5. Aims and Objectives

The objective of this proposal is to present **Metasurance**, an offering that leverages blockchain contracts to enable insurance organizations to launch the following Metaverse related insurance products: Virtual Lands, NFTs, Gadgets, and Avatars, and to integrate with a dynamic pricing model which ensuries optimized quote management, policy management, claims management with auditability and real time status updates.

To summarize, the main objectives of the proposal are:

1. To develop a blockchain-based insurance management platform in metaverse, considering the following digital assets: Virtual Lands, NFTs, Gadgets, and Avatars.
2. Modeling dynamic pricing of the above-mentioned metaverse assets in order to assist an optimal insurance management by employing predictive time-series analysis considering the impact of different factors affecting the demand and supply dynamics.
3. Finally, a product prototype will be developed using Innoveo (NO CODE platform).

6. Context/Background [Please elaborate on the existing literature relevant to the project?] (500 words)

As this domain is relatively new, academic research in this regard is quite scanty. However, we have tried to sketch a bird's eye view of the proposed theme in subsequent parts.

The emergence of metaverse is set to pave the way for industries to utilize various aspects to develop various products, services, and solutions. This new reality opens doors to possibilities that have never been heard before. One could imagine it as a continuum of connected worlds that will redefine and reshape human experiences. Metaverse is estimated to be a $800 Bn market by 2024, with a CAGR of 13.1%. This will transform how various industries work and function, and insurance will not be alien to this. Unlike traditional insurance management in the real world, there is a need to build a quick product launch with dynamic pricing for these non-admitted products.

All these have several implications for insurers wishing to use the metaverse. Firstly, *connectivity* as all the online interactions with both customers and other services and products will increase. Secondly, it is likely to change notions of space and distance, allowing a deeper understanding of connections between entities in the virtual and the physical world. And finally, the semblance of quality is going to be critical, the look, motion, sound, texture and feel of the digital content may become more important than backend functions.

Metaverse possesses great potential to disrupt the insurance industry for good, but this comes hand in hand with new risks and challenges. To start with, it provides the insurance companies an opportunity for a fundamental shift in the economic model. The industry is poised for structural changes and resolute growth with newer revenue models such as fee-based partnerships, subscription-based solutions and consulting fees. Rather than the conventional archetype of compensating for losses by collecting premiums, insurers need to offer more risk control and mitigation solutions. An integrated and collaborative ecosystem, that is coherently linked with different sectors like healthcare, BFSI, government and so on, will be critical in determining the success or failure of the organizations.

Metaverse is very new, hence the obligations, risks, remunerations, and physiological consequences associated with it are not fully understood and casts uncertainty over level of adoption. Forward thinking avant-garde organizations are maneuvering these challenges and uncertainties by making significant investments to supplant legacy systems and build a competent workforce around this.

Appropriate recommendations for insurers include firstly to up their skills base, to invest in human capital to enhance expertise, to familiarize themselves with the concept of metaverse, NFTs and cryptos, to identify potential risk factors and to look at new products, services and

models while being aware of synergistic effects. Insurance carriers and brokers are well placed to seize the opportunity and begin addressing these emerging risks. But if they delay their response, we expect these market developments could drive disintermediation of traditional insurers.

With a vast spectrum of insurance offerings along with metaverse capabilities, the Metasurance team from IIT Patna, Capgemini India Ltd. and Thinman websolvers India Ltd. can be the ideal technology partner to empower the design, build and manage of a generic insurance platform in this parallel universe, and to seize the limitless potential by transforming the lives of people and in turn by reshaping how the insurance industry operates.

7. Problems to be addressed [Technical fallouts in the existing state-of-the-art methods that are proposed to be addressed] (1000 words)

The worlds of commerce, business, entertainment, education, and healthcare are set for a transition into the Metaverse, enabling people to socialize, shop, invest, manufacture, buy, and sell in the Metaverse. Capabilities in visualization, AR/VR, machine learning/AI, connectivity, blockchain, and other 4IR (fourth industrial revolution) technologies help capitalize on this new trend.

With great opportunities, comes a great risk. The new virtuality will give rise to an increase in the life and health risks and accidents due to toggling between the real and the virtual worlds. Virtual assets and identities may be exposed to cyber threats, phishing, malware, and other forms of cybercrime. Moreover, assurance of the safety and security of consumers' sensitive information will be pivotal. Therefore, these factors will call for a desperate need for innovation and revamp in the product and service offerings.

In particular, there are two possible sources of threats to any digital assets. Firstly, it can stem from technical glitches (e.g., presence of bug, Byzantine fault, etc.) related to failure in operation of the developed platform. Second, the major source of external threats like cyber-attack, phishing, malware, etc. These two types of digital casualties bear different degrees of losses to the relevant customers. Some of the aforementioned issues may cause serious damages with probability of occurrence being very low (extreme value theorem), whereas other issues may be more frequent with lesser severity.

Keeping the above facts in mind, Metaverse residents need to protect their digital assets with insurance products that resemble today’s cybersecurity policies. Insurance companies need to be “metaverse ready” or risk being obsolete. In fact, efficient claims management is the area to be significantly enhanced by capabilities such as computer aided replication and virtual assessment of insurable assets. Glut of data (from billions of sensors and IoT devices) will be available to the insurers to analyze risks and establish appropriate pricing (intelligent underwriting), gain a better understanding of the customers, and effectively negotiate with reinsurers.

We propose the following objectives to address the above-mentioned problems:

(1) We will develop a unified blockchain-based decentralized platform, named **Metasurance,** for efficient insurance management of the following metaverse products: Virtual Lands, NFTs, Gadgets, and Avatars. The platform offers the insurance companies to launch and quote insurance products (in accordance to the degree and nature of risks and threats) for the above-mentioned digital assets and the buyers to buy them. We consider an automated management of the complete life cycle, starting from insurance shopping and purchase, premium payments, maturity and claim settlement without any hassle in the Metaverse.

(2) For each virtual asset as mentioned above, we will assess different factors affecting their demand and supply dynamics in the platform. This will also help us to analyze and collate

the real-time data for the prices of each asset. We will use these information metrics comprising of demand-side factors, supply-side factors, and the price to employ univariate (AR, MA, ARIMA) as well as multivariate time-series models (VAR, Co-Integration, etc.) to predict the future value of these assets.

Keeping in mind the current insurance market readiness to consume these products, we will roll out the product in the following manner: In the first phase, we will consider NFTs and Gadgets. While in the subsequent phases, we will consider Virtual Lands and Avatars. We will introduce a boundary range for coverage limits of insurance, deductibles, and also the price of the products before accepting the quotes. This will help insurance organizations to overcome the increase in claim-ratio. We will also introduce dynamic pricing models based on the current market condition of the risk exposure.

8. The novelty of the Project [Mention how the proposal is novel with respect to the current state-of-the-art FinTech?] (250 words)

The proposed **Metasurance** aims to achieve the following two:

- Speed to market platform for Quote, Policy, and Claims systems with out of the box product lines covering their screens, business logic, forms, and declarations. In particular, we adopt blockchain technology to cater decentralized insurance management with better transparency and accountability.

- Dynamic pricing studio empowering actuarial to handle market competition based on business intelligence.

As shown in Figure 1, Insured (customer) buys a metaverse insurance product through direct or through agency channels. The core quote, policy and claims insurance systems are integrated with blockchain framework to ensure transparency and unified workflow across personas (customer, agents, insurance company, etc.). The dynamic pricing engine helps insurance organizations to derive accurate pricing based on the product exposure, risks and competitor challenges based on market intelligence. The system of record is stored in a smart contract across the insurance value chain as depicted below.

Unlike existing solutions, Metasurance leverages blockchain and smart contracts to enable efficient broker channel integration while ensuring optimized policy management with auditability and real time status updates.

- Smart contracts: Standardized technology, eliminates data duplication by creating a shared source of truth.
- Common data model: Digital policies, distribution agreements and claims processing.
- Mutual and consistent multiparty workflows across an insurer and its full network of intermediaries.
- Automation reduces costs & reconciliation is drastically reduced.

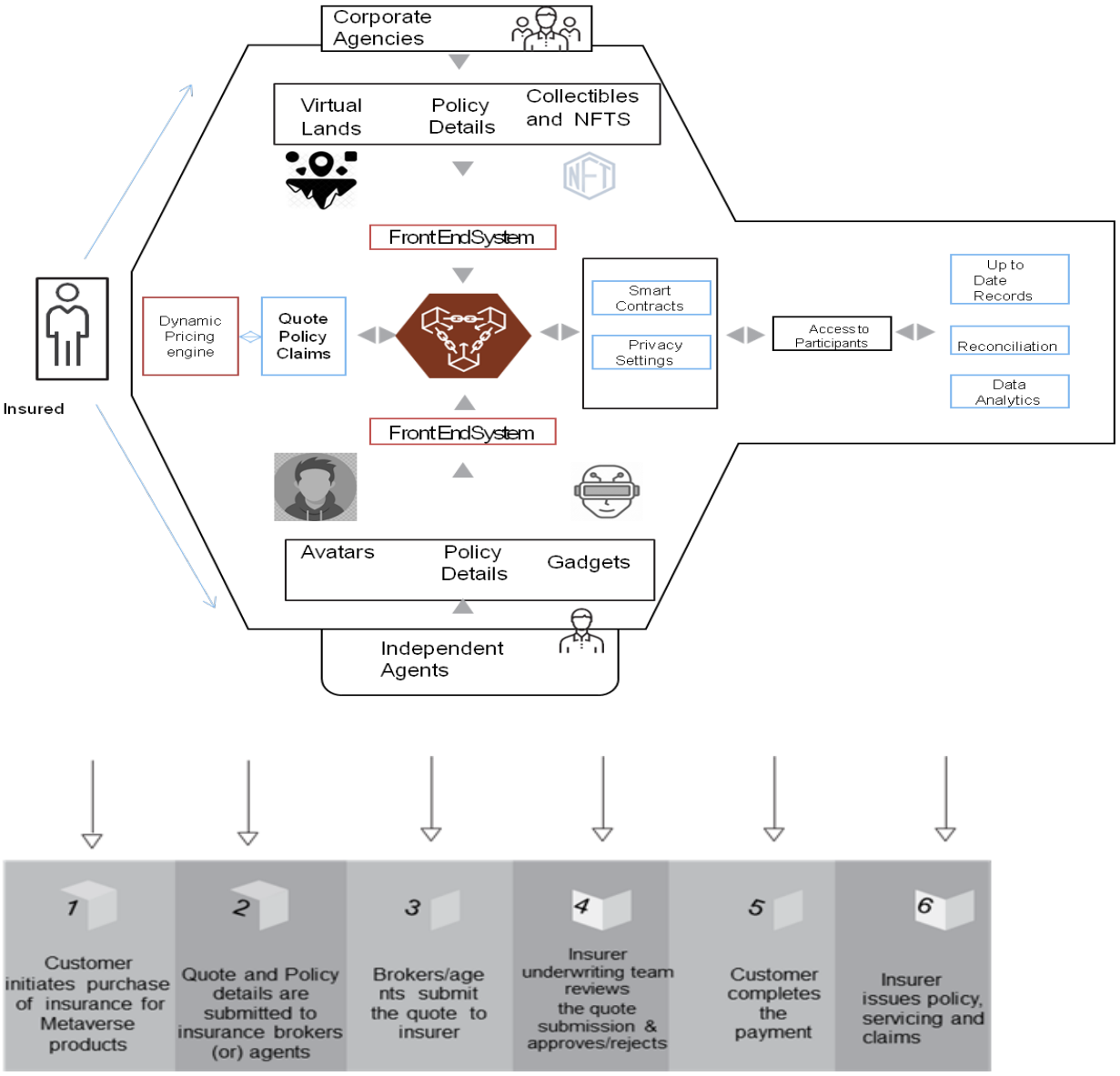


Figure 1: Business Architecture of **Metasurance**

9. Background work already done: [This section should elaborate on the business development strategy, product viability, commercialization, etc.] (1000 words) (1000 words)

a) Metasurance Product Development Strategy – From Idea to Commercialization

When it comes to successful new product development, productivity is key. Insurers seeking to remain relevant, efficacious and profitable must continuously conceive and develop new products that not only make it to the market, but also deliver great value to target audience members. Namely, it is crucial for businesses to understand what consumers want, whether similar products already exist on the market and how they can create products superior to those developed by their competition.

To take great product ideas and translate them into even greater final physical products, a new product development strategy (NPD strategy) is of the essence. **Metasurance** NPD strategy should be systemic, customer-driven and sales-goal oriented. Our product management team collaborates on developing a new product; following these eight stages of the new product development process will ensure ultimate productivity and drive the product's overall marketability upon introduction. **Metasurance** NPD strategy is systemic, customer-driven and sales-goal oriented. Here's how:

Stage 1 (Idea generation): Idea generation is a continuous, meticulous search for new, viable product development opportunities. Often, companies employ basic internal and external SWOT (strengths, weaknesses, opportunities and threats) analyses and examine market trends to

generate hundreds, or even thousands of potential product ideas. Internal ideas can be sourced through R&D and employee brainstorming, while external ideas tend to come from studying and communicating with distributors, suppliers, customers and competitors.

Some methods we will follow are:

- ***Dimensional analysis***: listing all physical characteristics of a product idea and asking relevant questions to assess its potential for success.
- ***Scenario analysis***: identifying market evolution to capitalize on anticipated consumer needs.
- ***Problem analysis***: formulating a list of existing consumer problems, pain points and needs to serve as a basis for new product development ideas.

Stage 2 (Idea screening): In this second step of new product development involves screening all newly-generated ideas to sift the good ones from the not-so-good ones – and discarding the latter, taking into account several factors:

- Our company's strengths,
- Our company's weaknesses,
- Customer needs,
- Current market trends,
- Expected/desired ROI,
- Affordability

Attributes belonging to each new idea are compared to these factors, now a standardized checklist, to weed out poor, unsuitable or less attractive ideas that would otherwise progress through the stages of new product development.

Stage 3 (Concept development & testing): Next in the new product development process is concept development and testing. In reality, this stage is two-fold:

Concept development. All ideas passing the screening stage are developed into concepts, which will subsequently be tested for real-world viability. A product concept is a detailed version or blueprint of product development idea, formulated into meaningful, relatable consumer terms so that it is optimally presentable. These alternatives can vary according to several factors, such as quality, price point, features and comfort/convenience of use.

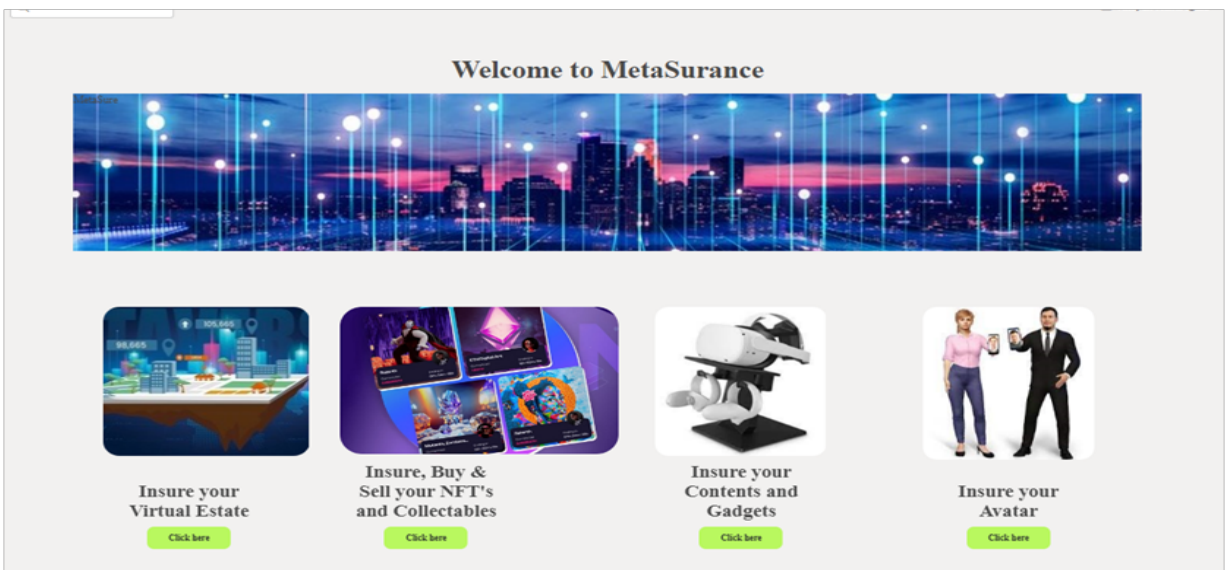


Figure 2: **Metasurance** Dashboard

Concept testing. Once concepts have been developed, each one is tested with sample target consumer groups. The feedback these focus groups provide is used to further develop the concept to better meet customers' needs and demands. The concept testing process therefore enables our business to quickly and economically gauge initial attitudes towards our new product, before copious amounts of time, money and manpower is spent on actual prototype development.

Stage 4 (Business strategy analysis & development (Mindmap)):

Once a promising concept has been selected, we have put together an initial business and marketing strategy. This requires an in-depth analysis of the methods product management, marketing and sales teams will ultimately use to create and sell the product to your target audience. Necessary strategies, such as product profitability and marketing mix will be determined.

- Product's planned value proposition
- Sales, market share and profit goals for the first few years following your new product's launch
- Planned development, marketing, sales and distribution budgets
- Planned long-term product goals

Figure 3: Metaverse in Insurance - Mind map

Stage 5 (Business & financial analysis): Eventually, metaverse products will become part of day today, allowing users to have unique experiences in the metaverse. Utilizing NFT's technology and attributes, users can identify answers to problems faced within the metaverse in a decentralized way. Have these mainstream products insured will improve security and minimize the risk exposure to insured.

Business analysis:

- Japanese tech giant Softbank, has put USD 150 million into a South Korean metaverse platform called Zepato.
- According to MetaMetrix, a metaverse land analytics provider, virtual real estate will grow to over $1.9 billion in sales in 2022.

- Digital demand for fashion and luxury brands will grow adding a further $50 billion in revenue to the industry by 2030.
- Metaverse has potential revenue of $1 trillion within a few years.
- Claims around personal content and gadgets have increased by 40% in 2022

Stage 6 (Product development): Following the approval of all relevant business, marketing, financial and development strategies, the product concept is developed into an actual tangible production in this sixth stage of new product development. The main actions involved in the product development stage include: Product construction, Usage testing, Packaging, Branding, Product positioning

Stage 7 (Test marketing): Unlike concept testing, test marketing involves placing an actual finished product for sale in one or multiple sample market settings and observing how well (or how poorly) it sells under the predetermined marketing plan. Here again, customer feedback is crucial, this time relying on actual observed customer behavior, as opposed to making inquiries about interest in a proposed concept. As such, it can be implemented in the form of further suggested changes to the new product, as required. The goal of the test marketing stage of the NPD process is to validate the entire concept behind the new product before the full investment is made and ready the product for its imminent commercial launch. The actual amount of test marketing needed can vary quite substantially with each new product.

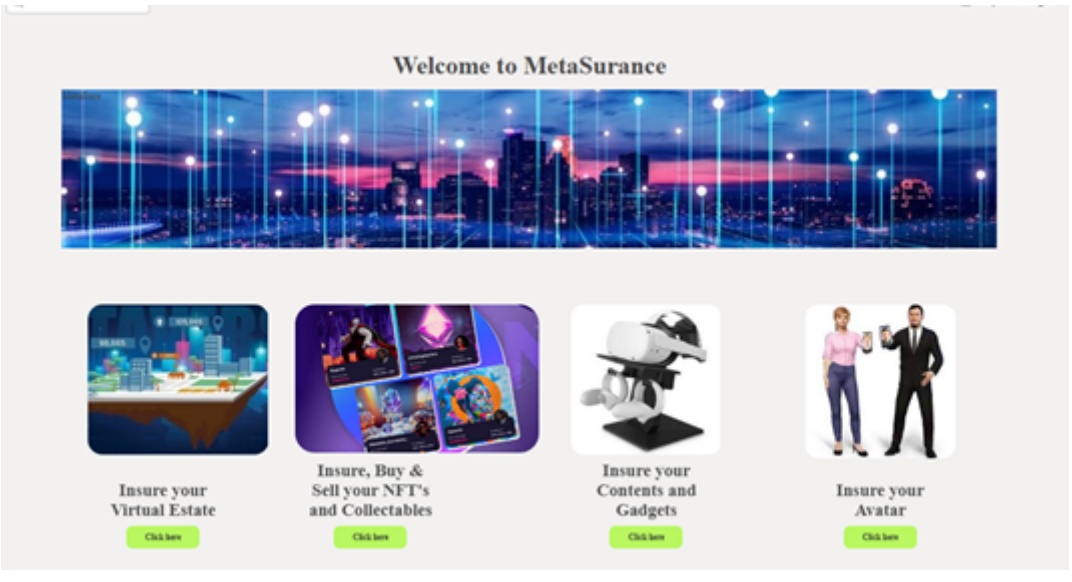
Stage 8 (Commercialization): Now at this stage Metasurance and all associated marketing strategies are ready for launch. Now it's time to implement a full marketing plan and production process. Our plan is to take Metasurance to developed markets as stage 1 followed by developing insurance markets in subsequent phases. Our Product layer will have regional customization; language support capability etc making is easier for a global launch.

10. Technology readiness level of the project [This section should elaborate on the technology readiness level in terms of Patents, and papers. Prototypes developed etc., if any] (1000 words)

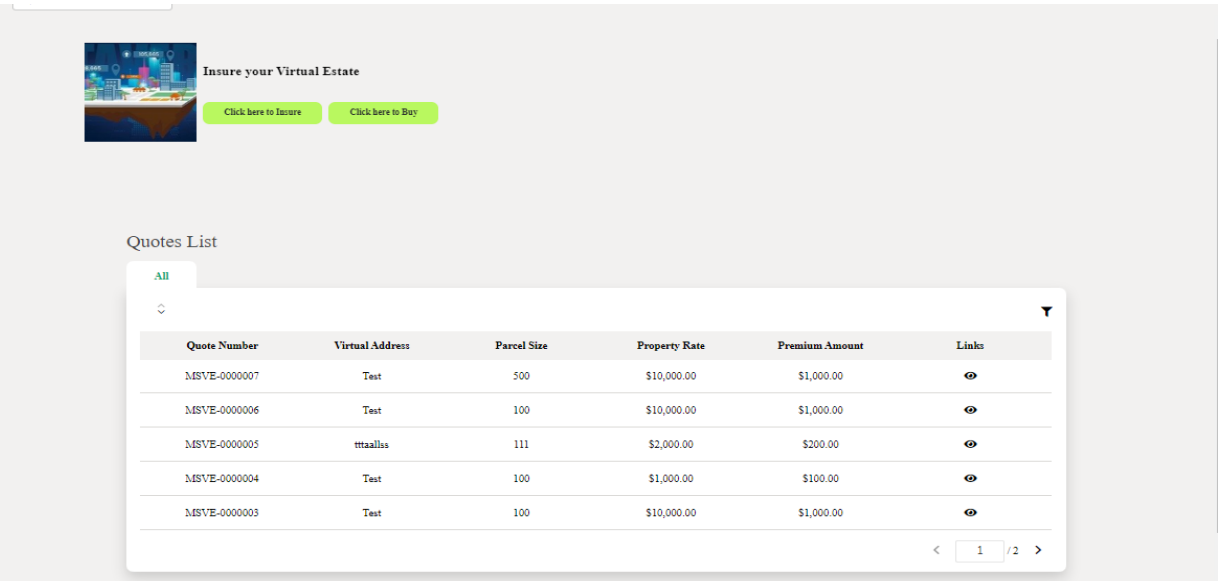
The team at IIT Patna, in collaboration with Mr. Chandra Mohan Kumar, is working on various aspects of Blockchain Technology since January 2019. In addition to the development of various smart city solutions using blockchain technology, the research team has been working on developing solutions to insurance of Metaverse objects. A proof of concept of the Quote module using Innoveo (NO CODE platform) is already in place.

Few snapshots of the developed prototype are shown below:

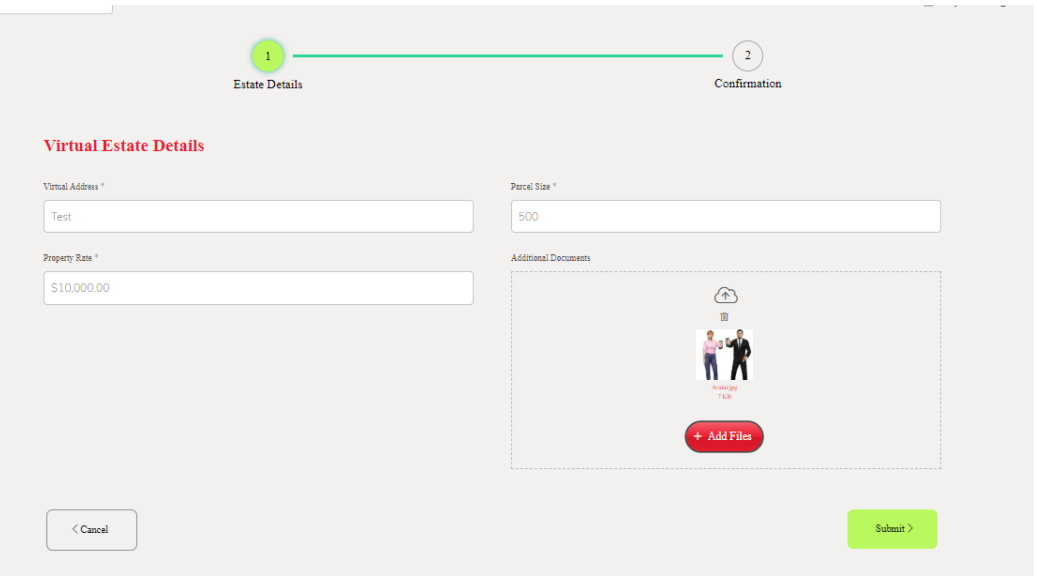
- Dashboard to launch insurance for all metaverse products:



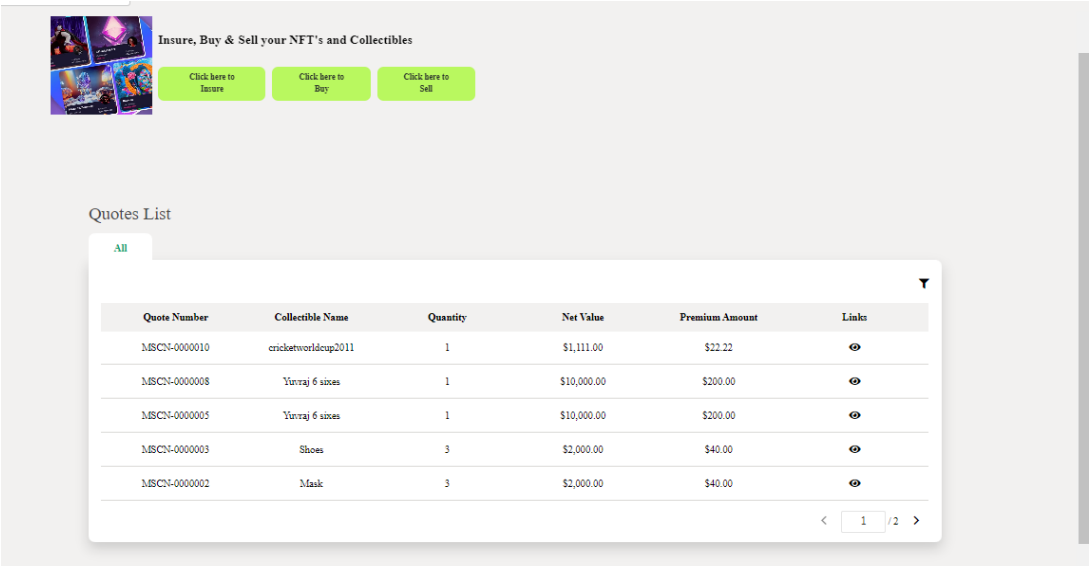
- Virtual Estate Zone:



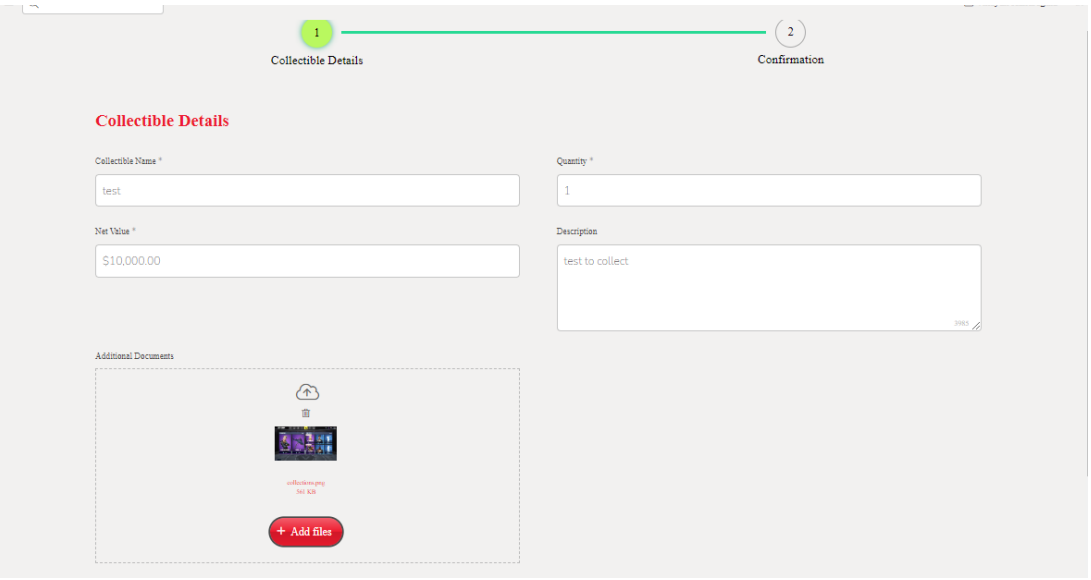
- Capture Virtual Land/Estate Details:



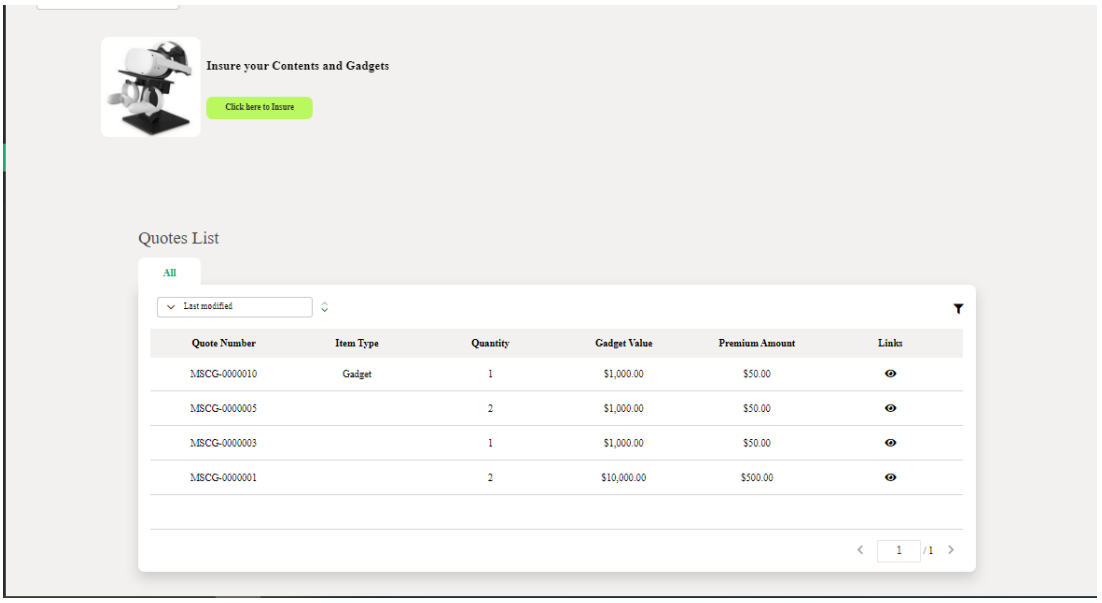
- Collectibles Zone:



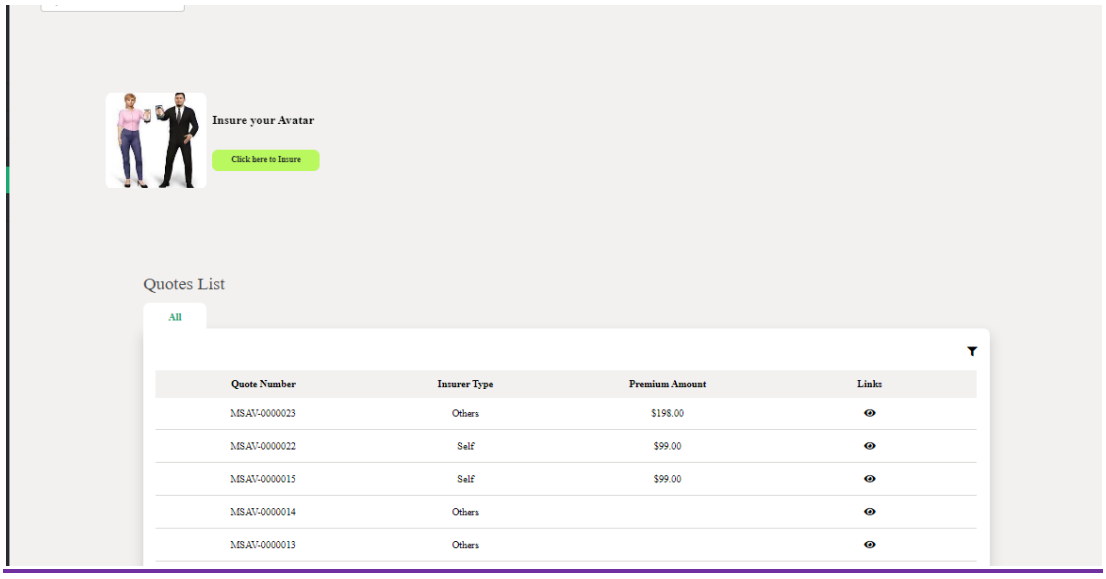
- Collectible Details:



- Content and Gadgets:



- Avatar:



11. Target beneficiaries (250 words)

The target beneficiaries of the proposed **Metasurance** product are listed below:

- Metaverse customers
- Insurance organizations across the globe
- Insurance Brokers and agencies
- Regional Compliance and regulatory units (IRDA, ISO, NAIC, etc.)

12. Gantt Chart of activities giving clear milestones for every quarter

This two year project will start with the initiation phase where project propositions are documented, requirements are established, and schedules are created. Meetings and collaborations are more often to ensure the project success. The most crucial part of the development is the execution phase since this will carry out the details of our project charter. This covers most of the timeline needed to develop our proposed work-packages. Finally, the closure phase to confirm the completion of the project. Final project disposition is also an important aspect of this phase.

We set the project execution time-frame mentioned below:

T1: 1st – 3rd Months:

- **Activities:** (1.1) Procurement, (1.2) Manpower Hiring, and (1.3) Literature Survey.
- **Deliverables:** Product scoping and documentation of overall system requirements and specification, Problem identification and formulation.

T2: 4th – 6th Months:

- **Activities:** (2.1) Identification of possible system components: on-chain and off-chain, (2.2) identification of stake-holders and functionality composition, (2.3) decentralized storage requirement, and (2.4) smart contract-based algorithms developments
- **Deliverables:** Blockchain-based quote, policy and claim solutions to support metaverse products..

T3: 7th – 9th Months:

- **Activities:** (3.1) Data readiness, (3.2) Empirical analysis using time-series framework.
- **Deliverables:** Price projection and premium calculation of each of the virtual and real assets

T4: 9th – 12rd Months:

- **Activities:** Integration and early business review
- **Deliverables:** Alpha-version of the product

T5: 13rd-15th Months:

- **Activities:** Non-functional requirement testing and regression
- **Deliverables:** Test results

T6: 16th-18th Months:

- **Activities:** Pre-launch user training and OCM
- **Deliverables:** User manuals, OCM logs

T7: 19th-21st Months: