

# AI Use in Application Modernization for Banking Applications

Rishiraj Nandedkar (Principal Technical Architect) NTTDATA India Ltd.

Alice Maniyar (Enterprise Architect) IDFC First Bank Ltd.

## Abstract:

Implementing Artificial Intelligence (AI) and machine Learning (ML) into application modernization will shake up various industries, including finance, healthcare, manufacturing, e-commerce, and retail. This white paper will analyze the transformative potential of AI and ML in modernizing legacy systems and applications, enhancing innovation, operational efficiency, and security during modernization. By leveraging AI technologies like machine learning, natural language processing, and deep learning, organizations can streamline processes, enhance decision-making in the planning phase, and reduce errors during application modernization.

The paper also addresses the challenges and considerations in planning and implementing application modernization in banks, as AI and ML have been increasingly adopted in the banking sector. AI and ML help with planning in Hollow the core, including data privacy, ethical concerns, and the need for a skilled workforce.

## Introduction:

Let's talk about why banking or any other enterprise needs application modernization for their infrastructure and applications.

Legacy Systems, Applications & Databases which form the core of banking applications for customers, are holding banks from leveraging new digital technologies and creating new experiences for their customers, and employees, Many banks find it difficult to modernize or extend their legacy systems in a way that enables them to make an IT strategy that supports the quick adoption of newer technologies such as Multi-Cloud, Big data, Microservices, Containerize environment, we have seen many banks they do attempt to modernize their legacy systems, any organizations connect new systems to their legacy databases and software with point-to-point integration leading to tightly coupled integration between applications like UPI, Credit cards system, new account opening, anti-fraud system, etc and creating an inelastic, costly, complicated, hard-to-maintain infrastructure.

Any Application modernization consists of a 7 R migration strategy which everyone knows we will not go deep inside rehosting, relocating, replat forming, refactoring, repurchasing, retiring, and retaining.

## How banks are taking initiative for Application Modernization:

All banks post the Internet explosion started deploying Internet banking, mobile banking, UPI, etc to enhance their applications to serve customers in a better way.

**Hollow the core** is a concept used for modernizing applications. Which means componentization. Breaking the monolith system into smaller components by building a series of smaller applications by using microservices thus adding to the agility

A typical application modernization process consists of Tool recommendation, Communication approach, Application inventory analysis, Application Rationalization Approach, Rationalization Metrics and Dashboard, Initiative Descriptions, and Roadmap.

Application Inventory can be examined through a few rationalization lenses like strategic alignment, Functional adequacy, financial fit, Technology risk, and technology adequacy., Tool recommendation, application redundancy,

#### **Let's talk about each one:**

**Strategic Alignment:** Is the application aligned to the business and IT strategy? Does the application provide a competitive advantage? Does the application align with Digital Trends: Digital and New IT Initiatives?

**Functional Adequacy:** What is the level of completeness of the application functionality/ features? Does the system meet current and future requirements? What flexibility does the application provide to adapting to product innovations or changes and how difficult and costly is it to change?

**Financial Fit:** Is the overall cost of ownership in line with the benefit delivered? Are there alternative/ less expensive ways to serve up the application and reduce overall cost? Are financial metrics such as cost per change or cost per transaction in acceptable ranges? Does the availability of the application meet expectations/ agreements with the business? What is the level of accuracy of data/information? Is the application easy to use and meets customer/end-user expectations?

**Technology Risk:** Is the application aligned with technology or architecture standards? Are the technologies utilized supported by their respective vendors? When does support end?

**Technical Adequacy:** Is the application scalable, extendable, and flexible to meet future needs? Is the application stable and reliable? Does the application meet expectations on maintainability, operability, and performance? Is the technology a viable solution for continued growth?

**Application Redundancy:** Does the application overlap with the function, or technical of another application? Are there multiple applications supporting the same business function or process?

**Tool recommendations:** Tool recommendations to leverage existing application options and address current data gaps.

**Communication approach:** for educating business partners and obtaining buy-in for identified application rationalization opportunities.

**Improved application inventory:** with resolution to open questions around lifecycles, categorization, and costs.

**Detailed application rationalization approach:** including application disposition, with a full implementation strategy for an agreed-upon set of high-priority rationalization candidates.

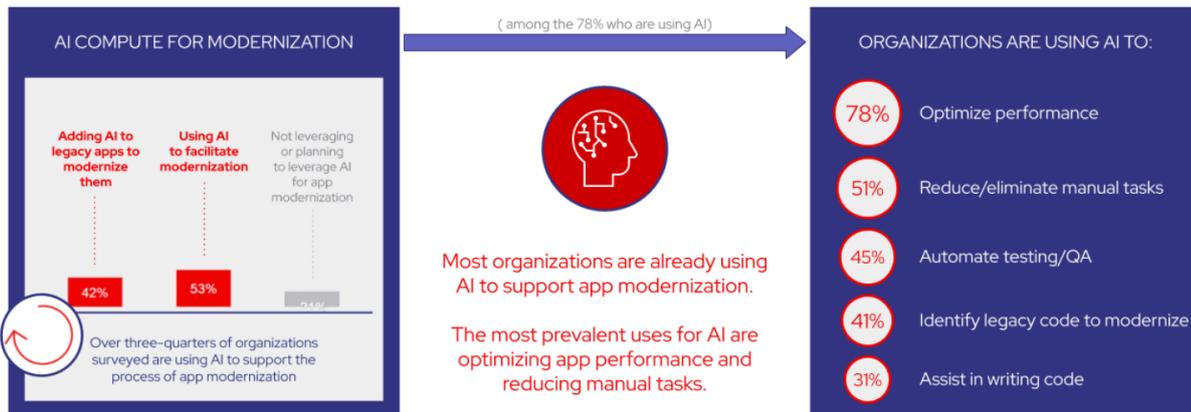
**Metrics and dashboards:** to reflect rationalization opportunities and track the rationalization process against targets.

**Initiative descriptions & roadmaps:** A 1-3-year roadmap highlighting the sequencing and timing of application transitions and integrated with existing roadmaps including an overview, scope, and key activities detailed for each initiative; duration; dependencies, risk, and key assumptions.

#### **Market for AI**

The McKinsey Global Institute (MGI) estimates that across the global banking sector, gen AI could add between \$200 billion and \$340 billion in value annually, or 2.8 to 4.7 percent of total industry revenues, largely through increased productivity.

## Emerging role of AI in application modernization



Source: <https://www.konveyor.io/modernization-report/>

Now let's explore how AI, ML, NPL, and LLM will be helpful for Application modernization journey for banking applications. space

AI can speed up the modernization process in several ways. We can make use of Machine learning models that can automate the migration of data and functionalities to new selected platforms, which eventually help to reducing the time and resources required for application modernization. Natural Language Processing (NLP) algorithms can interpret and convert existing old code in application and can help to convert into modern languages which is very helpful in simplifying the transition.

### How to Recommend Tool for Hollow the Core:

Feeding AI with data on all infrastructure application vendors for application modernization in banking can be incredibly beneficial in several ways:

**Vendor Evaluation and Selection:** AI can analyze the data to evaluate and compare different vendors based on various criteria such as cost, performance, reliability, and compliance. This helps in selecting the best vendors for specific modernization needs. You need to add data for OEMs that are working in this like CloudScape (RISC Networks), AWS App Discovery Amazon), ServiceNow Discovery, CMS(HPE), Cloudfundamentals, Transformation, Console (Cirba), TADDM (IBM), ADDM (BMC).

**Risk Assessment:** AI can equate the risks associated with each vendor by analyzing historical performance data, security incidents, and compliance records. This ensures that the chosen vendors have a proven track record of reliability and security.

**Optimization of Modernization Strategies:** AI can endorse the most efficient and cost-effective modernization strategies by analyzing the capabilities of different vendors and matching them with the specific needs of the banking application

### Which AI & ML can be useful for Tool Recommendations:

Use Decision Trees, Random Forests, Support Vector Machines (SVM), Neural Networks, K-means clustering: Principal Component Analysis (PCA), Gradient Boosting Machines (GBM), and Natural Language Processing (NLP) models for this.

**AI can be helpful in Data Analysis and Insights:**

AI can analyze a large volume of data to identify patterns and trends. This helps in understanding which applications are unused, redundant, or obsolete. AI can also provide insights into each application's performance value.

**Optimization Recommendations:**

AI can also be helpful in providing recommendations for optimizing the application portfolio. This includes suggesting alternatives for obsolete applications. AI can also be helpful in identifying opportunities for consolidation and recommending upgrades or migrations to more advanced solutions.

**Metrics and dashboards:**

Till now there have been lots of enhancements happening in the area of dashboards and metrics for applications, and server monitoring. We can upgrade existing monitoring tools with AI to increase the efficiency of the Application modernization process in planning and execution phase.

The challenge is that information is spread across multiple tools and platforms, making it difficult to get a unified view of the status of applications and servers.

AI and machine learning will enable dashboards to auto-populate. If one application might impact another, AI could be configured to detect this.

Several AI algorithms can be effectively used for enhancing metrics and dashboards in application and server monitoring. Here are some key ones:

**Anomaly Detection Algorithms:**

Isolation Forest: Useful for identifying unusual patterns in data that could indicate potential issues.

**Autoencoders:**

Neural networks designed to learn efficient representations of data, often used for anomaly detection.

**One-Class SVM:**

A machine learning algorithm used for identifying outliers in a dataset

**Predictive Analytics:**

- **ARIMA (AutoRegressive Integrated Moving Average):** A statistical analysis model that predicts future points in a series.
- **LSTM (Long Short-Term Memory):** A type of recurrent neural network (RNN) that is effective for time series forecasting.
- **Clustering Algorithms:**
- **K-Means Clustering:** Helps in grouping similar data points, which can be useful for identifying patterns and trends.
- **DBSCAN (Density-Based Spatial Clustering of Applications with Noise):** Useful for identifying clusters of varying shapes and sizes.

### Classification Algorithms:

- **Random Forest:** An ensemble learning method that can classify data points and predict outcomes based on historical data.
- **Gradient Boosting Machines (GBM):** Another powerful ensemble technique for classification and regression tasks.
- **Natural Language Processing (NLP):**
- BERT (Bidirectional Encoder Representations from Transformers): Can be used to analyze logs and extract meaningful insights.
- **GPT (Generative Pre-trained Transformer):** Useful for generating summaries and explanations of complex data.

### Reinforcement Learning:

- **Q-Learning:** This can be used to optimize resource allocation and improve system performance over time.

These algorithms can be integrated into monitoring systems to provide real-time insights, predictive analytics, and automated anomaly detection, enhancing the overall effectiveness of metrics and dashboards.

### Initiative descriptions & roadmaps:

Predicting roadmaps concerning applications in the Indian banking system will be impossible, as the Indian IT industry along with banking systems is very agile nowadays and changes are happening daily looking at the volume of users and changes in technology.

Defining the road maps of applications will need huge amounts of changes happening in applications, we are very naïve stage of this.

### Application Redundancy:

AI can summarize legacy code swiftly, despite being poorly documented. The code may be knotty and unstructured.

AI can allow developers to understand business logic and make decisions on what code needs to be retained, removed, or refactored.

The biggest technical enhancement that AI is having is of translation of coding languages through automated code conversion, which in short allows legacy applications written in outdated languages to be modernized to work on new platforms like the cloud, multi-cloud, hybrid cloud, and containers.

The best future will be AI's ability to potentially create self-evolving, self-healing, applications. Rather than regular manual upgrades, AI could allow applications to automatically transform the masses and continuously optimize performance. It will also be able to quickly change or adapt to new requirements and fixes without developer involvement.

### Technology Risk:

During application modernization, the application is at risk of release errors that can unfavourably affect the stability, performance, and security of the application. These can include vulnerability, integration errors, security errors, compatibility, and configuration errors.

For technology risk, Generative AI can be used. Generative AI in application modernization shines in assessing present codebases and automatically refactoring them for new-age applications. Generative AI can help in breaking down monolithic applications into microservices by analyzing usage patterns & dependencies. Gene AI understands

the technicality of different platforms and generates code that seamlessly adapts to diverse environments, whether it's mobile, web, or desktop applications for banking.

#### **AI Implementation for Application Modernization few challenges:**

The integration of AI in application modernization, a process traditionally led by experienced technical architects and multiple human resources over the past two decades, is raising concerns about unemployment and diminishing human creativity. AI's growing role in sectors like banking has already led to job reductions, and if its use continues to expand, there is fear that humans will become overly dependent on machines. This dependence could result in a loss of creativity, as machines might replace many tasks that were once driven by human ingenuity and problem-solving skills.

#### **Factoring extra server resources for AI & ML:**

Implementing AI & ML for application modernization needs lots of complex algorithms which need extra resources on each server which can be expensive for organizations like instead of CPU use GPU, All said and done AI implementation and maintenance is an overhead cost.

#### **Complex algorithms need to be developed:**

Enable Application modernization with AI-enabled needs very complex machine learning algorithms which require skilled resources and continuous upgrade of skills for the development of algorithms. Looking at diverse workloads in this cloud wave and the multiple services that hyper scalars offer is a tedious task.

#### **Noncompliance:**

AI systems, especially those using complex models like deep learning, can be "black boxes" where it is difficult to understand how decisions are made. This lack of transparency can be problematic for regulatory compliance and customer trust in Application modernization. Creating a safe, solid, and unbiased AI model is the foundation for the compliance framework around AI & ML in Banking Applications. Regulations such as GDPR, EEOA, ECOA & CCPA and mandate data protection, and privacy, the AI team is often unaware of these compliance mandates and fails to assess whether the controls apply to the data they're dealing with. This becomes even more complex when self-governed decision-making systems are deployed, when you start working on AI-enabled Application Modernization for banking applications it can lead to lawsuits and reputational damage.

#### **Trust Issues:**

In this IT admins, application owners, CTO, and Project managers will always depend upon the AI model to make predictions about infrastructure which is very dangerous in the long term for IT applications. In some cases, if AI initiates application modernization IT admins will not have any ownership of this which can lead to trust issues between humans and AI & ML algorithms.

#### **AI Can be Bias:**

AI models and algorithms that we develop for Application modernization will depend on the data that we are going to provide, if any discrepancy or someone will be biased towards vendors, applications, technical adequacy & financial fitness this can give you output in a biased manner.

**Conclusion:**

AI-enabled application modernization offers significant benefits by reducing repetitive tasks and enhancing efficiency in cloud environments, including containerization. It aids in capacity management, tool recommendations, improved application inventory, rationalization, dashboards, application redundancy, strategic alignment, and technology risk management. However, implementing AI solutions is complex and costly.

On the flip side, AI introduces risks such as potential noncompliance with regulations, especially in highly regulated sectors like banking in India, where data security is paramount due to RBI guidelines. Trust and bias concerns arise because AI relies on human-generated data, which may be flawed. Despite these challenges, the rapid growth of AI and ML startups signals a near-future surge in AI-driven application modernization, particularly in banking sectors in India and globally.

**Resources:**

<https://www.mckinsey.com/industries/financial-services/our-insights/scaling-gen-ai-in-banking-choosing-the-best-operating-model>

<https://www.konveyor.io/modernization-report/>

<https://www.ibm.com/topics/application-modernization>

[https://www.zerone-consulting.com/resources/blog/AI-in-Legacy-Application-Modernization-Opportunities-and-Best-](https://www.zerone-consulting.com/resources/blog/AI-in-Legacy-Application-Modernization-Opportunities-and-Best-Practices/#:~:text=For%20example%2C%20a%20major%20bank,satisfaction%20and%20reduced%20operational%20costs.)

[Practices/#:~:text=For%20example%2C%20a%20major%20bank,satisfaction%20and%20reduced%20operational%20costs.](https://www.zerone-consulting.com/resources/blog/AI-in-Legacy-Application-Modernization-Opportunities-and-Best-Practices/#:~:text=For%20example%2C%20a%20major%20bank,satisfaction%20and%20reduced%20operational%20costs.)

<https://www.linkedin.com/pulse/how-ai-reshaping-release-dashboards-apwide-skqof/>

<https://www.linkedin.com/pulse/how-ai-transforming-application-modernization-heidi-araya-mba-11sne/>

<https://radixweb.com/blog/generative-ai-in-app-modernization>

<https://www.online-sciences.com/robotics/artificial-intelligence-in-banking-advantages-disadvantages-mobile-banking-services/>