to take – much the way familiar mobile apps provide updates on a package shipment or pizza delivery. The best tracking tools allow customers to get updates and respond via the channels of their choice, and even allow other anxious parties in the transaction (such as realtors) to monitor status. In providing this level of transparency and communication, lenders typically face two roadblocks:

- The principle of "garbage in, garbage out" applies here: tracking tools frustrate rather than reassure if the underlying workflow information is not reliable. And customers and loan officers are unlikely to adopt new tools if the information they provide conflicts with the information provided directly by loan processors. It may be necessary to update workflow engines before launching a tracking tool.
- Consistency of information across communication channels is key. Otherwise customers are left wondering if the left hand knows what the right hand is doing.

## 5. HUMAN SUPPORT WHEN NEEDED

Support from live agents is available for customers who would benefit from it. In addition to reacting to customer inquiries, they also reach out proactively to nudge customers forward in the process and maintain momentum. Chat and call-me buttons allow for seamless transitions from the automated process to personal support and then back. Through multichannel communications and co-browsing capabilities, the customer is left with the impression that help is always there when needed and there is no room for procrastination.

## 6. ELECTRONIC CLOSING

The process concludes with an e-closing, which saves borrowers the trouble of having to meet a closing agent in person, empowers them to review the closing documentation on their own time and address any concerns, and reduces the chances of delays caused by a last-minute error in documentation. Lenders benefit from simplified workflow, reduced costs, improved data quality, and fewer physical documents to manage and store.

# WAIT, THERE'S MORE

Aside from questionable experiments with low- and no-doc loans before the financial crisis of 2008, the mortgage experience didn't change much for a very long time. As recently as mid-2015, processors felt they were cutting-edge if they accepted a scanned attachment in an e-mail. It was a sudden leap from there to a world with digital mortgage offerings from multiple lenders. What will happen next and how quickly?

As we see it, neither the remaining hassles in the mortgage process nor the emerging technologies to address them are mysteries. We see multiple areas where innovation could take place quickly:

# 1. INCREASED AUTOMATION OF FULFILLMENT

Mortgage fulfillment consists mostly of rule-driven tasks dictated by internal and external policies (such as the rules issued by the Consumer Financial Protection Bureau); most require no application of human judgment. The typical pattern for this work is

- acquire data (for example, gather detailed income information from external data sources, customer submitted documents, IRS tax transcripts, etc.); and
- analyze the data to inform a decision (for example, calculate an income figure based on requirements around how each income component needs to be treated and then calculate a debt-to-income ratio).

Precisely describable, repeatable tasks of this sort are typically easiest to automate.

## DATA ACQUISITION TASKS

Use of third-party providers makes it simple to acquire many types of customer data, but most lenders will continue to work with customer-submitted documents either because some information (such as records of some forms of income or explanation letters from customers) are not available from third-party sources or because customers are uncomfortable providing the required permissions and credentials. "Snap and send" capabilities have helped reduce the use of paper in document management by enabling imaged workflows, but typically human processors are required to extract the relevant information from these documents and feed it into databases and workflow tools. Thanks to advances in machine learning techniques and applications (including visual document classification and attribute identification, character recognition, and adaptive learning to replicate tasks currently handled by humans), lenders will be able to use increasingly powerful algorithms in several significant ways:

- Index documents to make it easier to find the right document and know in advance what information it contains (for example, document X is a paystub and should contain data fields related to income)
- Highlight the parts of the document most relevant to the processor (for example, overlay a box to point the user to the salary number on the paystub)
- Eventually, just extract the relevant information and populate the right database and tools through straight-through processing
- Bring in human processors as needed to deal with cases where algorithms have low confidence (new or unusual document types, extracted values outside expected norms, poorly scanned documents) and to continuously monitor and improve the algorithm

These technologies are already available from a variety of providers and we expect adoption to increase, possibly once lenders implement third party data ingestion technologies and look for the next big improvement.

The challenge for lenders will be orchestrating processing across three main paths:

- Ingestion of third-party data where possible and allowed by customers
- Automated extraction and verification of data from remaining paper or scanned documents where possible and cost effective
- Human processing for the rest

The missing pieces of the puzzle are to be found in the delivery and analysis of third-party tasks such as appraisals and title checks. Many loan origination system providers and third-party service providers already allow automation of at least some of these tasks. Further automation will likely be enabled as information is standardized across the industry and API usage continues to expand.

## DATA ANALYSIS TASKS

Data analysis is further along the path to automation than data acquisition, thanks in part to advancements in tools provided by the GSEs (for automated underwriting, collateral underwriting, data verification, etc.) and rules-based workflow capabilities offered by vendors of loan origination systems. At least for conventional lending, most calculations and comparisons are currently handled automatically, and underwriters and processors typically address red flags and additional tasks highlighted by these tools and also rely on their judgment to either conduct additional assessments or to allow exceptions warranted by compensatory factors.

The next step is to aggressively review existing manual tasks to determine why they haven't been automated already, and whether they can be automated soon given available technologies and emerging possibilities created by new data acquisition methods. (For example, it is possible to automatically review the transactions in machine-readable checking account records to identify unusually large deposits and ask the customer to explain the source of funds.)

It is worth noting that as early as 1988, researchers were experimenting with use of neural network learning systems in underwriting. They reached several significant conclusions:

- After being trained on prior underwriting decisions, the systems could reach a high degree of agreement with human underwriters when analyzing previously unseen examples
- Where there were disagreements, the system classifications were more consistent with guidelines than the underwriter's judgment
- Underwriters in many cases disagreed with one another and even themselves (when presented with the same file twice), and they were inconsistent in their use of guidelines

A crude but helpful explanation for this performance difference is that systems like this rely not on a single expert, but on consensus among a panel of networks – an approach that would be costly to replicate with panels of human underwriters. These systems are also easier to build than rules-based systems. There is no need to code the thousands of rules involved in underwriting; one merely needs a rich dataset of prior loan files and underwriting decisions for the machine to learn from. Unfortunately, there are also two main challenges:

- It is not easy to precisely explain and justify decisions made on each loan without the ability to point to specific rules in the system
- As underwriting requirements change and new requirements are introduced (for example, by internal credit policy teams, investors, insurers, and guarantors), the data used for system training becomes obsolete, and further training will be needed

Given the challenges, these systems are unlikely to completely replace human underwriters anytime soon, and rule-based tools may have long lives ahead of them. Nevertheless, there are opportunities to enhance the use of human underwriters with machine learning systems, using them, for example, to classify loan files for skill-based routing, stress-test rule-based systems, or build automated second-look processes that look for disagreements between the system and human underwriters.

## 2. ARTIFICIALLY ENHANCED FRONT END FOR SALES AND SERVICE

We recognize the value of human cognition, empathy, and communication abilities across the marketing, sales, and service process, even for digital mortgages in "self-service" channels. Technology and analytics can help maximize that value by augmenting human talent, improving employee productivity and effectiveness, and directing employees to activities where they can add the most value.

If you have experimented with digital assistants on your mobile phone, you're already familiar with some of the advances being made in natural-language customer communication. Speech recognition capabilities have come a long way, and some machines now nearly equal humans in transcription accuracy. Text-to-speech systems are sounding more natural. Providers are working with talented communicators from places like Pixar and The Onion to inject a little color in conversations and make them sound less robotic. Given how dry and scripted many call center conversations are even when conducted live, it will perhaps not be too difficult for bots to provide similar or better experiences in some conversations.

These developments suggest additional opportunities to artificially enhance the sales and service front end:

- Develop more impactful outbound marketing and service communications
- Rely on text and voice bots to address simple customer queries, freeing employees to address more complex issues – improving the experience for customers and employees alike
- Develop communication support tools and training to help employees follow identified best practices and have more impactful conversations
- Flag and escalate conversations that follow unfavorable patterns
- With additional learnings over time, start to personalize automated conversations, proactively engage customers when appropriate (for example with tailored reminders through the right time and channel, preemptive notification, and recommendations about upcoming issues)

## 3. RISK AND CUSTOMER-CENTRIC WORK

Lenders' work is already marked by a myriad of variations based on such factors as customer situation and needs, property characteristics, employee skill levels, differences in investor requirements, and local and state-level rules. As the use of software robotics increases, we see

opportunities for lenders to employ smarter workflow management engines to better align their work with the risks they face. Some examples:

- Deploy different tiers of fulfillment and underwriting scrutiny based on level of risk as judged by GSE tools or internal risk assessment engines
- Route riskier and more challenging loans to more skilled employees
- Schedule and sequence work based on risk of missing regulatory deadlines or failing to meet customer expectations
- Support quality control and skill assessment by dual-routing work and comparing the results produced by employees of different skill levels and software bots

We would also expect the industry to develop creative ways to combine technology and humans to define new, intermediate levels of scrutiny in activities such as appraisals: why shouldn't some combination of satellite images, valuation algorithms, and lower-cost home inspectors equipped with smart tools replace expensive and hard-to-find appraisers when risks are low?

Customer choice also has a role in determining work that needs to be done by lenders. Self-service options are already starting to replace some sales and processing tasks, such as document gathering, product selection, and status tracking. We expect this trend to continue. Furthermore, expect the industry to offer customers choice in what type of support they need and how much they are willing to pay for it (for example, speak with a bot now or wait 10 minutes for a representative, pay additional fees for two-week premium processing).

## 4. EXPANSION BEYOND THE MORTGAGE TRANSACTION

As customers and their influencers come to rely more on self-service tools and learn to trust automated recommendation algorithms, lenders are likely to move beyond the mortgage transaction in their quest to deliver and generate value in the home-buying journey. This may take many forms:

- Home investment advisory tools will provide not only affordability calculations, but calculations and automated advice to help assess the home purchase as an investment, looking at factors such as the customer's broader investment profile and risk appetite, home price expectations, and ownership timeline.
- Real estate broker and home builder tools will enable customers to get instant preapprovals at an open house, start an application that they can complete later, and provide permission for a third party to receive updates during the process
- Recommendation engines will suggest and even preapprove complementary financial services products during or after the mortgage process, taking advantage of the information about the customer revealed during the application process. The engine migwht recommend a checking account to take advantage of branches and ATMs near the new property, a home equity line to finance renovations, or credit cards to finance smaller purchases

Many of these ideas, which are being tested by various institutions, require changes in customer and influencer behavior, and some require closer scrutiny from a compliance perspective, so we view these as small bets that lenders could place to differentiate themselves.

## AVOIDING FAILURE

Many lenders recognize the importance of building digital mortgage capabilities into their business. However, most of those lenders also appear to be struggling for a number of reasons. Some have launched initiatives to build a front-end customer facing portal but it is entirely disconnected from legacy technology. Some have launched wholesale LOS replacement efforts but have ignored the newest technology focused on giving customers a great experience. And some lenders are excited about the new whiz-bang technology, investing millions, but have completely ignored a critical fact: the technology must fit hand-in-glove with a better process that's operated by people.

Those lenders who seem to be deploying digital technology effectively are doing several things right. First, they are abandoning the rudimentary idea and false choice of buy versus build. The more successful lenders have the in-house capabilities to piece together technologies from niche providers as well as their own technology. Second, these lenders have shifted towards a modular IT architecture with key attributes that include API-based connectivity, service oriented architecture, cloud-hosted platforms and configurable business rules. These attributes allow lenders to reuse solution components, accelerate new capabilities, and reduce overall cost. Third, the more successful lenders use "test and learn" through agile delivery. Successful case studies of agile development hinge on breaking down product and technology silos, rapidly building and launching minimally viable products and evolving them continuously. Lastly, the more successful lenders have pursued holistic and integrated transformations that tightly integrate digital enablement with changes to process design, process management, and culture.

Who will be the future leaders? How long will it take the rest of the industry to catch up? What new opportunities will lenders discover to improve the efficiency, security, and profitability of their business, while meeting new and ever higher customer expectations?

Exciting times await!

Oliver Wyman is a global leader in management consulting that combines deep industry knowledge with specialized expertise in strategy, operations, risk management, and organization transformation.

For more information please contact the marketing department by email at info-FS@oliverwyman.com or by phone at one of the following locations:

AMERICAS
+1 212 541 8100

EMEA
+44 20 7333 8333

ASIA PACIFIC
+65 6510 9700

AUTHORS

Ahmet Hacikura
Partner
ahmet.hacikura@oliverwyman.com

Cosimo Schiavone
Principal
cosimo.schiavone@oliverwyman.com

www.oliverwyman.com



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