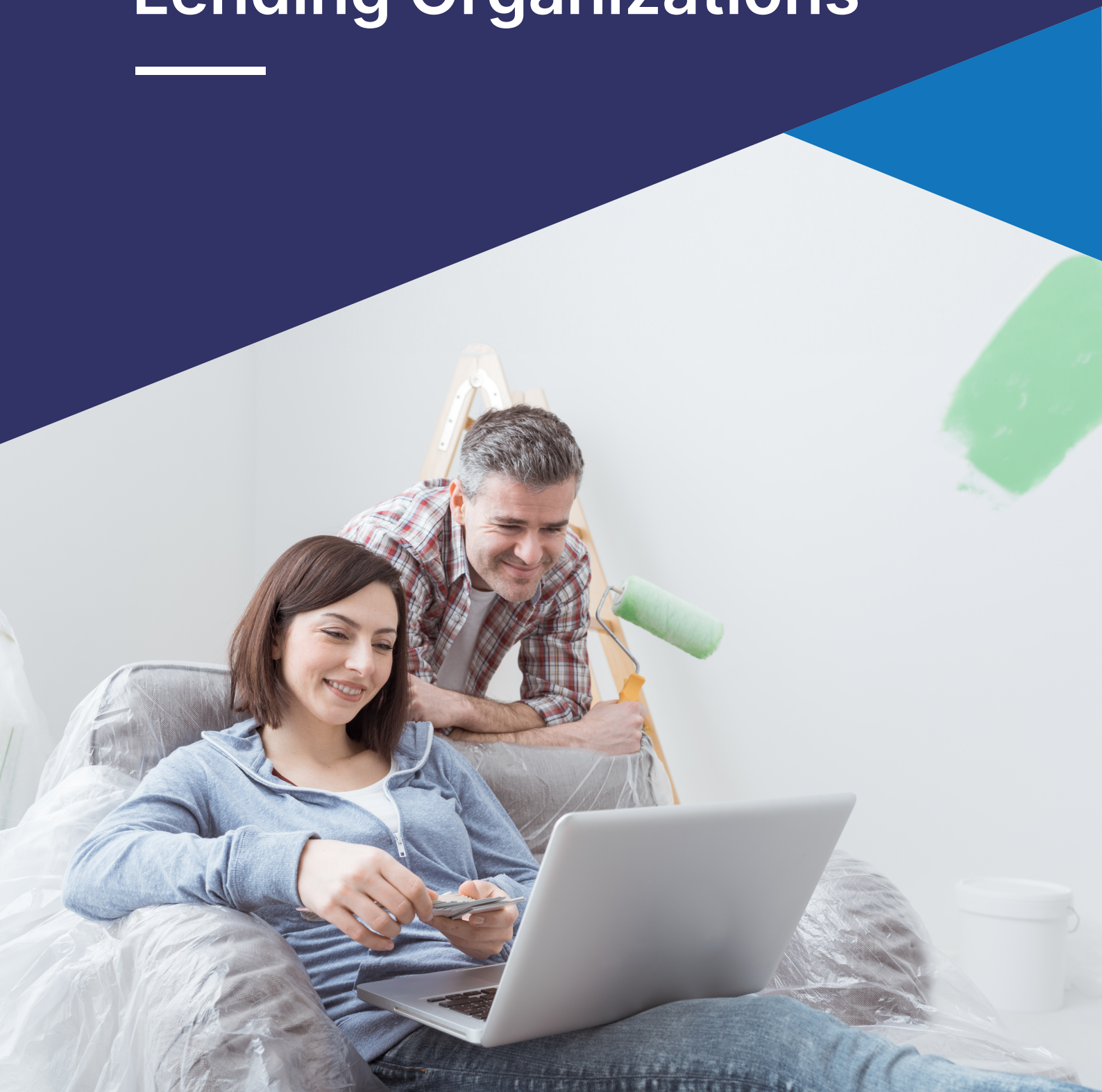


{p}rogrammers.io

Tools and Technologies to Future-proof Mortgage and Lending Organizations



| Overview

Financial institutions especially loan servicing and MBS funds are monitoring and dealing with the effects of the COVID-19 pandemic. Their main goal is to apply their expertise in understanding societal and economic challenges to benefit themselves and their customers. Additionally, they aim to enhance their internal processes to efficiently handle the increased demand for refinance and loan services.

Traditional approaches of the financial services industry, including loan servicing and MBS funds, continued to be “If it ain't broke, don't fix it”, which is working. However, these approaches make it extremely difficult to cope with the agility required by the industry in the current market's turmoil. Furthermore, the competition created by extremely efficient fintech startups in the industry adds to these challenges.

Digital technologies have emerged to deliver tangible cost benefits and increase loan processing throughput during these difficult times. In this document, we listed the emerging software models that have transformed the way new capabilities are built to meet increasing market demands with agility, speed, and compliance.

Over the last decade, the software industry has gone through several transformative changes, which resulted in new models that businesses need to adapt quickly for friction reduction. We can broadly categorize those into two groups – software development and business applications sell and consumption. We will focus on group one; particularly on DevOps, cloud computing “platforms”, low code, and SaaS models. These methodologies and techniques when used correctly can deliver substantial cost savings (some of our clients have seen their development costs reduce by 15%) and increase customer satisfaction with rapid delivery of innovation and features.

| Software Development

Custom software development is the key to providing agility and unique capabilities to businesses. The last decade marked a tectonic shift in software development paradigms. With the rise in demand for faster development cycles and promoting hardware independence, both top two development platforms have been deprecated (abandoned) and urged to migrate to new agile platforms. .NET framework and Java are deprecated. While Microsoft provided an easier (to some extent) platform-independent .NET Core (former Mono), it actively encouraged customers to test their code on Linux and recommended the use of web technologies like Electron, Node.js, and ReactJS for newer projects.

Ref: By Jack Wallen: [Could Microsoft be en route to dumping Windows in favor of Linux?](#)

After Oracle acquired Sun Systems, both MySQL and Java lost their most favored platforms' status. Soon after, IBM removed Java from their recommended language and Google migrated Android away from Java, it is now considered deprecated. Not even Oracle lists it as the preferred platform anymore. The high development cost due to strict (archaic) project needs from the 90s and verbose coding requirements make Java very expensive for development.

Today's favorite development platforms as they stand:

- Node.js: Typescript
- Electron
- .NET Core: C#
- ReactJS
- Angular
- Python

Just to clarify, in the above list, Node.js is the backend tool for most JavaScript and TypeScript platforms and supports many newer technologies. Therefore, it remains the most popular software development platform today. .NET core is only popular due to its portability of millions of .NET developers to Microsoft's newer platform.

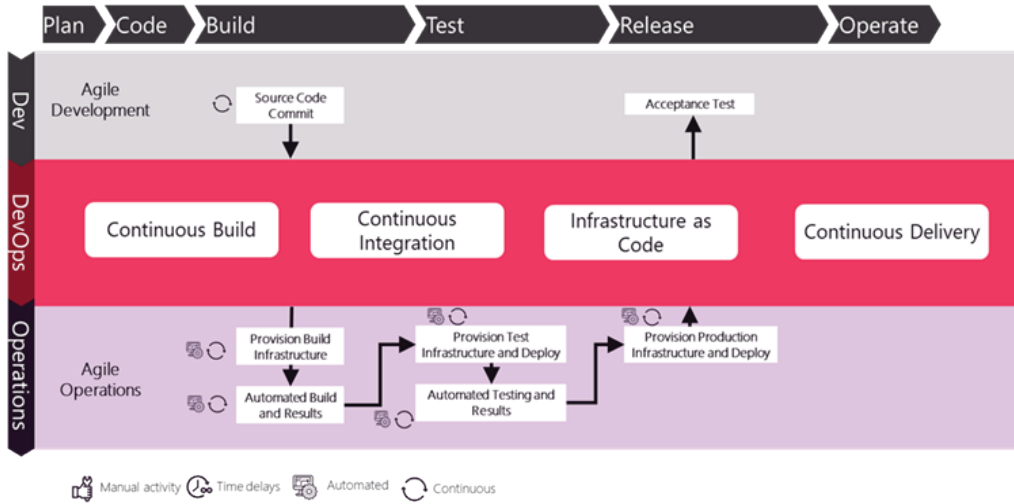
These newer technologies allow software development to be more agile and less opinionated. They also enable technologies like DevOps which significantly reduce concept to production in exceptionally low cycle times and changes to functionality incrementally without the need for elaborate planning. This reduces development costs and provides agility to businesses in times when needed.

Python is very popular with analytics-heavy requirements and its terse programming construct provides faster development. The availability of good Python developers has been the inhibitor to its adoption in most markets.

| DevOps

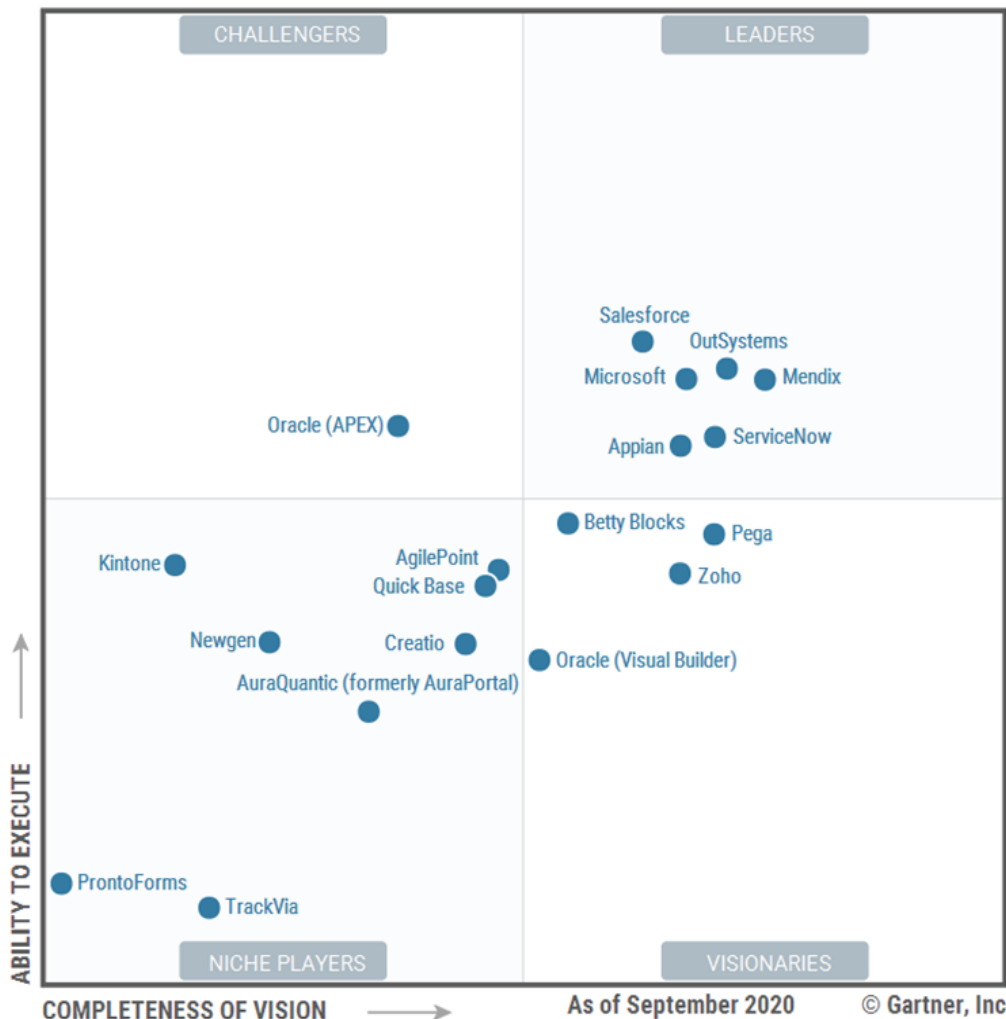
A well-implemented DevOps program removes information barriers between business users and developers, improving efficiency in delivering solutions and agility to businesses. Platforms like Jenkins, if properly implemented, can streamline communications and provide risk-free transfer of a concept (or work), from development to production, with the need for the overhead of planning. Changes can be prototyped, tested, and promoted to production quickly with a sequence of automated test and approval cycles. Microsoft has done an excellent job with Azure DevOps and provides a turnkey platform. We at Programmers.io have created an implementation blueprint to roll out a complete process in under a week.

DevOps also enables secure infrastructure deployment in the cloud. Furthermore, it reduces friction between Infrastructure, AppDev, and IT security teams by streamlining deployment, resource management, security, and change review processes. The transparency it brings reduces the cost of compliance as well.



Low Code Platforms

Another transformation of paradigm shifts in software development is the evolution of Low Code Application Platforms (LCPA). These platforms shift business tool development from professional software developers to citizen developers.



Low code platforms and citizen development concepts have been on the rise over the decade. Business users are the best people to innovate processes. These users are generally intimidated by the lack of programming skills required to develop any business software. Low-code platforms bridge this gap and promote citizen development. Developers can create components that citizen developers without programming knowledge can also quickly put together software that can help them improve the process and be more efficient.

- Salesforce
- Microsoft PowerApps and Office 365
- ServiceNow

Other mature platforms include

- Appian
- Mendix
- OutSystems

Most mortgage-related companies already have subscribed to one of these platforms in some capacity. However, they do not know how to utilize the full potential of these platforms to meet business problems in the need for agility.

Some use cases:

- Quick forbearance request
- Quick survey about potential assistance requirements
- Quick refinance application – you can use the information you already have
- High volume AI/ML-assisted underwriting workflows

While on the surface, it looks like building a simple survey form, you can build a highly sophisticated AI/ML-assisted process in a matter of days and significantly reduce your need for hiring more people quickly if not resulting in losing business.

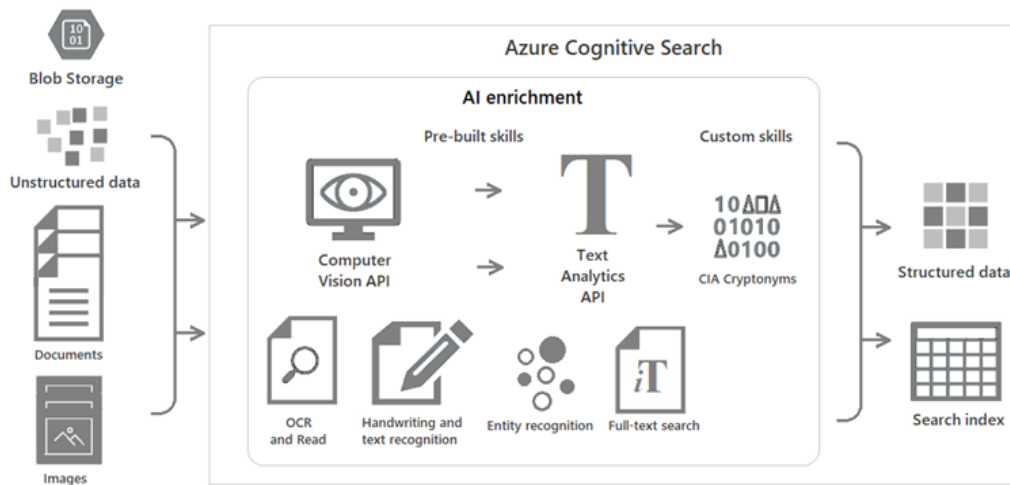
Here are links to Gartner analysis of low code platforms

- Magic Quadrant (Sep 2020):
<https://www.gartner.com/doc/reprints?id=1-24BC74AA&ct=201005&st=sb>
- Peer Insights:
<https://www.gartner.com/reviews/market/enterprise-low-code-application-platform>

| AI, ML, NLP, RPA & Chatbots

Not long ago implementing AI/ML used to be a herculean task limited to larger companies only. Today, thanks to the hard work of several open-source pioneers and cloud providers, even smaller companies can confidently deploy AI/ML for several applications to gain scalability and technical advantage over the industry.

A simple use case of the AI/ML and NLP is the document classification. For originators and servicers alike, the herculean task of reviewing loan documents in archaic 19th-century deed format can now be easily handled by NLP systems on any cloud. Major cloud providers including AWS, Azure, and GCP provide OCR and NLP capabilities which can be quickly configured to start classifying documents and verify required information needed for loan processing or buying loan pools. While these technologies are nowhere close to replacing the underwriter or an analyst, they can assist by cutting down up to 80% of the effort, thereby, reducing cycle times. A smart way to implement these technologies is to take a simple use case that adds value and can be built on top of it incrementally.



Another use case of NLP is voice assistant and transcriber, which can answer most of the loan or application-related questions over incoming calls. It can transcribe the conversation and transfer the call to an agent for questions it cannot answer. Inline transcription significantly reduces conflicts and prepares actions/tasks for the agent to perform. The information derived from the conversation helps the company in several ways.

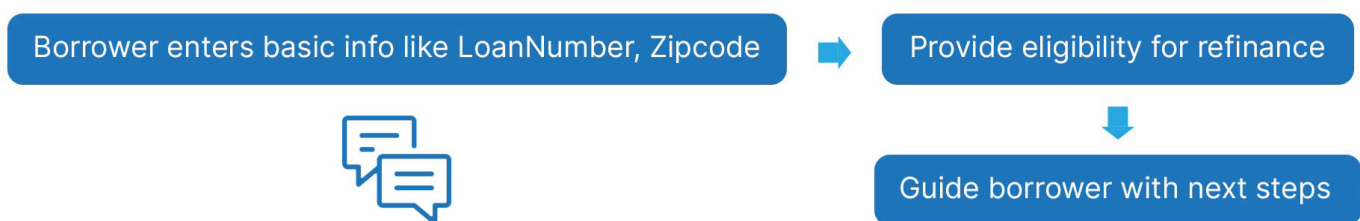
RPA

Robotic process automation mimics human interaction by an automation engine on third-party applications that do not provide native integrations. We have seen the most common application as moving files between the two locations or triggering OCR on files on incoming FTP sites. These are NOT the right use cases for RPA. Furthermore, due to the

higher error rate, reduced reliability leads to frustrating users, which should be carefully avoided for the success of any technology adoption.

There are numerous legacy third-party systems used in the mortgage industry. Some are unable to provide, while others do not or have integration costs that are too high or too complex. An RPA can simply mimic end-user actions - like Excel macros and get the job done. This automation frees up the user, letting them do the work that matters while rudimentary work is taken care of by the RPA bot.

Chatbots



Chatbots have got smarter over time and provide a lot of functionality these days. With the generational shift, next-gen workforce and homebuyers are more comfortable providing information in a chat window than filling out an online form. Here are a few chatbot use cases we have implemented recently.

Underwriter assistance from within Microsoft Teams improved efficiency and compliance. The key benefit was reducing fatigue from looking at a complicated screen, specifically the "everything about the loan" screen, and trying to find specific pieces of information. We have provided a chatbot that can fetch the required specific information an analyst/underwriter needs. With the combination of chat commands and NLP, the chatbot was live in a few days, and the turnaround time for each additional feature that businesses requested was under a day. The concept of a chatbot is like a flexible software solution that requires no design, reducing development costs by up to 90%.

'Loan Inquiry for Borrowers' is a quick chatbot that helps borrowers with basic questions and lets them update information in a fluid format.

Loan applications are being filled out on a chatbot with an interactive format. If the borrower is an existing customer, it will be detected and ask the user to validate in a subtle format so that the amount of information the borrower must provide will be reduced. The final filled application will sent to "e-sign" as a link in the chat or text completing the process. This removes user friction and increases the number of applications.

| Core Productivity Tools

Core productivity tools like Microsoft Office have undergone a significant shift, unlocking user efficiency.

Power Automate, as the name suggests is an automation tool that's a part of Office365. This tool enables automation and tool-to-tool integration including third-party applications. Simple ready-to-use templates enable business users to activate automations quickly without any help from IT.

One use case is document approval workflows. A user can initiate an approval workflow from within the document and target the approval request via a link in Outlook or Teams. This eliminates the need for moving documents over email. Documents, in this context, can be a PDF, Word, PowerPoint, Excel document or a record in Excel, a record in SQL table, a Form, or a Chat message in Teams. Imagine the efficiency gains and agility the company will realize with fluid and transparent processes that can be possible when approvals and reviews are naturally conversational.

You are already paying for the Office Suite and mere user training can unlock a lot of efficiency and agility in your company.

Tools readily available at your disposal

- Microsoft Word – Coauthoring
- Excel – Coauthoring, Power Query, and Excel Scripting
- Power Automate
- Teams – Bots and Project Oakdale Apps

It is interesting to note that smaller to mid-size companies can significantly benefit from software plans like Microsoft Office 365 E5. It would be far more economical if you could utilize the automation, virtual assistant, and compliance capabilities. The challenge generally arises from trying to migrate to such platforms using traditional approaches instead of rethinking from the ground up.

AI-augmented work is another area productivity tools are leaping at. PowerPoint comes with an AI designer that makes your presentations look good and consistent using machine learning. Word uses AI and ML-assisted meeting transcription to create discussion points and Editor, the AI-assisted language analysis tool, helps you write better content.

Script Lab is another lesser-known feature of Office365 productivity tools that allows integration with external applications straight from Office 365 applications and programs to handle commands, workflows, and data integrations. Similar features are available in competing G-Suite as well.

| Analytics

When discussing analytics tools, we generally think of one of the three below.

- Tableau
- PowerBI
- Excel Query

While these are the most popular analytics tools, lesser-known alternatives like CubeJS fit into the low-code platforms, addressing the embedded reporting needs of business applications.

Minor modifications to file storage strategy, like using DataLake storage in Azure as an FTP drop location can provide several benefits of big data analytics on raw file data. Companies can immensely benefit from big data analytics tools without the need for preprocessing these files or importing them into structured databases. The mortgage industry has to handle large datasets every day but most of this data is never harnessed due to the traditional approaches used to handle these files. Datalake solves this problem simply and economically while providing data transparency and cost savings over traditional data storage.

| Cloud Technologies

There used to be times when the debates used to be buy or build. These days it is to try and build. Now, you try out various components and tools available to build the application for business problem resolution. SaaS applications provide more integrations and cloud PaaS services offer more features, the gap is closing, enabling developers to quickly assemble these pieces like a puzzle block to quickly deliver the required business solution.

The most important platform tools for the mortgage industry to consider during solution design are listed here.

- Azure SQL Database
- Azure Data Lake Storage
- Azure Data Lake Analytics
- Azure Data Factory
- Azure Serverless
- Azure Functions
- Azure Logic App
- Microsoft LUIS
- Azure Bot Framework
- Azure ML

- Azure Cognitive Services
- Azure Form Recognizer
- Windows Virtual Desktop
- Azure Marketplace
- Microsoft App Source
- AWS Data Exchange
- AWS Lake Formation
- AWS Glue
- Amazon AppFlow
- Amazon WorkDocs
- Amazon AppStream
- Amazon Workspaces
- Amazon Pinpoint
- Amazon SageMaker and ML Tools
- Amazon Lambda and Serverless

| Offshore Team Augmentation

Offshoring some of the mundane tasks where manual review is legally required, can help companies be more efficient. While the gap of cost factor is closing quickly, offshoring to time-augmented areas will significantly help speed up processes. India, China, the Philippines, and some eastern European countries like Ukraine and Romania would help add preprocessing capabilities.

One way to assist an underwriter is by reviewing all loan applications and reaching out to applicants for any missing information. This can help the underwriter process the loan more efficiently, potentially reducing the total processing time to a quarter.

Another scenario is the mortgage securitization process where a large number of loans in loan tapes should be carefully reviewed, graded, and pooled for purchase. Having the tape reviewed, and requesting missing information from custodians, and servicers before the analyst starts his day would shorten the process by more than a third. While the reduction in the direct cost of reviewing per loan is questionable, the reduction in overall processing time enables the funds to deploy more cycles of securitization per month, freeing up capital quickly and redeploying it to effectively double the returns.

Augmenting a team with offshore personnel would not be effective without first deploying tools and technologies that provide effective workflow handoffs between two geographically and culturally distinct regions.

| Conclusion

The above list is not conclusive and there will be several new tools in the market soon. It is easy to experiment with tools and see which one works. Furthermore, it takes less cost and effort to try them out, apply them to solve business problems, and then assess outcomes, rather than debating for a careful assessment of their suitability. The new model is about speed and agility while platforms generally take care of reliability and compliance. With the market in turmoil and the extreme speed and agility required, the tooling helps you meet business needs.

| About the Author

Bhuvan Pasham has over 25 years of experience helping businesses unlock efficiency. He built technology teams at some of the largest private equity and asset management firms that have seen rapid growth, including Blackstone, KKR, TPG Capital, etc. Bhuvan has been instrumental in driving technology adoption in the PE industry for over 16 years. Bhuvan is the Chief Technology Officer (CTO) of Programmers.io and has been advising alternative investment firms on digital transformation and technology adoption.

Bhuvan Pasham
CTO, Programmers.io
bhuvan@programmers.io

| Address

8951 Cypress Waters Blvd
STE 160
Dallas, TX 75019-4784, USA

| Contact:

Bhuvan Pasham
CTO, Programmers.io
bhuvan@programmers.io
<https://programmers.io/>

Legal Notice

The content of this document is for general information and illustrative purposes only and is used at the readers' own risk. Programmers.io puts reasonable effort into ensuring the accuracy of the information. However, Programmers.io does not guarantee or warrant the accuracy, completeness, factual correctness, or reliability of any information in this publication and does not accept liability for errors, omissions, inaccuracies, or typographical errors.