



virtusa

vLife™ 6.0

FAQs for Virtusa's healthcare and life sciences application marketplace

www.virtusa.com/vlife/

"Healthcare and life sciences companies must lean into disruption. Consumers not only want but expect personalized experiences and our industry is no exception. Algorithms are the key to using transfer learning and federation learning at scale. If you can't offer your customers a seamless, personalized experience influenced by data, your customers will find it elsewhere."

— **Anthony Lange, Senior Vice President,**
Healthcare and Life Sciences, Virtusa

Q. What is vLife™?

- A.** vLife is Virtusa's own healthcare and life sciences marketplace for anyone who deals with data and data science. Through the self-service portal, payers, providers, biopharmas, and medical device companies can access industry-based solutions built on journey maps. The solutions include pre-trained machine learning (ML) models, jump-start snippets of code, tools, and accelerators specific to the healthcare and life sciences industries.

Built on AWS, vLife provides a comprehensive set of solutions on a HIPAA-compliant data lake with multiple sources, prebuilt APIs, AI, and ML models. It offers niche tools that not only leverage the latest technology but also address the domain needs. It is an AI/ML-based applications marketplace.

vLife contains over a billion rows of clinical, claims, genomic, and IBM™ MarketScan™ research data. In addition, vLife also contains simulated data for full U.S. population for 34 disease conditions.

Using vLife, customers can get access to and deploy code based on their unique business challenges. The code can act as accelerators for prediction models, and visualizations to create a convenient shopping cart checkout, recommend similar products, and establish buying patterns based on purchase history.

With close to 1,000 AI artifacts, customers can build their own ML models to leverage data based on their priorities and budget. The extensive collaboration is made possible through GitHub supporting projects.

Q. What are the functional goals of vLife™?

- A.** While there have been numerous technology-driven advancements in the healthcare and the life sciences industry (thanks to the AI revolution), our goal is to functionally slice the business problems into service lines, platforms, LOBs, and use cases. These use cases are divided horizontally across domain-centric themes, and vLife recommended technology offerings like Faster AI, Computer Vision, Synthetic Data Generator, and IaaS.

Based on the belief that it's imperative to use technological advancements to fuel our research towards value-based solutions, vLife provides a holistic approach, covering each service line and domain-driven platform.

The functional goals are:

- **Domain:** Healthcare and life sciences are our primary focus.
- **Service line:** The service line-specific solutions for life sciences companies are in MedTech and biopharma, and healthcare companies are in payer services and provider services. These are broken down further into distinct offerings.
- **Platform:** Each offering gets categorized as a platform. Customer utilization goals determined the specific platforms available.
- **LOBs:** The platforms contain logical groupings of solutions and use cases to solve unique business problems.

Q. How are the solutions within vLife™ arranged?

A. We developed each solution on vLife with a customer-centric, research-driven approach and separated the offerings into specific service lines. Our solution-specific platforms include:

Biopharma

- Clinical trials
- Commercial analytics
- Patient engagement
- Bioinformatics-as-a-Service (BaaS)

MedTech

- Commercial solutions
- Connected solutions
- Patient engagement
- Provider and payer engagement

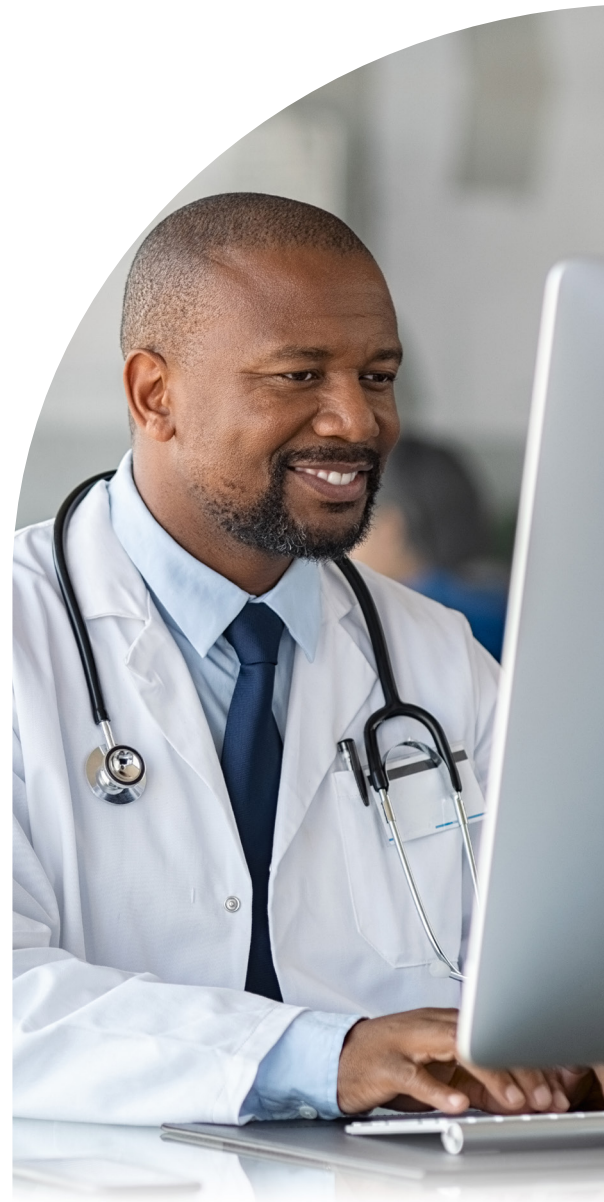
Payer services

- Member journey
- Claims processing
- Care management
- Provider journey

Provider services

- Population Health Management (PHM)
- Patient engagement
- Ancillaries
- Virtual care
- Advanced analytics

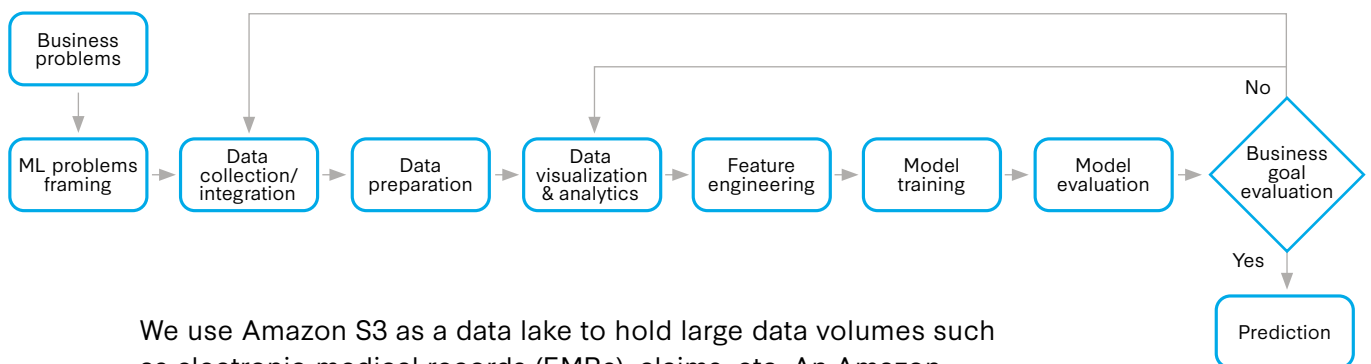
In addition to this, we also have the vLife Offerings Platform with Faster AI, Computer Vision, Synthetic Data, and Innovation as a Service (IaaS), which horizontally cuts across all these solutions. We have a separate section on the vLife Offerings.



Q. How are the models delivered via vLife™ different from other consulting firms that offer similar services?

A. We validate the success of a model against the domain-driven use cases daily by comparing it against the ML problem (framed) and the system level resources used to support the phases of ML workloads. Our end-to-end solution building life cycle contains the following set of activities with automation applied at every stage:

- Business goal identification
 - ML problem framing
 - Data collection and integration
 - Data preparation
 - Data visualization and analytics
 - Feature engineering
 - Model training
 - Model evaluation
 - Business evaluation
 - Model deployment
 - Transfer learning
 - Federated learning
 - MLOps
- Faster AI (**Virtusa and Stanford AI Laboratory collaboration**)



We use Amazon S3 as a data lake to hold large data volumes such as electronic medical records (EMRs), claims, etc. An Amazon SageMaker notebook to run against the P3 instance types and G4 EC2 instances. Data cleansing, processing, discovery, and feature engineering get completed in both the SageMaker training instance and G4 EC2 instances. We also use Amazon SageMaker to train custom models using the transformed data, leveraging the distributed training capability, and creating an Auto Scaling API endpoint. The API endpoint makes batches and real-time inferences.

Q. What is vNet™ 1.0, and how does it power vLife™?

A. **vNet** is an enterprise-AI application for building faster, smarter, and better ML models to accelerate digital transformation.

vNet has three components, data, AI, and business, that are further broken down into platforms.

Artificial intelligence (AI)

- **Computer Vision** is a no-code/low-code image analytics platform that helps optimize performance to increase efficiency and decrease operational costs.
- **Faster AI** is an intuitive, codeless AI platform used to build, train, deploy, and optimize ML models. The solution leverages applications developed with Stanford University to create noise-free and unbiased datasets.

Business

- **Platform AI** is a business model designer that pieces together pre-trained AI models from the vLife marketplace. It enables business analysts to put together end-to-end solutions.
- **Innovation as a Service (IaaS)** is an AI platform that intuitively selects third-party applications and software across MLOps, transfer learning, and federated learning.

Q. What is the business goal of vNet within vLife™?

A. **vNet** is built for domain experts, data scientists, and data engineers to:

- Have sufficient data points to train an ML model
- Have less noise and unbiased datasets
- Build highly accurate AI/ML models with no-code/low-code
- Deploy AI-driven solutions designed to empower customers
- Deliver applications faster

Q. What are the key offerings of vNet within vLife™?

- A.** The five key offerings of vNet within vLife to accelerate the technology-driven innovations are:
1. **Platform AI:** End-to-end, pre-trained ML algorithms built for scale
 2. **Faster AI:** Virtusa's innovation with SAIL for faster, better, and cheaper ML models
 3. **Computer Vision:** Advanced image and video analytics
 4. **Synthetic Data:** High-fidelity image and tabular data synthesis
 5. **IaaS:** Partner solutions across healthcare and life sciences
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Q. What is Platform AI in vNet?

- A.** Platform AI provides a platform that combines all AI-driven solutions in the form of data, NLP, visualization, and insights designed to empower customers across any domain to explore, train, experiment, and identify domain-driven solutions for conclusive decision-making. It is a framework that functions more efficiently and intelligently than traditional ones to help clients scale from experimentation with a domain-driven, structured approach.
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Q. What is Faster AI in vNet?

- A.** Faster AI is an intuitive AI tool where you can easily build, train, and deploy ML models, all in one place, without writing a single line of code. This platform enables users with no AI coding skills to optimize day-to-day operations, allowing developers to rely on technical purity and solve business issues. Faster AI empowers teams to operationalize AI and drive business value.

Leveraging the tools from SAIL, we've optimized the model to obtain a noise-free and unbiased dataset.



Q. What is Computer Vision in vNet?

- A.** Computer Vision is a no-code/low-code image analytics platform that helps optimize performance to increase efficiency and decrease operational costs. With the ability to upload your videos or images, you can carry out the necessary pre-processing steps, train AI/ML models, and then start using them. Development of the computer vision models is completely codeless. Everything on the platform is an intuitive, visual task, resulting in an environment that takes only a few minutes to learn. Thus, it becomes a powerful tool for beginners to get started quickly and AI experts to develop faster and leverage custom code with a fully managed infrastructure for computer vision.
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Q. What is Synthetic Data in vNet?

- A.** Synthetic Data Generator is a platform that uses algorithms to create artificial data by mirroring the statistical properties of the original data without revealing any information regarding real people. Using the platform enables business users to maintain privacy, successfully carry out product testing, and train ML algorithms. It helps businesses avoid choosing between data privacy and data utility while selecting a privacy-enhancing technology.

Our AI-powered synthetic data solution takes your original data and transforms it into privacy-compliant synthetic copies. Data in the form of tabular datasets or images can flow freely across your business and partnerships while providing maximum data security. By retaining the original data with synthetic copies, we empower engineers, data scientists, analysts, and product owners to make decisions that matter faster — without exposing your sensitive data.

The platform makes building datasets faster and better with data quality profiling, labeling, and synthetic data generation. It helps anyone who struggles with gaining access to sensitive data or uses poor quality data while building and deploying scalable AI solutions. Our platform solves these data pain points with synthetic data and tools that improve data quality with automation.

Q. What is Innovation as Service (IaaS) in vNet?

- A.** **IaaS** is a platform that intuitively connects every step of the domain journey and hosts several solutions. These solutions help customers efficiently improve the cognitive system of the domain systems across various AI-driven innovations. The ability to capture new innovations from the knowledge pool and make them accessible to the corporate world is what we call Innovation as a Service.

Q. What are the key differentiators of vNet within vLife™?

A. Our partnership with Stanford Artificial Intelligence Lab (SAIL) and the use of Generative Adversarial Networks (GANs) differentiate vNet from other solutions.

vNet:

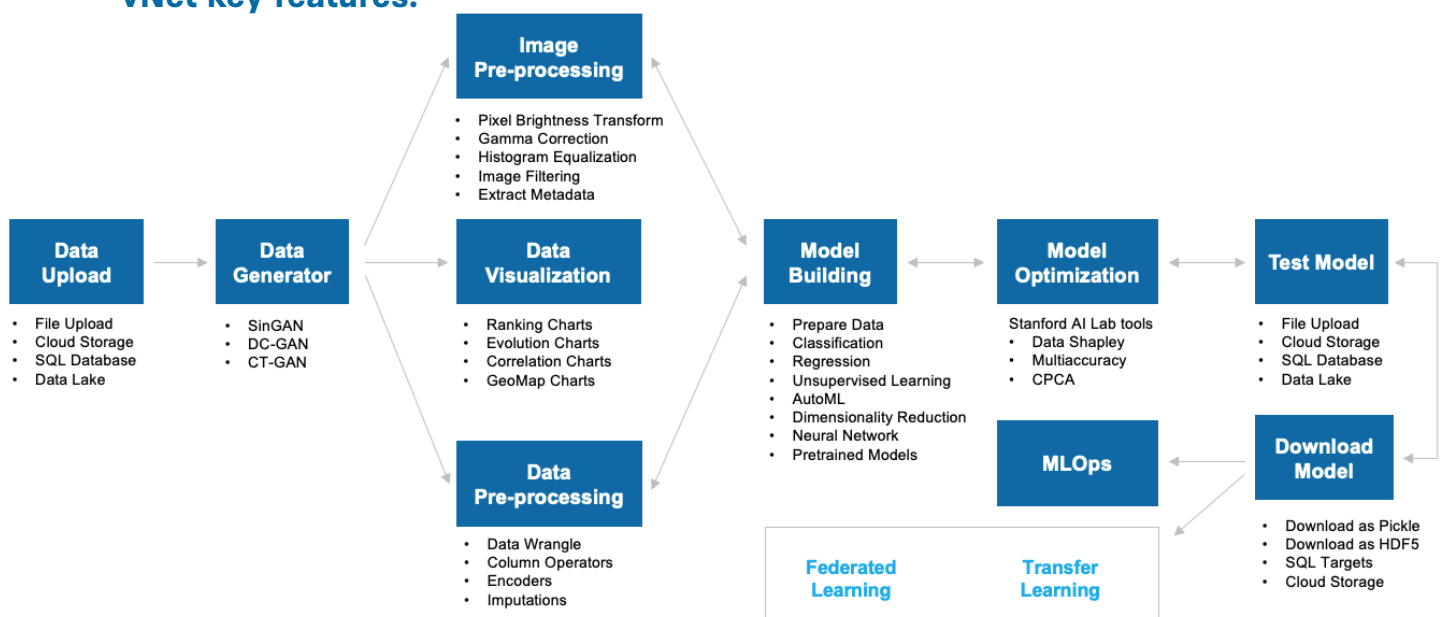
- Leverages applications developed with SAIL to create noise-free and unbiased datasets.
- Uses GANs for dataset augmentation for images and text/numerical data.

Q. What are the features offered by vNet as a no-code/low-code AI Platform?

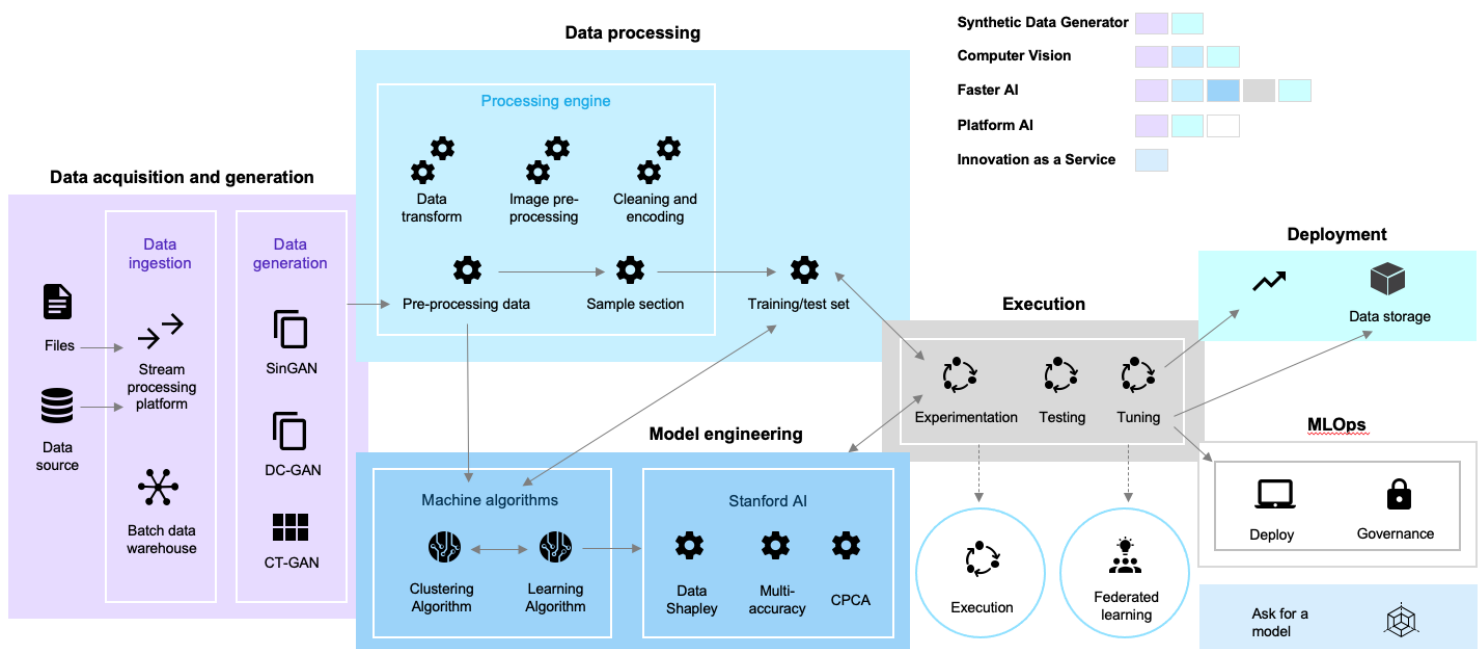
A. vNet allows users to perform the following operations:

- Generate synthetic tabular and image data.
- Perform image pre-processing and build computer vision models.
- Build ML pipelines without coding.
- Leverage Stanford Artificial Intelligence Lab (SAIL) applications to remove noise and bias from datasets.

vNet key features:



vNet features overview:



Q. What are the benefits of using vNet via vLife™?

A. The benefits of using vNet via vLife are the ability to:

- Put together your use cases from the vLife marketplace using pre-trained ML models that are built for scale across healthcare and life sciences enterprise-level AI initiatives.
- Generate and use high-fidelity tabular, image, or video data to train ML algorithms to jump-start your business or initiatives via vNet suite of products within vLife.
- Onboard your organization onto vLife by choosing a subscription model.
- Use Computer Vision and other low-code/no-code products to boost industry solutions and optimize performance, cost, and efficiency.
- Leverage Faster AI, our codeless AI platform, to build, train, deploy, and optimize ML models to create noise-free and unbiased datasets.
- Work with the Platform AI business model designer to piece together pre-trained AI models from the vLife marketplace and enable business analysts to put together end-to-end solutions.
- Employ Innovation as a Service (IaaS) to intuitively select third-party applications and software across MLOps, transfer learning, and federated learning.

Q. How can organizations access and explore vNet?

A. With over 1,000 ML models and AI artifacts available on vLife, you can build your own ML models to leverage data based on your organizational priorities and project budget.

Training customized ML models will remain a challenge for data scientists if they don't have enough data available. To address this, we've created vNet. The solution, available on vLife, gives organizations access to high-fidelity synthetic tabular and image data generated by vLife applications.

Using vNet, you can get access to:

- (a) Applications to generate synthetic data
- (b) Synthetic image or tabular data
- (c) Virtusa's consulting and engineering services to generate option A and/or option B

We recognize the critical importance of collaboration in advancing AI technologies to create intelligent solutions. These solutions have the power to make lives better, businesses more efficient and help them evolve as thought leaders in the healthcare and life sciences space. We understand that not all solutions can be built and hosted in a single place as one "solution for all."

vNet will soon be accessible for all Virtusa customers and partners via vLife healthcare and life sciences marketplace in a UI-based application within vLife.

Our goal is to develop cutting-edge assets, guided by academic research and partnerships, that address industry pain points. Through a rich marketplace experience, we can inspire everyone in the healthcare and life sciences industries to accelerate AI-driven medical research with data and innovation.

Q. How secure is vLife™ for a user?

A. We designed vLife to give a smooth user experience to its trusted users. The User Management Engine of vLife was developed using AWS Cognito to protect the integrity of our customers and is 100% safe and secure. The data is securely stored in AWS Cloud and is under multiple firewalls and security layers for protection.



Q. What is the vLife™ User Management Engine and how does it work?

- A.** The User Management Engine is an end-to-end workflow that stores, maps, protects, and classifies the user's information using AWS Cognito and other AWS services. It guarantees 100% security over user information. Credentials used to access vLife are converted to secure access keys and are encrypted multiple times. Once the user registers/logs in to the vLife portal, the credentials are verified in the backend incognito. We verify the user's email with a one-time password (OTP) for extra safety, which remains valid for 24 hours. The user is then mapped to their subscription plan and can access the vLife offerings. These credentials remain unique for every user, thus protecting integrity.
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Q. How is the primary user different from other users?

- A.** For every subscription plan, there's a primary user representing the organization. The primary user has admin rights to allow access to and deny access from additional users for the organization based on the subscription plan.
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Q. What details are required to log in to vLife™?

- A.** While registering to the portal, the user needs to verify their email, generate a password, and provide the company's name. After successful registration and approval from a vLife admin, the user can then directly log in to the portal using their username and a password.



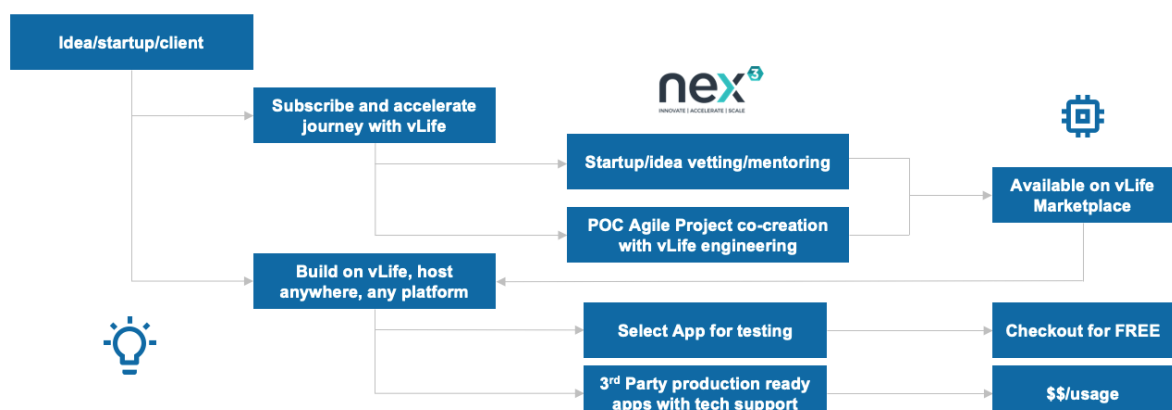
Q. How does Virtusa generate synthetic data in vLife™ with vNet?

A. Synthetic data helps solve the most common data problems by either producing artificial data from scratch or using advanced augmentation techniques to produce novel and diverse training examples. We use the following tools to generate synthetic data:

1. **GANs:** Generative Adversarial Networks (GANs) are ML models where two neural networks compete to become more accurate in their predictions. These processes run unsupervised and use a cooperative zero-sum game framework to learn and generate realistic data.
2. **GenRocket:** The GenRocket test data generation platform uses high-quality test data that reflects the most complex data models and is available whenever needed to avoid bottlenecks during continuous testing. GenRocket replaces manual Test Data Generation (TDG) with a fully automated process that turns dummy data into intelligent data. Technology for real-time synthetic data generation enables customers to increase the speed to market and reduce business risk.
3. **Synthea:** Synthea is a generator that models the medical history of synthetic patients. Our mission is to provide high-quality, realistic patient data and associated health records, covering every aspect of healthcare. Synthea uses an agent-based approach to generate synthetic health records. Each patient is generated independently and progresses from birth to death through modular representations of various diseases and conditions through every module in the system.

Q. What is the Innovation as a Service in vLife™?

A. Capturing innovation from crowdsourcing is now streamlined enough to become a part of any company's survival kit. Crowdsourcing relies on large, unstructured groups of people to create a single, structured outcome. Businesses want to harness the crowd to expedite innovation and accelerate product and technology development. Capturing new innovations from the knowledge pool and making them accessible to the corporate world is essentially IaaS.



Q. What is the collaboration of Virtusa with vLife™ and Stanford AI Laboratory?

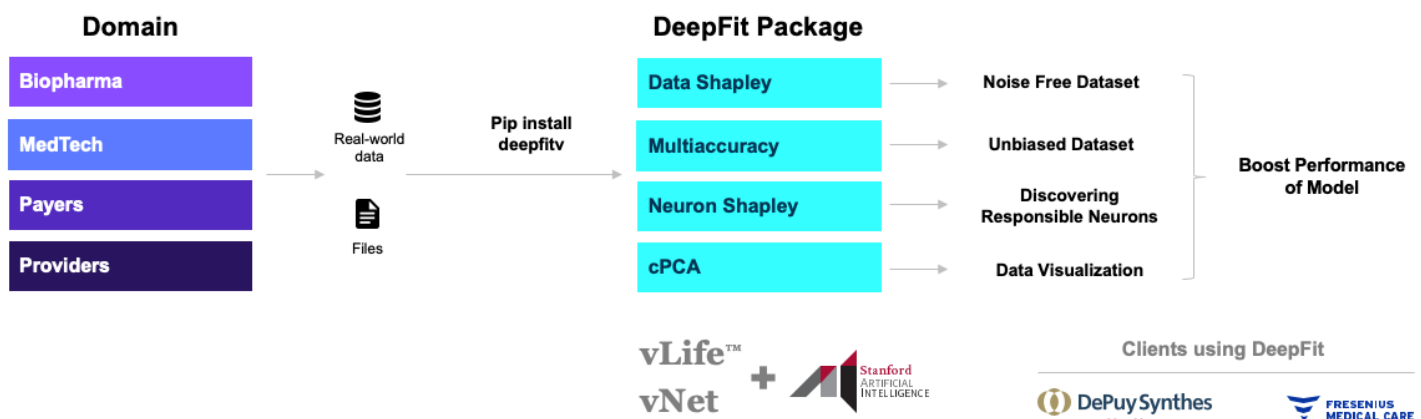
A. Virtusa joined the Stanford Artificial Intelligence Laboratory (SAIL) as an Affiliate Member through its vLife initiative. The collaboration brings together 'Virtusa's deep digital engineering expertise and prestigious researchers from 'the Stanford Innovation Lab to develop and advance AI technology. With SAIL collaboration, vLife will focus on using AI to help patients live longer and improve the profitability of products used across the healthcare and life science industries by extending open-source research projects for AI.

The SAIL Applications have also been integrated into the Faster AI platform of vNet that users can use to create noise-free and unbiased datasets.

Virtusa and Stanford Artificial Intelligence Laboratory (SAIL) developed an efficient approach to help find and mitigate bias from our ML models. Pre-processing and post-processing of both datasets and models create our systematic approach.

Steps include:

- Using Data Shapley and Neuron Shapley to evaluate every data point in the dataset
- Using Multiaccuracy to remove bias from the model
- Using cPCA to visualize the dataset

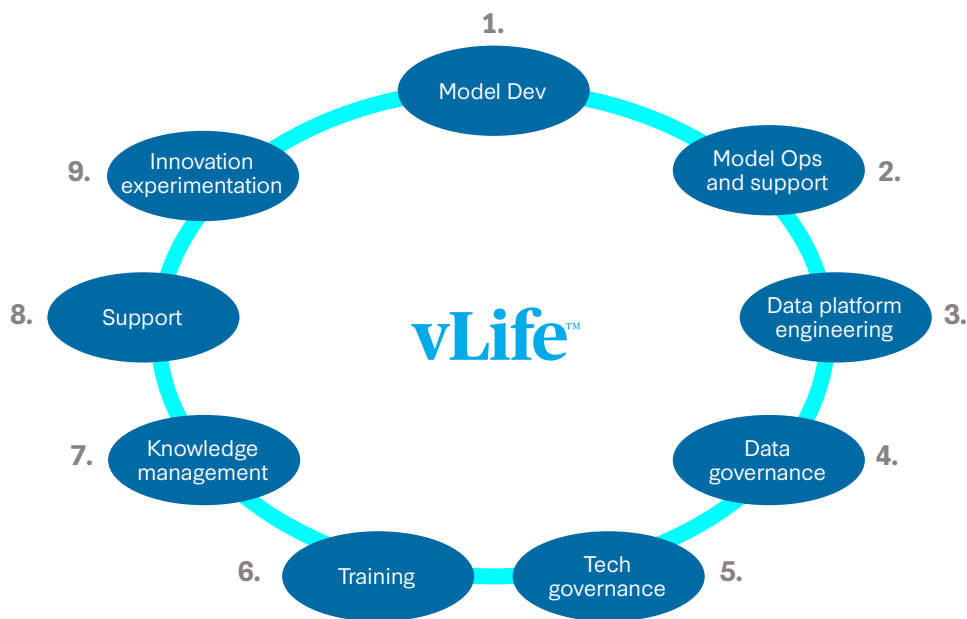


Q. What does vLife™ offer for MLOps?

A. vLife is designed based on the AWS Well-Architected Framework embracing the architectural best practices for designing and operating reliable, secure, efficient, and cost-effective systems in the cloud. The architecture is consistently measured for the best practices focusing on how to design, deploy, and architect our ML solutions in the cloud.

The design as such enables developers and data scientists to quickly and easily build, train, and deploy ML models at any scale using AWS SageMaker. In vLife, the ML operations are driven using open source ML frameworks, such as TensorFlow, PyTorch, and Apache MXNet.

The Deep Learning AMI and Deep Learning Containers in this level have multiple ML frameworks preinstalled that are optimized for performance and serve as the core engine for Faster AI. The optimization makes these models always ready to launch on powerful, ML-optimized compute infratructures, such as Amazon EC2 G4 and P3 instances, which provide faster speed, cost optimization, and efficiency to ML workloads.



At vLife, we follow the Seven Steps to Excellence for MLOps:

1. MLOps preparedness
2. Model documentation
3. Track Model Lineage
4. ML workload Automation
5. Model monitoring and logging
6. Retrain model for new data and updates
7. Incorporate learnings

Q. What does vLife™ offer for federated learning?

A. Federated learning is an ML technique that trains an algorithm across multiple decentralized edge devices or servers holding local data samples without exchanging them. In vLife, we aim to implement federated learning when training the distributed data. Differential Privacy is maintained, and Deep Neural Networks' accuracy of case-sensitive medical data is not compromised.

Q. What are the different subscription models for vLife™?

Features	For individual	For startup	For organizations	
	Starter	Silver	Gold	Platinum
	30 days free	100k per quarter	250k per quarter	Contact us
Number of users	1	10	50	Unlimited users Volume discount Unlimited synthetic generations Priority support
Access to vLife applications	Yes	Yes	Yes	
Bring Your Own Data	No	Yes	Yes	
vLife data access	Restricted	Restricted	Restricted	
Synthetic image generation	up to 10	up to 1000	up to 2000	
Tabular data generation	up to 1GB	up to 5GB	up to 20GB	
Support	No	Yes	Yes	

For further details, please
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About Virtusa

Virtusa Corporation is a global provider of digital business strategy, digital engineering, and information technology (IT) services and solutions that help clients change, disrupt, and unlock new value through innovation engineering. Virtusa serves Global 2000 companies in banking, financial services, insurance, healthcare, communications, media, entertainment, travel, manufacturing, and technology industries.

Virtusa helps clients grow their business with innovative products and services that create operational efficiency using digital labor, future proof operational and IT platforms, and rationalize and modernize IT applications infrastructure. This is achieved through a unique approach blending deep contextual expertise, empowered agile teams, and measurably better engineering to create holistic solutions that drive business forward at unparalleled velocity enabled by a culture of cooperative disruption.