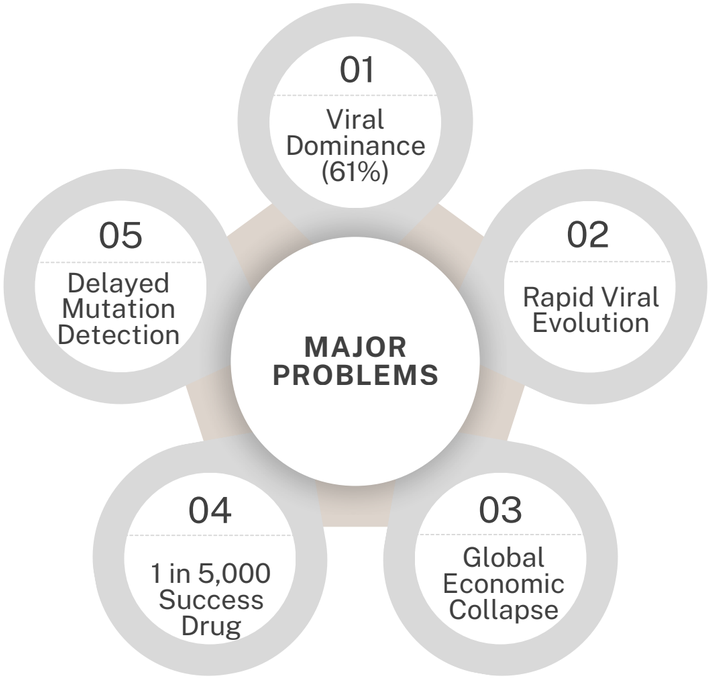
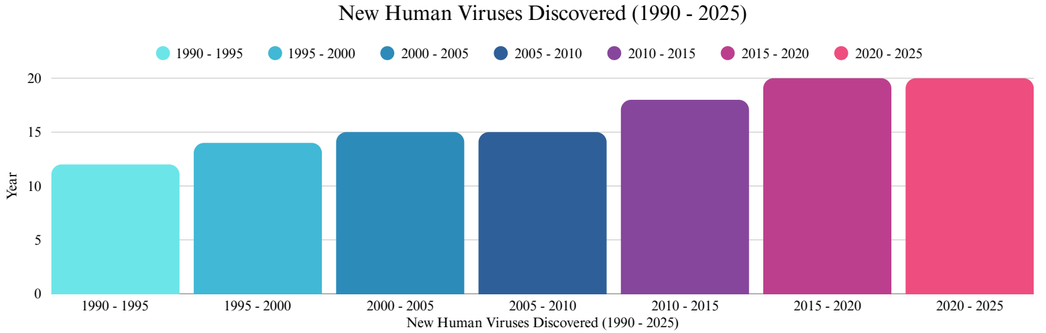
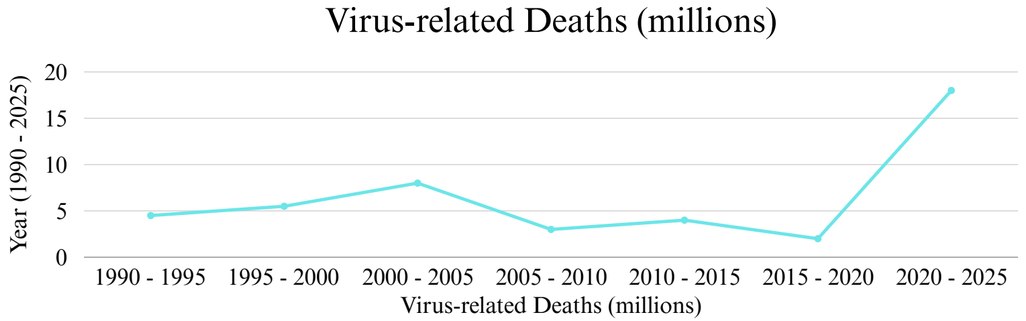
VIRO - AI

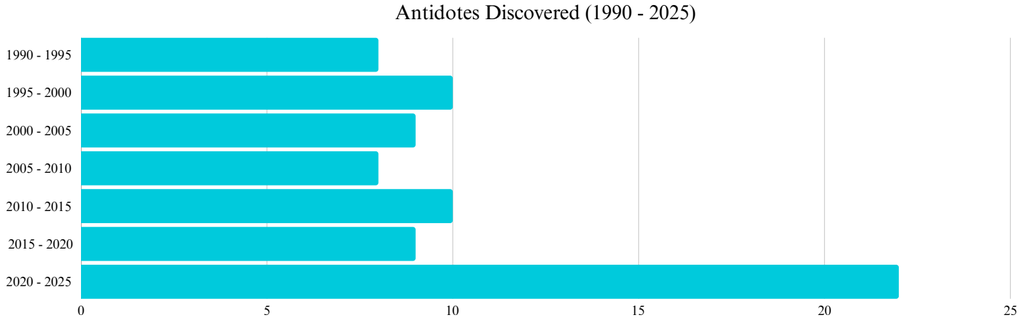
PROBLEM STATEMENT

Rising healthcare needs and growing populations **drive demand** for **innovative biotechnologies in viral prediction** and **drug discovery.**





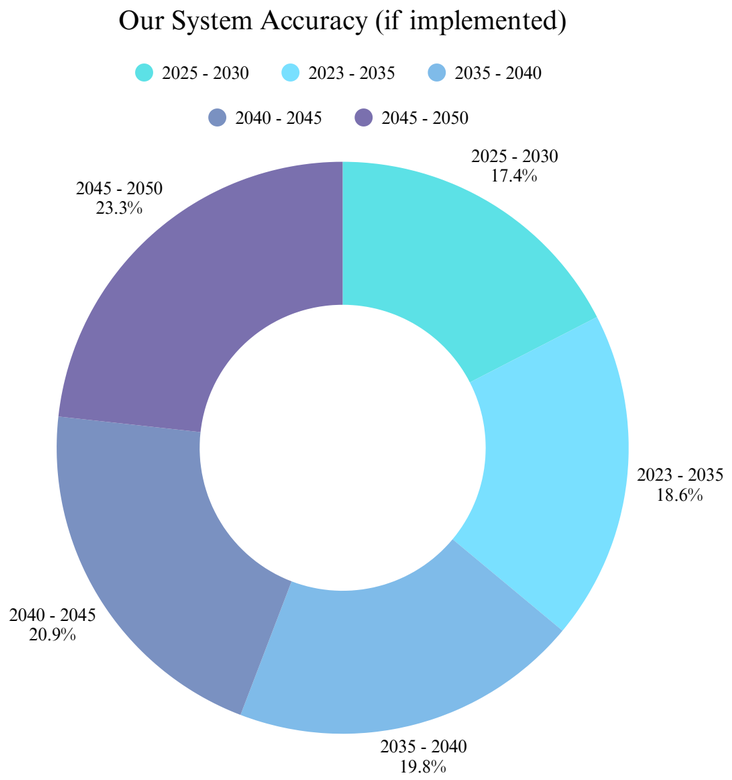




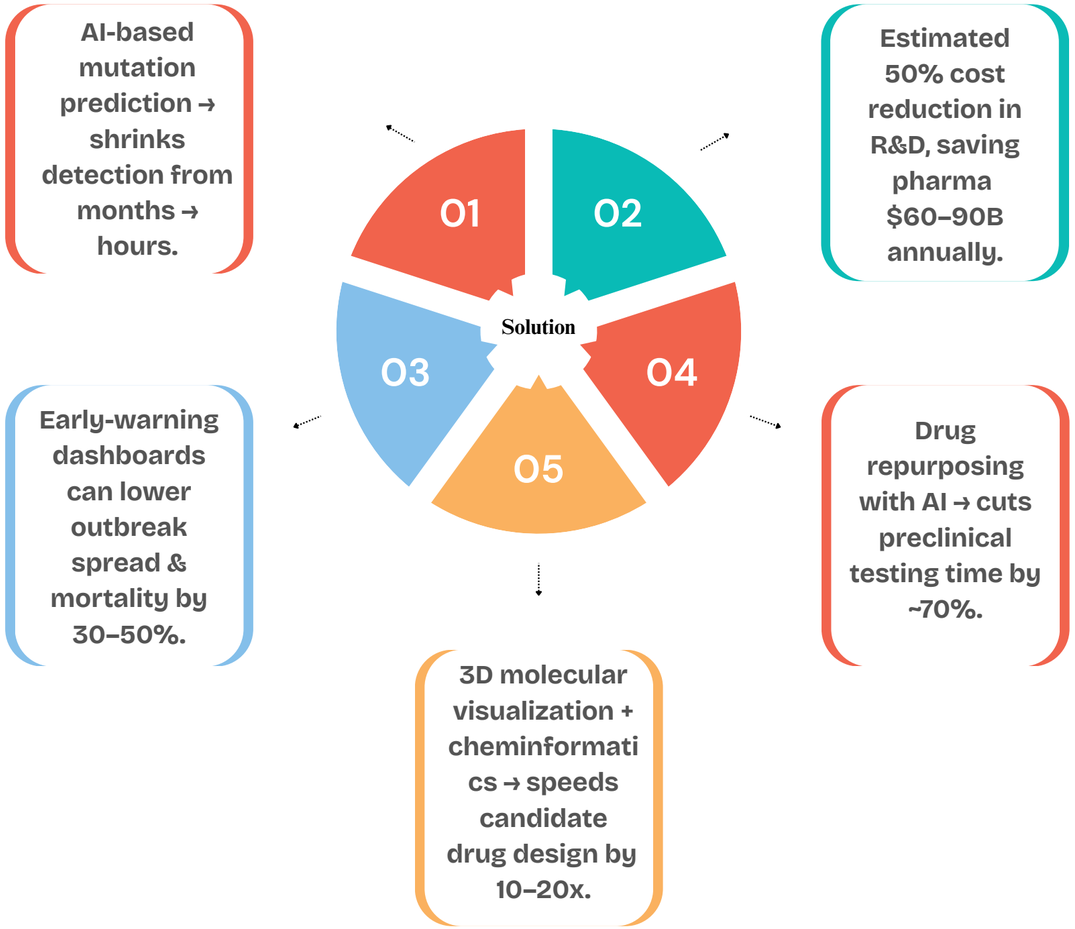
The Black Death **wiped out nearly one-third of Europe's population** — 25 to 50 million lives lost in just 7 years."

SOLUTION

Viro-AI: An **AI-driven bioinformatics platform** that forecasts **viral mutations, simulates protein structures, and identifies potent drug candidates** to **accelerate outbreak response** and therapeutic discovery.



Viral Insight & Rapid Optimization Analytics Intelligence



TECHNICAL APPROACH

SYSTEM ARCHITECTURE

Secure Web Portal (Streamlit / Dash)

User Authencation

Data Upload
3D Protein Structure, Virus Description, Clinical Behavior

Python (Flask / Fast API)

Input Data

AWS Cloud Storage

Genetic Data
Experimental Data
Epidemiological Data
Pharmacological Data
Pharmaceutical Library
Protein Structure

gsutil / AWS Cloud SDK

Data Processing & Knowledge Base

Mutation Prediction
Batch processing (Dask/Networks, Sequence Alignment, Spark)

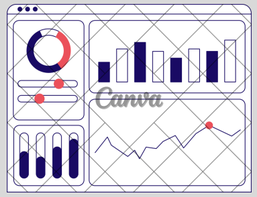
Curated Knowledge Base
Contains data on viruses like SARS-CoV-2, HIV, Influenza A.

Antidote Optimization
LSTM/GRU Neural Networks, TensorFlow, PyTorch, RDKit.

Molecular Docking & Binding Affinity Predictions
TensorFlow, PyTorch, RDKit.

Python (Pandas, Dask)

Interactive Dashboard & 3D Visualization



Predicted Mutations
Deadliness Score
Antidote Candidates
3D Docking Simulation
Color-Coded Alerts

JavaScript (three.js), Python, PyVista, Open3D API.

Database Accessing / Adding new Research

FEASIBILITY & VIABILITY

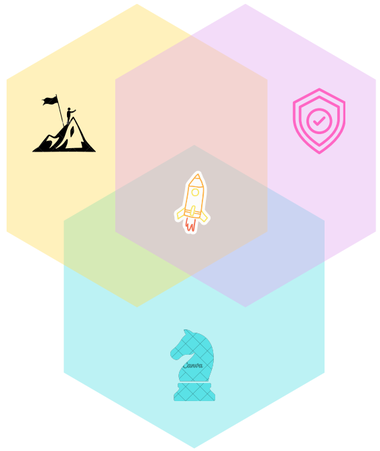
The Synergy of Strengths, Readiness, and Strategies

Prepared Advantage

- Accelerated Discovery
- Proactive Response
- Decision Support

Strengths

- End-to-End System Integration
- Proactive Threat Assessment
- Interactive 3D Simulation



Readiness

- Scalable Architecture Challenge
- Mitigation Clear Roadmap

Strategic Advantage

- Phased Go-to-Market Strategy
- Multi-Modal Data Integration
- Explainable AI (XAI) for Trust

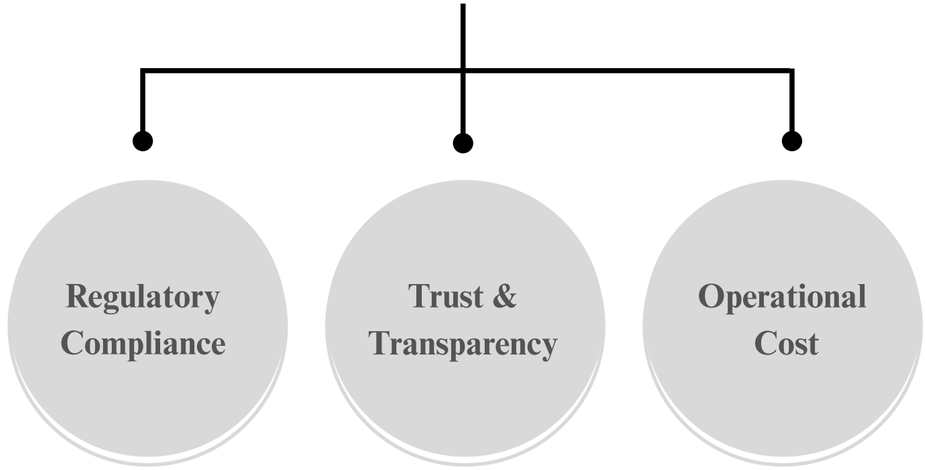
Proactive Planning

- Phased Development Roadmap
- Systematic Data Sourcing
- Anticipatory Risk Mitigation

Strategies

- Automated Data Acquisition
- Explainable AI (XAI)
- Transparency Phased Commercialization

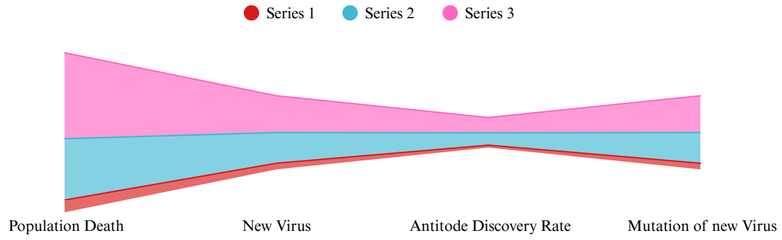
Potential Challenges



Global health data governed by GDPR, GDPR, HIPA; non-compliance risks fines fines up $20M or 4% revenue.

Lack of transparent reasoning limits limits clinical validation;70% of biomedical AI tools fail, to advance beyond pilot studies

Training large biological models (e.g.., AlphaFold) requires >200 GPUS, costing, costing $1-2M annualy if unanaged



IMPACT & BENEFITS

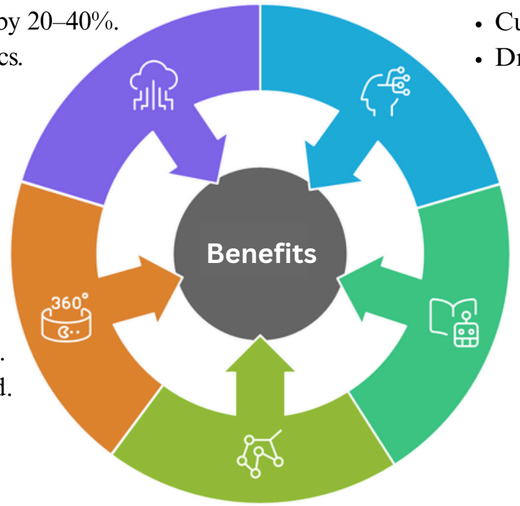
Benefits of VIRO - AI System

Social

- Early detection cuts fatality rates by 20–40%.
- Saves millions of lives in pandemics.

Economic

- Cuts R&D costs by 30–50% (saves $60–90B/year).
- Drug discovery time reduced: 12 yrs → 2–3 yrs.



Healthcare

- 3D molecular visuals for clinicians.
- Cuts 80% bioinformatics workload.

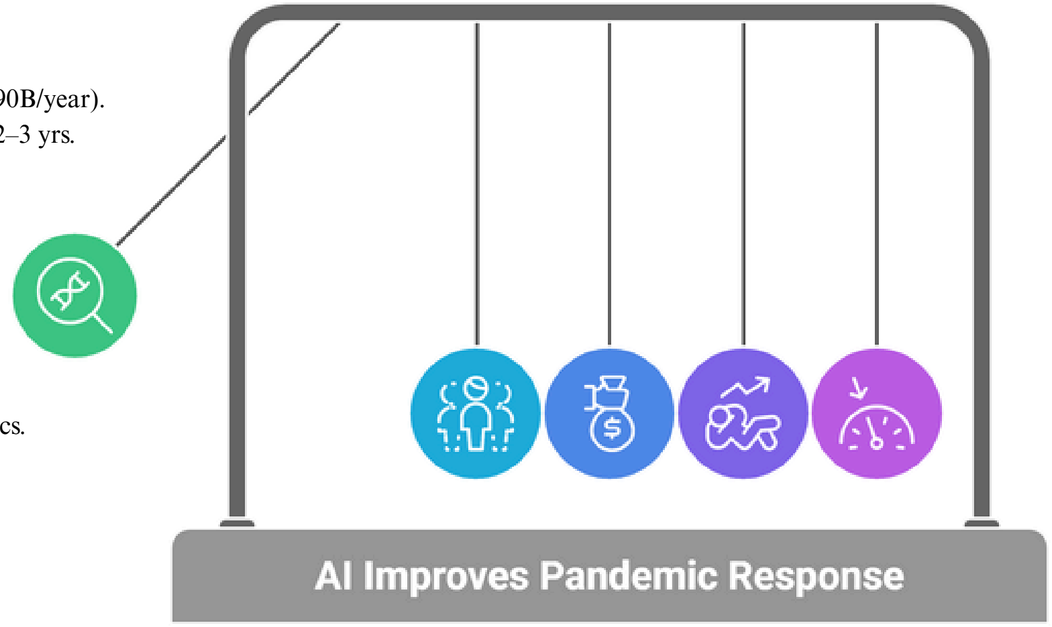
Technological

- Unified AI + ML + Cheminformatics.
- Cloud-native,
- 99.9% uptime global monitoring.

Environmental

- Less animal testing with simulations.
- Tracks zoonotic diseases.
- Lower R&D carbon footprint.

Impact of Pandemic Preparedness



Reduced Transmission
Up to 60% reduction

Economic Savings
$4–5T cost reduction

Reduced Fatality
20–40% fatality reduction

Faster Research
Discovery time cut drastically

BUSINESS IDEOLOGY

Phase 1
Research & Validation (Years 1-2)

- **Focus :** Establish Scientific Credibility
- **Product :** Research-as-a-Service (RaaS).
- **Target Audience :** University Labs & Biotech Startups.
- **Revenue Model :** Research Grants & Project-Based Contracts.
- **Key Goal :** Achieve >70% prediction accuracy in a published case study and secure foundational research partners.

Phase 2
Commercialization (Years 2-4)

- **Focus :** Build a Scalable Business
- **Product :** Tiered SaaS Platform (Basic, Pro, Enterprise).
- **Target Audience :** Mid-Sized Pharma, CROs, and Health Agencies.
- **Revenue Model :** Recurring Subscriptions & Usage-Based Fees.
- **Key Goal :** Onboard first paying enterprise clients and achieve key regulatory compliance (e.g., HIPAA).

Phase 3
Ecosystem Expansion (Year 5+)

- **Focus :** Become an Industry Standard
- **Product :** Predictive drug discovery and viral mutation analysis Software
- **Target Audience :** Large Pharma, Governments, and Global Health Organizations (WHO).
- **Revenue Model :** Government Contracts & API Marketplace Revenue Sharing.
- **Key Goal :** Integrate into national pandemic preparedness plans.

RESEARCH & REFERENCES

Sr. No	Author	Paper Title	Publication	Year	Link
1)	Jumper, J. et al.	AlphaFold: Highly accurate protein structure prediction	Nature	2021	https://www.nature.com/articles/s41586-021-03819-2
2)	Kokudeva, M. et al.	AI as a tool in drug discovery and development	Biotechnology & Biotechnological Equipment	2021	https://www.nature.com/articles/s41573-019-0016-z
3)	Deng, J. et al.	Artificial intelligence in drug discovery: applications & techniques	Briefings in Bioinformatics	2020	https://www.nature.com/articles/s41573-019-0016-z
4)	Vamathevan, J. et al.	Machine learning in drug discovery and development	Nature Reviews Drug Discovery	2019	https://www.nature.com/articles/s41573-019-0016-z

https://tinyurl.com/bdhhftt6

“For more details about this project, please get to this link for detailed overview.”

https://viroai2.netlify.app

Prototype Link

ANY QUESTIONS ??

THANK YOU