FROST & SULLIVAN

Anonos

2022 TECHNOLOGY INNOVATION LEADER

United Kingdom Patient Data De-ID Solution Service Industry

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Anonos excels in many of the criteria in the patient data de-ID solution service space.

Industry Challenges in Data Anonymization

With the growing prevalence of artificial intelligence (AI) and machine learning (ML) in an increasingly data-driven world, such as the Fourth Industrial Revolution (4IR), companies require advanced data protection techniques to manage data flow and data access. While Big Data has facilitated data collection and processing, privacy enhancing techniques (PETs) are still lacking. Within the healthcare sector, first-, second-, and third-generation PETs currently have various limitations.[1]

First-generation PETs (e.g., encryption/similar security techniques) protect data in motion and at rest by limiting and restricting certain data; however, this technique leaves data accessible to external hacks and misuse. To avoid this issue, second-generation PETs (e.g., anonymization/differential privacy) have been developed, which, with the struggle of balancing protection and utility for sharable data, have their own limitation of working only in the presence of centralized controls. Third-generation PETs (e.g., synthetic data and homomorphic encryption) have been developed with the principle of decentralization in mind. Nevertheless, while synthetic data allows for decentralized data processing, the data cannot be re-linked for longitudinal studies. Similarly, homomorphic encryption requires high computational power and long processing times, resulting in a high carbon footprint.

[1] MarTech Series: Marketing Technology Insights; April 27, 2021; "Anonos Becomes World Economic Forum Global Innovator as a Fourth Industrial Revolution Data Protection Technology Expert"

In the healthcare industry, predictive algorithms have aided in synthesizing and analyzing vast amounts of data collected from multiple sources, such as laboratory results, diagnostics, doctor notes, and research studies, and then transforming the data into predictive information. The application of predictive algorithms can, in turn, help clinicians and researchers with better diagnoses and prognoses and in finding cures for diseases; however, with the lack of complete privacy and with increasingly available information, the risk of re-identification can lead to data breaches and vital information leaks. Apart from data leaks, another challenge from data anonymization is its effect on data utility. High-level anonymization can dilute the data, and all the information could be lost, impacting health analytics and secondary data processing.

Founded in 2012, US-based Anonos has invested 10 years in research and development on de-identification software that incorporates policy, privacy, and security controls into data flows to preserve the data source through its pseudonymization rather than only anoymization.[2] Anonos is present in London, Brussels, New York, and Colorado. The company's subject matter expertise in developing innovative 4IR data protection technology overcomes the problems of previous generation PETs and allows re-linkable, non-identifying personalized data. In addition, the company's state-of-the-art data enablement and technology to protect the data maximizes the innovation for data processing, sharing, and combining.

Commitment to Innovation and Commitment to Creativity

Regulations supervised by authorities, such as the European Data Protection Board (EDPB) and General Data Protection Regulation (GDPR), have put stringent data protection laws in place, where no one, including data controllers, can re-identify the data. While anonymization, in terms of health-specific and patient data, must be ruled out, unless an aggregate data set is created and with no intention of returning to a particular patient, pseudonymization is the key. The National Health Service (NHS) data governance toolkit defines pseudonymization, its limits, and what data can be de-identified. In the United Kingdom, there is an undergoing consultation by the information commissioner's office (ICO), which is actively looking at finalizing the actual definitions of anonymization and pseudonymization.

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>
> ***- Dr. Maeirah Ashaie, Consulting Analyst***

Anonos' Data Embassy platform is the only software that utilizes both state-of-the-art GDPR pseudonymization and patented relinking techniques (known as Variant Twins®) to transform personal data into privacy-respecting data assets, which is a technology that is absent with other competitor data service providers.[2] These Variant Twins make it legal and ethical to use, share, process, and analyze data and to utilize the data's value while protecting the rights of individuals. In the context of patient data, using only data anonymization may not work, especially if a trend has

[2] Newswires; August 16, 2021; "World Economic Forum Highlights Benefits of GDPR Pseudonymisation as Fourth Industrial Revolution Technology"

affected a cohort of patients and where the requirement is to connect and identify that cohort. Additionally, because patient information is critical, hackers can release the data to the public.

Anonos' non-identifying personalized data can only be relinked to individuals by combining additional information that the data controller exclusively possesses. The company, therefore, facilitates the separation of information from its identity without loss of data accuracy and by technologically enforcing dynamic and granular privacy/security policies. For example, third parties cannot identify individual European Union (EU) data subjects from shared/transferred data.

Anonos' innovation and creativity are evident by how the Variant Twins concept works.[3] The original source data, which is known as a Digital Twin (i.e., digital representation of a specific person), will contain direct identifiers (e.g., name and location) and/or indirect identifiers (e.g., date of birth and income). Different Variant Twins can then be designed based on this source data, depending on the authorized needs and use cases, by selecting different privacy actions. In other words, each Variant Twin contains only a specific subset of the original data of the Digital Twin, significantly enhancing downstream data fidelity and simultaneously maximizing both data protection and data utility.

Anonos has 10 years of research and development (R&D) and innovation experience and more than 70 patent assets and 24 international patents granted;[4] therefore, its Data Embassy solution can serve as a core of trust and accountability, supporting discoveries that can advance health and medicine forte. Additionally, Data Embassy can support further research by retaining health data, which is secured and protected with privacy, thus masking the formats of critical patient information. By decreasing the risk of patient/subject identity disclosure while respecting and enforcing data protection for data subjects, Anonos' technology complies with EU regulatory recommendations to combine informed consent for EU clinical trial purposes and compliant Legitimate Interests processing, enabled using pseudonymization under the GDPR, to avoid unnecessary disruption to clinical trials.[5] Areas such as personalized medicine, precision medicine, and advanced research in different specialties such as genomics, oncology, and cardiology can be covered.

Compared to some competitors that are trying to use anonymization in place of pseudonymization, Anonos has specific patents, such as for re-linkability and the dynamic nature of its application of pseudonyms for particular use cases, thereby educating customers and standing out in the market, compared to other service providers that do not provide this data facility.

Commercialization Success and Application Diversity

Compared to competitors offering solutions that were only acceptable prior to GDPR/data privacy laws, Anonos complies with evolving data privacy regulations that cover lawful analytics, AI, and ML. The company is certified by EuroPrivacy for complying with GDPR requirements for compliant pseudonymization and was featured in IDC's published special report titled "Anonos' SaveYourData — a

[3] Anonos; March 2020; "Pseudonymisation: When you need more than consent for lawful data processing"
[4] Anonos; 2021; "Patents"
[5] See EDPB Document on Response to the Request from the European Commission for Clarifications on the Consistent Application of the GDPR, Focusing on Health Research at https://edpb.europa.eu/our-work-tools/our-documents/other-guidance/edpb-document-response-request-european-commission_en and EDPS Preliminary Opinion on Data Protection and Scientific Research at https://edps.europa.eu/sites/edp/files/publication/20-01-06_opinion_research_en.pdf

> *"Anonos complies with evolving data privacy regulations that cover lawful analytics, AI, and ML. The company is certified by EuroPrivacy for complying with GDPR requirements for compliant pseudonymization and was featured in IDC's published special report."*
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> ***- Dr. Maeirah Ashaie, Consulting Analyst***

EuroPrivacy Certified Solution — "Deep Freezes" Enterprises' Existing Personal Data Sets as They Plan Analytics Strategies."

In addition, Anonos has derived 50 best practices using content contained in several European Union Agency for Cybersecurity (ENISA) reports and offers the only technology solutions that follow all these best practices. Examples include (i) *Enables a Risk-Based Approach accounting for required protection and utility/scalability* and (ii) *Advances the State of the Art,* which were extracted from "Recommendations on Shaping Technology According to GDPR Provisions - An Overview on Data Pseudonymisation" and "Pseudonymisation Techniques and Best Practices."[6]

Within healthcare, Anonos' pseudonymization technology can be used in medical research, pharmaceuticals, and hospitals. The company's services are used in non-healthcare sectors as well, such as financial services and telecommunications. Anonos is currently working with hospitals and big pharmaceutical companies and their large data sets that have not been historically used because they hold sensitive health information. Anonos provides 100% accuracy of the clear text or unprotected data in the form of protected bulk patient data. For example, Anonos has currently engaged a customer with data assets worth £1.4 billion and is helping it convert the data into a usable form. In addition, some big pharma participants are actively running software trials with Anonos.

Anonos provides a competitive edge to other market participants that use competitive technologies but provide weak pseudonymization. While Anonos' focus is purely based on pseudonymization, various service participants in the market often provide an aggregate data set without the ability to perform re-identification, which is a bid that Anonos has patented.

Growth Potential and Human Capital

One of Anonos' key growth strategies is working closely with supervisory authorities, such as chief data officers, chief security officers, data protection officers, and heads of analytics and legal compliance. The company has strong partner and community relationships and has raised a series of capital funds through its partners worldwide. The company intends to use these funds mainly for increasing the market adoption of its privacy rights management solutions across various data-driven industries, of which healthcare remains an essential component. Depending on the nature of the work and target goals, the annual budgets of clients working with Anonos will vary, with some clients having budgets from £100,000 to £850,000 a year. The company charges an installation and license fee for the use of the software, based on the number of specific use cases.

Pseudonymization routines run by clients vary, with limited to unlimited amounts of data; therefore, Anonos, with its pricing model, offers an annual license with the cost based on time of use for clients. For clients with transformations involving unlimited amounts of data, an annual license is a cost-effective way

[6] Anonos; "ENISA Guidelines Comparison: 50 Best Practices for Pseudonymisation"

of providing data protection. Anonos is client driven and offers extensive service and a robust quality assurance process; therefore, various clients will buy its solutions, with cost being an irrelevant factor.

Anonos' Data Embassy software solution is offered as a product and with implementation services (customization). Similar to other competitors, Anonos provides clients with implementation services; however, what sets Anonos apart is that it provides clients with a Quick Start program, with access to the software and effectively a temporary license, making them defensible.

Additionally, the Anonos team trains clients, and after 2 to 3 months, if Anonos meets the use case requirements, it takes clients through the development of use cases, enabling them to decide whether the software should be used on-premises or in the cloud.[7] To maintain the legality and to adhere to regulations where identification of EU personal data cannot be processed in the US cloud, Anonos Data Embassy software can be used to create GDPR-compliant, pseudonymization-enabled Variant Twins from the desired data. This desired data, which must be in the EU at the time of transformation, is uploaded to the cloud or follows the compliance with Schrems II obligations.

Anonos is an official member of the World Economic Forum Global Innovators Community, serving as a protection technology expert for 4IR since April 2021 and is part of the Data for a Common Purpose Initiative (DCPI).[8] The company's co-founders, Gary LaFever and Ted Myerson, have nearly 20 years of business partnership experience, along with industry expertise in identifying market trends and developing relevant solutions.

Anonos' co-founders have participated at various events, such as the 5th Annual Bitkom Privacy Conference on a panel titled "How Can Pseudonymisation Enable Compliant Data Sharing Initiatives." In January 2020, they attended the 13th International CPDP Data Protection and Artificial Intelligence Conference, where they led an interactive discussion with representatives of EU member state Data Protection Authorities and non-governmental organizations (NGOs) regarding the technical and organizational controls necessary for lawful AI and secondary processing when consent is not enough.

Conclusion

Anonos is an innovator and leader in data technology within the de-identification market and is at the forefront of advocating pseudonymization and its application for the benefit of appropriate data utilization. The company is present in the United Kingdom, Brussels, and the United States, and its Data Embassy solution can enhance security, provide privacy of human subject data identification, and save researchers time in referring to filtered data for required analysis.

With its strong overall performance, Anonos earns Frost & Sullivan's 2022 Technology Innovation Leadership Award in the UK patient data de-ID solution service industry.

[7] See Schrems II Executive & Board Risk Assessment Framework at https://www.schremsii.com/board2

[8] MarTech Series: Marketing Technology Insights; April 27, 2021; "Anonos Becomes World Economic Forum Global Innovator as a Fourth Industrial Revolution Data Protection Technology Expert"

What You Need to Know About the Technology Innovation Leadership Recognition

Frost & Sullivan's Technology Innovation Leadership Award recognizes the company that has introduced the best underlying technology for achieving remarkable product and customer success while driving future business value.

Best Practices Award Analysis

For the Technology Innovation Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Technology Leverage

Commitment to Innovation: Continuous emerging technology adoption and creation enables new product development and enhances product performance

Commitment to Creativity: Company leverages technology advancements to push the limits of form and function in the pursuit of white space innovation

Stage Gate Efficiency: Technology adoption enhances the stage gate process for launching new products and solutions

Commercialization Success: Company displays a proven track record of taking new technologies to market with a high success rate

Application Diversity: Company develops and/or integrates technology that serves multiple applications and multiple environments

Business Impact

Financial Performance: Strong overall financial performance is achieved in terms of revenues, revenue growth, operating margin, and other key financial metrics

Customer Acquisition: Customer-facing processes support efficient and consistent new customer acquisition while enhancing customer retention

Operational Efficiency: Company staff performs assigned tasks productively, quickly, and to a high-quality standard

Growth Potential: Growth is fostered by a strong customer focus that strengthens the brand and reinforces customer loyalty

Human Capital: Commitment to quality and to customers characterize the company culture, which in turn enhances employee morale and retention

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at http://www.frost.com.

The Growth Pipeline Engine™

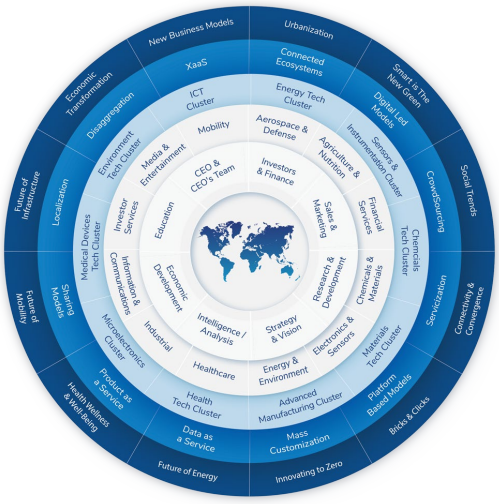
Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.
Learn more.

Key Impacts:

- **Growth Pipeline:** *Continuous Flow of Growth Opportunities*
- **Growth Strategies:** *Proven Best Practices*
- **Innovation Culture:** *Optimized Customer Experience*
- **ROI & Margin:** *Implementation Excellence*
- **Transformational Growth:** *Industry Leadership*

The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.



Analytical Perspectives:

- Mega Trend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)