



*ViewMind Recognized for*

**2021**

**Enabling Technology Leadership**

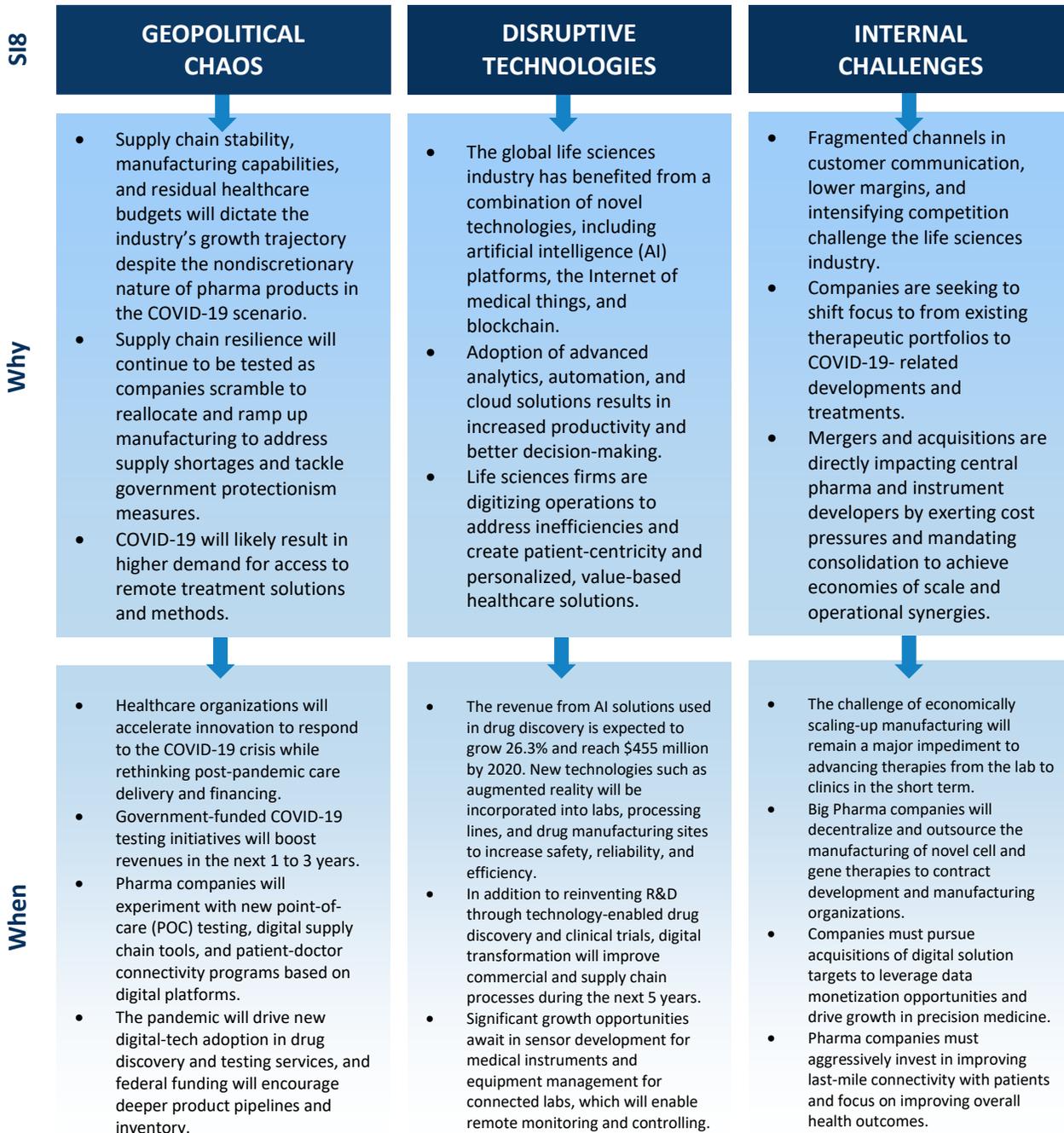
Global Digital Biomarkers

for Neurocognitive Disorders Industry

*Excellence in Best Practices*

## Strategic Imperatives

Frost & Sullivan identifies three key strategic imperatives that impact the life sciences industry: geopolitical chaos, disruptive technologies, and internal challenges. Every company that is competing in the life sciences space is obligated to address these imperatives proactively; failing to do so will almost certainly lead to stagnation or decline. Successful companies overcome the challenges posed by these imperatives and leverage them to drive innovation and growth. Frost & Sullivan’s recognition of ViewMind is a reflection of how well it is performing against the backdrop of these imperatives.



## 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. ViewMind excels in many of the criteria in the digital biomarkers for neurocognitive disorders space.

AWARD CRITERIA	
<i>Technology Leverage</i>	<i>Customer Impact</i>
Commitment to Innovation	Price/Performance Value
Commitment to Creativity	Customer Purchase Experience
Stage Gate Efficiency	Customer Ownership Experience
Commercialization Success	Customer Service Experience
Application Diversity	Brand Equity

### Background

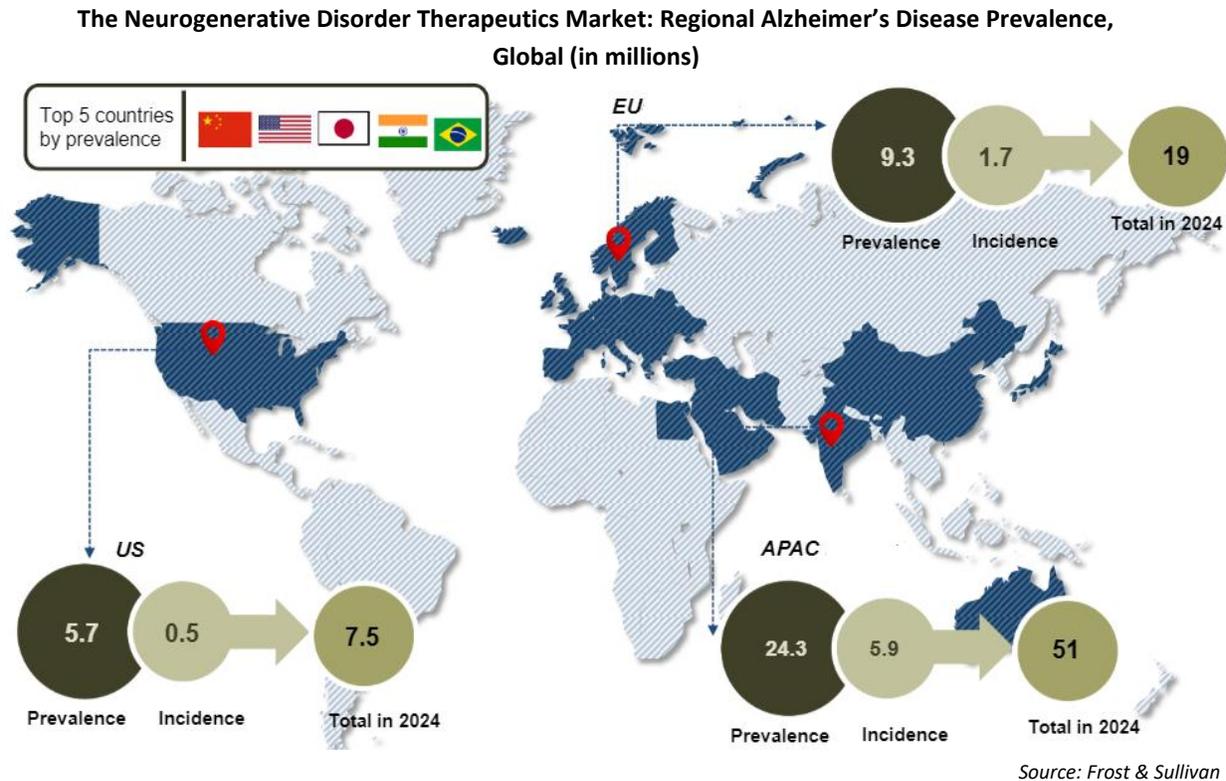
As digital health gains rapid traction worldwide, the healthcare space witnesses a significant increase in collected health information. Digital tools gather vital health data, including digital biomarkers: objective physiological and behavioral information, insightful for formulating personalized treatments, predicting health-related outcomes, and enabling reactive and preventive actions. Digital devices such as wearables and implants collect digital biomarkers that biopharmaceutical companies leverage for advanced research and precision medicine.

Drug development’s increasing costs and low success rates have accelerated digital biomarkers’ studies, which help target specific research areas, reducing drug development failure, thereby decreasing the required overall time and cost. As a result, the United States (US) Food and Drug Administration modified its guidelines for software-as-medical-device by streamlining the regulatory review process to boost digital health technology innovation and simplify market entry for digital biomarker companies.

Digital biomarkers are imperative to detect the early onset of dementia and other neurodegenerative disorders such as Alzheimer’s disease (Alzheimer’s). The World Health Organization predicts that Alzheimer’s will be one of the top 20 mortality causes globally, causing 12 deaths per 100,000 people.<sup>1</sup> This number is greater than the mortality rate from breast cancer and pre-term complications.

<sup>1</sup> *Growth Opportunities in the Neurodegenerative Disorder Therapeutics Market, Forecast to 2024*, (Frost & Sullivan, August 2019)

Between 2017 and 2020, there were over 1,834 patents for digital biomarkers.<sup>2</sup> The US accounted for 30% of the total published patents,<sup>3</sup> indicating a promising growth for the US digital biomarker market. Established in 2016 and headquartered in Luxembourg, ViewMind is a digital health and artificial



intelligence (AI) company that provides clinically validated solutions for the early diagnosis of cognitive diseases. With a focus on detecting Alzheimer’s and Mild Cognitive Impairment (MCI) in a standardized non-invasive test, it is a revolutionary company in the digital biomarkers for neurocognitive disorders market.

*“ViewMind provides an effective, affordable, and accurate diagnostic tool to identify individuals who can benefit from the drug. Thus, the company has a powerful value proposition and maintains strong collaborations with tier-one pharmaceutical companies.”*

**- Ojaswi Rana, Best Practices Research Analyst**

***ViewMind: Innovation and Creativity at the Core of a Widely Applicable Technology***

Currently available treatments for neurodegenerative disorders involve either pen and paper assessments or complex and costly invasive evaluations.

ViewMind was born out of decades of research on how ocular movements correlate to different brain functions, developing easy-to-use tools to detect pathologies early and treat them before they create permanent brain damage.

<sup>2</sup> Frost Radar™: Digital Biomarkers Through Connected Devices, 2020, (Frost & Sullivan, December 2020)  
<sup>3</sup> Ibid.

The company's solution includes a high-end augmented reality/virtual reality (AR/VR) eye-tracking headset, a personal computer, and ViewMind's cloud-based AI application. Following a standardized non-invasive test, the device and AI system can detect early Alzheimer's onset up to an incredible 20 years before clinical symptoms.

In Alzheimer's, the protein beta-amyloid ( $\beta$ -amyloid) accumulates in the brain 20 years before symptoms emerge. The state-of-the-art technology's early  $\beta$ -amyloid detection allows preventive measures to impede the disease's further advancement. Unlike its competitors with relatively more generalized solutions, ViewMind's digital biomarker diagnostic is the only one in the market that explicitly detects Alzheimer's.

### **How It Works**

Essentially, the individual puts on the ViewMind headset and undergoes a series of stimulus tests, followed by diagnostic evaluations. Different visual exercises activate specific brain areas. Studying eye movements during these exercises can help measure cognition. Since each exercise activates a particular brain area, the overall result correlates with specific neurocognitive diseases. The company collects and uploads more than 10,000 data points into an AI system, generating a report from which physicians can make a diagnosis.

For instance, a reading test involves:

- Locking the eyes on a word
- Storing and processing the information
- Planning the subsequent gaze

Individuals with healthy cognition can access the stored data in a fraction of a second, understand it, and perform forward-directed eye movements. However, individuals with impaired cognition cannot access working memory quickly and will have to re-read words, performing backward-directed eye movements.

ViewMind devises tests that correlate to different diseases and compares them with standardized tests to increase accuracy. The company builds a specific stimulus or diagnostic evaluation that activates distinct brain spheres every time it studies a condition. ViewMind then measures the activation through eye movements. Thus, each evaluation set intends to assess different cognition aspects and correlate them to specific diseases, such as Parkinson's disease and multiple sclerosis. The company is also conducting clinical trials for brain fog associated with COVID-19.

**ViewMind AR/VR Headset**



*Source: ViewMind*

ViewMind prioritizes Alzheimer's because of the extensive research and clinical validation in the field. It has conducted nine clinical trials with more than 1,000 participants and has received regulatory approvals as well. The company will further conduct clinical trials in other areas.

ViewMind works with both impaired and healthy individuals. It worked with a professional basketball team and was able to enhance some players' performance. A healthy individual has various executive functions in the brain to make the right decision and react quickly. The company uses these functions as a stimulus and diagnostic, precisely stimulating specific brain areas.

*"ViewMind delivers its services in four main geographies – the US, Europe, Latin America, and parts of Asia, and is planning to expand further into Asia, increasing its growth rate at an astounding 100% year-on-year."*

**- Ojaswi Rana, Best Practices Research Analyst**

Stroke is another opportunity in the ViewMind's roadmap. To measure the impact of a stroke and cognition, patients must undergo neural imaging, which will tell them which brain areas need repair. But to understand how the stroke will affect the patient's quality of life, the only available option is pen and paper evaluation and an interview with the patient and their family. This method has been in use for several decades, and there have not been any significant developments in this area. The company can

assess stroke's impact on cognition in an accessible and scalable manner and understand how it will impact the patient's quality of life. This ability is a game-changer in the field.

ViewMind's goal is to enable a timely intervention for a large population for different neurocognitive diseases. Presently, access to mental health and early diagnosis is virtually non-existent. By acting in early disease stages and managing conditions effectively, the company plans to avoid an older population with a high prevalence of chronic diseases.

### ***Bright Future for ViewMind: Unique Value Propositions Propel the Technology***

ViewMind has a healthy pipeline in terms of opportunity. While competitor digital biomarker companies with ocular motor components carry out generalized tests, the company's offering is unique and has a high degree of impact on the market.

ViewMind is working with tier-one pharmaceutical companies on high-profile projects. Pharmaceutical customers seek to introduce amyloid inhibitors, a first-of-a-kind drug, by mid-2021. However, the pharmaceutical industry has screening issues, i.e., finding individuals early enough for the drugs to be most effective. Alternative methods, such as positron emission tomography (PET) scans and cerebral spinal fluid extraction, have their challenges.

Spinal fluid extraction is a costly, invasive, and painful process that involves lumbar puncture. On the other hand, PET scanners can cost up to \$1,000,000 and are not readily available in many facilities. Moreover, not all PET scanners are capable of scanning for  $\beta$ -amyloid. Therefore, none of these methods are pervasive due to a lack of technology accessibility.

Moreover, the process costs are not just a function of the test's price but the total cost of getting to that test. In other words, it typically takes multiple meetings with a doctor and a series of assessments, costing up to \$7,000, and repeat tests or undergoing a new evaluation in six months or a year, totaling

up to \$15,000. ViewMind costs a fraction of this sum, around \$1,000. The device produces an accurate result and complements the diagnostic tools available to physicians. More importantly, there is a hidden cost over delayed intervention and therapy. For example, if Alzheimer's patients do not receive early intervention and treatment, they will suffer from the condition earlier than if they received therapy on time. The cost of care over the remaining life is astronomical.

ViewMind provides an effective, affordable, and accurate diagnostic tool to identify individuals who can benefit from the drug. Thus, the company has a powerful value proposition and maintains strong collaborations with tier-one pharmaceutical companies.

ViewMind's clinical validations are noteworthy. In a longitudinal study of over 42 months with 63 participants regarding the conversion from MCI to Alzheimer's, the company predicted 34 converting to Alzheimer's. It reported nine in the first year and 21 in the second year, with 32 altogether by the third, reflecting 94% accuracy so far. The participants the company predicted not developing Alzheimer's did not develop the condition.

In another study with a coveted group of people with familial Alzheimer's, ViewMind identified participants 20 years before symptoms appeared, with an astonishing 89% sensitivity and 96% specificity.

Similarly, with MCI, the company showed 100% accuracy with its predictions. In another study with Alzheimer's patients' offspring, ViewMind identified the susceptible offspring correctly 95% of the time. Therefore, the company's specificity and positive and negative predictive values are key market differentiators.

Today, the digital biomarker market is experiencing significant growth for neurocognitive assessment. ViewMind has exceptional growth potential, with medical centers, clinics, and elderly care centers rapidly adopting its proprietary technology. The company's offering spans the diagnostic continuum, from early-stage to disease progression, monitoring, and response to treatment. ViewMind delivers its services in four main geographies – the US, Europe, Latin America, and parts of Asia, and is planning to expand further into Asia, increasing its growth rate at an astounding 100% year-on-year.

## Conclusion

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Digital biomarkers are gaining rapid traction due to drug development's increasing costs and low success rates. ViewMind developed its one-of-a-kind reliable, non-invasive, affordable, and accessible digital biomarker technology using artificial intelligence. It delivers clinical results as accurate as of today's definitive tests, viable for early screening at scale. The company shows outstanding commitment to innovation and creativity, standing out among its competitors. ViewMind's technology applies to a range of neurocognitive conditions, an exceptional and unique value proposition. The company is well-poised for massive commercialization success, guaranteeing top-class customer satisfaction and value.

For its novel and ground-breaking technology and overall strong performance, ViewMind earns Frost & Sullivan's 2021 Global Enabling Technology Leadership in the digital biomarker for neurocognitive disorders market.

## What You Need to Know about the Enabling Technology Leadership Recognition

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Frost & Sullivan's Enabling Technology Leadership Award recognizes the company that applies its technology in new ways to improve existing products and services and elevate the customer experience.

### Best Practices Award Analysis

For the Enabling Technology 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

#### *Customer Impact*

**Price/Performance Value:** Products or services provide the best value for the price compared to similar market offerings

**Customer Purchase Experience:** Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

**Customer Ownership Experience:** Customers proudly own the company's product or service and have a positive experience throughout the life of the product or service

**Customer Service Experience:** Customer service is accessible, fast, stress-free, and high quality

**Brand Equity:** Customers perceive the brand positively and exhibit high brand loyalty

