

Solution Brief

Life Sciences
Pharmaceutical and Biologics Industry



VeriSIM Life and Intel Are Accelerating Drug Development by De-risking Translational Research and Development

VeriSIM Life's BIOiSIM™ platform, powered by Intel® technologies, is a virtual drug development engine that uses AI to simulate drug interactions and clinical outcomes for treating specific illness or disease, helping guide decision making through the investigational new drug (IND) application process.

VERISIMLife



About VeriSIM Life

VeriSIM Life, founded in 2017, brings together a team of world-class scientists, machine learning engineers, and in silico simulation experts to optimize drug development research using computational science to reduce trial and error testing waste.

VeriSIM Life believes with machine learning they can simulate potential successful treatment compounds in medicine without the need for redundant trials, helping see faster and verified results with reduced animal testing.

Pharmaceutical and Biologic Developers Require Drug Development Optimization

Pharmaceutical and biologic drug development is a long, complex, and regulated process that takes over a decade to get to market. This includes many preclinical trials and failures in animal studies before finally discovering effective drug compositions that show promising results to help cure a specific illness or disease.

However, animal testing can be a poor proxy to predicting drug effectiveness on human pharmacokinetics. Inaccurate testing can cost developers time, money, resources. And testing on animals can be inefficient and without reassurance of drug approval.




According to Zippia, the FDA approves about 12% of drugs submitted for clinical testing every year,¹ which is an alarmingly low rate. Before a drug treatment can be approved for market consumption, researchers must first understand the disease or illness, then sift through enormous amounts of possible molecule compositions with repeated preclinical trials and animal testing. Narrowing down drug interactions and clinical outcomes on humans more accurately and efficiently can save developers and animals on unnecessary testing and get the treatment to market faster.

Wielding the Power of Data Analytics for More Informed Development

With the growth in big data, drug developers can leverage AI to reduce research and development time and increase clinically active compound candidates all while meeting government regulations and standards. According to GlobalData's report, 23% of survey respondents confirmed their use of AI to enhance drug discovery and development processes, while 28% expected to continue or start using AI in the next two years.²

However, pharma and biopharma organizations must optimize their tools to accurately and efficiently translate data into insights that can help accelerate drug development by de-risking research and development trial and testing.


To Address These Pain Points, Pharmaceutical And Biologic Companies Are Moving Toward AI And Machine Learning To:


 <p>Condense lengthy development time</p> <p>The average drug discovery and development time is 13 years due to trial-and-error experimentations slowing down time-to-market.³</p>	 <p>Decrease preclinical failure rate</p> <p>For preclinical candidates successfully moving into clinical trials, the average preclinical failure rate is 90%, leading to huge R&D costs and low efficiency³</p>	 <p>Lower research and Development costs</p> <p>The annual preclinical research and development spend on unsuccessful candidates in trial-and-error experimentation is \$28.8 billion on average.³</p>
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VeriSIM Life’s BIOiSIM™ AI Engine Addresses the Industry’s Pain Points Using Predictive Modeling to Identify Potential Candidate Molecules with High Success Probability of Treatment Effectiveness


VeriSIM Life’s BIOiSIM™ platform is a virtual drug development engine designed to narrow down drug compositions that offer anticipated value for the treatment of a specific illness or disease. The platform utilizes chemical and biological modeling along with AI and ML techniques to provide a Translational Index™ demonstrating confidence in drug compound scenarios to de-risk and guide go/no go decisions in preclinical trials and testing.


VeriSIM Life applies five key principles to ensure translational accuracy and efficacy:

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Mechanistic Model and AI Infusion: Integrates machine learning techniques with deterministic, statistical models for greater predictive results.
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Minimalistic Generalization: Reduces overfit and specialization, the platform provides predictions that are translatable across different species, routes of administration, and therapeutic areas.
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Cross-disciplinary Accurate Scientific and Data Backbone: Preserves scientific context by utilizing wide range of scientific data as well as synthetic data for proper model training.
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Accessible Synthesis and Scalability: Supports 800 billion total potential simulation scenarios and presents results as a summary and visually to provide actionable insights.
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Accuracy and Reliability: The platform is benchmarking at 82% greater predictive accuracy than non-AI mechanistic models.³

These 5 principles empower customers with greater predictive analysis of millions of scenarios that can lead to a better drug and reduced cost and time-to-market.

Current	With VeriSIM Life
 <p>Drug Discovery 10,000 Compounds</p>	 <p>Drug Discovery 10,000 Compounds</p>
 <p>Pre-clinical (Animal Testing) 250 Compounds</p>	 <p>Refined preclinical Experimentation Fewer Animals Trials</p>
 <p>Clinical Development 5 Compounds</p>	 <p>Only the Strongest candidates in the Clinic</p>
 <p>3 Years Unguided Development</p>	 <p>Shortened Prediction-Driven Development</p>

Intel Accelerates Performance For Potential Molecule Composition Processing

Running many simulations to determine the best potential candidate molecules requires powerful computing resources to calculate efficiently without hiccups.

Intel technologies delivers the powerful performance VeriSIM Life's BIOiSIM platform needs to achieve rapid modeling while also providing the flexibility to run a diversity of workloads.

Intel® Xeon® Scalable Processors

Intel's Xeon® Scalable processors deliver the power bandwidth needed to process molecule composition probabilities efficiently for accelerated drug research and development while also handling the additional workloads life science customers need to run.

Intel® Xeon® Scalable processors include breakthrough memory and I/O capabilities with the introduction of DDR5 memory, PCIe 5.0, CXL 1.1, as well as **built-in AI acceleration with a new engine in Intel® Deep Learning Boost (Intel® DL Boost)**, called **Intel® Advanced Matrix Extensions (Intel® AMX)**. Intel DL Boost includes Vector Neural Network Instructions, along with optimized software for machine learning, deep learning and data analytics.



Case Study: Translational Prediction of Drug Disposition Using an AI-integrated Computational Platform

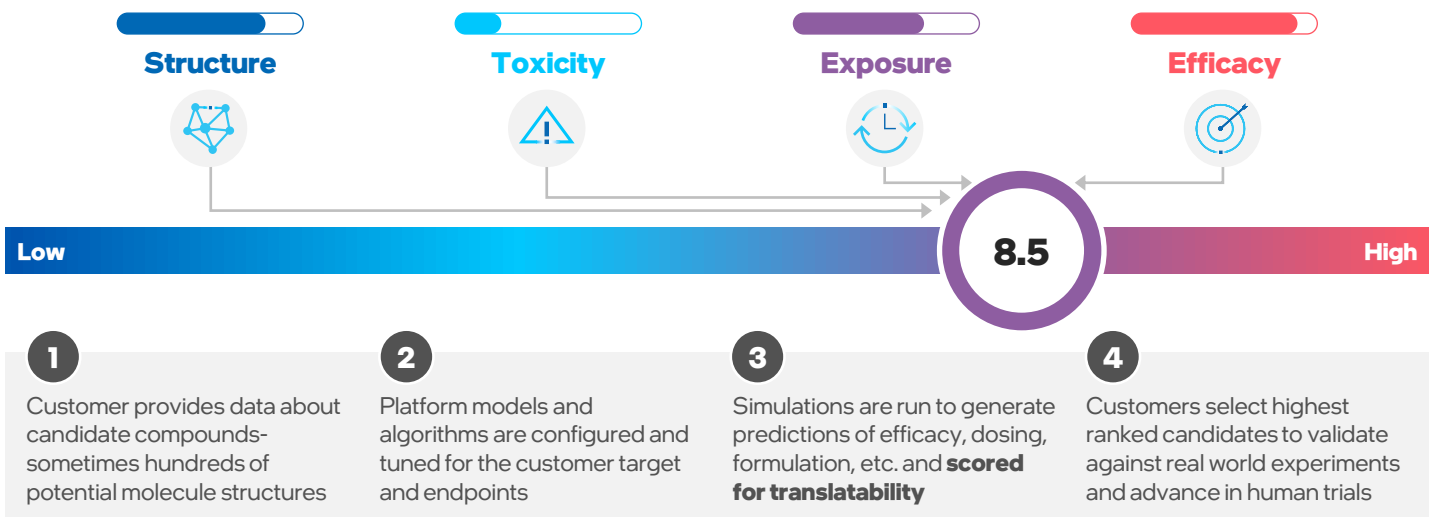
VeriSIM Life conducted a small molecule study to find a method that offers greater translatability from preclinical research and experimentation to the clinical setting. While traditional mechanistic models are great for providing the causality missing from machine learning approaches, integrating machine learning to work symbiotically with it can deliver greater universal predictions. VeriSIM Life's BIOiSIM platform does exactly that, integrating machine learning with the mechanistic model to successfully predict simulations for intravenous (IV) administered compounds.

The BIOiSIM platform successfully simulated in vivo rat experimental data for over 1000 chemically diverse compounds. The model yielded accurate pharmacokinetics predictions within acceptable variability for 90% of the compounds, and optimized drug-specific physicochemical parameters and generated simulation results in a matter of hours.⁴

This resulted in research and development groups significantly reducing development time and cost.

BIOiSIM Translational Index™

How it works



Conclusion

VeriSIM Life's BIOiSIM™ drug development AI engine solution with Translational Index™ analyses improves treatment accuracy and efficiency with drug simulations that help pharmaceutical developers optimize their resources, as well as potentially reduce animal testing. With the power and performance of Intel® Xeon® Scalable processors with built-in AI acceleration inside like Intel® DL Boost and Intel® AMX, BIOiSIM helps pharmaceutical developers rapidly test millions of molecule composition simulations to increase efficiency in their research processes. With rapid, efficient, and accurate research and development, developers have the potential to get treatments to market quicker, potentially saving time and costs. BIOiSIM™ is the future of pharmaceutical research and development that improves time-to-market for critical drugs.

Learn More

Find more information by contacting health.lifesciences@intel.com or through the links below:

- [VeriSIM Life Home Page](#)
- [VeriSIM Life Peer Reviewed Publications](#)
- [VeriSIM Life Whitepapers and Case Studies](#)
- [Intel® Healthcare and Life Sciences Home Page](#)
- [Intel® Xeon Scalable Processors Product Page](#)

Sources

1. Zippia. "[26 Incredible US Pharmaceutical Statistics \[2022\]: Facts, Data, Trends And More](#)", 2022,
2. European Pharmaceutical Review, "[AI and big data will continue to disrupt pharma sector, says survey](#)", 2021
3. VeriSIM Life Internal Report
4. VeriSIM Life Internal Case Study

VeriSIM Life Data Privacy

Dealing with sensitive pharmacological research data, VeriSIM Life takes extra care to safeguard this data from both threats and mishaps.

VeriSIM Life handles data security in two main ways:

1. VeriSIM offers an Independent Hosted Database to ensure data is isolated from all other sources with separate access credentials at different restriction levels.
2. Integrates with BIOiSIM to ensure no data used in conjunction with BIOiSIM is used to drive insights for any other VeriSIM Life partner; each data is entirely isolated.



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