



Frontier Business Meeting - FBO Showcase -

Hiroshi Nomura
Representative Director, President and CEO



Disclaimer Regarding Forward-looking Statements

This material contains forecasts, projections, targets, plans, and other forward-looking statements regarding the Group's financial results and other data. Such forward-looking statements are based on the Company's assumptions, estimates, outlook, and other judgments made in light of information available at the time of preparation of such statements and involve both known and unknown risks and uncertainties.

Accordingly, plans, goals, and other statements may not be realized as described, and actual financial results, success/failure or progress of development, and other projections may differ materially from those presented herein.

This document was prepared to explain the nature of Frontier Business; it is not intended to endorse any specific product or to make a commercial profit. Information contained herein includes material on devices and solutions that are under development or being planned for development, but such content is not intended as advertising or medical advice. Nor is it to be construed as including recommendations for such devices or solutions.

Frontier Business Domain



In anticipation of environmental changes in the future, such as the spread of preventive medicine and digital technology, Frontier Business is launched with the aim of providing new solutions to address social issues in the healthcare area other than pharmaceuticals



Aiming to establish Frontier Business as a growth engine in the medium to long term, following the group's pharmaceutical business

Establishment of Frontier Business Office: April, 2019



- Focusing on areas in which synergies can be expected with the group's pharmaceutical business

**Psychiatry
&
Neurology**

**Motor
Dysfunction**

**Lifestyle
-related
disease**

Oncology

- Building a business foundation on, among others, core technologies (information, engineering, etc.) and networking (via alliances, investment in venture businesses, etc.)
- Initiating and developing multiple pilot solution projects, including the coordination of initiatives for prevention, prediction, cure, and care
- Exploring commercialization opportunities primarily in Japan, the U.S., and China



Future Vision for Frontier Business

Senior Executive Officer
Hiroyuki Baba



A Division of Sumitomo Dainippon Pharma

A Society Overflowing with “Good People”



“Good People”

People with Good/Big Hearts and Compassion

Good-natured people who attend to others, including those in vulnerable positions, with kindness and warmth at all times without seeking compensation or behaving patronizingly

Aiming for a world brimming with “good people”—This is the theme that represents the mission of Frontier Business for the future society



Increasing the number of “good people” who live healthy lives with respect for the values of their own and others, thereby raising the QOL of society as a whole

Social Trend and “Good People”



- Negative incidents in society, troubles with interpersonal relationships



⇒ Help mitigate community alienation by increasing “good people”

- Technological innovations such as AI



⇒ Aspiring to “humanity,” human work after reaching the singularity (only goodness and beauty)

- Post-COVID-19 pandemic, low growth rate, declining birthrate/aging population



⇒ “Good people” are essential for a society of mutual aid



Frontier Business's Vision for the Future

Diversity in Wellbeing



- Expertise cultivated through pharmaceutical R&D for neuropsychiatric diseases
- Integration of projects related to the pharmaceutical business and Frontier Business-related assets



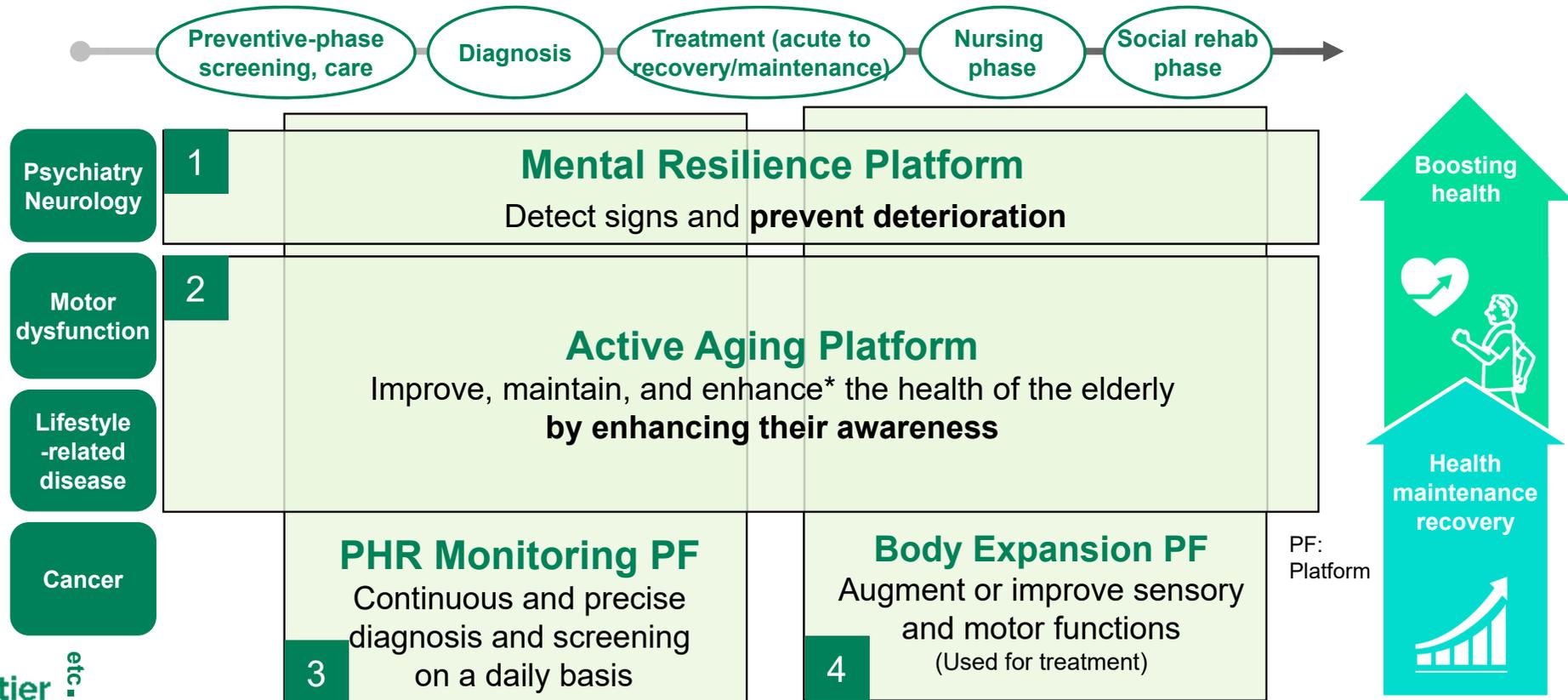
Business partner

- One and only technology cultivated and developed in-house
- Technical expertise/patents

Frontier Business Domain



By utilizing technologies and solutions based on monitoring and augmentation of capabilities and functions, we work to resolve unmet needs in maintaining, recovering, and enhancing health, focusing on mental issues (psychiatric diseases) and aging (health issues of the elderly)





Sumitomo Dainippon
Pharma

Digital Devices for Relieving BPSD (Partner: Aikomi Ltd.)

**Seiji Hori, Officer, Business Development &
Portfolio Strategy, Frontier Business Office**

Junichi Kato, COO, Aikomi Ltd.



BUSINESS

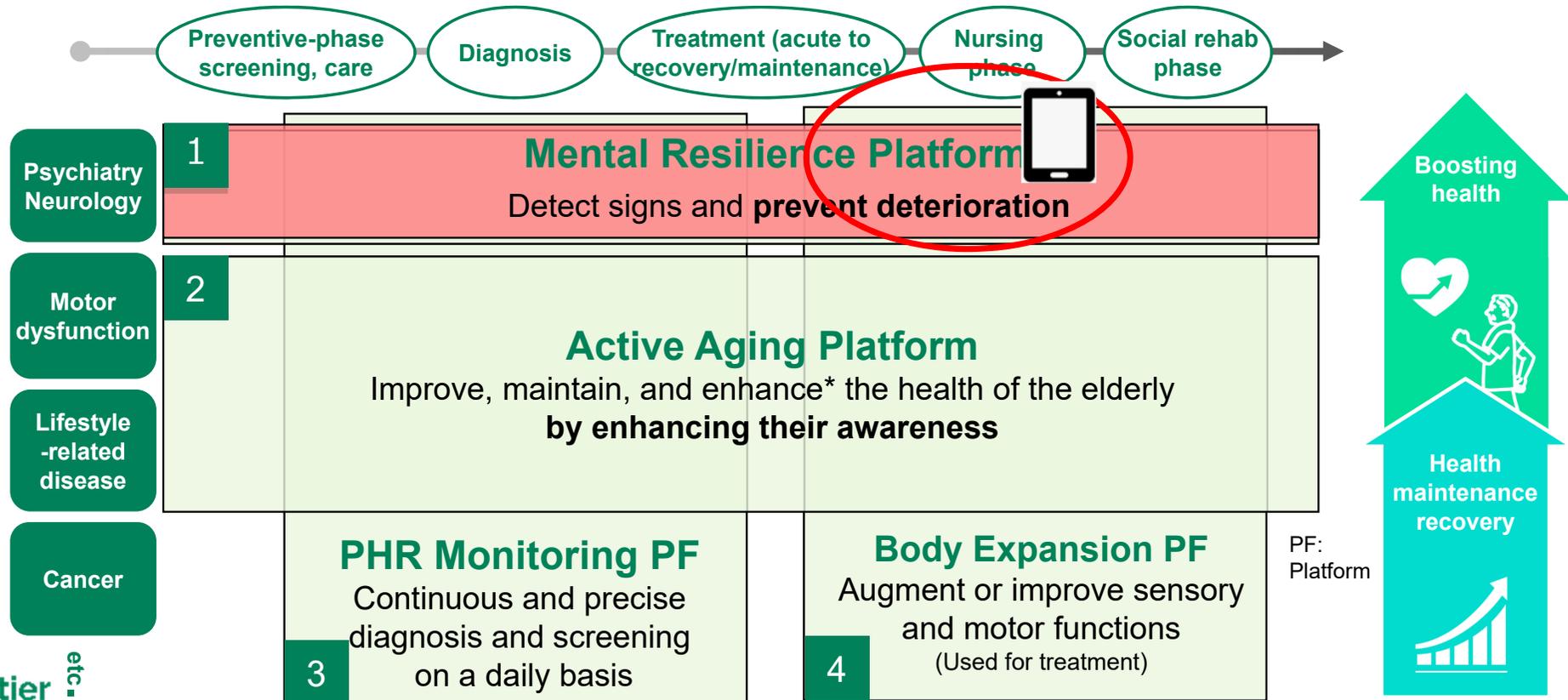
A Division of Sumitomo Dainippon Pharma



Frontier Business Domain



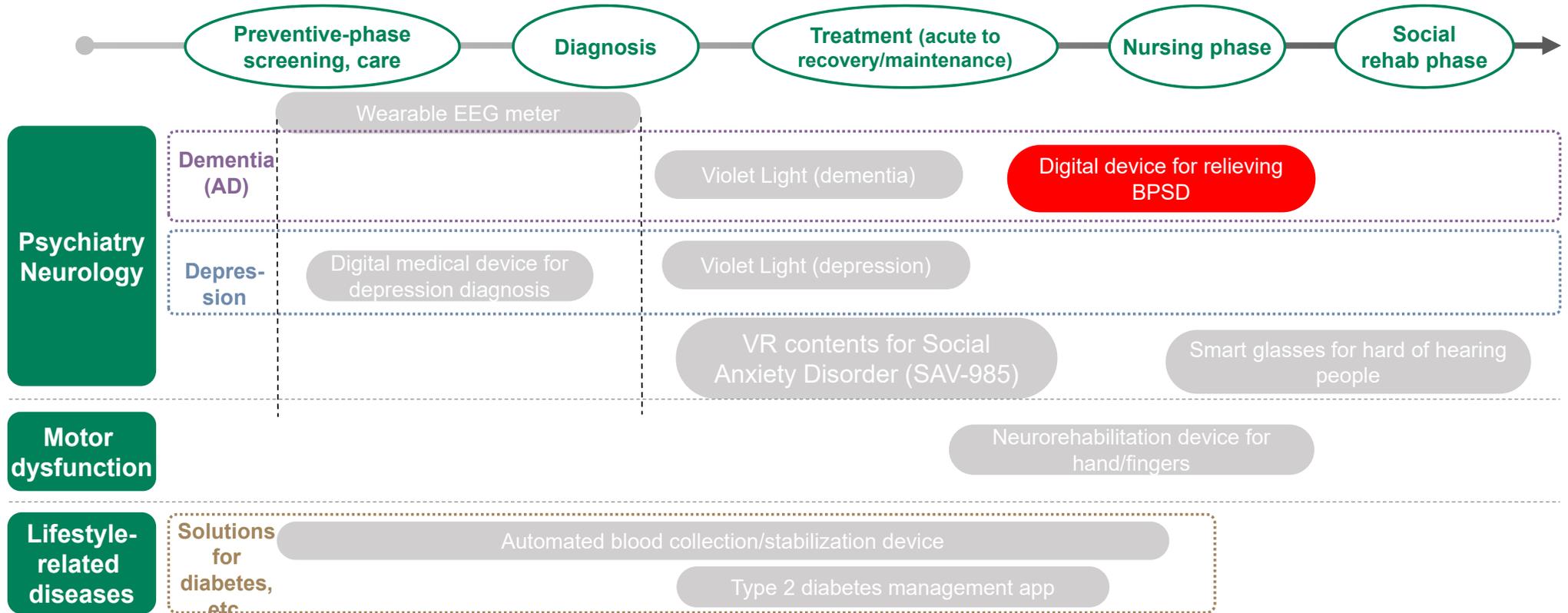
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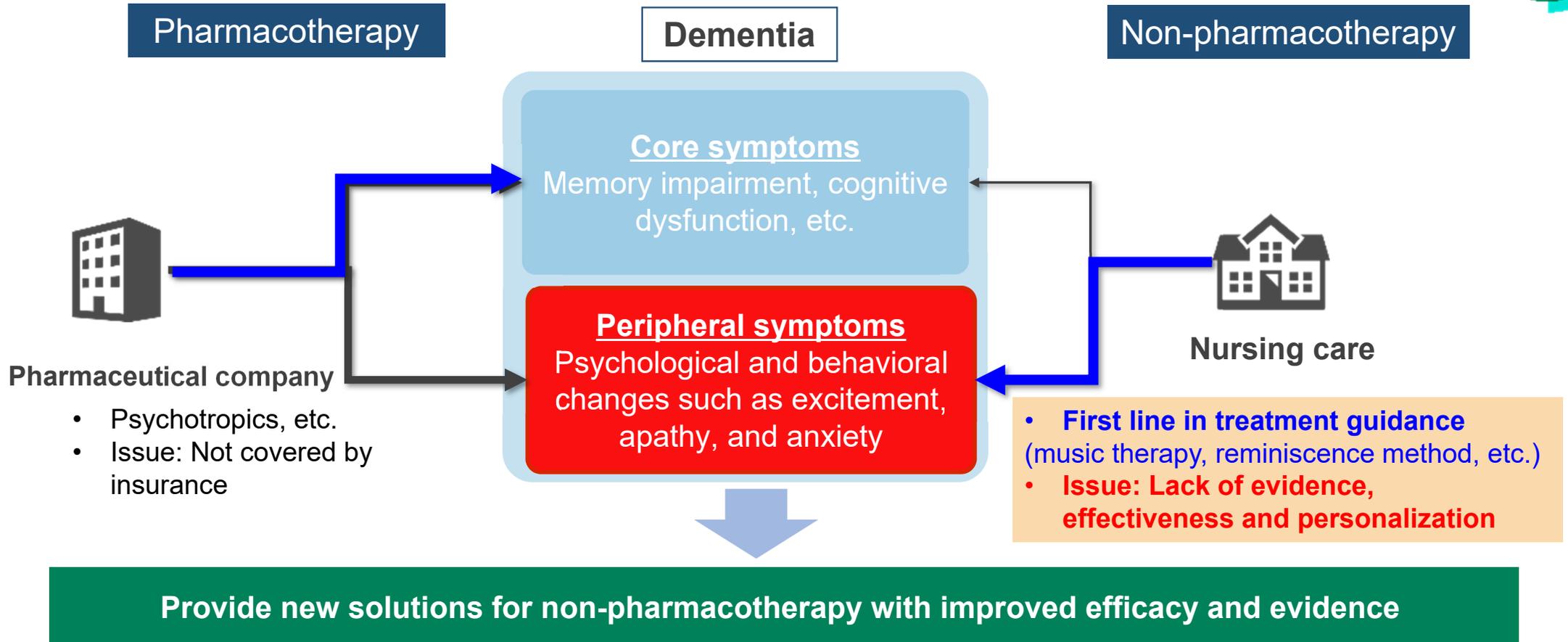
Business Portfolio by Patent Journey



- Through technological innovations such as data analysis and sensory stimulation, we will provide solutions ranging from prevention and early diagnosis to intervention in dementia and depression
- Since medical care and nursing care/social rehabilitation support are integrated in some cases involving CNS disease care (BPSD, etc.), we conduct our business as integrated care
- Plans call for building integrated non-pharmaceutical solutions in Japan that can maximize the value of the diabetes pharmaceutical business



Positioning of BPSD in Dementia Care



- Generate evidence through clinical research
- Use digital technology to improve personalization and effectiveness

Targeted Vision of the World



We aim to build a world in which the elderly with dementia can lead autonomous lives

Current Issues

Non-pharmacotherapies **recommended for BPSD care lack evidence and systematic application**

Dementia care is a specialized and personalized business area with high need **for improvement through innovation**

This solution/device aims to realize:

Reducing the burden of nursing care by strengthening care relationships between people with dementia, their families, and other caregivers through active communication and engagement

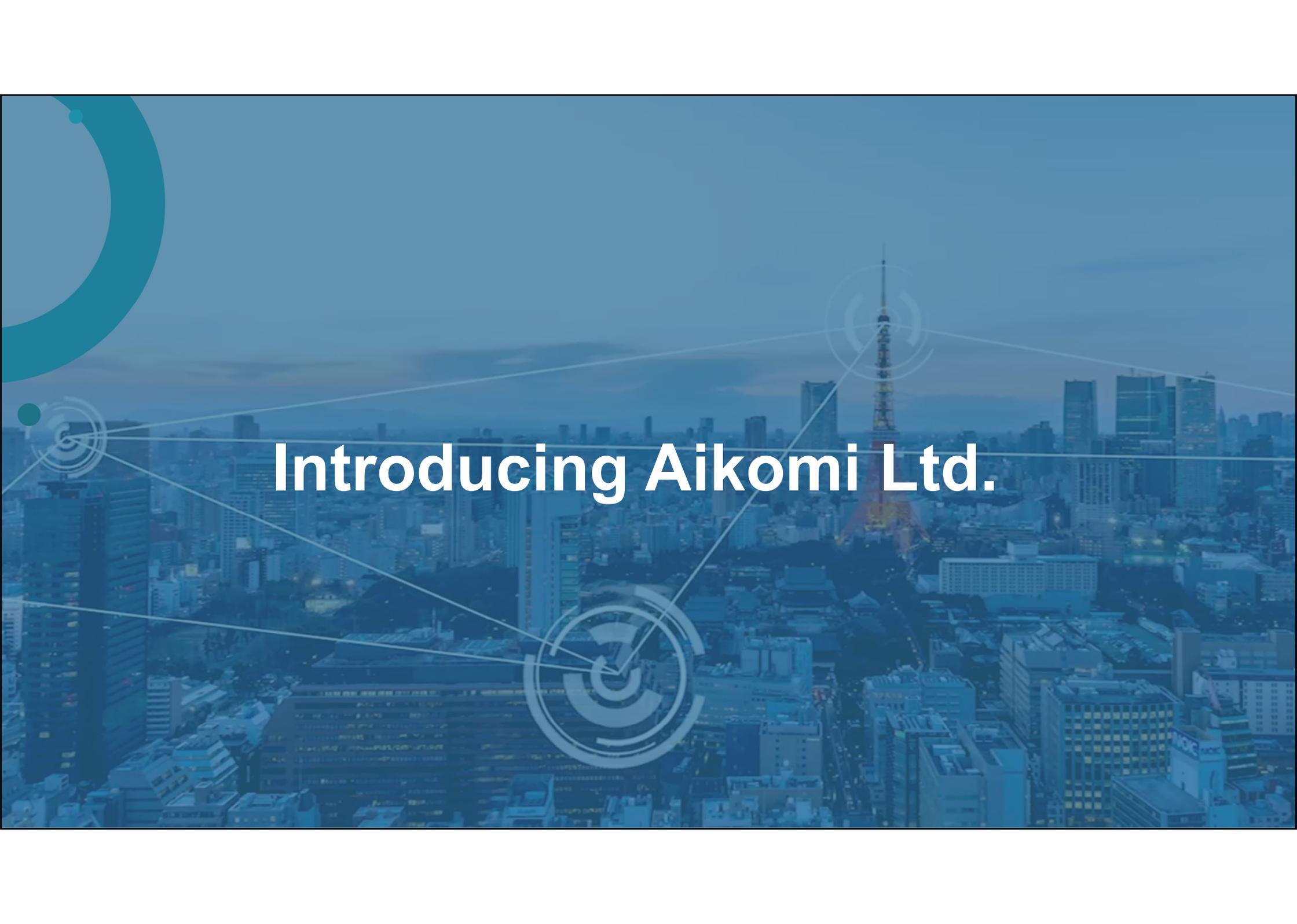
Improving the QOL of all people involved in dementia care by digital non-pharmacotherapy tailored to the life story background, interests and preferences of people with dementia



- **Creating healthcare solutions** integrated with pharmaceuticals for neuropsychiatric diseases
- **Integration with other care solutions** in the dementia area



- **New digital therapy aimed at comprehensive non-pharmacotherapy** for BPSD
- R&D to improve QOL in person-centered care through personalization/automation

The background is an aerial view of a city at dusk, with a blue color overlay. The city skyline is visible, including a prominent tower with a spire. Overlaid on the image are several technical graphics: a large teal circle in the top left corner, a network of white lines connecting various points, and three circular icons with internal patterns. The text "Introducing Aikomi Ltd." is centered in white.

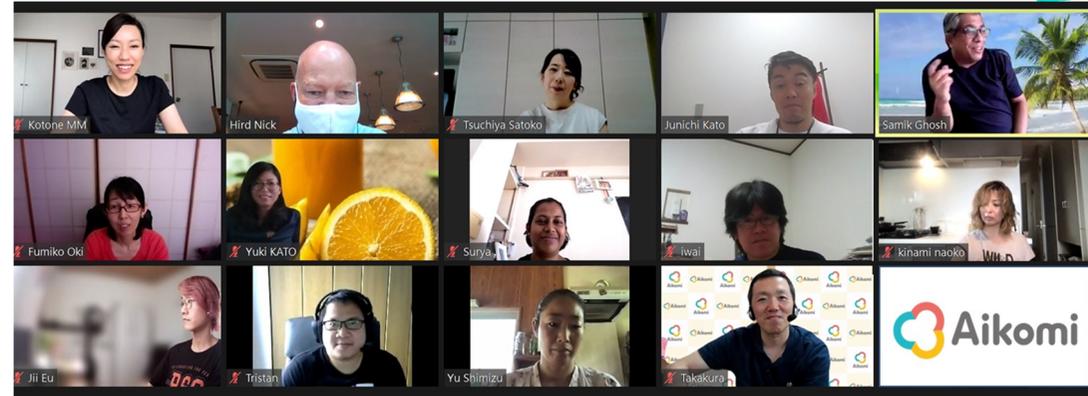
Introducing Aikomi Ltd.

Overview of Aikomi Ltd.



Corporate philosophy: Living with Dementia

- Support providing person-centered care focused on treating patients with dementia as “people” rather than “dementia cases”
- Creating an environment that fosters positive aspects of nursing care
- Improving the QOL of all people involved in dementia care



- 2018 • Spun out from Takeda Pharmaceutical (funded by JVC Kenwood and Takeda Pharmaceutical)
- 2019 • Concluded a joint research agreement with Sumitomo Dainippon Pharma
• Won the Excellence Award in the Tech for Life Pitch Contest
- 2020 • Won U.K.'s Tech Rocketship Award for “Healthy Ageing – Medical Technology for an Aging Society”
• Investment by Sumitomo Dainippon Pharma
• Cooperative agreement with Sumitomo Dainippon Pharma and Sompo Japan Insurance Inc.
- 2021 • Started marketing Aikomi care on a trial basis
• Awarded Small Business Innovation Research (SBIR) grant jointly with a U.S. care service provider

Three Problems with Dementia



Living with dementia is challenging for most people



No effective treatment



Behavioral and psychological changes

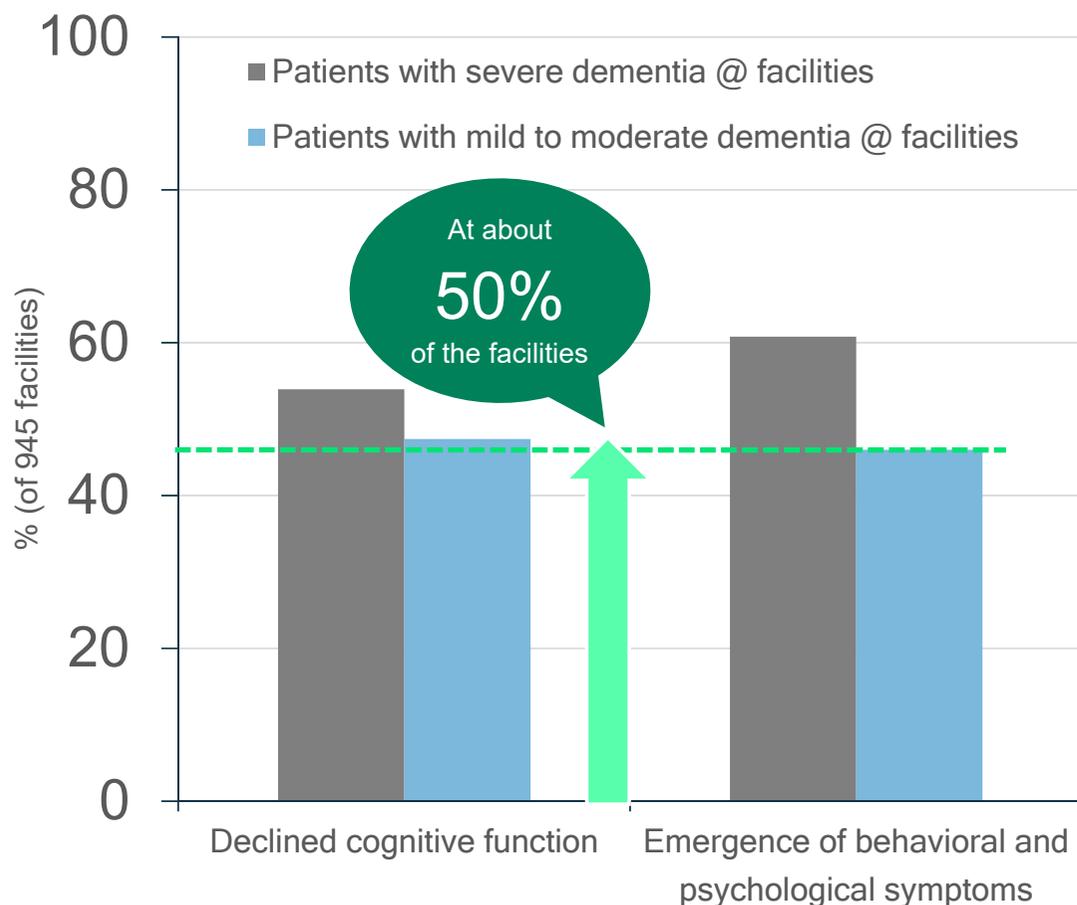


Loss of mutuality

Relationship between Dementia and Society in the COVID-19 Pandemic



Percentage of facilities affected by COVID-19



Lockdown measures in care homes which caused severe access restriction for external visitors to facilities were shown to have adverse effects on dementia patients, such as decline in cognitive function and worsened **behavioral and psychological symptoms**

Source: "The Spread of COVID-19 Shown to Aggravate Symptoms in People with Dementia and Increase the Burden of Care by their Families." Shinya Ishii, Hiroshima University news release, July 30, 2020.

Features of the “Aikomi Care” Solution to be Provided



Communication



For operation by the caregiver

For viewing by the person with dementia

Promote two way communication using two devices (tablets), one for the caregiver and one the person with dementia
Can be operated remotely in preparation of the “new normal” in the post-COVID-19 era



With facility staff



Remotely



Face-to-face

From home afar

Sitting side by side

“Aikomi Care” Service Content and Cycle



(1)

Information related to the person's memories and emotions

Collecting photos and videos from family



(2)

Creating a non-pharmacotherapy care program

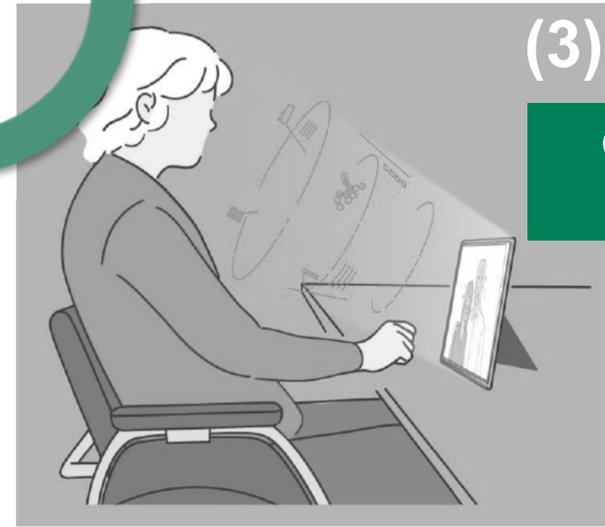
Creation of a video program based on the person's life history



(4)

Data analysis

Optimizing the program contents to improve positive effects of intervention



(3)

Collecting program viewing data

Identify content that promotes conversation, response, and concentration

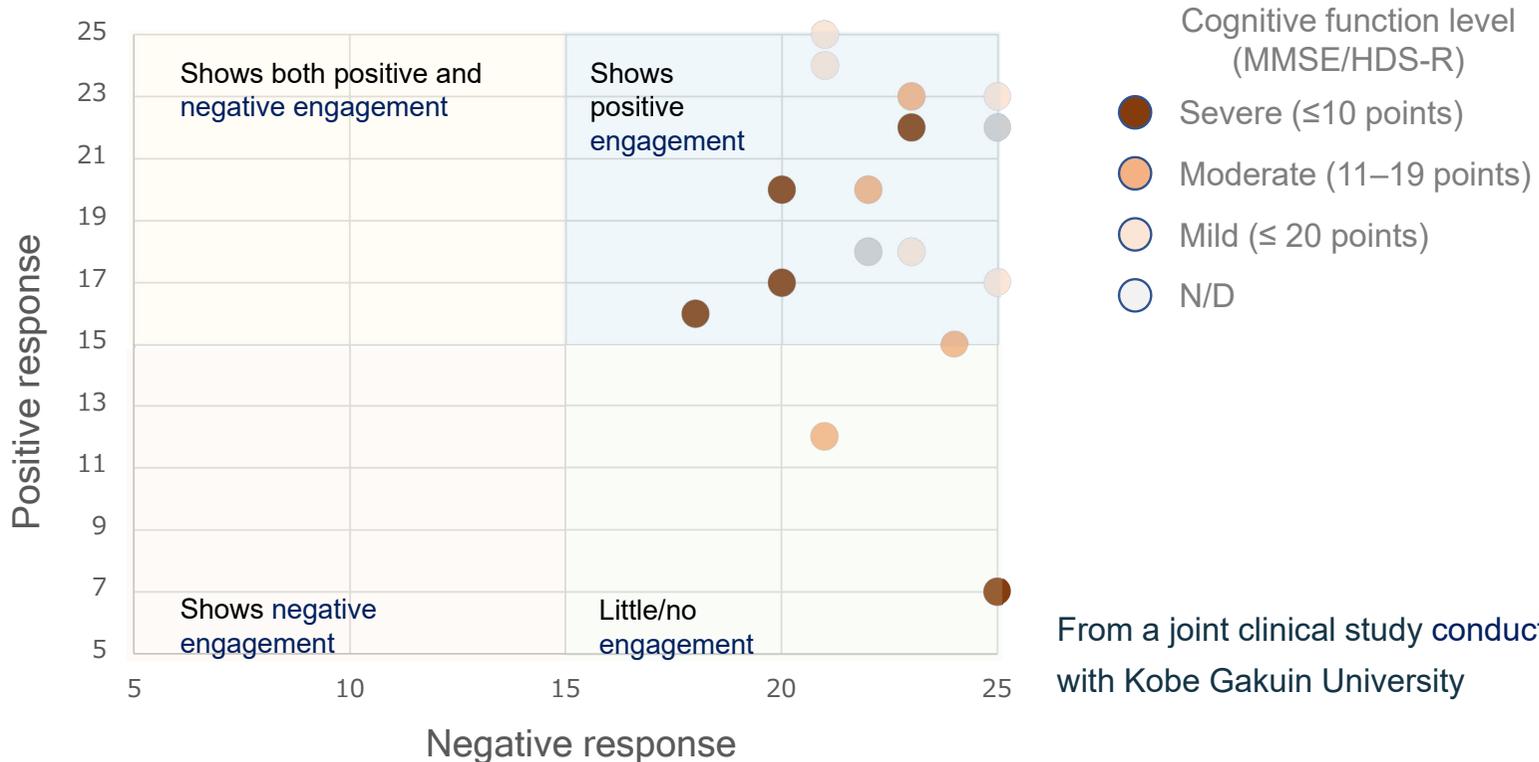


Results of a Clinical Pilot Study Using a Prototype Device

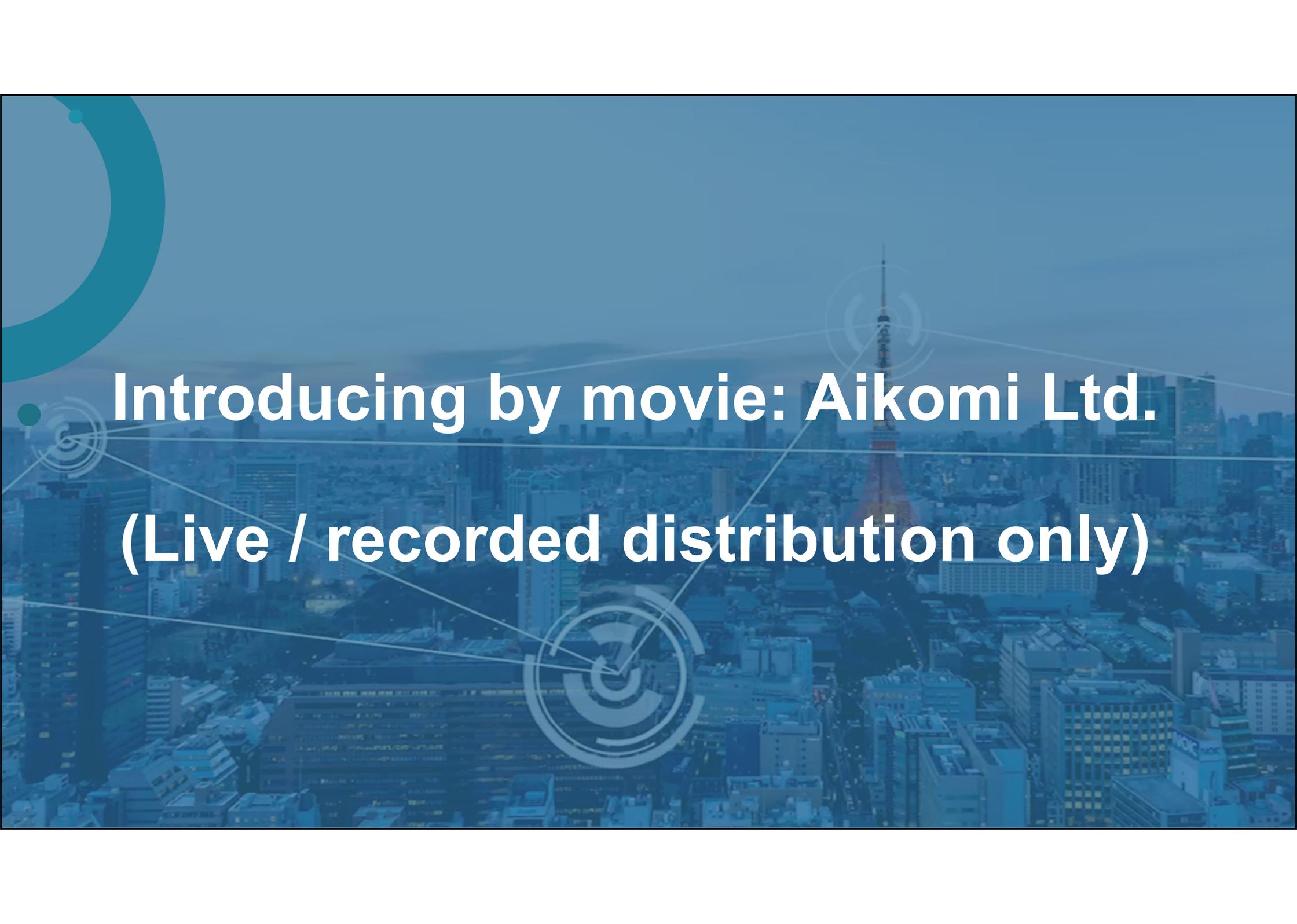


People with dementia who are unfamiliar with using tablets showed positive engagement with personalized psychological intervention

Degree of engagement in Intervention Using a Prototype Device



Evaluation based on the Engagement of a Person with Dementia Scale (EPWDS)

The background is an aerial view of a city, likely Tokyo, with a blue color overlay. The Tokyo Tower is visible in the center-right. There are several technical graphics overlaid on the image: a large teal circle in the top-left corner, a circular radar-like graphic on the left, a circular graphic with a central '3' on the bottom, and a circular graphic with a central '1' on the right. White lines connect these circular graphics across the cityscape.

Introducing by movie: Aikomi Ltd.

(Live / recorded distribution only)

Targeted Vision of the World



We aim to build a world in which the elderly with dementia can lead autonomous lives.

Current Issues

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Future Developments

Current Status of Dementia

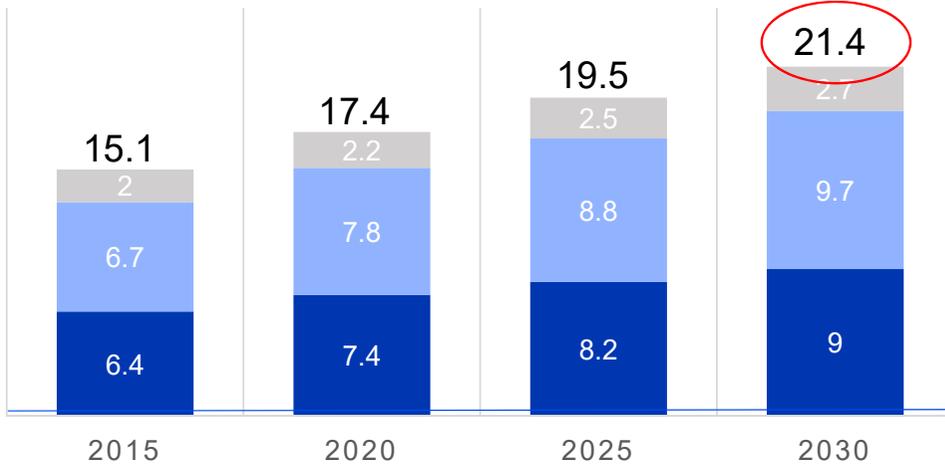


Business development for BPSD care requires working with companies familiar with the nursing care business.

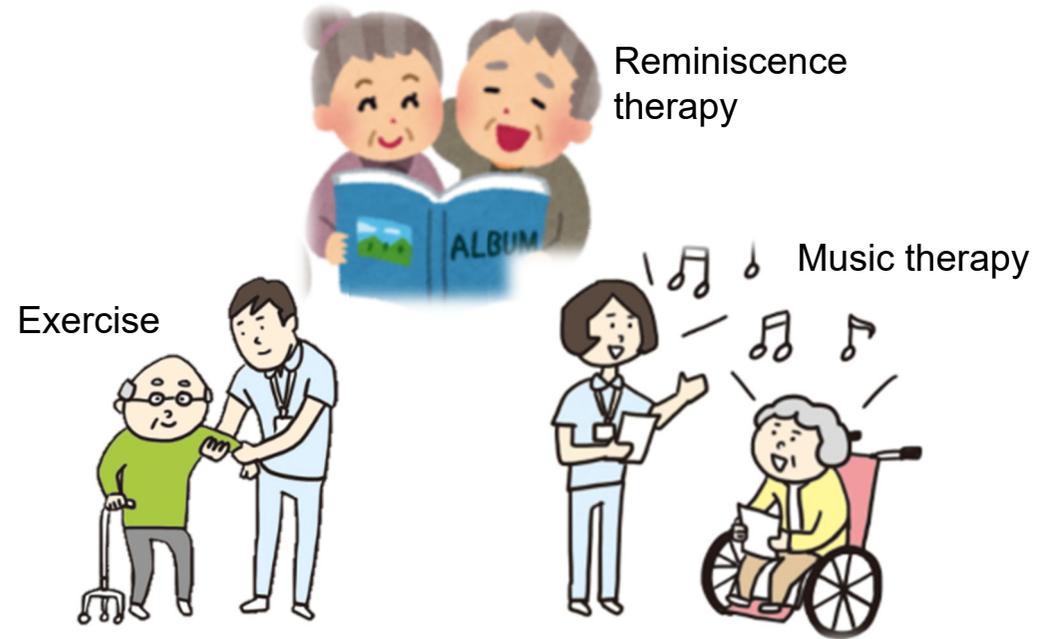
Estimates of the future social cost of dementia
– Exceeding **21 trillion yen** by 2030 –

Non-pharmacotherapies for BPSD
practiced in nursing care settings

■ Medical costs ■ Nursing-care costs ■ Informal-care costs



Excerpted from “2030 Outlook and Reform Task Force Report” by the Cabinet Office



3-Company Alliance, Including Sompo Japan Group, which Operates a Nursing Care Business*

* The three companies concluded a memorandum of cooperation in August 2020



Clinical research support
Conduct clinical study as needed

Global CNS Specialized Player
Support for clinical research and technology development using clinical expertise in CNS pharmaceuticals



Improved QOL
Setting a Gold Standard for Dementia Care



Platform Technology



Care Delivery
Support for market development
Clinical research support (provided at demonstration sites)



Tool/AI development

Checking on-site needs



Conceptual Image of Business Development



Aiming to start full-scale marketing of consumer/nursing care applications in FY2022

Consumer/nursing care applications

Purpose

Joint research agreement between Sumitomo Dainippon Pharma and Aikomi

Start of test marketing

- Verification and improvement via expanded trial use
- Setting a business model
- Conducting clinical research to obtain evidence

Start of full-scale marketing

Sales expansion

Enhanced communication
Improved positive aspects nursing care
Improved QOL

FY2018

FY2020

FY2022

Software as a medical device applications

Decision on conducting medical device clinical trial

Clinical trial implemented

Treatment of BPSD
Implement as part of rehabilitation for people with dementia



VR contents for Social Anxiety Disorder (SAV-985) (Partner: BehaVR)

Tetsuya Uyama, Officer, Frontier Business Office

Aaron Gani, CEO, BehaVR, Inc.



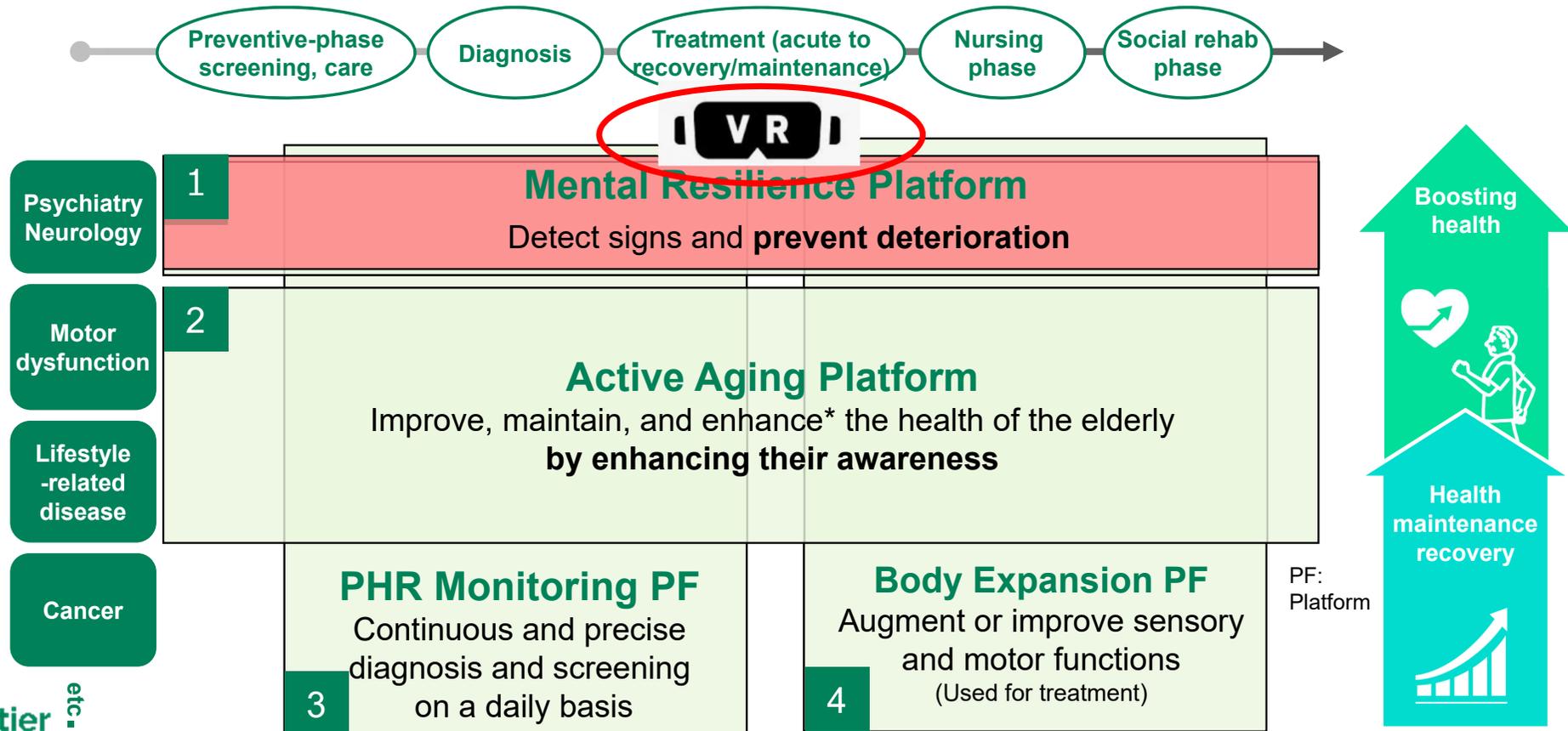
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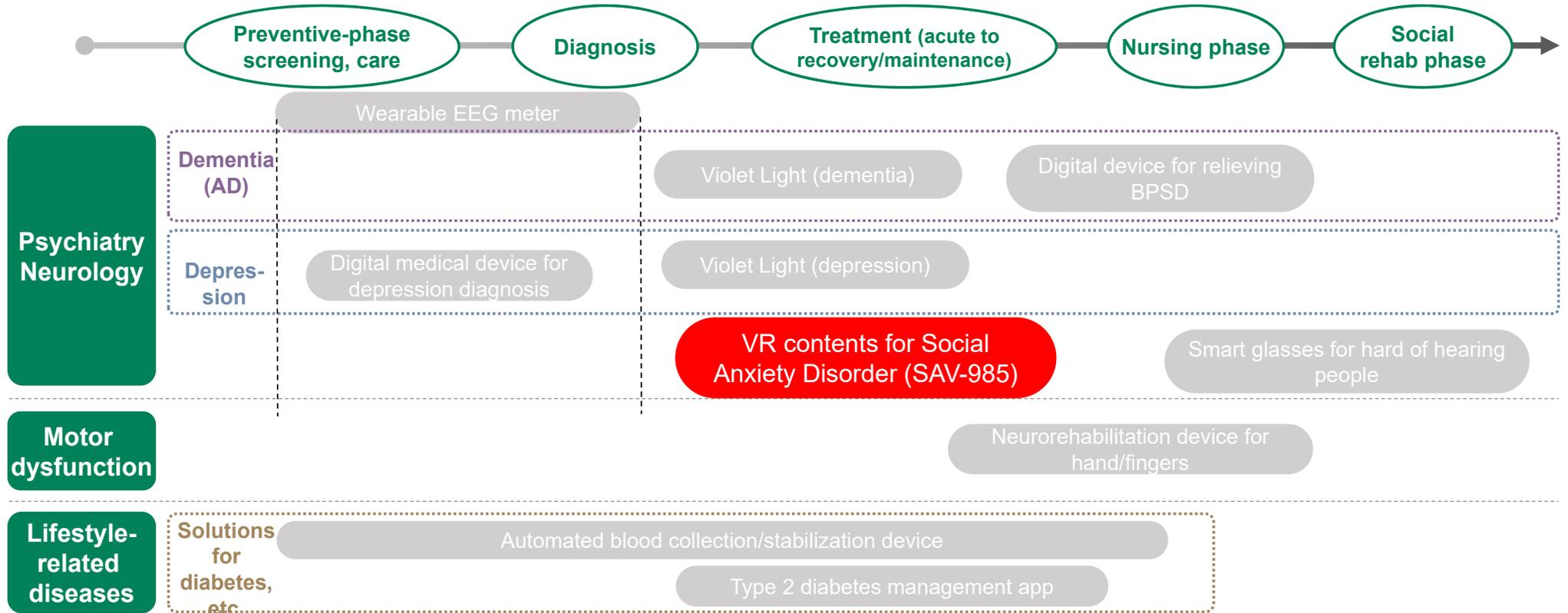
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Targeted Vision of the World



A world in which people who are unable to receive face-to-face therapy can live with the disease and resume social activities

Current Issues

Due to the limited number of counselors and therapists, not everyone has access to face-to-face therapy.

Due to the nature of the disease and people's hesitation to receive face-to-face therapy, it takes a considerable time before they receive appropriate treatment.

This solution/device aims to realize:

Taking advantage of the characteristics of VR, joint development is underway for social anxiety disorder. We pursue the possibility of reproducing cognitive behavioral therapy (CBT) with VR content.

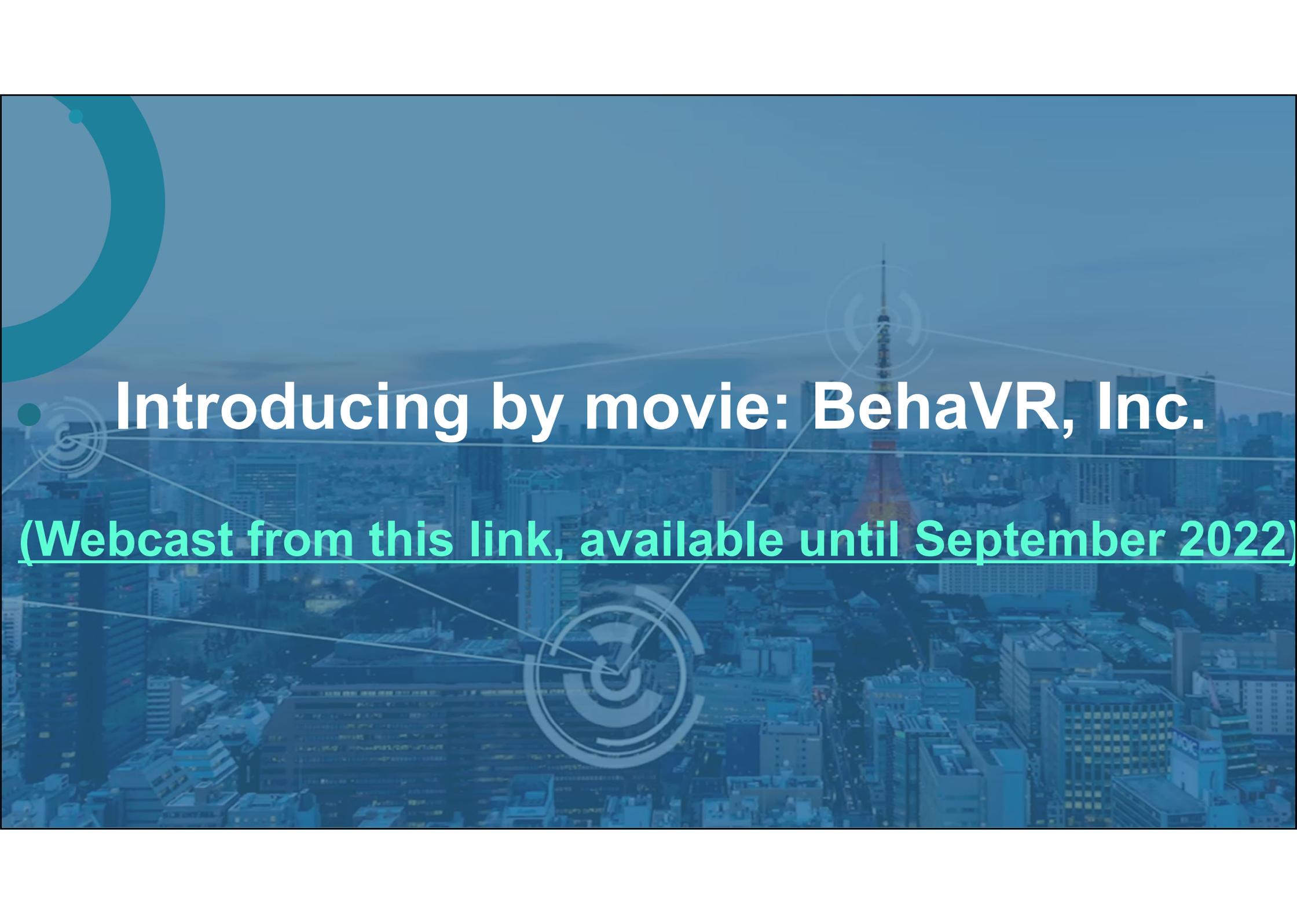
We will commercialize/market the device as a general wellness product model in the U.S. by the end of 2022, in expectation of marketing it as a medical device (DTx) in the future.



- Expertise cultivated through R&D of pharmaceuticals for neuropsychiatric diseases
- Knowledge and experience in the clinical study design of pharmaceutical compounds



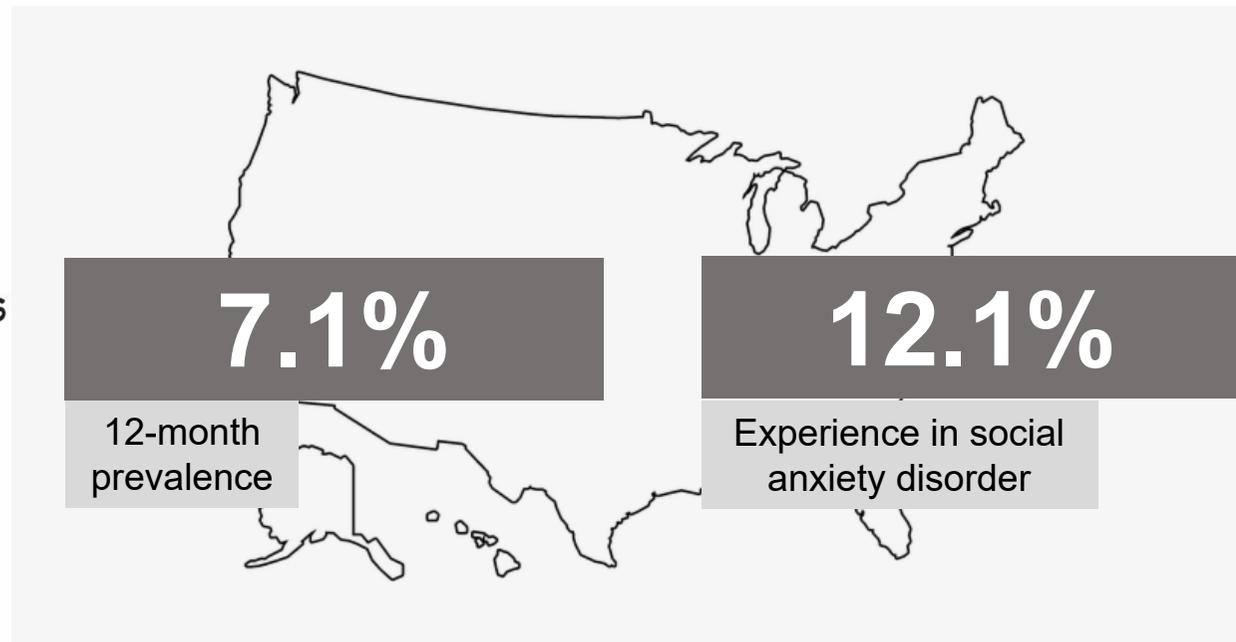
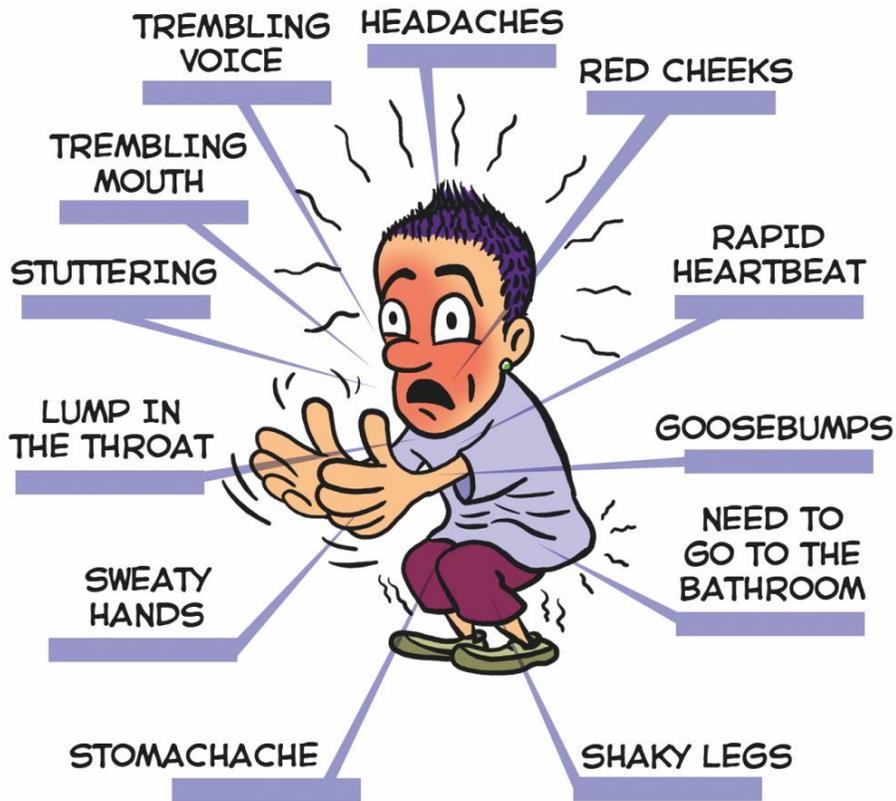
- Development experience in reflecting cognitive behavioral therapy (CBT) and mindfulness into best-in-class VR content
- Track record of VR program sales in the U.S.



- **Introducing by movie: BehaVR, Inc.**

[\(Webcast from this link, available until September 2022\)](#)

Social Anxiety Disorder



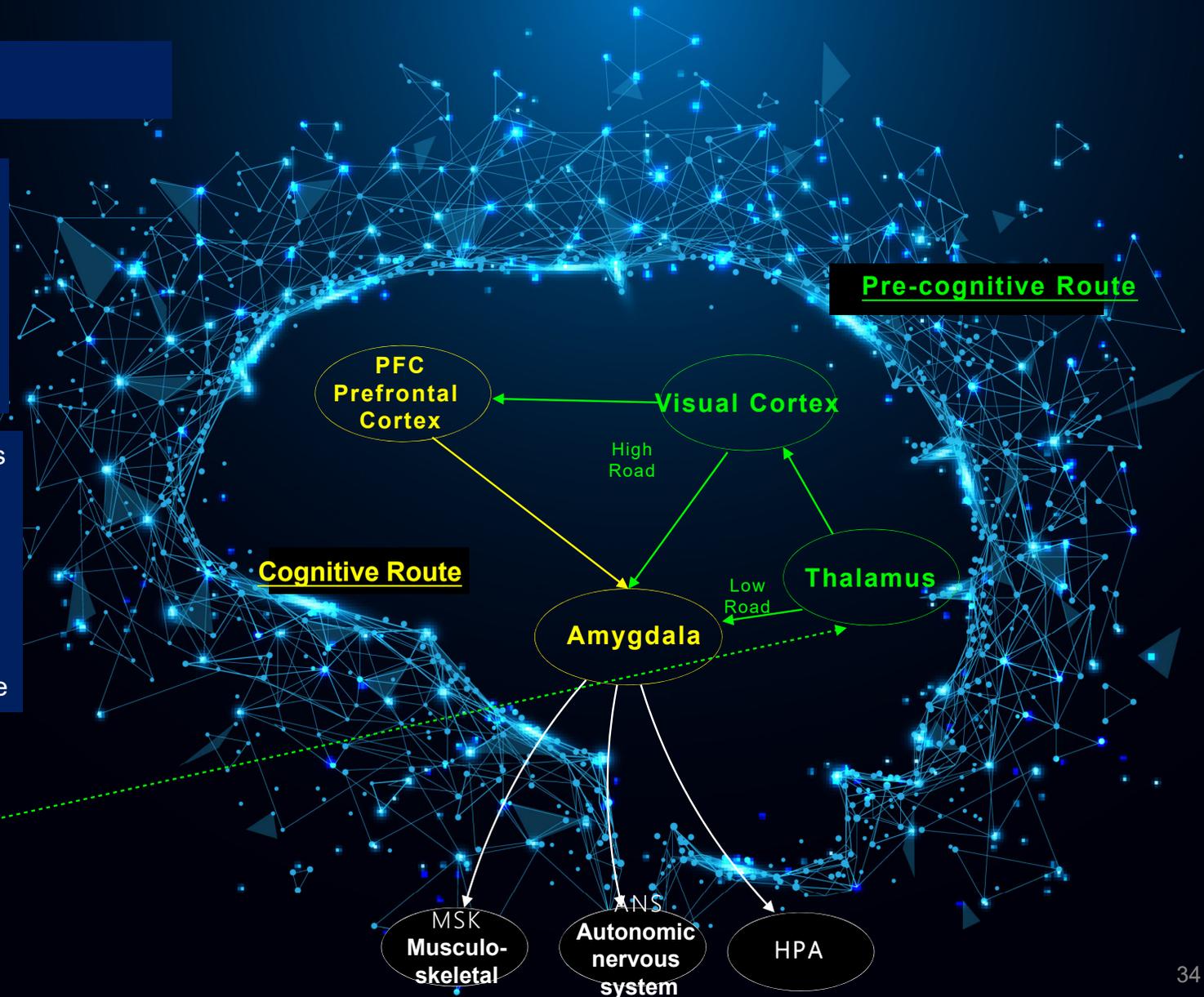
NIH National Institute of Mental Health

Source: [NIMH » Social Anxiety Disorder \(nih.gov\)](https://www.nimh.nih.gov/health/statistics/social-anxiety-disorder)

Why VR?

- Activating both the **cognitive** and **pre-cognitive routes** may improve the effectiveness of signal transmission to the musculoskeletal, autonomic, and neuroendocrine systems

- Exposure therapy on the person's body is time-consuming for securing a condition suitable for the person and may be dangerous. It is also difficult to standardize the therapy
- The implementation of conventional exposure therapy is limited to clinics where therapists can control it in real time

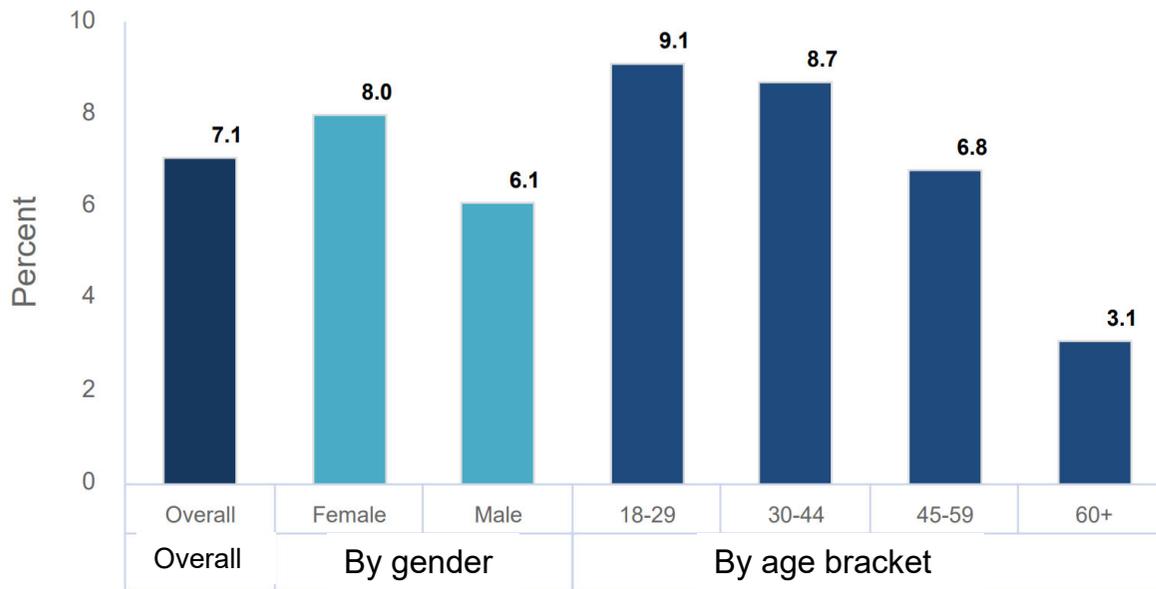


Social Significance

Social Anxiety Disorder Patient Segment in the U.S.

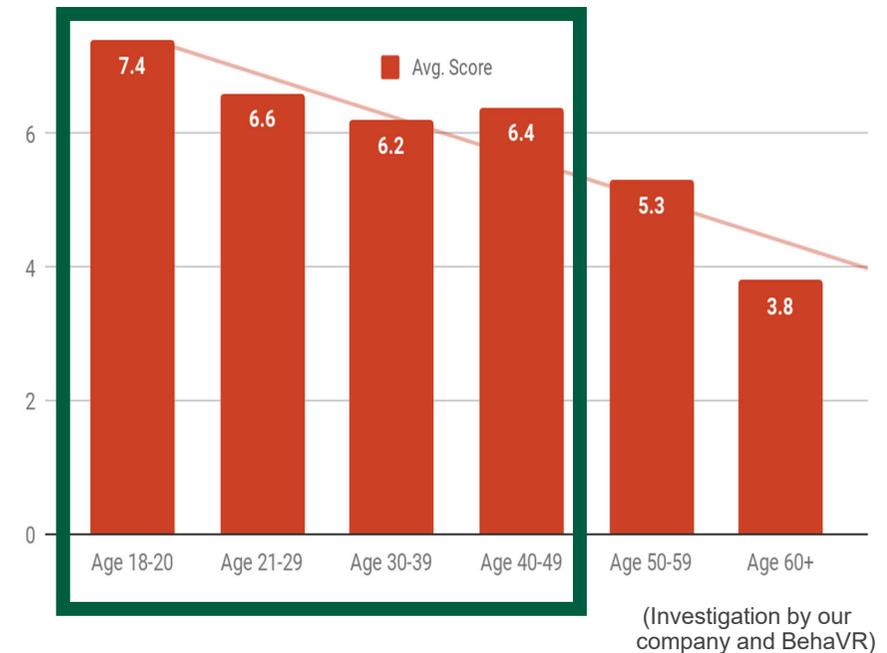
Prevalence of Social Anxiety Disorder in the U.S. (12 Months)

Data from National Comorbidity Survey Replication (NCS-R)

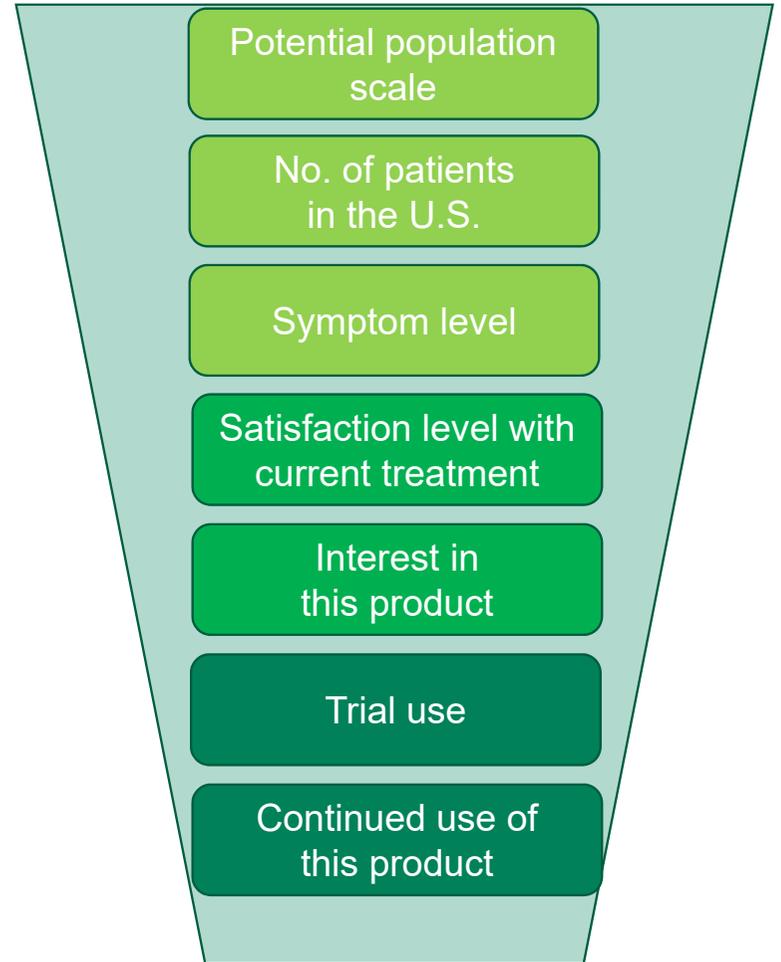
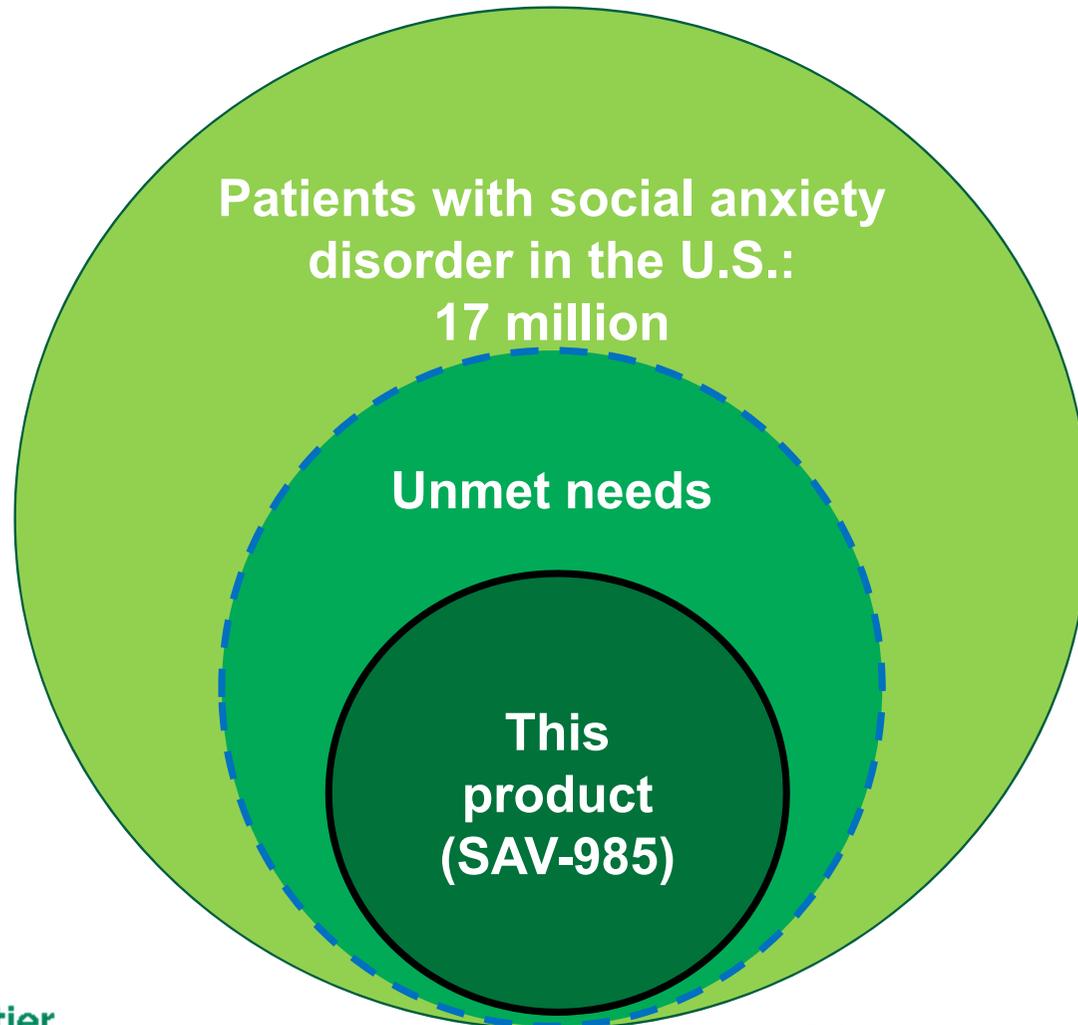


Source: NIMH » Social Anxiety Disorder (nih.gov)

Effects of Social Anxiety Disorder (Scale of 1 (min.) to 10 (max.))



Prospective Scales of Target Markets



Timeline



FY2020 (2H)

Completion of
concept version
prototype

FY2021 (1H)

Completion of
minimal viable
product

Small-scale user
experience test

FY2021 (2H)

Feasibility test to confirm
effectiveness

FY2022 (1H)

Completion of
commercial
product

FY2022 (2H)

Start of sales in the U.S.

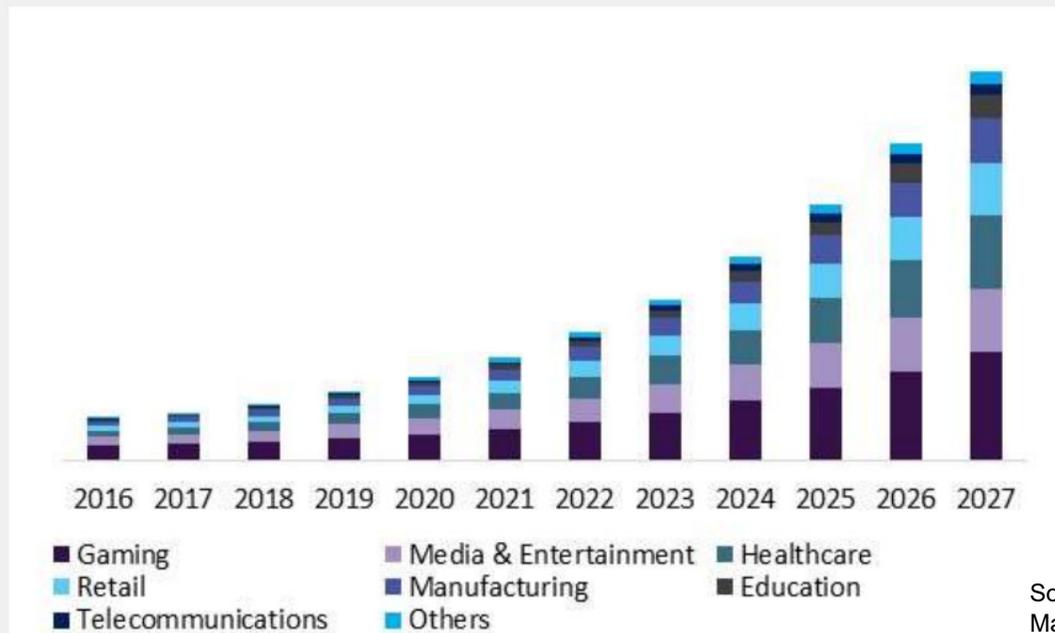
Upgrading

Summary



A future in which healthcare is much closer to patients through virtual reality

Fig.15 North America VR headset market by application, 2016 - 2027 (USD Million)



Source: Grand View Research, Virtual Reality Headset Market Size, Share & Trends Analysis Report 2021–2028





Sumitomo Dainippon
Pharma

Neurorehabilitation Device for Hand/Fingers (Partner: MELTIN)

Yukako Nishimaki, Business Promotion
Officer, Frontier Business Office

Mark Kasuya, CEO, MELTIN



frontier

BUSINESS

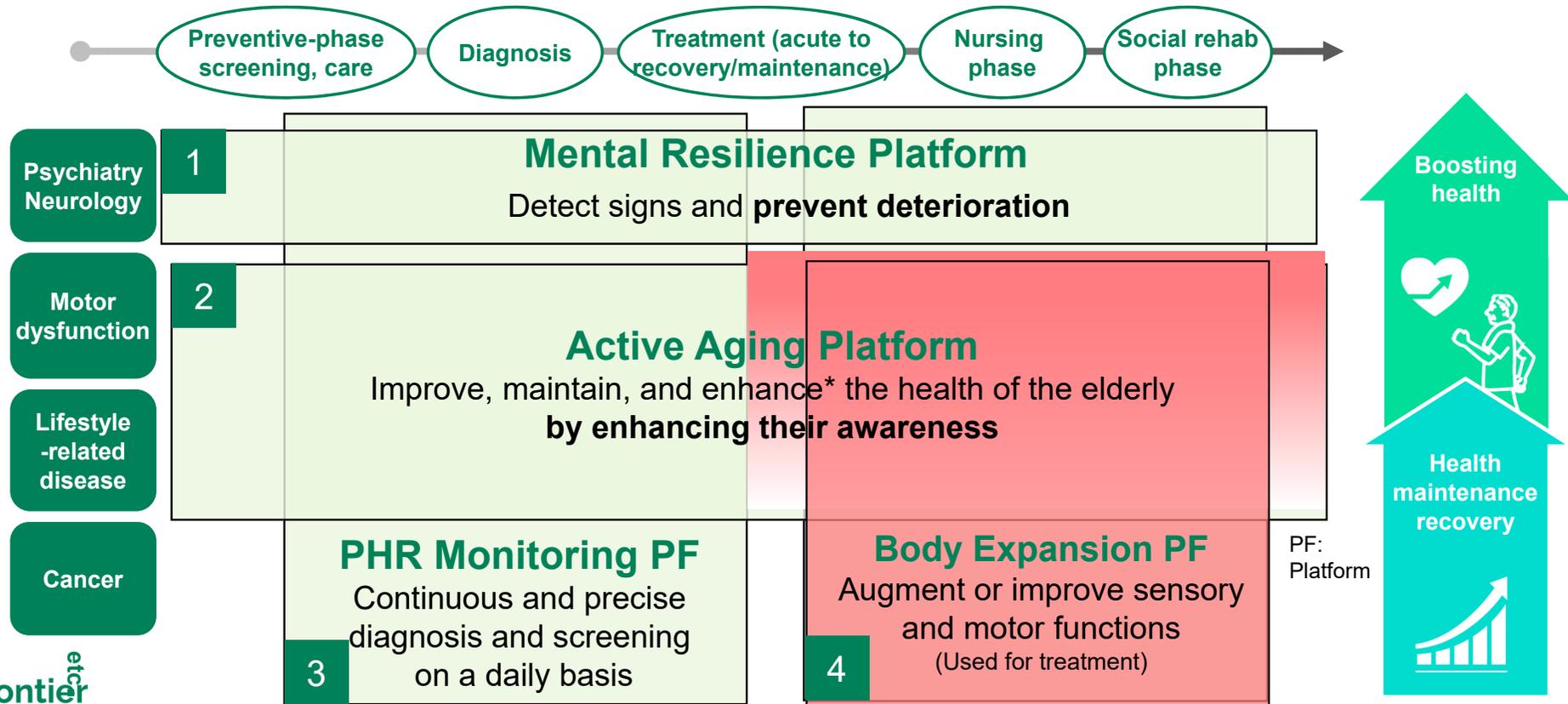
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Frontier Business Domain



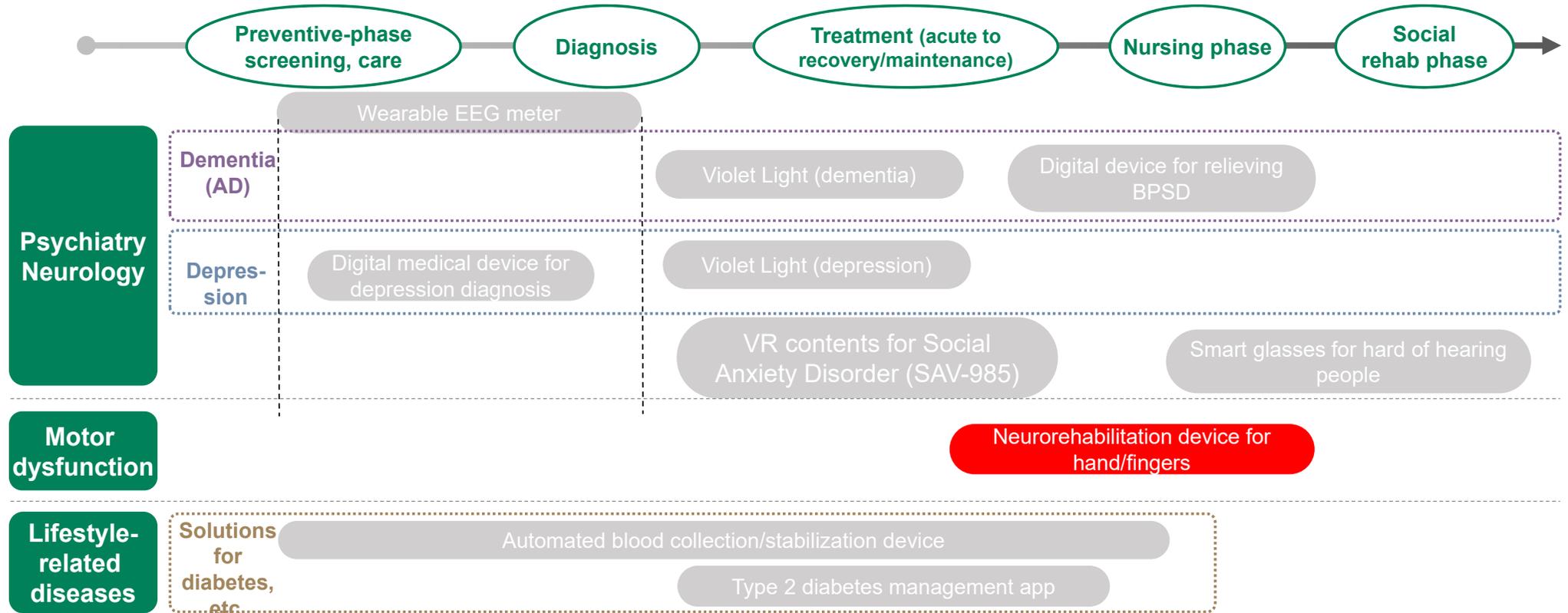
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History of MELTIN

Venture company for cyborg technology founded in 2013 out of academic research

History

July 2013: Registration of incorporation

Jan. 2016: Seed round

Sep. 2017: Adopted for NEDO STS/Tokyo Metropolitan Government's medical device grant

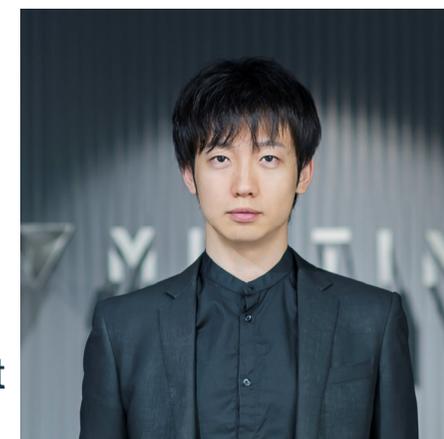
Dec. 2017: Series-A round

June 2018: Selected as a J-Startup (a unicorn company candidate in Japan) by METI

Oct. 2018: Series-B round; **a joint R&D agreement concluded with Sumitomo Dainippon Pharma**

May 2019: Office moved to Kayabacho due to business expansion

Sep. 2020: R&D Center opened in Minamisoma, Fukushima Pref.



Mark Kasuya, Ph.D.
CEO, MELTIN

The Future Envisioned by MELTIN & Sumitomo Dainippon Pharma



A Future in which Everyone Can Maximize
Their Creativity without any limitations

制約にとらわれず
誰もが自分らしく可能性を最大化できる未来

Embody your creativity
人類の可能性は無限大

Targeted Vision of the World



**A Future in which Everyone Can Maximize
Their Creativity without any limitations**



Sumitomo Dainippon
Pharma

- Expertise, knowledge, and experience cultivated through basic research and clinical development in neuropsychiatric diseases
- Integration of active aging and body augmentation platforms

Medical - Engineering
collaboration



MELTIN

- Robotics technology that moves a multi-joint robot as flexibly and powerfully as the human body
- Possesses high-speed, high-precision algorithms that convert biosignals into high-dimensional body movement

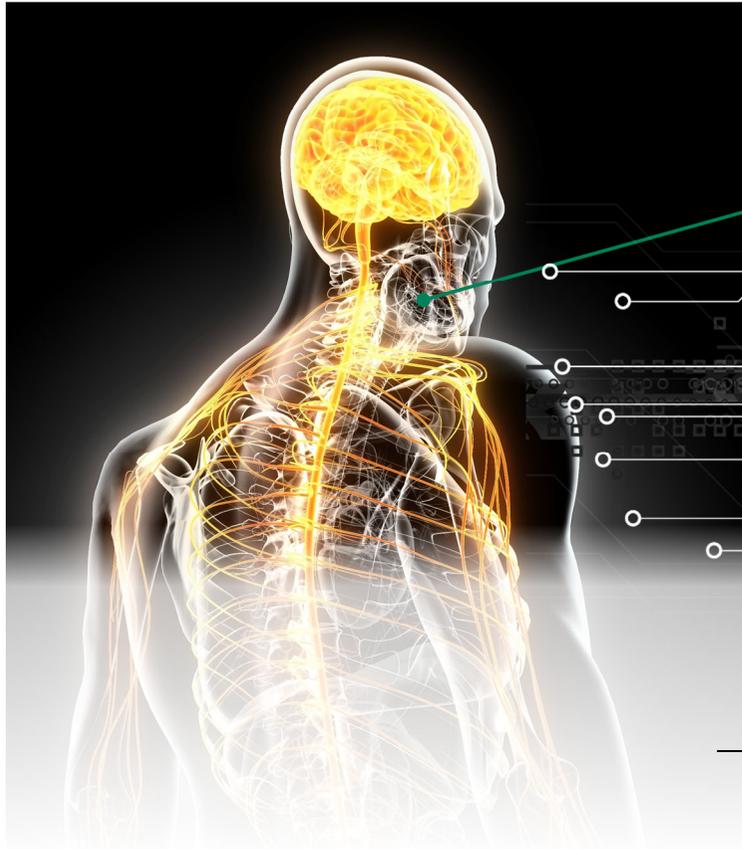
The image features a blue-tinted aerial view of a city skyline at dusk. The Taipei 101 tower is a prominent landmark in the center. Overlaid on the image are several technical graphics: a large teal circular shape in the top-left corner, a network of white lines connecting various points across the city, and three circular icons with internal patterns. The text 'Core Technology of MELTIN' is centered in white, bold font.

Core Technology of MELTIN

Our Technology

What is cyborg technology?

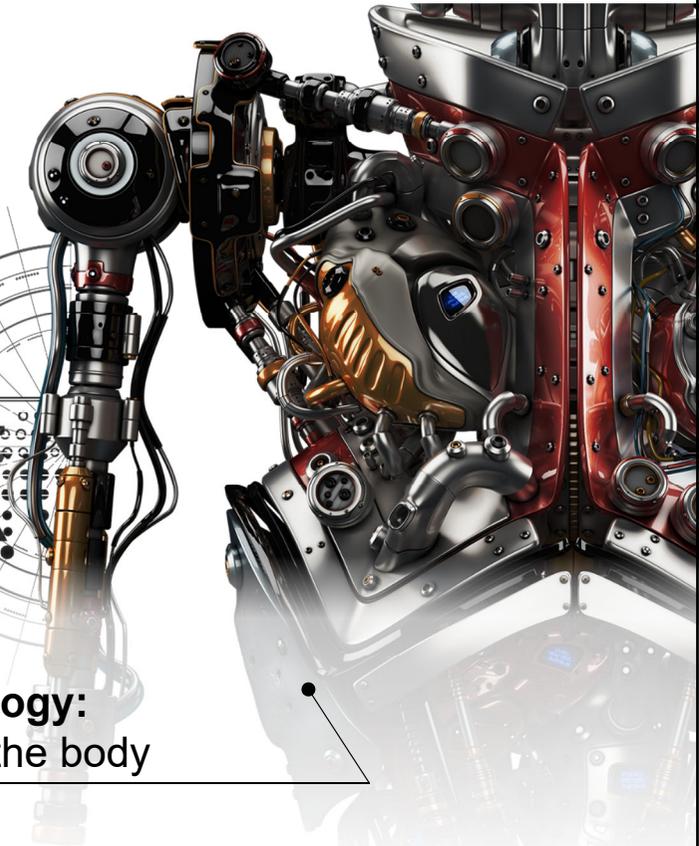
Technology that fuses people and machines to open up new possibilities



Electromyogram/
neural signals, EEG

Biosignal-interface:
Sensor Technology and analyzing
algorithm

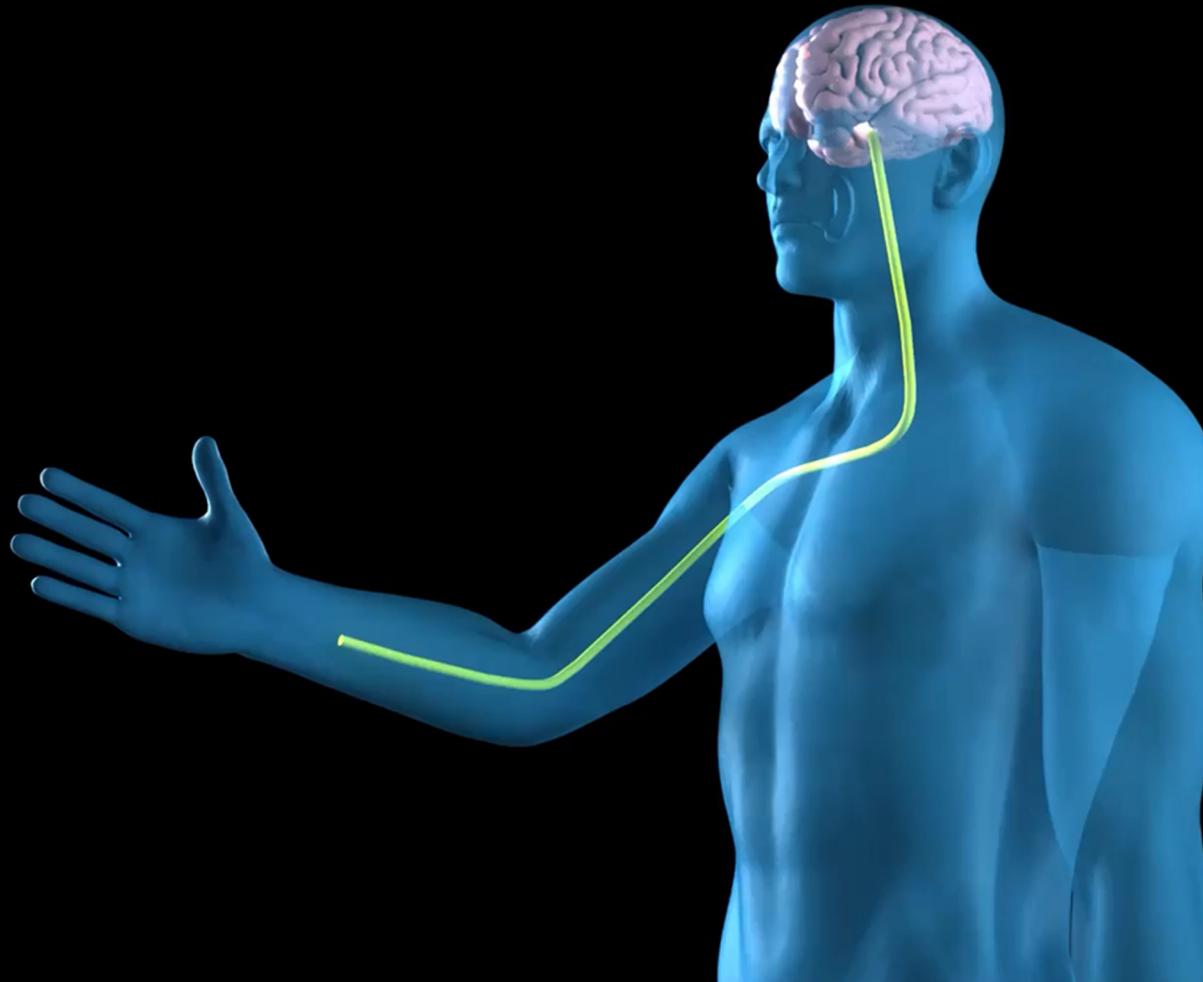
Avatar consisting of robotic technology:
Technology for artificially constructing the body



Technology (Movie)



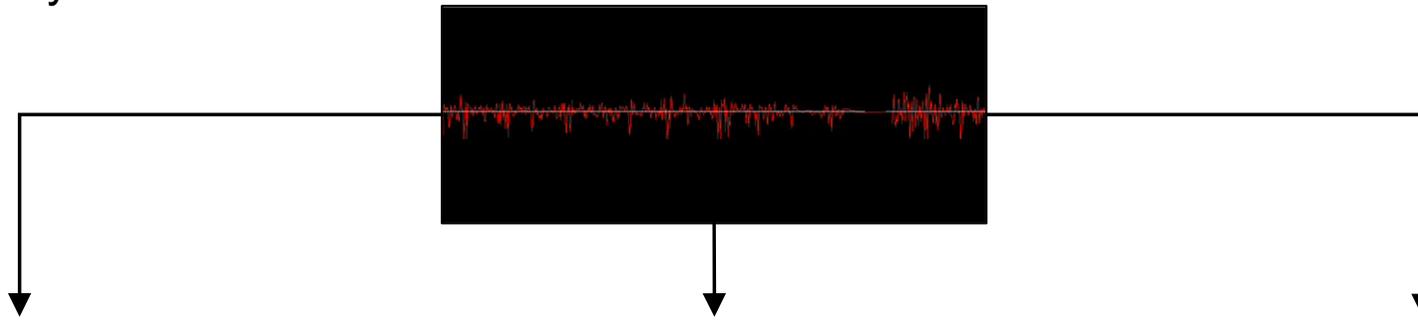
Introducing by movie (Live / recorded distribution only)



Integrated Technology



Infinite Possibilities via Combining Robotic Technology with Biosignal Possesses **high-speed, high-precision** algorithms that convert biosignal into high-dimensional body movement



Neural prosthetics



Body augmentation



Motor recovery





Bio-signal × Robotics

**Development of Robotic Neurorehabilitation
Device for Hand/Fingers**

Targeted Vision of the World



A Future in which Everyone Can Maximize Their Creativity without Any Limitations

Current Issues

The percentage of post-stroke hemiplegic patients recovering a functional hand is lower than that of lower limb recovery. Unless hand/finger extension manifests on the hand at an early post-stroke stage, the hand is likely to become nonfunctional. In such cases, treatment focuses on compensatory rehabilitation such as changing hand dominance, leaving the rehabilitation of the paralyzed hand inadequate.

Recent neuroscience research has revealed that appropriate rehabilitation can induce plasticity change and improve motor function even after brain damage. Thus, there is a growing need to realize neurorehabilitation aimed at reconstructing the neural network by taking advantage of the plasticity of brain nervous system tissues.

This solution/device aims to realize:

The robotic neurorehabilitation device is designed to read the patient's motion intention from surface electromyography (EMG) signals and operate the robot attached to the hand/fingers in sync with the intention. By learning the activity of the motor cortex of the brain and the motor sensation of the hand/fingers, we are examining how to demonstrate the function to support the reconstruction of a series of motor mechanisms, with the aim of recovering "functional hand/fingers," even if the device is removed.

Epidemiology of Motor Paralysis (in Japan and Overseas)



- ✓ Brain stroke is the most common causative condition of motor paralysis
- ✓ There are about 1.2 million patients with brain stroke in Japan

	Japan	Overseas
Annual incidence of brain stroke ¹⁾	300,000	17 million worldwide
No. of patients with brain stroke	1,115,000 ²⁾	About 7.2 million in the U.S. ³⁾ About 13 million in China ⁴⁾

- ✓ No.1 cause of being bedridden in Japan and 2nd of requiring nursing care²⁾

1) <http://www.jsa-web.org/citizen/95.html> (Message from the Japan Stroke Association and the World Stroke Organization)

2) <http://www.seikatsusyukanbyo.com/statistics/disease/cerebral-hemorrhage/> (Japan Preventive Association of Life-style related Disease website)

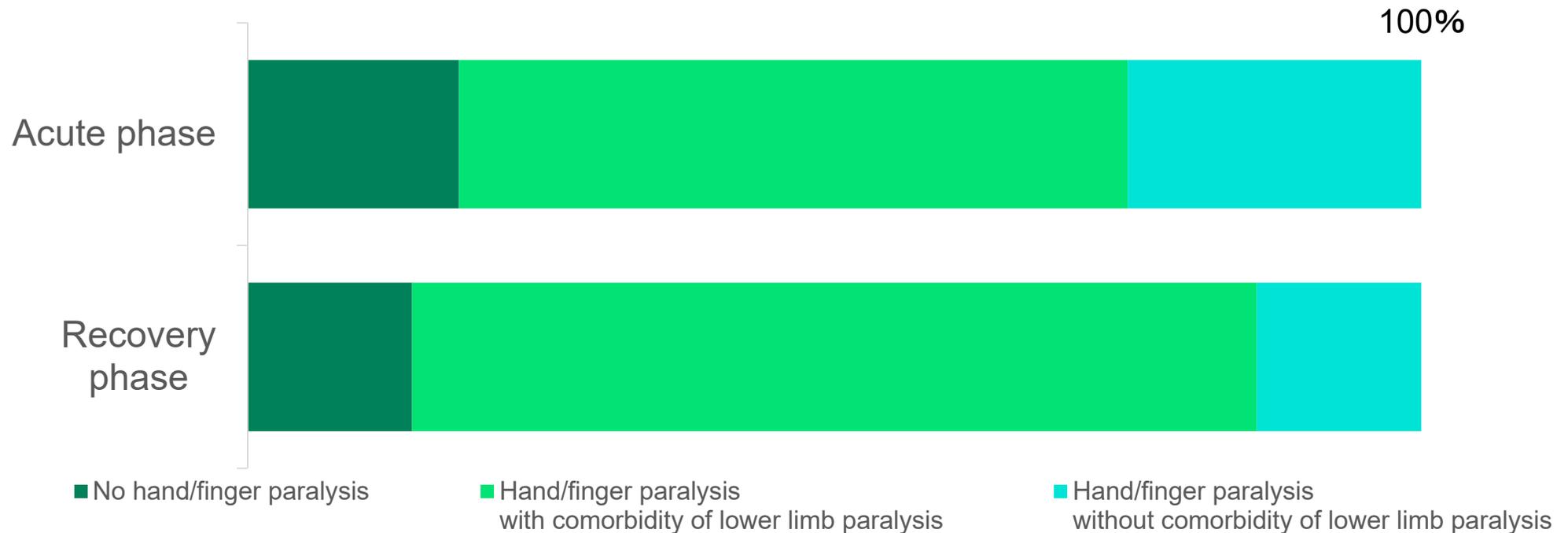
3) [Circulation 2017; 135:e146–603](https://doi.org/10.1161/CIRCULATIONAHA.116.146603) (AHA report)

4) <http://j.people.com.cn/n3/2020/0930/c94475-9766118.html> (People Daily Japanese edition: Report on Cardiovascular Diseases in China 2019)

Estimated Percentage of Patients with Post-Stroke Hand/Finger Paralysis (in Japan)



Percentage of Patients with Post-Stroke Hand/Finger Paralysis
(Questionnaire survey of doctors)



Calculated from the number of stroke patients examined by doctors in the last month, the proportion of patients with severity of finger paralysis at admission, and the number of patients undergoing rehabilitation (Survey in 1st half of 2020, more than 100 doctors in both acute and convalescent facilities)

Issues of Stroke Rehabilitation



Early start

→ The percentage of post-stroke hemiplegic patients recovering a functional hand is lower than that of lower limb recovery.¹⁾ Unless hand/finger extension manifests on the hand at an early post-stroke stage, the hand is likely to become nonfunctional.²⁾ In such cases, treatment focuses on compensatory rehabilitation such as changing hand dominance.

→ Increased frequency and quantity + Neurorehabilitation (Rehabilitation based on brain science) Appropriate rehabilitation can induce plasticity and improve motor function even after brain damage.

Realizing Neurorehabilitation via Bio-signal × Robotics

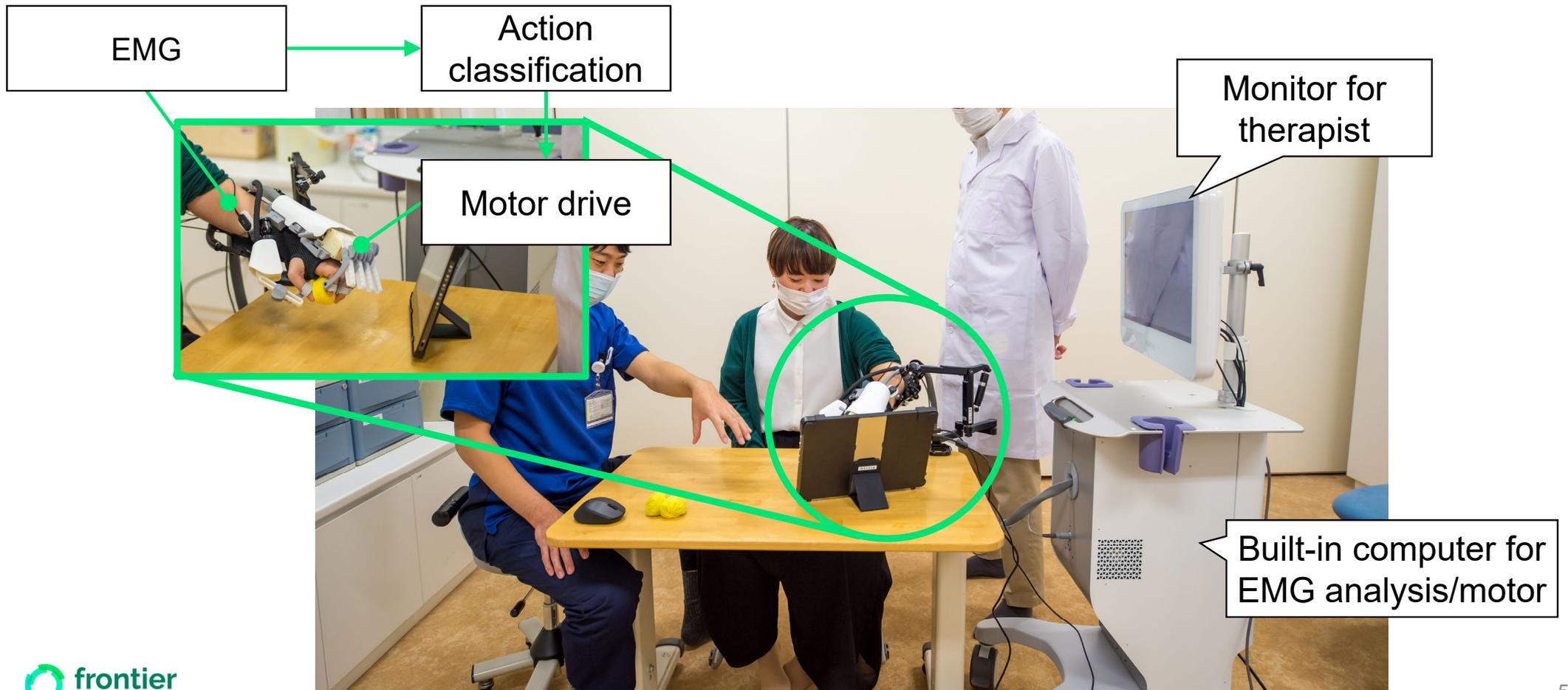
The robotic neurorehabilitation device is designed to read the patient's motion intention from surface electromyography (EMG) signals and operate the robot attached to the hand/fingers in sync with the intention. By learning the activity of the motor cortex of the brain and the motor sensation of the hand/fingers, we are examining how to demonstrate the function to support the reconstruction of a series of motor mechanisms, with the aim of recovering "functional hand/fingers," even if the device is removed.

Although there are some robotic rehabilitation devices for simple grasping movement, or for large joints such as elbows, no robotic neurorehabilitation device has been developed for the severe hand/fingers paralysis yet.



Overview of Robotic Neurorehabilitation Device for Hand/Fingers

The device is driven in accordance with biosignal then moves the patient's body



Features of Robotic Neurorehabilitation Device for Hand/Fingers



Features

1. Powerful, cable-driven finger traction
 - Lightweight and compact design, yet powerful enough to support spasticity
2. Identifies the user's motion intention even with feeble biosignal (surface EMG)
 - To achieve neurorehabilitation with movement in time with the user's intention
3. Algorithm that classifies movement by the bio-signal "waveform"
 - The device will not be distracted by spasticity, unlike conventional devices
4. A wearable exoskeleton that assists occupational therapy in sync with the user's motion intention
 - No mechanism on the palm side, facilitating occupational therapy
 - Independent control of 5 fingers allows holding objects of various sizes and shapes



For reference:
Differences from
other technologies

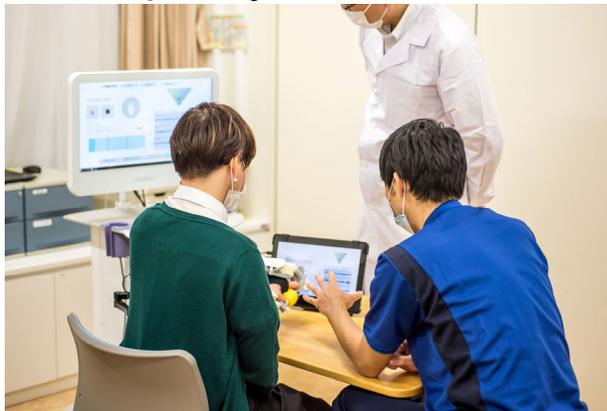
Investigated
by MELTIN

	MELTIN	A	B	C
Control	EMG waveform	EMG amplitude (intensity)		Constant rhythm
Drive method	Cable driven	Direct drive	Electrical stimulation	Pneumatic
Responsiveness to patient intent	◎ Supports spasticity	○	○	×
Pinching	○	×	△	×

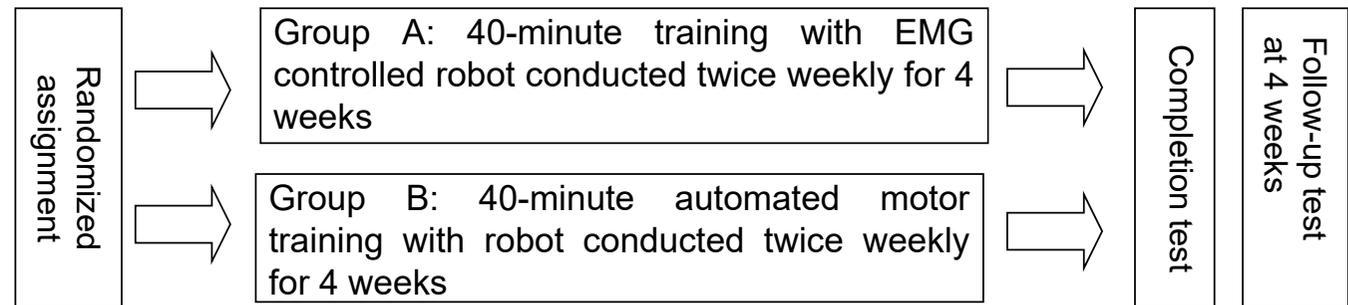
Clinical Development Status of Neurorehabilitation Device for Hand/Fingers



Juntendo University and MELTIN concluded a joint research agreement on the therapeutic effects of using a robotic neurorehabilitation device on post-stroke upper limb paralysis



- ◆ Targets: Post-stroke hemiplegic patients
- ◆ Population size: 30
- ◆ Study period: May 2020 to April 2022



Primary endpoints: Fugel-Meyer Assessment upper limb parameters

Secondary endpoints: Box and Block (BBT),

Jebsen-Taylor Hand Function Test (JTT),

Motor activity Log-14 (amount of use) (MAL-14 AOU),

Modified Ashworth scale (finger, wrist, elbow)

electrophysiological testing

(Clinical study protocol No.: jRCTs032200045)

Summary: What the Robotic Neurorehabilitation Device for Hand/Fingers is Pursuing

Clinical Needs

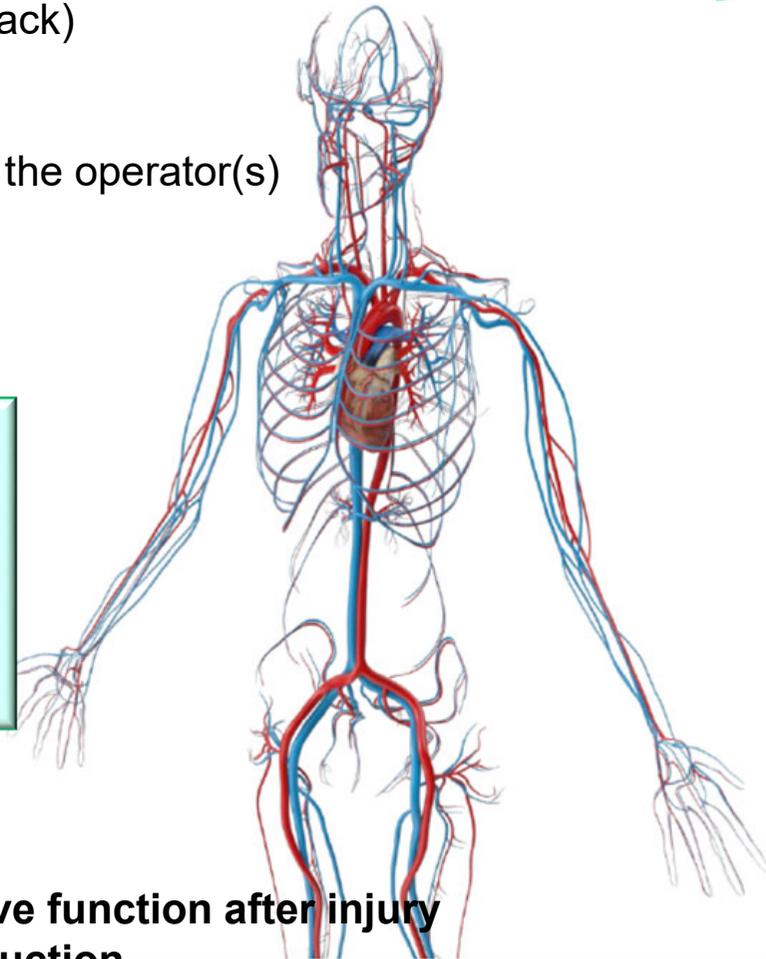
- Response to and visualization of biosignal (bio-feedback)
- Conducting exercise with purpose (issue-dependent)
- Repetition with the device, etc. (quantity-dependent)
- Usage independent of the number and experience of the operator(s) (handing over expert skills)

Functionality Pursued as a Medical Device

An easy-to-use robotic neurorehabilitation device that detects and visualizes EMG even from paralyzed hand/fingers so that it can accurately classify the user's motor intention from feeble EMG to assist exercise with no time lag

Clinical Benefits

- Rehabilitation aimed at promoting the recovery of nerve function after injury
- Promotes brain plasticity and neural network reconstruction



Envisioning Future Business Development



Market expansion, downsized device,
development for home and telemedicine,
and overseas expansion

Evidence obtained from certified
devices; applications to other diseases
→ Approval for new (improved)
medical devices

Acquisition of medical device
certification

→ Collection of clinical evidence

Within FY2022



FBO Showcase Portfolio Overview

Takehiko Nomura
Senior Director, Frontier Business Office

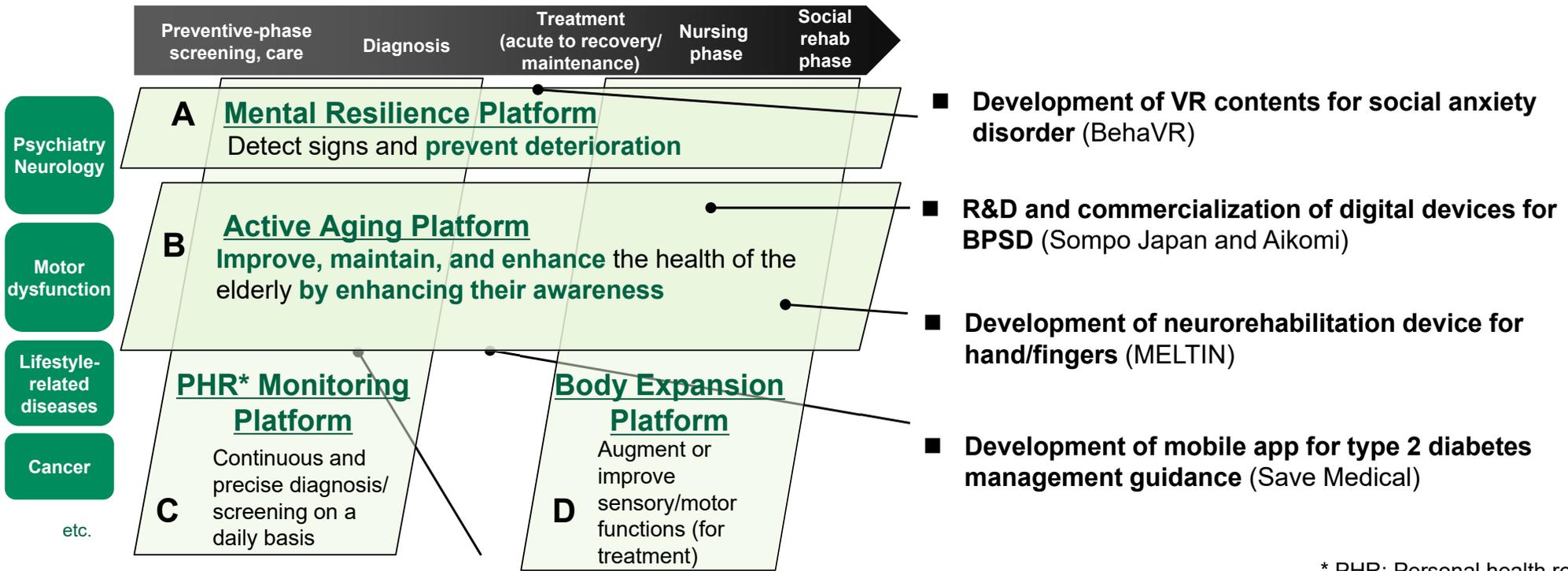




Establishing Growth Engines: The Challenge of Launching New Businesses

Accelerating the Development of Frontier Business

Investing in promising technologies and businesses in each disease area, with the aim of contributing to all stages of the patient’s journey from recognizing the disease to social rehabilitation



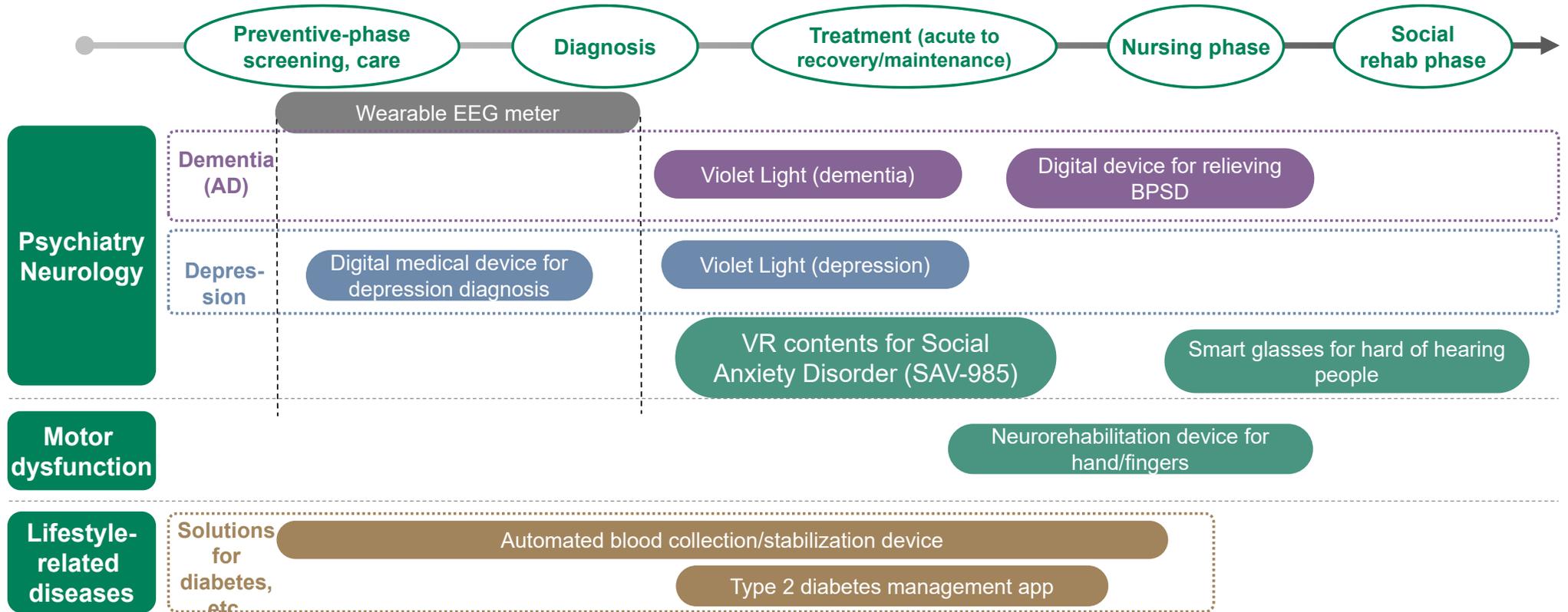
- Psychiatry Neurology
- Motor dysfunction
- Lifestyle-related diseases
- Cancer
- etc.

* PHR: Personal health record

Business Portfolio by Patent Journey



- Through technological innovations such as data analysis and sensory stimulation, we will provide solutions ranging from prevention and early diagnosis to intervention in dementia and depression
- Since medical care and nursing care/social rehabilitation support are integrated in some cases involving CNS disease care (BPSD, etc.), we conduct our business as integrated care
- Plans call for building integrated non-pharmaceutical solutions in Japan that can maximize the value of the diabetes pharmaceutical business



Competitive Landscape



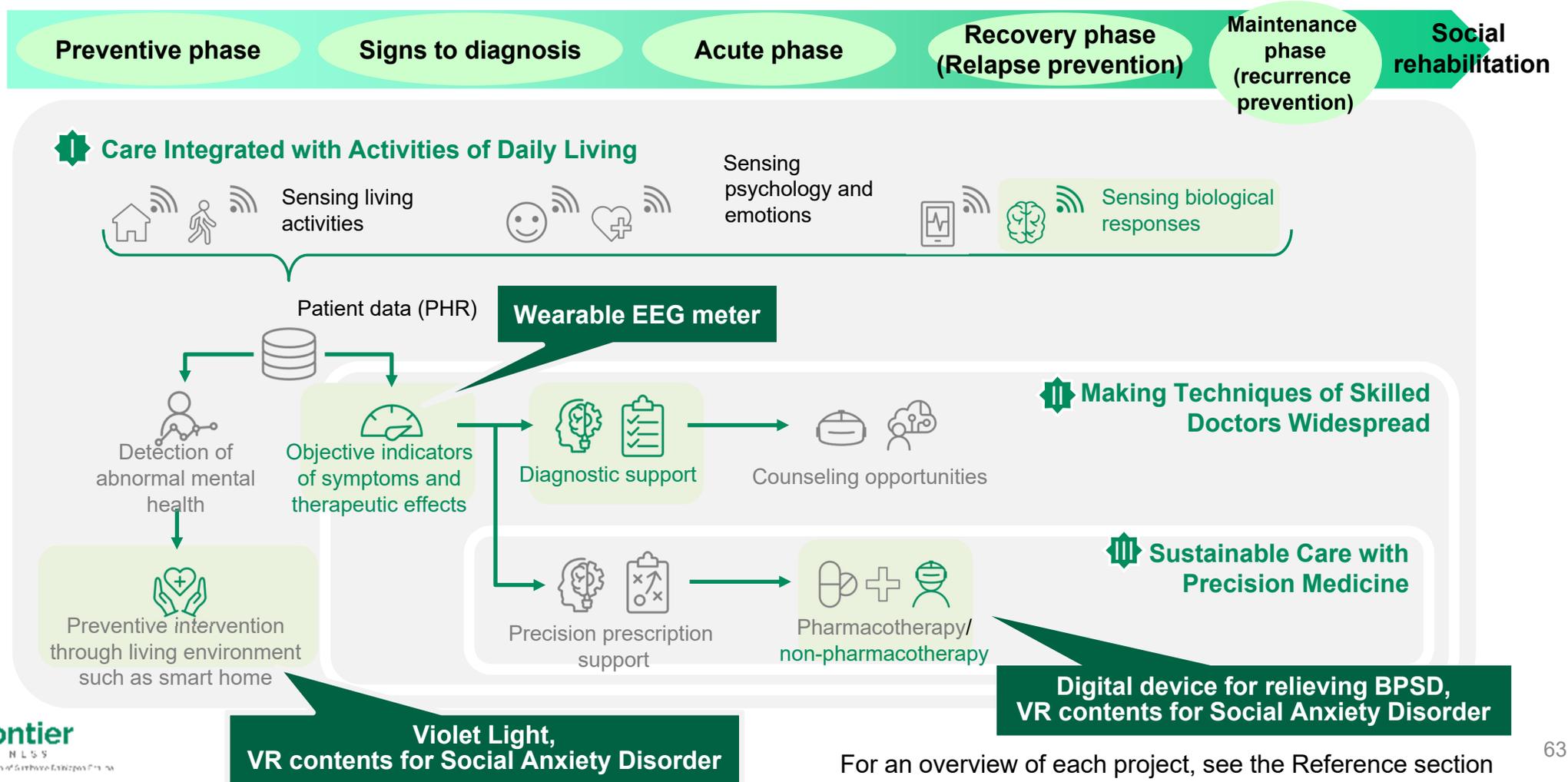
- **Digital device for relieving BPSD (Aikomi)**
 - Dthera Sciences (USA): Discontinued development during clinical trials using reminiscence therapy
 - Not in competition with pharmaceutical BPSD treatment (primarily targeted at improving psychiatric symptoms)
 - Aikomi's target: Anxiety/autistic disorders
 - Aikomi solution (non-pharmacotherapy) + pharmacotherapy can be used in combination
- **VR contents for Social Anxiety Disorder: SAV-985 (BehaVR)**
 - FDA approved drugs indicated for SAD: SSRI/SNRI (symptomatic therapy) only
 - Development of VR solutions for SAD:
 - Psious (Spain): Has already launched VR treatment kit for doctors, which includes content for SAD, GAD, and compression
 - Oxford VR (UK): Has already launched VR program for anxious social avoidance, which is used by patients, as operated by medical professionals
- **Neurorehabilitation device for hand/fingers (MELTIN)**
 - There are several competitive development companies in Japan and overseas pursuing functional recovery and motion assist of upper limbs using EMG and robotic technology
 - MELTIN's competitive advantage
 - Recognizes the shape of the EMG waveform itself and responds to the user's intention with AI (competitors: recognize the amplitude and intensity of the EMG waveform)
 - A wire drive powerfully drives the knuckles, precisely assisting even pinching with the hand/fingers (other companies: motor drive)

System Construction on Mental Resilience Platform



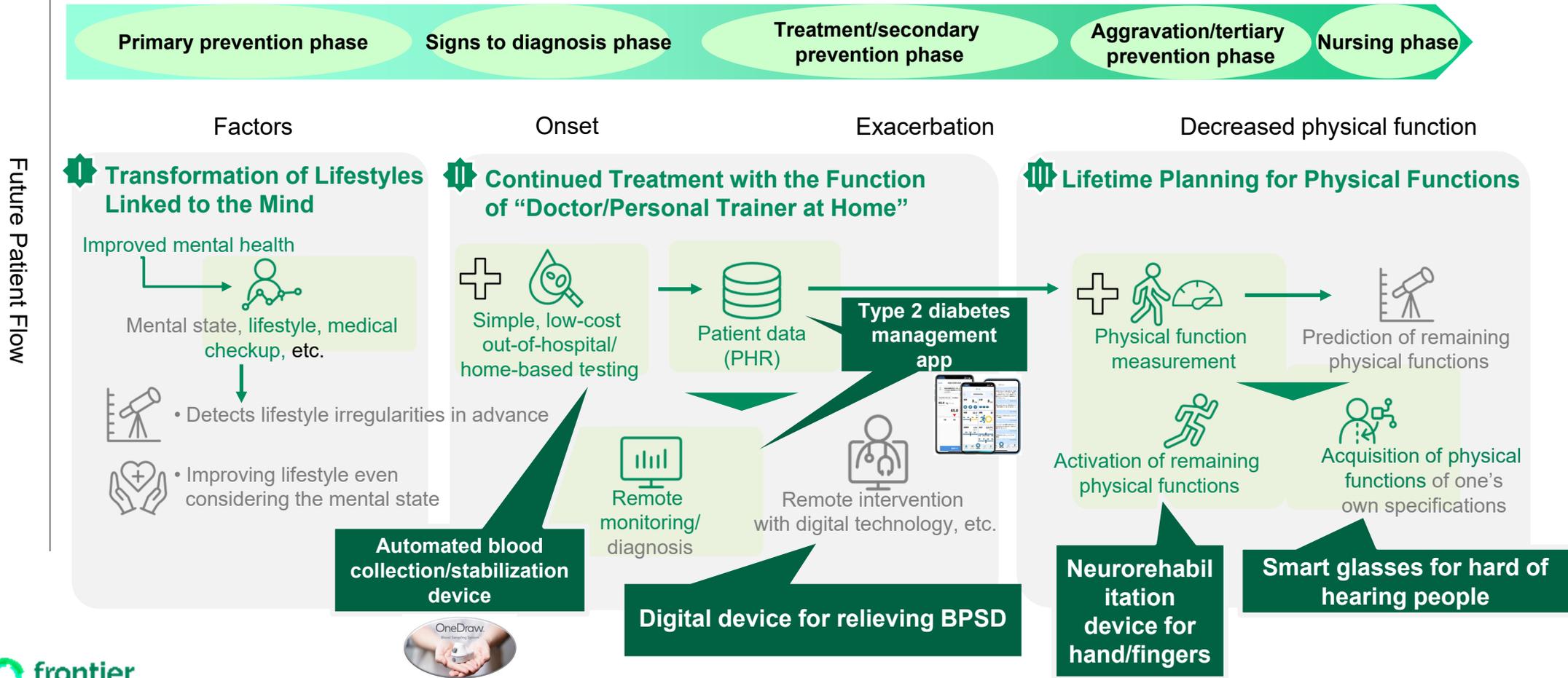
“Making diseases measurable” on a daily basis to achieve sustainable cure/care integrated with pharmaceuticals

Future Patient Flow



System Construction on Active Aging Platform

Provides options for life design and its realization based on the patient's physical function and work/lifestyle to accompany the patient throughout life



Approach to New Business Creation: Investing in Kicker VC



Sumitomo Dainippon Pharma invested in Kicker Ventures I, L.P., a venture capital fund consisting of human resources with extensive experience and a wide network in the digital healthcare business (up to approximately 2.0 billion yen in February 2021). The goal is an integrated implementation of discovery, investment, and development of future pipelines.

In-House Lab: Co-Studio



Masayasu Sawada
CEO, Co-Studio Co., Ltd.

Open Innovation Promotion

- Business development at large companies
 - New business development at Omron Corporation
 - Development of new dementia insurance by Sampo Japan
- Set up 7 digital healthcare/community companies within 1.5 years

VC



Masashi Kiyomine
Managing Partner

Venture Capitalist

- Former Head of Life Sciences, Mitsui Global Investment
- Venture capital investment experience:
 - 13 years of experience in the U.S.
 - Management experience in 11 digital health, medical device, medical service, and drug discovery ventures

Global BD Capabilities

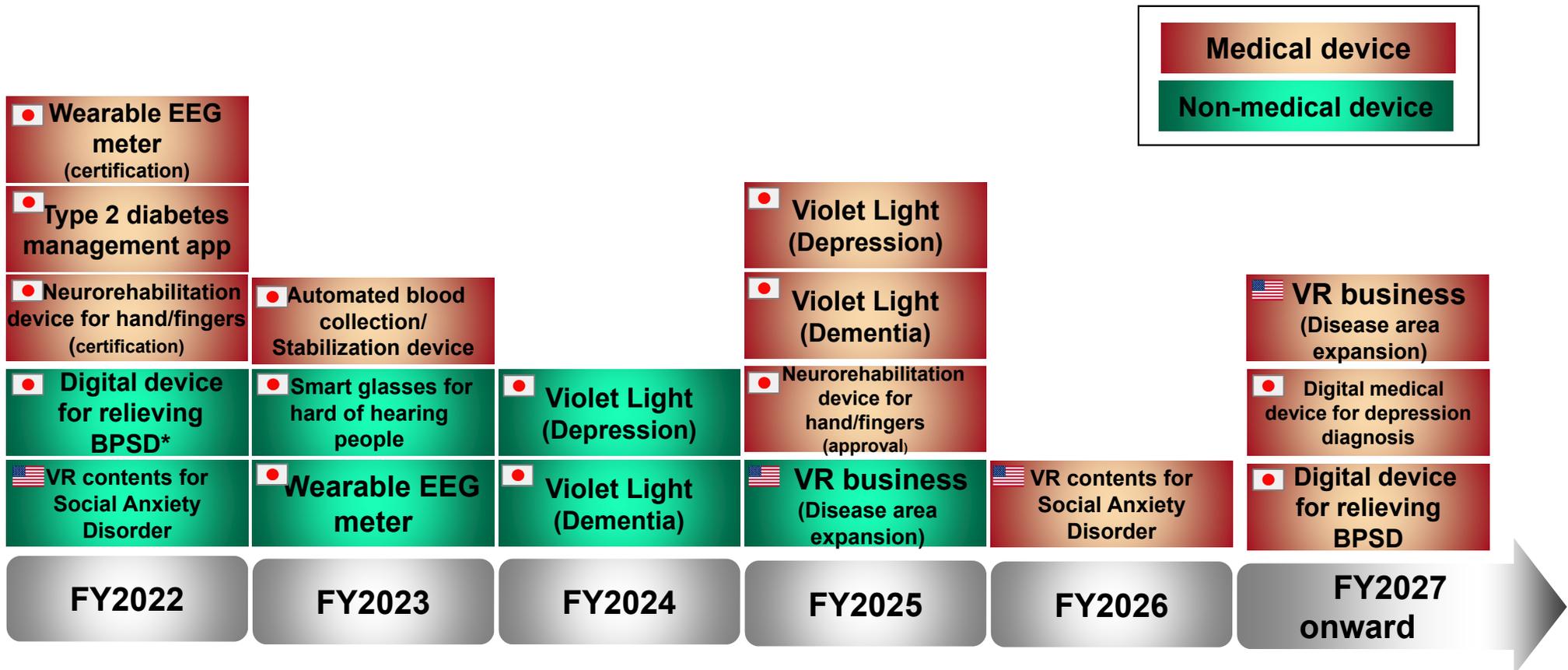


Tomoko Ishikura
Partner

Business Development Professional

- Global experience in developing and investing in medical devices and healthcare businesses
- Extensive cross-cultural partnership experience

Launch Timing of Major Products



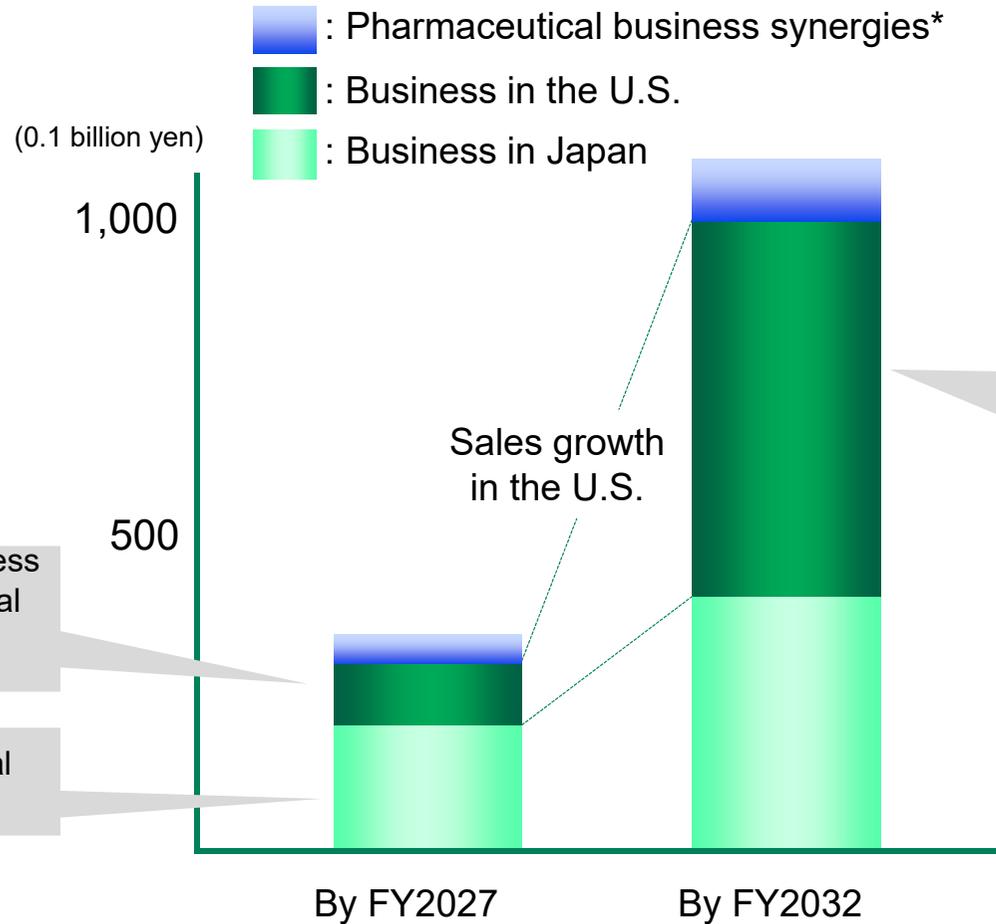
The product launch timing represents the estimated start of each project, and the project description varies with the product (device sales, solution business, royalties, etc.)



* Sales for nursing care applications by Aikomi

For an overview of each project, see the Reference section

Business Potential Based on Frontier Portfolio (Target)



General Wellness business in VR contents for Social Anxiety Disorder and other diseases

Focusing on the mental resilience business

- VR contents for Social Anxiety Disorder and other diseases: Expansion into DTx business
- Platform business
- Expansion of Japanese products into North America

* “Pharmaceutical business synergies” are synergistic contributions made by the launch of Frontier-related products, such as increased sales of pharmaceuticals in the market through the same sales channels and platforms, streamlined R&D processes, and helping maximize product value.

Value Provided by System Construction in Each Business Area



Narratives for Newly Offered Value

1

Improved Mental Health

▶ **“Making diseases measurable” on a daily basis to achieve sustainable cure/care integrated with pharmaceuticals**

2

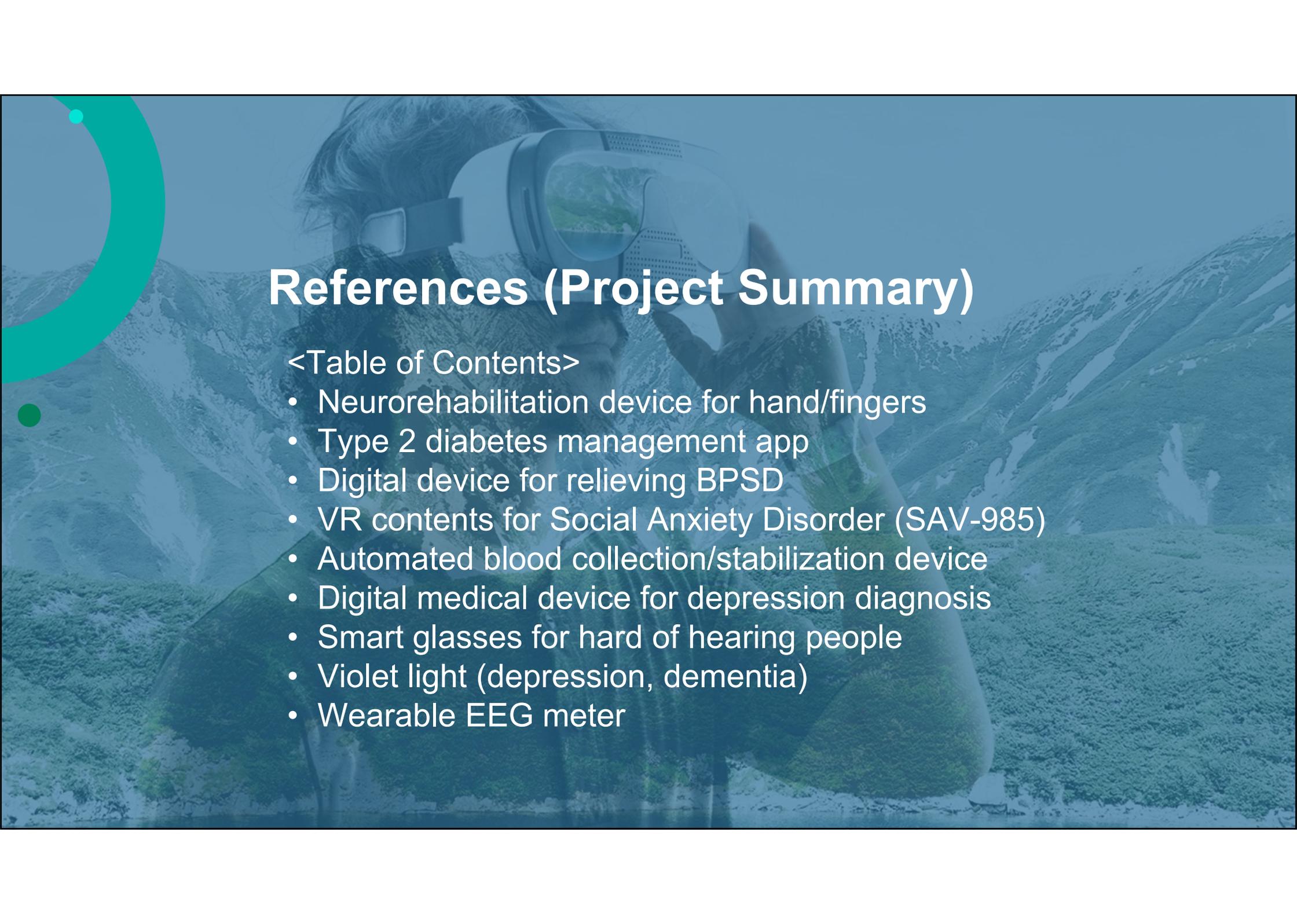
**Active Aging
(Cognitive Function)**

▶ **Predicting early the risk of onset and symptom progression patterns to provide the patient with an environment that helps maintain cognitive functions and assists in daily life**

3

**Active Aging
(Lifestyle/Physical Functions)**

▶ **Provides options for life design and its realization based on the patient’s physical function and work/lifestyle to accompany the patient throughout life**



References (Project Summary)

<Table of Contents>

- Neurorehabilitation device for hand/fingers
- Type 2 diabetes management app
- Digital device for relieving BPSD
- VR contents for Social Anxiety Disorder (SAV-985)
- Automated blood collection/stabilization device
- Digital medical device for depression diagnosis
- Smart glasses for hard of hearing people
- Violet light (depression, dementia)
- Wearable EEG meter

Neurorehabilitation Device for Hand/Fingers



- Target Disease: Post-stroke hand/finger paralysis, etc.
- Partner Company: MELTIN
- Anticipated Product Profile:

Realizing Neurorehabilitation via Bio-signal × Robotics

The robotic neurorehabilitation device is designed to read the patient's motion intention from surface electromyography (EMG) signals and operate the robot attached to the hand/fingers in sync with the intention. By learning the activity of the motor cortex of the brain and the motor sensation of the hand/fingers, we are examining how to demonstrate the function to support the reconstruction of a series of motor mechanisms, with the aim of recovering "functional hand/fingers," even if the device is removed

Technology/Features

An easy-to-use robotic neurorehabilitation device that detects and visualizes EMG even from paralyzed hand/fingers so that it can accurately identify the user's motor intention from feeble EMG to assist exercise with no time lag



- Neurorehabilitation aimed at promoting the recovery of post-injury nerve function
- Promotes brain plasticity and neural network reconstruction



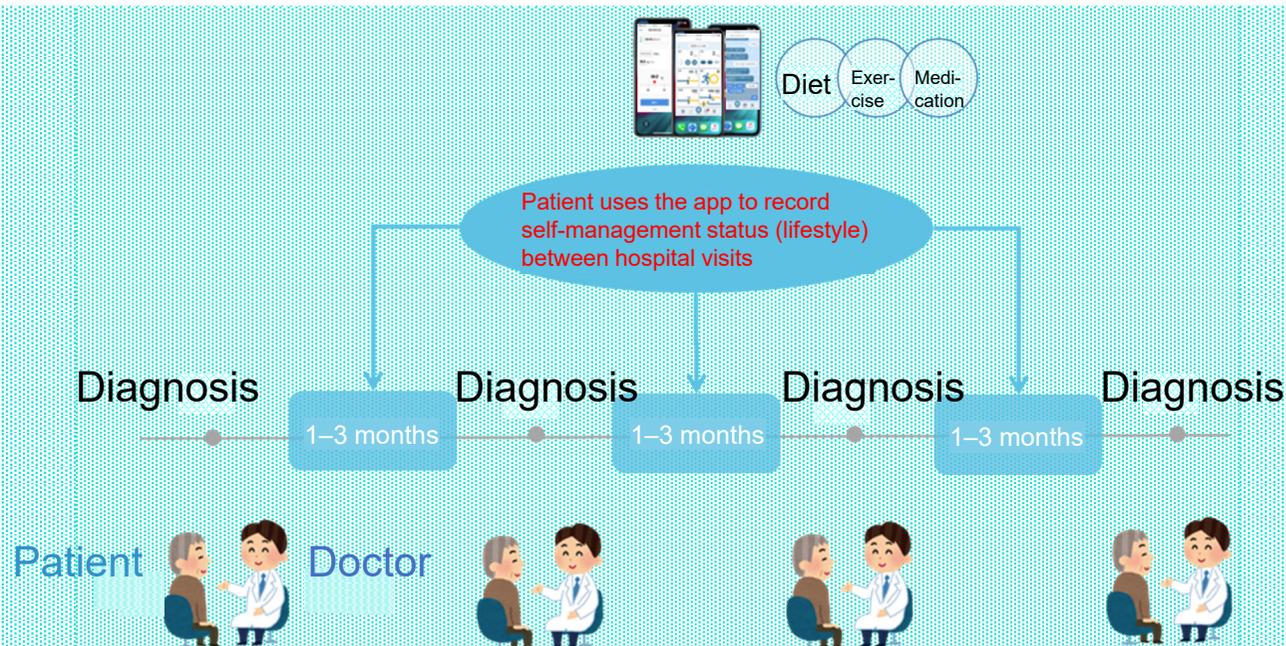
Type 2 Diabetes Management App



- Target Disease: Type 2 diabetes
- Partner Company: Save Medical Co., Ltd.
- Anticipated Product Profile:
 - An app for patients with type 2 diabetes to promote behavioral change in their lifestyle (diet and exercise) and support medications and management of blood glucose/blood pressure levels with real-time guidance. The efficacy of the app is defined by clinical indicators which will be confirmed through clinical studies
 - The app will be prescribed by medical doctors under medical insurance

Features

- Supports patients' blank periods of intervention between hospital visits
- Assists in medical examinations, prevents treatment withdrawal, and amplify treatment effects



Digital Device for Relieving BPSD



- Target Disease: Behavioral and psychological symptoms of dementia* (BPSD)
- Partner Company: Aikomi Ltd.
- Anticipated Product Profile:
 - Improving the QOL of all people involved in dementia care by digital non-pharmacotherapy tailored to the life story background, interests and preferences of people with dementia
 - Reducing the burden of nursing care by strengthening care relationships between people with dementia, their families, and other caregivers through active communication and engagement

Features

- Promote two way communication using two devices (tablets), one for the caregiver and one the person with dementia
- Can be operated remotely in preparation of the “new normal” in the post-COVID-19 era.



For operation by the caregiver



For viewing by the person with dementia

Communication



Face-to-face



Sitting side by side



At a facility

With facility staff



From home afar

Remotely

* Behavioral and psychological symptoms of dementia (BPSD) typically emerge as symptoms such as excitement, apathy, and anxiety. Researchers in the nursing care field have begun using the term “responsive behaviors” in place of peripheral symptoms in their literature as they encourage the caregivers of the patients to look for the meaning behind the patients’ behavior.

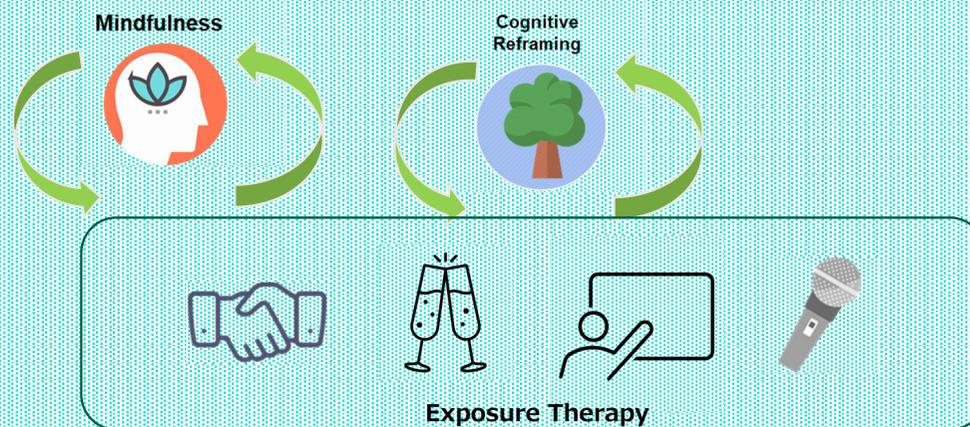
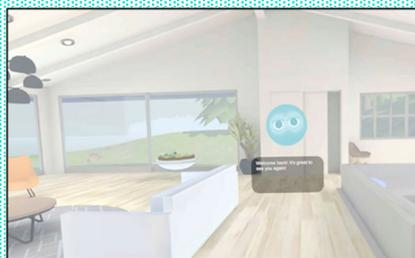
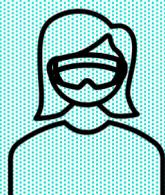
VR Contents for Social Anxiety Disorder: SAV-985



- Target Disease: Social anxiety disorder
- Partner Company: BehaVR, Inc. (Kentucky, USA)
- Anticipated Product Profile:
 - Providing VR content created for cognitive behavioral therapy (CBT) as a tool to complement conventional therapies, including menus equivalent to exposure therapy and menus for cognitive reframing exercises to help the patients switch their perspective to a positive one
 - By using such VR program while staying at home, the patients can learn how to live with social anxiety disorder and resume their social activities such as going out for shopping, eating, and work

Features

- Creating VR content of CBT
- Self-training at home



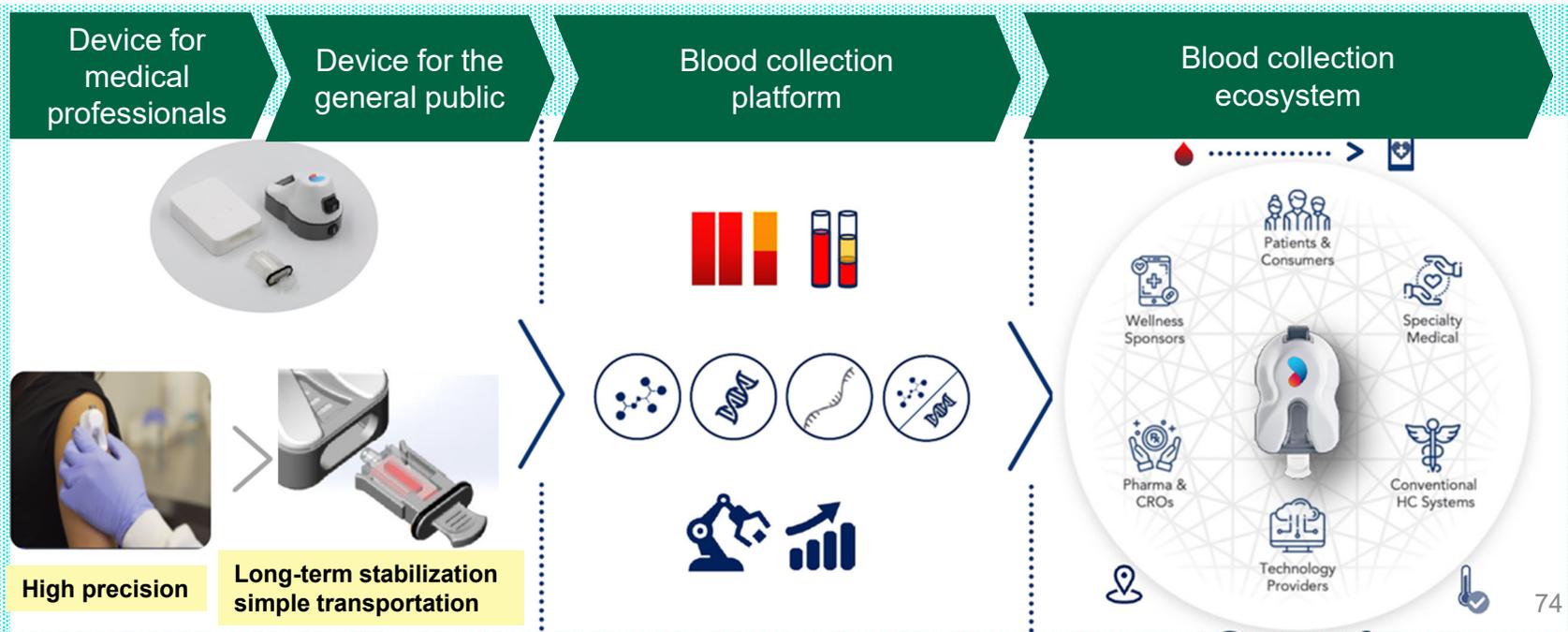
Automated Blood Collection/Stabilization Device



- Target Diseases: Lifestyle-related diseases centered on diabetes and related complications
- Partner Company: Drawbridge Health, Inc. (USA)
- Anticipated Product Profile:
 - Automated blood collection/storage device designed for low pain, long-term storage, and simple transportation (blood collection anytime, anywhere, by anyone)
 - A diagnostic aid and complication monitoring solution for lifestyle-related diseases for the purpose of promoting self-management of these diseases, including diabetes care at home, which is attracting attention in the face of the current pandemic

Features

- The world's only seamless automated blood collection/storage system, proprietary to Drawbridge Health
- Part of a plan to build a "PHR monitoring" ecosystem that links home with clinical settings to realize the collection and analysis of real-world data (RWD) and big data



Digital Medical Device for Depression Diagnosis



- Target Disease: Depression
- Partner Company: i2medical LLC
- Anticipated Product Profile:
 - Enabling objective, quantitative, and simple screening and severity assessment using day-to-day patient data
 - Enabling continuous, out-of-hospital/remote monitoring of the patient condition
 - Standardizing assessments regardless of doctor's specialty or experience

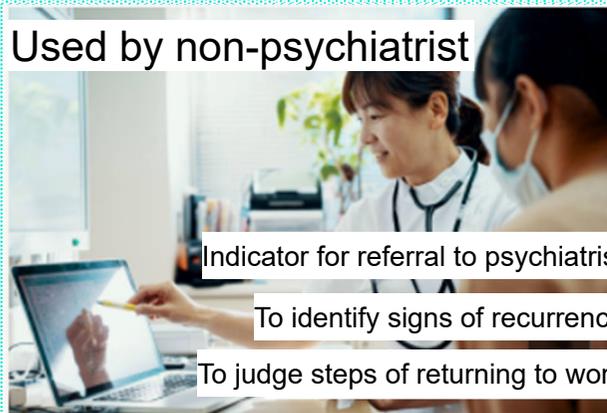
Features

- Facilitates more frequent and detailed clinical assessment than previously possible levels
- Contributes to appropriate treatment interventions for appropriate patients
- Enables early referrals to specialists and early detection of depressive episodes



Activity level Skin temp. Heart rate Sleep

Used by non-psychiatrist



Indicator for referral to psychiatrist

To identify signs of recurrence

To judge steps of returning to work

Used by psychiatrist



Objective indicator for diagnosis

To judge treatment effects

To help determine treatment options

Smart Glasses for Hard of Hearing People



- Target Disease: Communication issues due to hard of hearing
- Partner Company: Pixie Dust Technologies, Inc.
- Anticipated Product Profile:
 - Smart glasses that display the content of speech as subtitles so that the speaker can understand it clearly
 - A glasses-like form for excellent usability with less hassle
 - Solving the communication problems in a one-on-multi-person conversation that is highly challenging for hearing aids

Technology/Features

- As shown in the image on the right, the speech of each speaker is identified and subtitled so that the wearer can visually understand who is saying what
- Pixie Dust Technologies possesses proprietary wave control technology and expertise in user interfaces for people with disabilities



An image of how smart glasses “see” speech

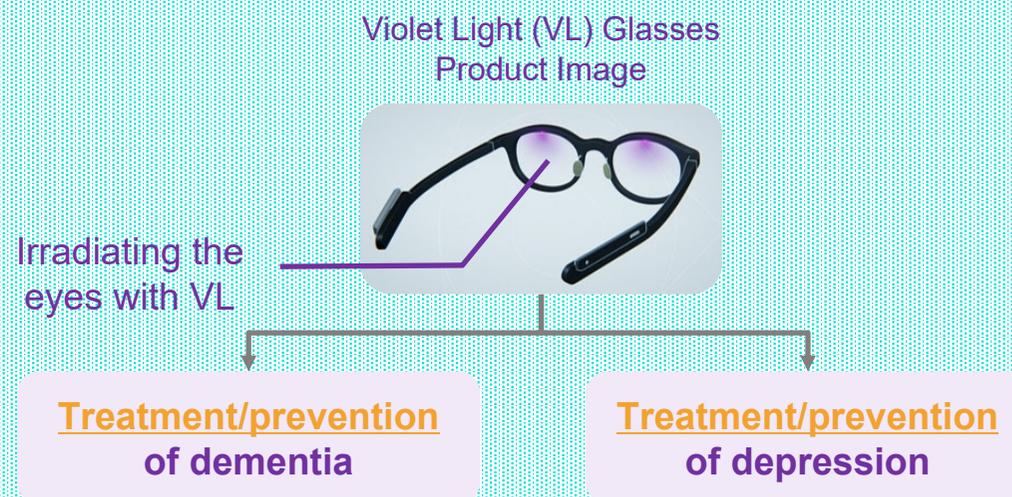
Violet Light (Depression, Dementia)



- Target Diseases: Depression, dementia
- Partner Company: Tsubota Laboratory, Inc.
- Anticipated Product Profile:
 - Neuromodulation technology to treat/prevent dementia and depression by irradiating the eyes with violet light (VL)
 - Treatment/prevention method with high safety and low risk of adverse reactions
 - Excellent usability (worn just as glasses) leading to high adherence

Features

- Since violet light is almost invisible to the human eye, a wearable device in the form of glasses is expected to have excellent usability without causing any discomfort in daily life
- Tsubota Laboratory is a venture company originating from Keio University School of Medicine and possesses proprietary technology and expertise in violet light



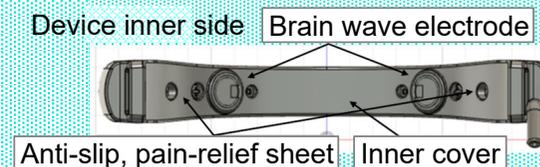
Wearable EEG Meter



- Target Diseases: Neuropsychiatric diseases (details undisclosed)
- Partner Company: NeuroSky Co., Ltd.
- Anticipated Product Profile:
 - Wearable EEG meter that can be used with ease by anybody, anywhere
 - A wide range linking of EEG data is expected, from healthcare to medical care

Features

- Medical device certification is expected as a telemetry EEG meter
- Measurement by a 2-point dry sensor on the forehead
- Enabling EEG measurement at home makes it easier to assess EEG trends, which has previously been difficult





Sumitomo Dainippon
Pharma

Innovation today, healthier tomorrows