



Mindtree

A Larsen & Toubro Group Company

Transformation of 2D marketplaces





Table of Contents

1. Consumer expectations
2. Challenges and opportunities
3. Virtual marketplace
4. Virtual marketplace for retailers
5. Virtual marketplace for banks and financial institutions
6. Virtual community hub platform
7. Apprehension
8. Key value propositions
9. Functional architecture
10. Technology architecture
11. Appendix





■ Abstract

Chief Marketing Officers across industries are facing increased pressure for brand differentiation and business growth.

Marketers are exploring innovative digital business initiatives and more effective marketing strategies.

Uncertain times like the pandemic have significantly altered many businesses across industries. With commutations curtailed and confinement to homes, consumers are forced to shop differently. A survey by Engine found that average spend online has increased by 10-30%.

Source: <https://enginegroup.com/us/stay-informed/covid-19-consumer/>

Hence, there is a necessity to shift the focus towards digital channels for new businesses and laggards.

Early adopters of digital transformation are reaping benefits through significant acceleration of their businesses powered by remote sales and services. They are already considering the next level of maturity in their digital transformation journey.

The pandemic devastated many businesses. But there were a few who had the ingenuity to emerge stronger.

Many who went down



Curtailed commutations, lockdowns, and the apprehension of consumers to visit retail stores and malls resulted in low footfall and conversion rates for many brick and mortar retailers, threatening their sheer existence, and resulting in a total shutdown of businesses.



Physical branches of banks and other financial institutions are witnessing drastically reduced customer footfalls.

Few who made it through



E-tailers, on the other hand, experienced high footfall as several consumers began shopping online from the convenience and safety of their homes during the pandemic.



Customers are increasingly turning to digital channels for their banking needs. 72% of customer interactions with banks are now digital.

Source: <https://www.fisglobal.com/pace>



In this whitepaper, we will discuss

1. The need for a virtual market place
2. Features of a virtual marketplace
3. Applications of a virtual market place to various industry segments
4. The key value propositions
5. Risks & challenges

Consumers are expecting the culmination of convenience and personalized services with a human touch.

While e-commerce consumers enjoy the convenience of online shopping, there are still a few consumer needs that need to be addressed to ensure a complete and gratifying shopping experience.

For example:

1. Tangible (touch and feel) experience of products
2. Holistic view and evaluation of products
3. Live interactions with associates for product-related queries
4. Product fitment in spaces (washing machines, fridge, etc.)

Similarly, on the banking side, customers enjoy the flexibility and convenience that digital banking provides. However, there are a few un-met needs.

1. Physical interaction with tellers and agents
2. Emotional connections
3. Personalized and contextual services

50% of consumers are likely to open their next account with a new bank rather than their existing bank. Source:

<https://www.pwc.com/us/en/industries/financial-services/library/digital-banking-consumer-survey.html>



Key challenges faced by retailers, e-tailers, and banks

Retailers

1. Reduced footfall
2. Reduced product showcases
3. Customer acquisition and engagement
4. Reduced sales

Banks

1. Reduced footfall
2. Customer acquisition and engagement
3. Reduced sales
4. Losing consumers to competitors

E-Tailers

1. High return of products
2. Retention of consumers on webpages
3. Virtual product trial and fitment
4. Losing consumers to competitors

Retailers, e-tailers and banks are exploring innovative ways to differentiate their brand and create the right blend of physical store or bank branch experiences with the convenience of online channels to provide immersive and gratifying consumer experiences





■ A virtual Marketplace

A virtual market place converges physical store/bank branch experiences with online convenience

The virtual marketplace is an immersive 3D representation of shopping malls with brick-and-mortar retail stores, bank branches, and automotive showrooms augmented by interactive and cognitive chat or voice-based avatars to guide purchases.

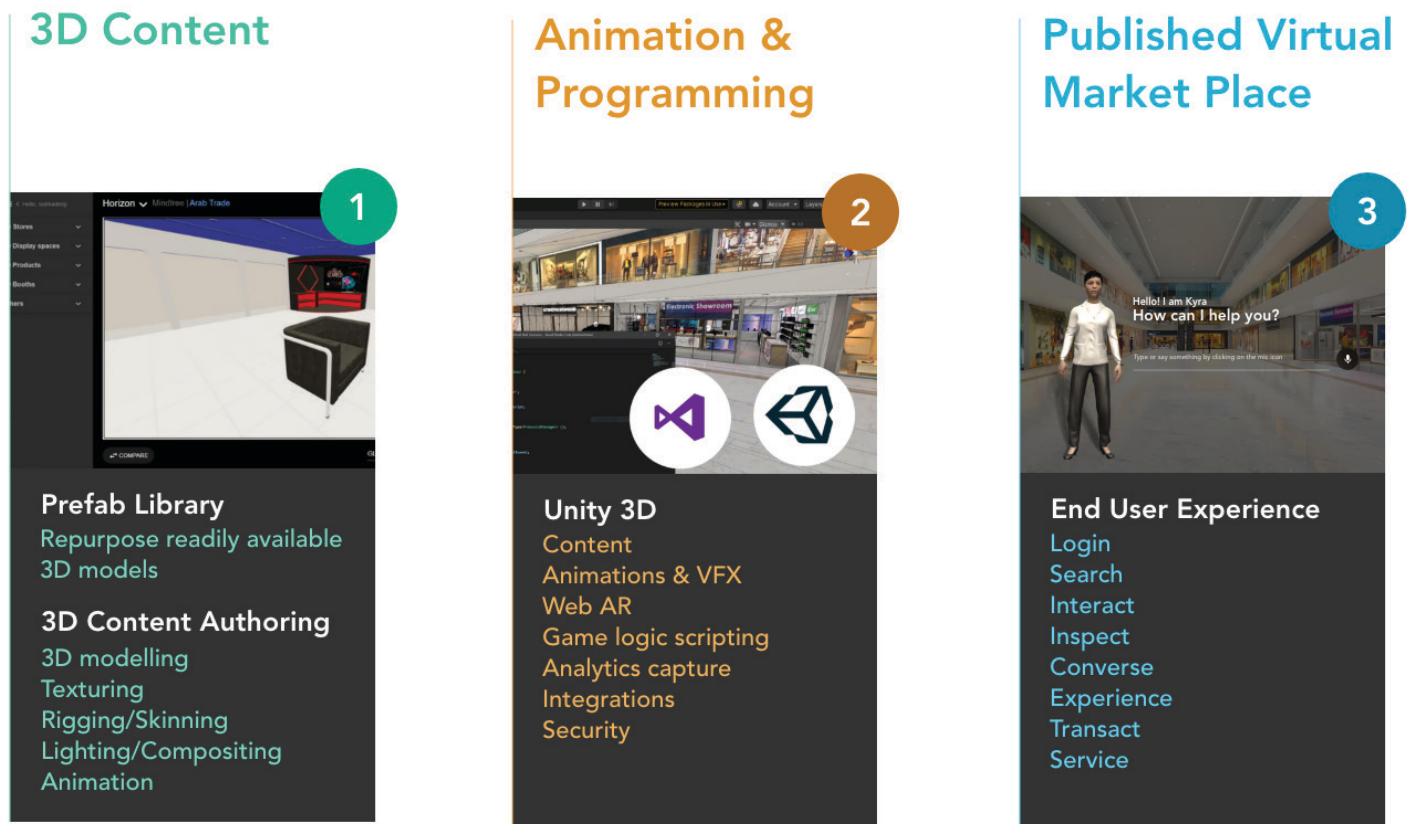
Customers can now visualize, interact, and experience products in immersive 3D. Three-dimensional models of products assist consumers in understanding the intricate details of the product from all angles by offering the ability to interact with it (zoom in/out, rotate, etc.).

Key highlights of virtual marketplaces

- Immersive shopping with friends as virtual avatars
- Transformed e-commerce/e-banking portal
- Fun and interactive avatars providing guidance with a human touch
- One stop mall for all necessities
- Immersive product interactions and evaluations for product fitment. e.g. evaluating the fitment of a fridge in your kitchen
- Visualization and comparison of products in assorted colors and sizes

A right blend of emerging technologies such as AR, VR, Computer vision, AI, LiDAR, and 5G, creates delightful experiences for consumers.

3-step process to realize a virtual marketplace



Step 1: 3D content creation – One of the key components of the virtual marketplace is the 3D content associated with it.

3D models, of the environment, stalls, and products are created using 2D references or pre-built 3D models that are fetched from a prefabricated library and repurposed. The scene and products are textured, skinned, rigged, lit and composited before being animated.

Step 2: The created 3D content is then integrated with the scene using a game engine (e.g. Unity 3D). Web VR visualization, game logic, animation, and integrations with upstream and downstream systems are implemented.

Step 3: The last step is the deployment of the app for customer experience.

The virtual marketplace offers a plethora of benefits that can be leveraged by various industries.



■ Virtual Marketplace for retailers

The virtual marketplace allows retailers to position their brands, stalls, and products innovatively. Retailers do not need specialized 3D skills as the marketplace offers all the services required for designing a store and placing products through an intuitive 2D user interface. The virtual marketplace provides the option to create an entire scene in 3D with a single click. Retailers can then review the 3D layout, validate it, and sign-off.

Ideal virtual marketplace experience

Let us consider an end-to-end retail experience.

Steve is a coffee enthusiast and wants to purchase the latest coffee maker online. He browses various sites and finds a virtual marketplace. He then searches and navigates an electronic store where he is personally greeted by a virtual store associate avatar. Steve interacts with the product and converses with the avatar to understand the features of the product. Steve then selects a coffee maker, views the different colors that are available, and compares it with similar models. Steve asks the avatar about promotions or offers in the store for loyal customers. The avatar connects him with a live agent over a call to address Steve's queries. The agent then provides the best offer available to Steve. Finally Steve makes the payment to purchase the product, and the order is prepared for dispatch.

Virtual marketplaces, combined with interactive, immersive, and personalized services to consumers, can help influence their buying decisions.



Virtual Marketplace for banks and financial institutions

Experience the confluence of physical bank branch experiences with the convenience of online channels

A 3D virtual marketplace presents an opportunity for traditional banks to allow their customers to visualize the various features of banking products in an immersive manner. Banking customers and prospects can interact and converse with smart, bot-driven SME avatars, or remotely connect with live agents. This not only simulates the experience of physical bank branches, but also enhances the overall experience by adding features and visualizations which customers typically do not get in physical interactions.

Here us a quick sneak peek into the virtual bank journey:

Maria Authenticates using her user id and password and enters into the Virtual Market Place



1

Maria spots ABC bank branch



2

Maria enters the bank and is greeted by the Information Desk Agent. "Hi Maria, How May I Help you Today"



3

Maria: I am looking for a Home loan and would like to connect with a Mortgage Advisor



4

Virtual Bank Branch Journey



5

Virtual Information Agent guides Maria to the Digital Display

- Current Bank Balance of Maria is displayed.
- Maria requests for her expense dashboard
- The expense dashboard is presented.
- Maria asks about a Mortgage loan



6

- A virtual mortgage advisor provides all the information required.
- Maria: Can I speak to a Human Mortgage Advisor



7

The virtual Mortgage advisor connects Maria to a Human Advisor on a Video call



8

Maria discusses details with the Mortgage advisor and finalizes the Mortgage Loan rate and digitally signs the Mortgage Agreements

Virtual community hub platform



Many small and medium enterprises lost their business and shut down due to the pandemic. Banks have extended loans to these SMB merchants, which carry the risk of increasing their NPA's (Non-Performing Assets).

Banks can help their small and medium business customers survive and revive during this pandemic through a community hub platform.

A virtual community hub helps banks:

- Provision an immersive 3D platform with services to support the small and medium business customers and corporates
- Open a new monetization channel and serve the community's needs
- Bring together elements of virtual banking and immersive marketplace based on AR/VR powered by ecommerce, payments through banking instruments, settlements and loyalty through Blockchain, data insights for personalization, cross-sell, and up sell.

A quick visualization of a virtual community hub journey

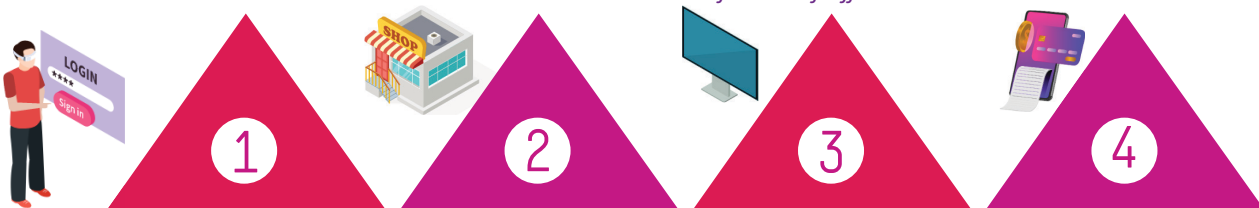
Virtual Bank Assistant:
Is there anything else that you're looking for?

- Automotive
- Electronic Store

Maria had plans of purchasing a Television so she selects Electronic Store

- Maria enters the store and starts analyzing a Television.
- Features of the TV are highlighted
- Maria can also compare features of different TV brands

Maria receives an offer from ABC bank, Pay with ABC bank wallet and get \$XX as cashback



Community Hub Journey



- Maria selects a TV and adds it to the cart.
- Clicks on Checkout

- Maria selects Pay with ABC Bank Wallet
- Clicks on Pay Now
- OTP generated

- Maria enters OTP
- Payment completed
- Invoice displayed to Maria

- TV Delivered to Maria
- Cashback credited to Maria's ABC bank wallet

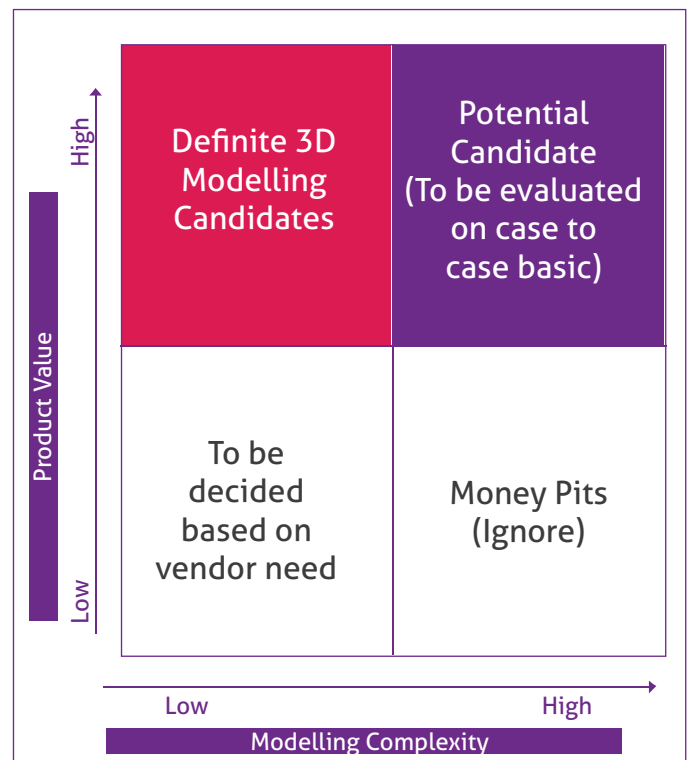


As with any innovation, there are apprehensions about the virtual marketplace. Listed below are a few common queries posed by retailers and banks.

Query 1: We are a global retailer with over 10,000 products. Do we have to model all our products in 3D?

For industries with a large and fast-moving inventory (e.g., apparel, spectacles, etc.), mass production of 3D content becomes a huge challenge.

However, it is important to note that not all products require 3D modelling. The decision to consider a product for 3D modelling can be based on a 3D Candidate Evaluation Framework. This framework allows consultants to position products in four quadrants based on parameters like product value and modelling complexity. Based on this chart, a decision can then be made on the products that require to be modelled.



Query 2. Is the virtual marketplace scalable? How long will it take to model the products? Will the cost be exorbitant?

3D content created for products needs to be accurate, lightweight, and easily deployable in the existing ecosystem. There are three approaches that businesses could consider for 3D content authoring, each of which have their respective pros and cons. Balanced decisions must be made based on the 3D model accuracy required and the time to market.

Approach 1 – Automated 3D object designing using 3D modelling software

Pros	Cons
Quick capture	Output models are heavy (high poly) and need optimization
Faster 3D model creation of voluminous objects	Animation of products is a challenge as the 3D output is a single file model
Scalable	Low texture quality and accuracy
	Does not scan objects which have low volume e.g., sunglasses
	Automated file formats are proprietary, need third-party tools to convert proprietary format to 3D application format (fbx, obj, gltf, etc.)

Approach 2 – Content created using a 'Prefab' approach

A 'prefab' is a prefabricated 3D object that can be either used as-is or combined with other objects to generate a complete model. Typically, several parts of a physical object in the inventory can have commonalities with the product required to be modelled. For instance, sunglasses have multiple parts such as frames, bridges, lenses, temple arms, nose pads, rivets, and hinges. Most of these parts are similar and can be repurposed while designing new sunglasses.

Exploiting the commonality between various artefacts is key to achieving a fast and efficient workflow for churning out large volumes of 3D models in a quick and accurate manner.

Pros	Cons
Fast and efficient	Requires a pre-defined set of models
Lower cost to creation	Manual effort required to tweak existing 3D models
Re-Usable	
Low Poly (Light Weight)	
High Accuracy	

Approach 3 – A hybrid option combining approaches 1 and 2 can also be considered, based on the criticality of the project and time-to-market.

Query 3: My brand has a global presence. Is the virtual marketplace pervasive, accessible, and secure?

To make the application pervasive, the app should support the most popular channels on both mobiles and desktops. Unity 3D is a recommended option to implement a virtual marketplace as it supports both web and native (iOS and Android) applications. Unity 3D allows the code to be written once and ported to the channel or platform of choice.

The virtual marketplace can be hosted on cloud infrastructure such as Azure/AWS/GCP. The most important protection in accessing the application is to use Transport Layer Security (TLS). It is an improved version of the SSL protocol that helps provide encryption for http traffic. Usage of TLS 1.3 is recommended for all connections that are transmitting sensitive data such as credentials, credit card details, and other confidential information.

Query 4: Will the loading time of webpages increase due to 3D content? Do we require additional bandwidth to load 3D content?

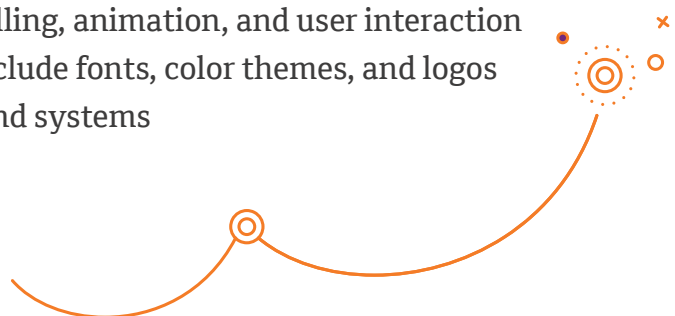
The 3D content created by artists is optimized for the best performance on the web. A 4G connection with 10 to 20 mbps bandwidth is sufficient for seamlessly rendering 3D experiences.

Query 5: Do we need specific/advanced devices for visualizing VR experiences?

Not particularly. We can create immersive experiences using WebVR - a technology that works seamlessly across laptops, tablets, and mobile browsers. Through the flexibility and power of WebVR, banks and retailers can make virtual experiences seamless and pervasive across geographies.

What are the pre-requisites for retailers and banks to step into the virtual marketplace?

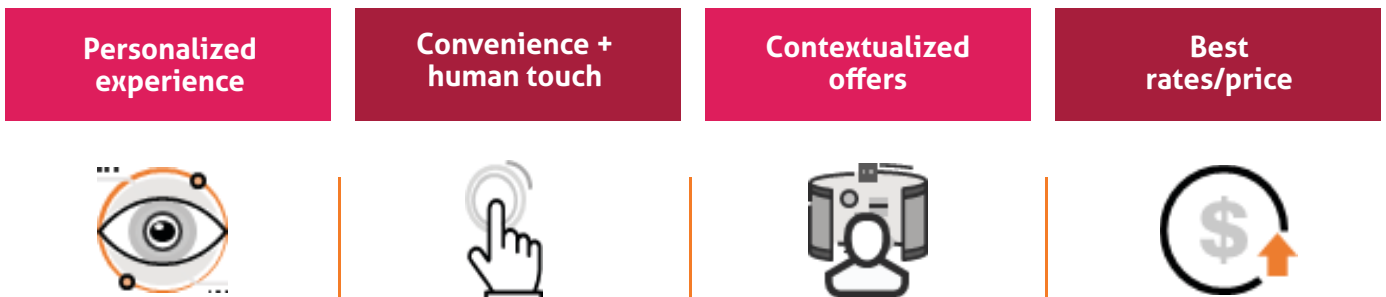
1. Image references of products for 3D modelling, animation, and user interaction
2. Well-established brand guidelines that include fonts, color themes, and logos
3. Exposing web-services of CMS and backend systems



Key value propositions for retailers & banks

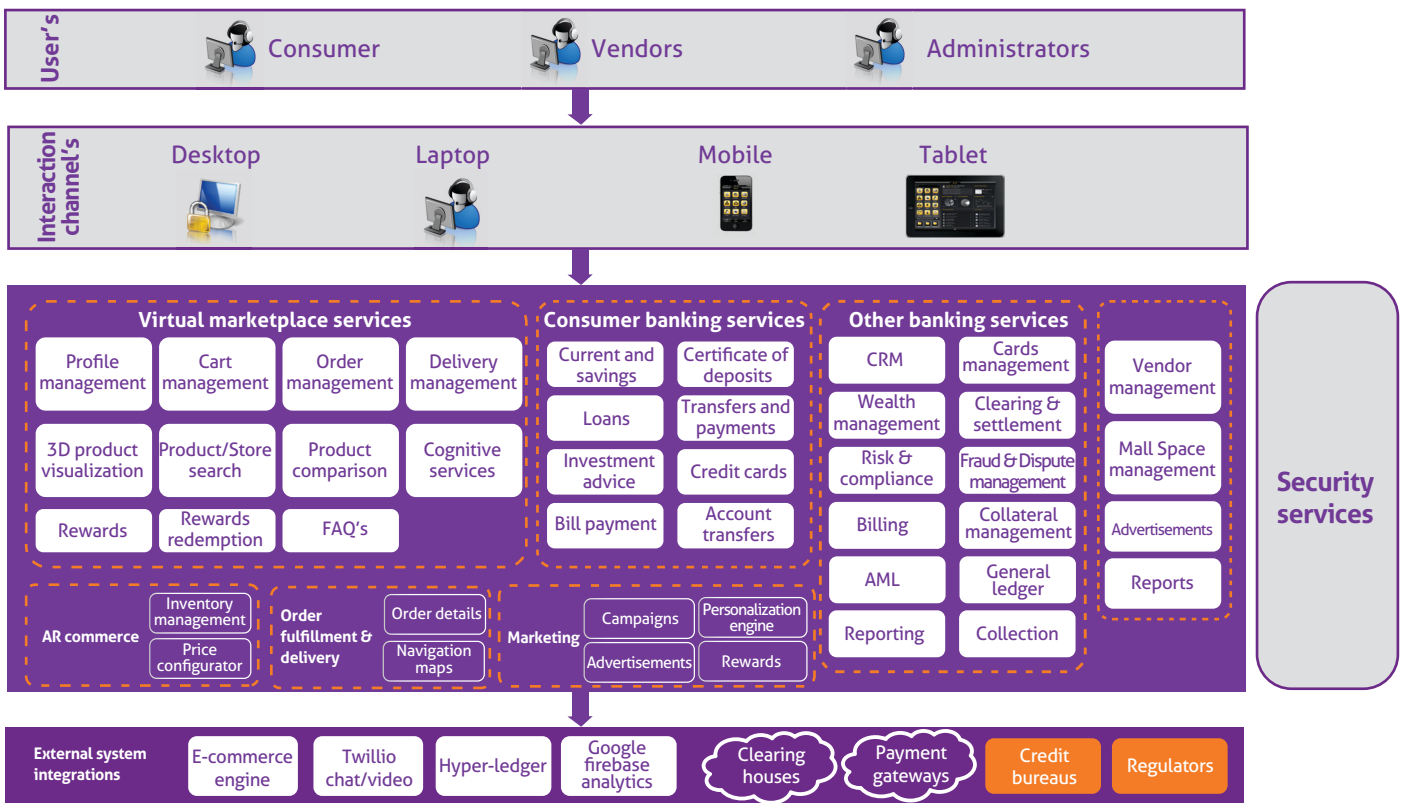


What is in it for consumers and customers?



Functional architecture

In addition to all the existing features of 2D digital marketplaces, a 3D virtual marketplace provides an immersive experience of the mall, with personalized store experiences being based on frequency of purchase, user demographics, and preferences, 360-degree product visualization and interactions, interactive product comparisons, and live correspondence with agents for queries and negotiation.



Banking consumers can perform all banking activities virtually, have immersive interactions with banking agents, and get queries clarified through automated avatars or live agents through video calls. 3D virtual banking fuses physical and digital interactions, assisting consumers to receive services and perform transactions seamlessly.

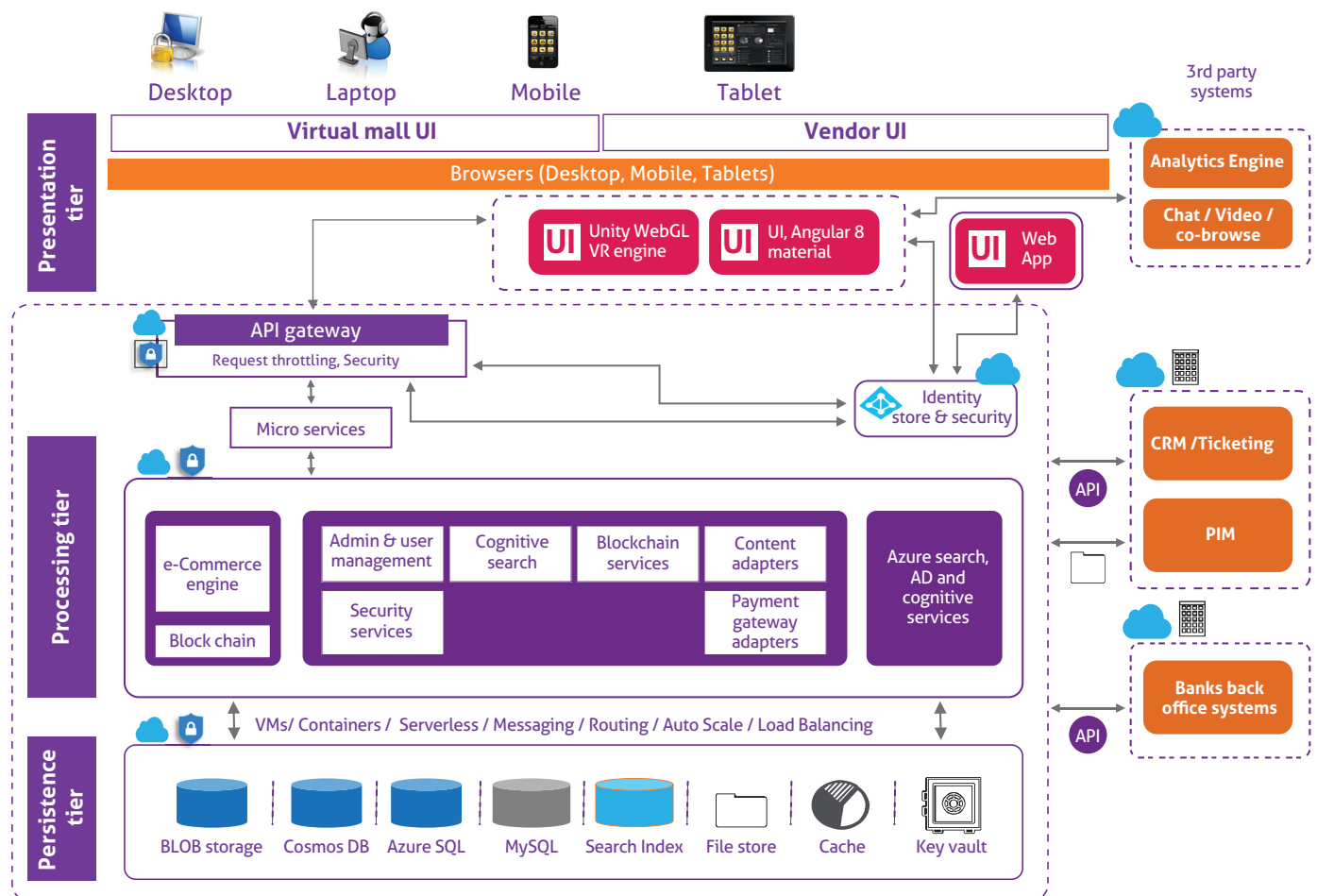
Banks can provide a proactive, predictive, and hyper-personalized customer experience through contextual offerings and connected data.

The convergence of virtual banks and community hub services is the future of banking. Virtual marketplaces extend support to small and medium businesses both proactively and reactively. Banks, by extending these services, differentiate their brands and position themselves as innovators and community enablers. Banks can also leverage community banking to create new channels of revenue through community marketing and business networking.

3P tier technology architecture

(Presentation, processing, and persistence tier)

Below is a high-level representation of the various modules of a virtual marketplace. The virtual mall user interface is the gateway for users to experience the marketplace. The UI is built using Web-GL to support 3D visualizations and interactions on browsers supporting Web-GL. All the interactions from the UI to the downstream and upstream systems are through a Rest API micro-services layer.



A set of micro-services are implemented to separate various integrating layers. The micro-services layer also provides integration adapters as an abstraction for replaceable subsystems such as digital asset management, order fulfillment, ticketing systems, cognitive search, and banking systems. These micro-services provide high availability and dynamic scalability to the system.

The persistence layer provides virtual machines for deploying services and storages for persisting data. The application is deployed on cloud VM's (Azure/AWS/Google). The micro-services run on containers and the cognitive services reside in the cloud.

■ Inclusion and accessibility

Applications and services should be accessible to all the users. To achieve accessibility compliance, we recommend Web Content Accessibility Guidelines (WCAG), W3C 2.0/2.1 Level A and Level AA guidelines.

To support the accessibility needs of the audience, the WCAG 2.1 standard provides four key principles that provide the foundation for web accessibility. Under each principle is a set of guidelines to meet the different needs of the audience.

VR commerce will be the future of 2D e-commerce and virtual marketplaces will be the future of banking, providing immersive and gratifying experience to consumers.

Quick visualizations of the virtual marketplace

Virtual bank and virtual marketplace: [Click Here](#)

Virtual wealth advisor: [Click Here](#)

Appendix:

Recommended Reading for TLS (Transport Layer Security) and Security best practices: <https://devblogs.microsoft.com/premier-developer/microsoft-tls-1-3-support-reference>

WCAG 2.1

Ref: <https://www.w3.org/TR/WCAG21/#toc>



Karthikeyan Dhayalamani

Program Director – Head of AR/VR CoE

Karthikeyan is a part of the Emerging Digital Solution practice in Mindtree. As the head of AR/VR, he is responsible for innovation, conceptualization, implementation, and GTM strategy of platforms and solutions. With 17+ years of versatile experience in the IT industry working on cutting-edge technologies, digital transformation programs, and platforms, he has successfully led several large digital engagements with customers across the globe. He has contributed to many industry-first showcases at events.

About Mindtree

Mindtree [NSE: MINDTREE] is a global technology consulting and services company, helping enterprises marry scale with agility to achieve competitive advantage. “Born digital,” in 1999 and now a Larsen & Toubro Group Company, Mindtree applies its deep domain knowledge to 260 enterprise client engagements to break down silos, make sense of digital complexity and bring new initiatives to market faster. We enable IT to move at the speed of business, leveraging emerging technologies and the efficiencies of Continuous Delivery to spur business innovation. Operating in 24 countries across the world, we’re consistently regarded as one of the best places to work, embodied every day by our winning culture made up of over 27,000 entrepreneurial, collaborative and dedicated “Mindtree Minds.”