THE FUTURE OF GENES AND BLOCKCAIN

INTEGRITY FUTURE FOR ALL MANKIND

THE PROBLEM:

In a world where a global catastrophe is inevitable, whether it be a natural disaster like a flood or technological factors, the only thing that matters is preserving genes (this is true in the Bible, albeit in an allegorical form). And how can we preserve genetic information with the ability to transform it? The answer is blockchain technology

In the world of medicine, genetic information allows us to create entire libraries filled with details about each gene in the human body. Each gene has its own map, its own history, and its own connections to diseases and conditions. This allows our doctors and researchers to create drugs and therapies that are precisely tailored to each individual patient, taking into account all of their genetic characteristics.

Biotechnology and Plant Genes

In the field of biotechnology, information about genes becomes a powerful tool for transforming our world. In the future, we may be able to create plants that can survive in the most extreme conditions, whether it's deserts or the Arctic, while still producing the food necessary to sustain human life. Or trees that can purify the air from pollutants much more efficiently than any existing technologies.

Humanity and Our Understanding of Ourselves

And what if we use this genetic information to understand ourselves as species? We can uncover the mysteries of our origins, understand which genes are responsible for our behavior, our abilities, our fears, and hopes. Perhaps we can even glimpse into the future and see how we, as a species, can evolve and develop.

All of this is a possible future.

BLOCKCHAIN AND GENETIC

- **Blockchain**
- **The advantages of using blockchain technology in the transformation of genetic information.**

Blockchain is a distributed database that can be used for recording and storing information without the ability to change it. This innovative approach can also be applied in the field of genetics for recording gene sequences.

Recording gene sequences in *blockchain has several advantages*:

1. Reliability and security: Blockchain ensures a high level of data security and reliability. Each block of information is linked to the previous block and contains a hash code, making it impossible to change without the intervention of all participants in the system. This means that recording gene sequences will be protected from potential hacks or tampering.

2. Transparency and accessibility: Blockchain is a public database accessible to all network participants. This means that scientific researchers, doctors, and other specialists can easily access gene information. This facilitates collaboration and data exchange in the field of genetics, making scientific research more efficient.

3. Large volume of data: Blockchain can store a vast amount of data, which is especially important in genetics where information is evaluated in terabytes. Recording gene sequences in blockchain allows for the preservation and processing of large amounts of genetic information, which is useful for various research and medical purposes.

4. Privacy and control: Blockchain can be configured to ensure data confidentiality. This means that each user can have full control over their genetic information and decide who has access to it. This is important for protecting privacy and preventing unauthorized use of data.

Recording gene sequences in blockchain represents an innovative and promising approach that can improve the exchange of genetic information, accelerate scientific research, and contribute to the development of medicine. This method has numerous advantages and can become a key tool in the field of genetics and biology.

OUR PROJECT:

- The goal of our project.
- Integrity Token. The type of asset
- Emission of the INT token

The goal of our project is to create a functional product that can be used in various fields of genetic research, whether it's plants, animals, or humans. The project is an example of an *RWA (Real World Asset)* as we will be using real-world data to digitize them on the blockchain. Imagine how important it is to preserve information about the genotype of all living things in a world that is crumbling.

For investments in the project, we will use the TON blockchain. Its capabilities include creating smart contracts, DApps, and an audience of 800 million users. In the initial stage, we have developed Integrity Tokens with a*n issuance of 1 billion.* These tokens will be used in the ecosystem for the transformation of genetic information. Scientists and people from all over the world will be able to add their genetic code to the blockchain, build their genealogical trees, study inherited information, and plan their offspring.

TECHNICAL PART:

- **Methods of decoding genetic information**
- **DNA Chain Recording Technology**

Methods of Decoding Genetic Information

In recent years, scientists have been constantly announcing the decoding of genomes of various species. DNA, which is one of the fundamental languages of biology, consists of just four letters: A, T, G, and C. This molecule can be compared to a very complex computer program with many errors and workarounds, but it still functions. DNA can be extracted from almost all cells in the body, except mature red blood cells, which lose their nucleus to facilitate oxygen transport. The process of DNA extraction consists of four stages: cell membrane disruption to release DNA, purification from DNA-associated proteins, removal of various impurities, and DNA dissolution for storage. DNA can be extracted from blood, saliva, or hair, with blood being the easiest biological material to obtain. The genome is the entirety of an organism's DNA with all its specific characteristics. There are very complex mathematical algorithms that enable scientists to find the most probable scenario of genome development based on genetic data. Good models have predictive capabilities and can be tested with new data that should not contradict the model. Decoding the genome has numerous practical applications in all areas of human activity, including genetic archaeology, which can provide clues on how to avoid population bottlenecks and prevent the extinction of animal species.

DNA Chain Recording Technology

The question of recording DNA chains in blockchain is not directly mentioned in the provided sources. However, our company aims to develop technologies for protecting the privacy of genetic data and ensuring controlled and secure data exchange. They offer data ownership rights, access control, and secure data exchange, guaranteeing that no organization, including Integrity Farm, will have access to your genetic data without your consent. This implies the use of blockchain technology to ensure security and transparency in the processing and storage of genetic data.

TECHNICAL PART:

- About web 3.0 app for recording genetic information on the blockchain
  - Key function of the App
  - The process of creating a smart contract
  - Use of genetic information by scientists and individuals

Key Functions of the Application

The Web3 application for recording genetic information on the blockchain will provide users with control over their genomes, ensuring the security and confidentiality of individual genomic information. It will contribute to the development of personalized medicine by allowing users to compare their DNA with a reference genome and store only the differences in related blockchain blocks. This will enable patients to be informed about their personal risk of developing diseases and guide the treatment of existing disorders. The application can also be expanded to store information on gene expression profiles and will be freely available to researchers with individual consent.

Process of Creating a Smart Contract

A smart contract for recording genomic data on the blockchain will be developed to enable anonymous transfer of genetic information, allowing for the exchange of DNA data between individuals with guaranteed anonymity and confidentiality. It will utilize its own blockchain to ensure anonymous transmission of DNA sequence data and maintain complete confidentiality during the transformation of genomic data. The smart contract will manage the rights and ownership of genetic data in the form of NFTs stored on the blockchain, allowing users to establish digital ownership and control in accordance with privacy laws using "privacy-preserving programmable contracts."

Use of Genetic Information by Scientists and Individuals

Scientists and ordinary people will be able to use their genetic information for personal understanding of genetic risks, as well as for selling or exchanging their genetic data through a secure marketplace. Users will be able to directly sell their genomic data to data buyers, which will benefit researchers and companies gaining direct access to genomic data."

TECHNICAL PART:

- Transmission and storage of genetic information
- Security
- App interface

Transmission and storage of genetic information:

The transfer and storage of genetic information involve using blockchain technology to ensure anonymity and privacy. Data on genomic sequencing will be stored on a decentralized off-chain IPFS, and control over genetic information and access permissions will be individually managed.

Security:

Blockchain provides a high level of security for genetic data by allowing users to establish digital ownership and control in compliance with privacy laws. NFTs can be used to represent individual genomes and their advantages in managing rights and ownership of highly valuable and unique assets, both within and outside the blockchain.

Application Interface:

The application will include an interface for uploading and analyzing genetic data, a control panel for access control and permissions, as well as features for viewing and interpreting genetic information. It will be integrated with the blockchain platform to ensure the security and transparency of transactions.

A Web3 application for recording genetic information on the blockchain will provide users with a secure and controlled way to manage their genetic data, ensuring confidentiality and transparency in data exchange and storage.

TECHNICAL PART:

- App interface
  1. User profile
  2. Genome Information
  3. Account balance
  4. Gene portfolio
  5. Control buttons

TECHNICAL PART:

- App interface
  1. User profile
  2. Genome Information
  3. Account balance
  4. Gene portfolio
  5. Control buttons

1. *User Profile:* At the top of the screen, there is a user profile card that allows setting an avatar, which is attached to the identification number or wallet address. To the right, you can see the selected asset, or in other words, the genome as it is presented to other users.

2. *Genome Information:* The next window contains detailed information about the genome, presented in both text and graphical formats, with corresponding markers. This form of the genome is only accessible to the user who owns the NFT genome.

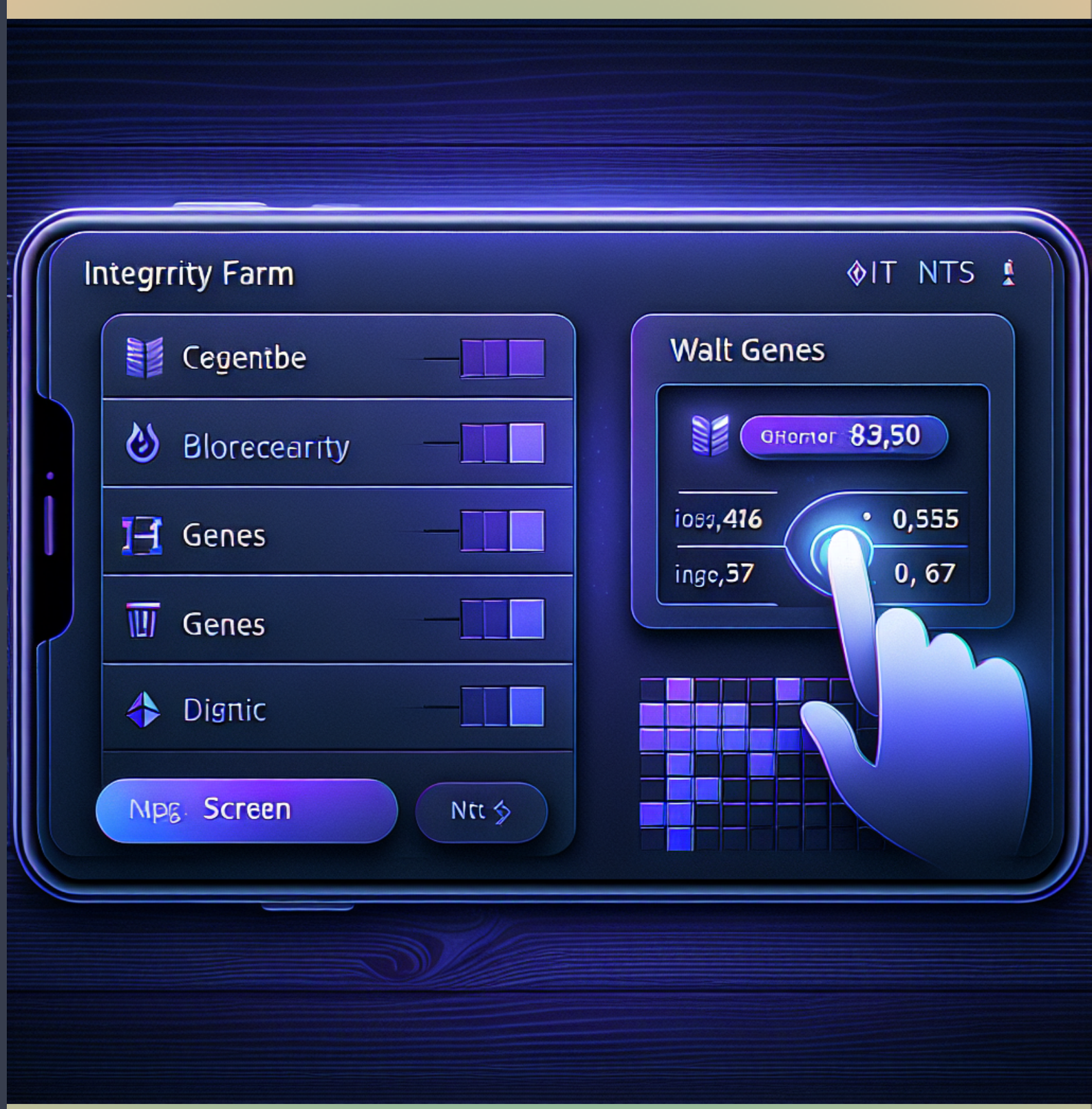
3. *Account Balance:* The account balance is displayed in INT tokens, which will be used for the transformation of genetic information. INT tokens serve as the control token.

4. *Gene Portfolio*: This includes all the NFT genes that have been acquired by the wallet.

5. *Control Buttons:* The control buttons enable the user to manage their genome, specifically, to perform transformations on the genetic information.

TECHNICAL PART:

- **NFT marketplace of genetic information**



Marketplace of Genetic Information. This is what the genetic information marketplace window looks like. Where you can buy and sell various genotypes, including genotypes of plants, animals, and humans.

TECHNICAL PART:

- Integrity Farm. Sequencing laboratory
  - Laboratory Equipment
  - Sequencing technologies

Laboratory Equipment:

Key elements include:

- **Incubators** for creating optimal conditions for working with biological samples.
- **Centrifuges** for separating substrates into fractions.
- **Laboratory refrigerators** for sample storage.
- **Laminar flow hoods** for ensuring biological purity of samples and operator protection.
- **Capillary electrophoresis instruments** used for separating complex mixtures.
- **Homogenizers for preparing samples** for molecular analysis.
- **Spectrometers and fluorimeters** for assessing the quality of proteins, RNA, and DNA.
- **Cell counters** for accurate cell counting in samples.
- **Thermal cyclers** for nucleic acid amplification.
- **Automated sample preparation stations and homogenizers** from well-known manufacturers.
- **Spectrophotometers and fluorimeters** for determining the concentration of proteins and nucleic acids.
- **Pyrosequencers** for DNA sequence analysis.

Sequencing Technologies:

The sequencing technology of the Nanopore device is based on changes in ion flow through nanopores embedded in an artificially created membrane. The nanopores can be biological, synthetic, or semi-synthetic. The nanopore is integrated into an artificial membrane that has particularly high electrical resistance.

The Nanopore sequencing technology is developed by the British company Oxford Nanopore Technologies.

In single-stranded DNA sequencing, double-stranded DNA is separated by helicase and introduced into the nanopore.

TECHNICAL PART:

- Integrity Farm. Sequencing laboratory
  - Oxford Nanopore PromethION

For high-throughput sequencing projects, two models of PromethION are available: PromethION 24 (P24) and PromethION 48 (P48). P24 can process up to 24 flow cells simultaneously, while P48 can process up to 48 flow cells simultaneously. Both systems are equipped with the powerful PromethION A-Series tower, which utilizes 4 NVIDIA A-Series graphics processors for real-time data processing.

Features of PromethION systems:
- PromethION offers flexible, scalable, and direct DNA and RNA sequencing.
- Both PromethION models (P24 and P48) use flow cells for sample processing.
- The PromethION A-Series tower is equipped with 4 NVIDIA A-Series graphics processors for real-time data processing.

Applications of PromethION:
PromethION is widely used in scientific research, including studies of genomic variations in plants and human cell lines. It can also be used for DNA and RNA sequencing of various organisms and for large-scale sequencing projects.

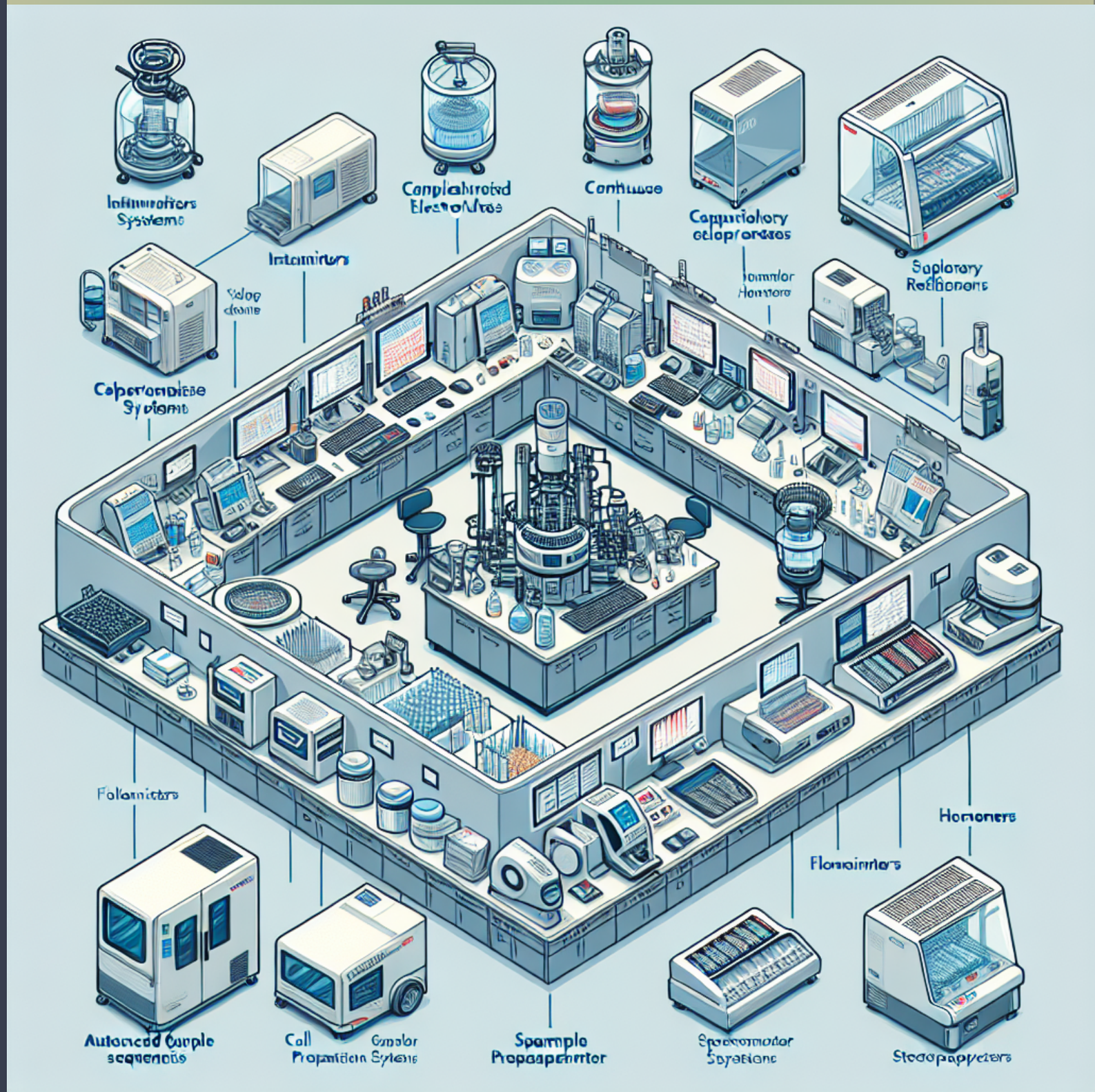
TECHNICAL PART:

- Integrity Farm. Sequencing laboratory
  - Laboratory specialists
  - Laboratory plan

Laboratory specialists:

- Bioinformatician. Engage in the analysis of sequencing data.
- Clinical geneticist. Interprets research results

Laboratory plan:



TECHNICAL PART:

- Integrity Farm. Farm
  - Rooms for different stages
  - Equipment
  - Required Personnel

1. Rooms for different stages:

- **Germination and Cloning:** At this stage, a room with controlled conditions such as temperature, humidity, and light is required. Special germination boxes or hydroponic systems are used for successful seed germination and plant propagation through cloning.
- **Vegetation:** Plants in the vegetation stage require more intense lighting and specific temperature and humidity conditions. The room should be equipped with appropriate lamps, ventilation systems, and climate control.
- **Flowering:** At this stage, plants require specific light cycles and more moderate temperature and humidity conditions. The room should be equipped with special lamps that emulate natural light cycles, as well as climate control systems.

2. Equipment:

- **Lighting:** Special lamps such as LED or HPS are used to provide optimal lighting at each stage of cannabis development, ensuring the necessary light spectrum.
- **Ventilation:** A ventilation system is necessary to maintain fresh air, eliminate excess humidity, and ensure sufficient air exchange in the room.
- **Irrigation System:** Irrigation systems such as hydroponics or aeroponics are used to provide optimal humidity levels and watering of plants.
- **Climate Control:** Climate control systems, including air conditioners, humidifiers, and sensors, are used to maintain optimal temperature and humidity conditions in the room.

3. *Required Personnel:*

- **Agronomist:** Plant cultivation specialists who can monitor and optimize growing conditions, manage irrigation systems, and control crop quality.
- **Technician:** Specialists who can service and adjust equipment, including lighting, ventilation, and irrigation systems.
- **Control System Operators:** Specialists who can monitor and manage automated farm systems, including lighting, irrigation, and climate control.

TECHNICAL PART:

- Integrity Farm. Farm
  - Security
  - Data Management
  - Farm plan

4. *Security:* The farm should be equipped with security systems such as video surveillance and access control to ensure plant protection and prevent unauthorized access.
5. *Data Management:* Monitoring and data management systems can be used to track cultivation parameters, analyze performance, and optimize processes.
6. Farm Plan

Tokenomics:

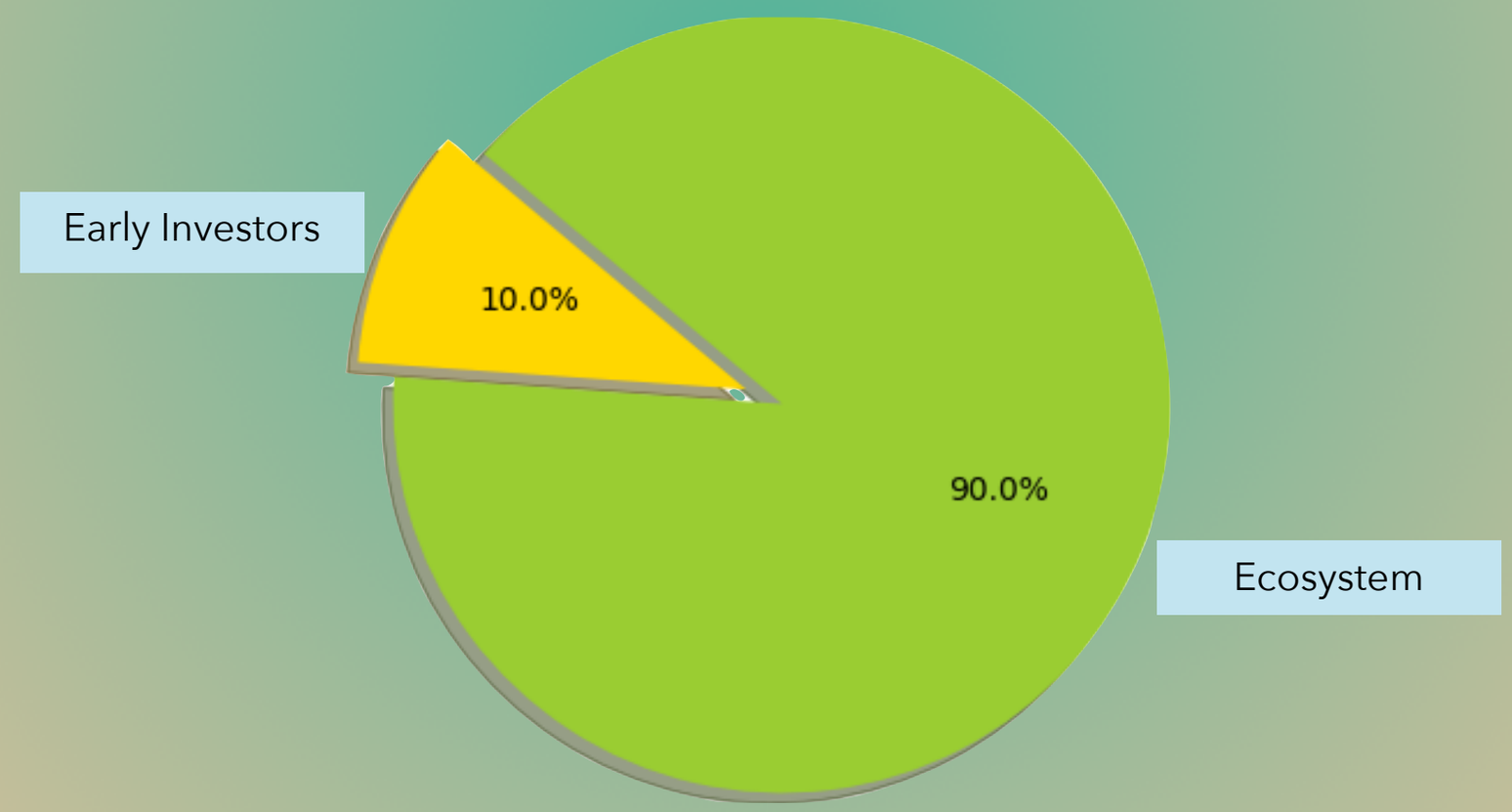
- Distribution of the utility token Integrity Token (INT)
- A Pie chart

The token distribution in the project is as follows:

Early Investors (10%): Early investors are individuals who provide the initial capital needed to launch the project. They take on significant risk by investing in the project at its early stages and, in return, receive a portion of the tokens.

Ecosystem (90%): The remaining 90% of the tokens will be used within the ecosystem on the gene market, with a predetermined monthly release of coins equal to 2% of the total issuance.

A pie chart reflects the token distribution between Early Investors and the Ecosystem. The total token issuance is 1,000,000,000. Early Investors own 10% (100,000,000 tokens), while the Ecosystem owns 90% (900,000,000 tokens).



Tokenomics:

- Advantages of gradual token release:
  - Supply and demand balance management
  - Price stability
  - Attention to the project
  - Transparency and predictability
  - Comparison with other models

Advantages of gradual token release:

Gradual token unlocking, where 2% of the coins are released each month, has several advantages over other tokenomics models:

- *Supply and Demand Balance Management:* Gradual unlocking helps maintain a balance between token demand and supply. This helps avoid sharp price fluctuations that can occur if a large number of tokens enter the market simultaneously.

- *Price Stability*: Gradual token release contributes to price stabilization by preventing a mass sell-off of tokens immediately after unlocking, which could lead to price drops.

- *Attention to the Project:* Before each unlocking, the project can use media attention to increase awareness of the token, which can drive demand and temporarily increase the price (pump). However, after unlocking, the price usually stabilizes, indicating the short-term impact of such events.

- *Transparency and Predictability:* The gradual unlocking system is usually clearly described in the project's tokenomics, providing transparency and allowing investors to plan their actions in advance.

- *Comparison with Other Models:* Unlike models where tokens remain fully locked for an extended period, gradual unlocking allows investors to access a portion of their assets regularly, which may be more preferable to them.

The tokenomics model where 90% of the tokens are utilized within the ecosystem and undergo gradual monthly unlocking of 2% seems more advantageous compared to other models. It ensures price stability, manageability of supply and demand, and predictability for investors.

Tokenomics:

- **Advantages of the tokenomics model:**
  - **Stability**
  - **Incentivization**
  - **Price Stability**
  - **Investor Trust**

Advantages of the tokenomics model:

The tokenomics model, where 90% of the tokens are utilized within the ecosystem, has several advantages:

- *Stability:* Gradually unlocking 2% of the coins each month ensures a stable flow of tokens into the market. This prevents sharp volatility spikes that could potentially disrupt the token's stability.
- *Incentivization:* Gradual token unlocking can serve as an incentive for users to actively participate in the ecosystem. The knowledge that additional tokens will be available in the future can motivate users to continue engaging with the ecosystem.
- *Price Stability:* The token's value being tied to the health and success of the ecosystem ensures price stability, as it is less susceptible to external market factors.
- *Investor Trust*: Early investors, who take on significant risk by providing initial capital, receive 10% of the tokens as a reward. This can increase investor trust, as they have a vested interest in the project's success.

Unlike other tokenomics models, this model offers the aforementioned advantages. For example, models where a small group of individuals controls a large portion of the tokens can lead to centralization and potential manipulation of the token's value. Similarly, models where tokens are released all at once can result in market instability.

Thus, this model with a high percentage of tokens allocated to the ecosystem and a gradual release schedule can provide a more stable and sustainable approach to token distribution.

Tokenomics:

- **The evaluation of INT tokenomics**

The evaluation of INT tokenomics:

The tokenomics of the INT token is well-balanced, providing sufficient allocation of resources for the project's development and growth, as well as rewarding early investors, advisors, and marketing efforts. A significant allocation of funds to the treasury also ensures a safety net for the project, allowing it to manage unexpected expenses or market volatility.

Investors can benefit from owning the INT token in several ways. As a utility token, it allows holders to participate in the ecosystem, enabling them to generate value. Additionally, as the project grows and improves its product offerings, the demand for the INT token is expected to increase, potentially leading to an increase in its value. Therefore, it can be advantageous for investors to hold the token for an extended period.

Tokenomics:

- *Market research*
  - The target audience
  - Competitive analysis
  - Market needs
- *Product and service description*
  - Laboratory services
  - Software
  - Farm

1. Market Research:

The target audience of the genetics market includes:

- Research institutes and universities
- Pharmaceutical and biotechnology companies
- Medical institutions and doctors
- Private individuals interested in personalized medicine, genealogy, and acquiring patent rights to genetics.

Competitive Analysis: The demand for genome sequencing and genetic analysis continues to grow globally due to advancements in personalized medicine, pharmacogenomics, and agrogenomics. Countries with developed healthcare systems, such as the United States, European Union countries, China, and Japan, are leading in the utilization of genetic testing and sequencing.
Major players in the market, such as Illumina, 23andMe, Ancestry.com, and MyHeritage, offer various services for sequencing and genetic analysis. Pricing policies vary depending on the complexity and depth of the analysis, as well as the country where the services are provided.

Market Needs: Making gene information more distributed and secure. Protecting patent rights. None of the competitors have web3.0 software where you know that your genetics are stored in your pocket and no one else has access to them.

2. Product and Service Description:

Laboratory Services: Providing services for gene material sequencing.
Software: Developing and providing access to a blockchain-based platform for managing and analyzing genetic data, which opens up a completely new market for buying, selling, and owning gene information.
Farm: Cultivating plants for research and commercial sale.

Tokenomics:

- *Marketing plan*
  - Promotion strategy
  - Pricing
  - Sales
- *Operational plan*
  - Location
  - Processes

3. Marketing Plan:

- *Promotion Strategy:* Online marketing, including blogging and specialized forums, participation in scientific conferences, and publications in specialized mass media.

- *Pricing:* Prices for gene material sequencing can vary significantly depending on the country and level of services. On average, whole genome sequencing can cost between $1,000 and $3,000, while simpler tests for specific genetic markers can be much cheaper, around $80. Pricing for the subscription of the software product for partners will be calculated in INT management tokens. Prices for buying and selling genetic information are not standardized and depend on various factors, including data rarity and significance, as well as consent for their use. The pricing for buying and selling plant genetics from the farm will depend on rarity and significance.

- *Sales:* Direct sales through web3.0, partnerships with universities and research institutes.

4. Operational Plan:

- *Location:* Choosing the location for the laboratory and farm. Selecting a warm climate with fertile soils.

- *Processes:* Developing processes for sequencing, data analysis, and farm management, as well as creating blockchain-based software, smart contracts, NFTs, and web3.0 capabilities.

Tokenomics:

- *Financial plan*
- *Revenue forecast and payback period*
  - Annual revenue from sequencing
  - Annual revenue from subscriptions
  - Total annual revenue
  - Payback period

5. Financial plan:

Expense item	Description	Cost, USD
Sequencing equipment	1 device	US$ 850,000
Additional laboratory equipment	Centrifuges, PCR machines, etc.	US$ 250,000
Farm equipment	Lighting, ventilation, watering systems	US$ 150,000
Construction and renovation of premises	Laboratory and farm	US$ 600,000
Software development	Development team, servers, licenses	US$ 1,200,000
Employee salary (annual)	Researchers, technicians, programmers	US$ 1,500,000
Marketing and advertising	Product promotion	US$ 300,000
Administrative expenses	Rent, utilities, other	US$ 150,000
Expedition expenses	Study of gene pools of various locations	US$ 1,000,000
Unexpected expenses	In case of unforeseen circumstances	US$ 200,000
TOTAL:		US$ 6,200,000

Revenue Forecast and Payback Period:

Assuming that in the first year, the project can attract 500 clients, the average service cost will be $1,500, and the software subscription will be $3,000 per year. The profit from selling plant genetics from the farm is $500.

Annual revenue from sequencing: 500 clients * $1,500 = $750,000
Annual revenue from subscriptions: 500 clients * $3,000 = $1,500,000
Total annual revenue: $750,000 + $1,500,000 = $2,250,000

Payback period = Total investment / Annual revenue
Payback period = $6,200,000 / $2,250,000/year ≈ 2.756 years

Conclusion

Thank you for your attention =)