DeCaAI

Dementia Care-assist AI system which predicts and prevents BPSD

Dementia Care-assist AI system

What's DeCaAI?

DeCaAI is an abbreviation of "Dementia Care-assist AI system". Development of the system is a 3-year project from 2019 to 2022, financially supported by the Japan Agency for Medical Research and Development (AMED). The project was executed by following institutions: Tokyo Center for Dementia Care Research and Practices as a representative; Senior Dementia Institute as a co-representative; University of Electro-Communications; and so on.

How DeCaAI works?

From medical and nursing care facilities (including home),
① Vital data of the person with dementia (pulse, body movement, etc.)
② Environmental data (room temperature, moisture, illuminance, etc.)
③ The care record entered by the caregivers
  are collected to cloud computer via internet communication link.
Analyzing these data using AI,
1) DeCaAI predicts BPSD＊ 30 min and 60 min in advance
2) DeCaAI notifies BPSD with appropriate preventive care to on-site caregivers.
These prevent the occurrence of BPSD, and reduce severity of it, when it occurs, through notification of appropriate care to caregivers.
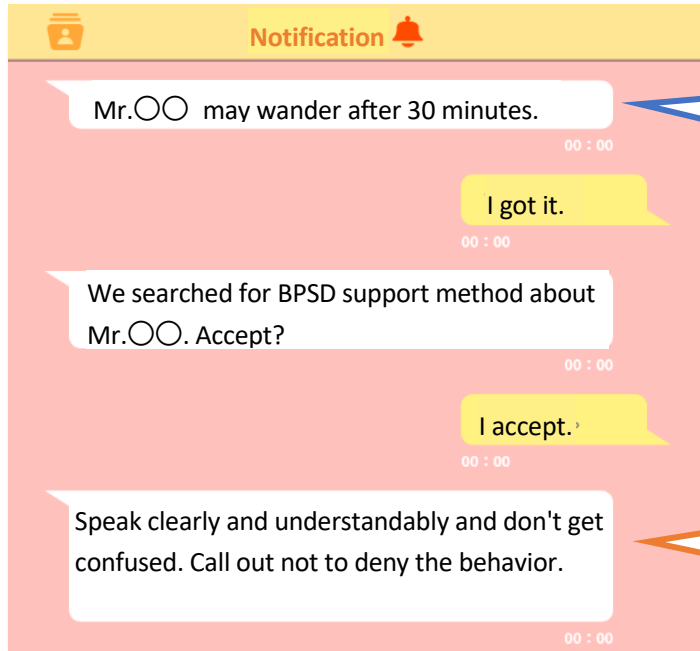
＊ BPSD, which is a medical term, is an abbreviation of "behavioral and psychological symptoms of dementia". This includes irritability, verbal abuse, repetitive behavior, delusions, hallucinations, depression, and anxiety. From the caregiver's point of view, it is a symptom. But BPSD can also be seen as a sign that the person's heart is expressed in their words and actions.
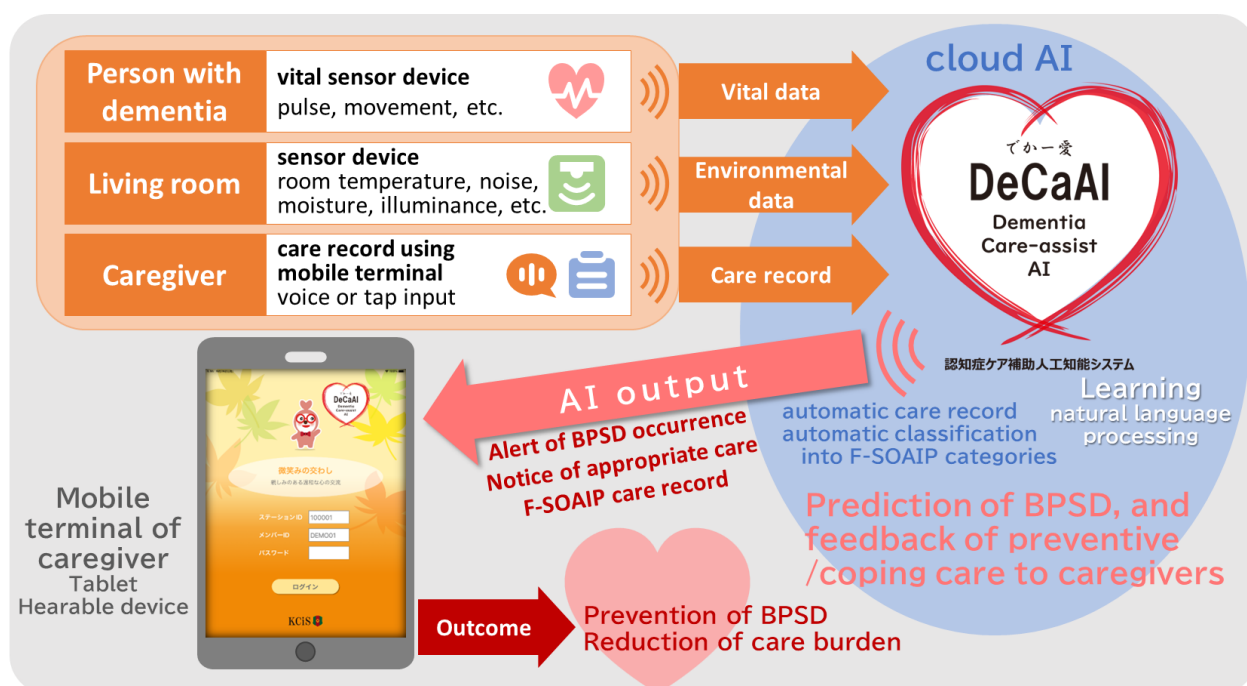
Utilization of DeCaAI ① AI Prediction of BPSD
- Feedback of Preventive Care to Nursing Care Site

Examples of notification on mobile devices (tablets and smartphones)

Notification 🔔

Mr.○○ may wander after 30 minutes.
00 : 00

I got it.
00 : 00

We searched for BPSD support method about Mr.○○. Accept?
00 : 00

I accept.
00 : 00

Speak clearly and understandably and don't get confused. Call out not to deny the behavior.
00 : 00

① **Notify the type and time of BPSD that occurs.**

② **Notify preventive care at the same time.**

After being notified, then provide care

The caregiver inputs the result after doing the preventive care. Thus, AI learns more, and will propose more accurate preventive care next time.

Symptoms

Auditory hallucinations may occur after 30 minutes.

Preventive care

Guess the trigger and remove it.
Let's try to eliminate daily dissatisfaction.

feedback of preventive care

🔘 The sign present, and improved by the care.

⚪ The sign present, but NOT improved by the care.

⚪ The sign present, but NO care is needed.

⚪ The sign NOT present.

⚪ I will deal with it later.

save

③ **Feedback to AI（Yes/No）**
1) **Presence of the sign**
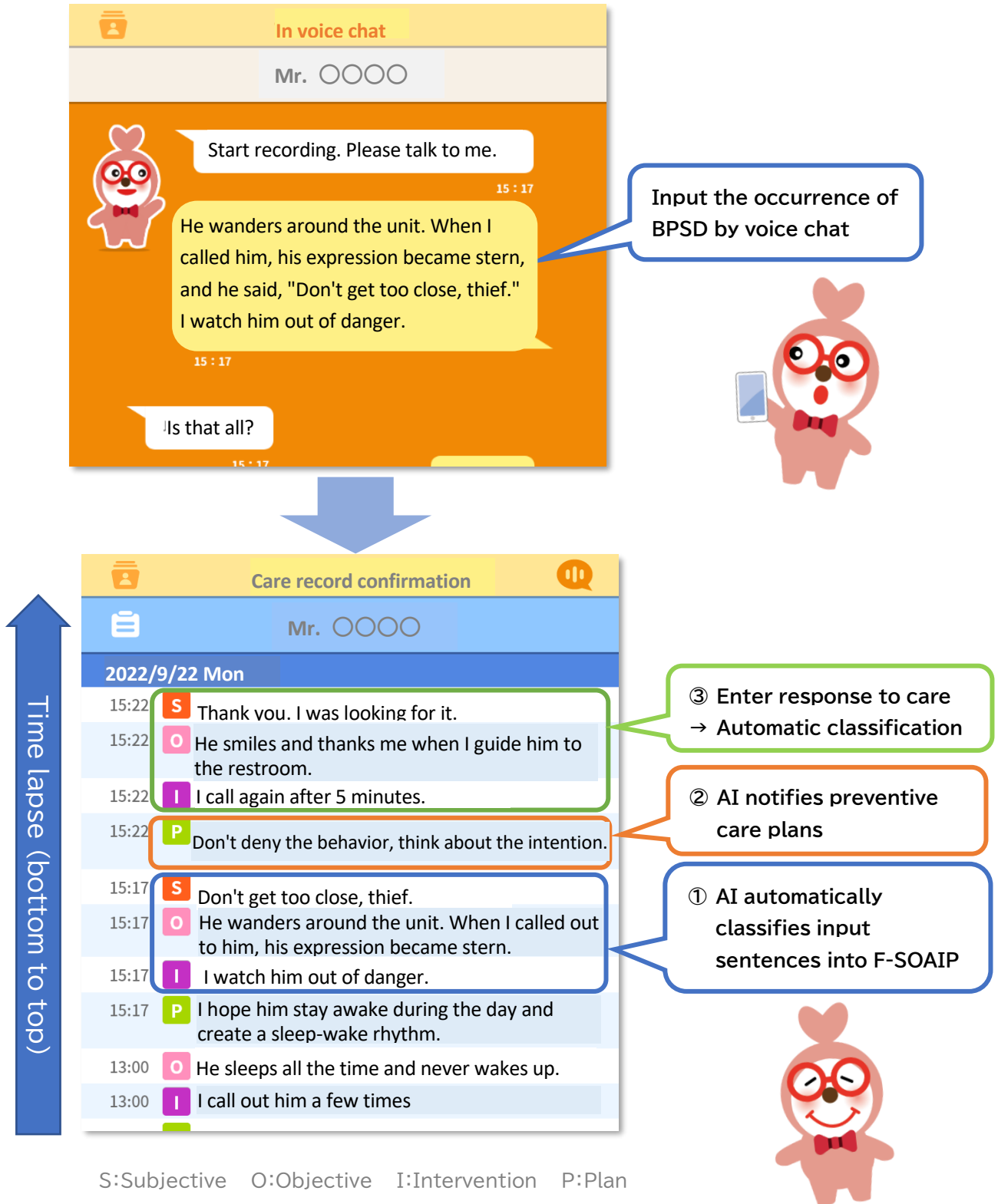2) **Improvement after the care**

Utilization of DeCaAI ② Voice input when BPSD occurs
- Care record with automatic classification of sentences into F-SOAIP

Example of voice input chat screen and record confirmation screen

In voice chat

Mr. ○○○○

Start recording. Please talk to me.
15 : 17

He wanders around the unit. When I called him, his expression became stern, and he said, "Don't get too close, thief." I watch him out of danger.
15 : 17

Is that all?
15 : 17

Input the occurrence of BPSD by voice chat

Care record confirmation

Mr. ○○○○

2022/9/22 Mon

15:22	S	Thank you. I was looking for it.
15:22	O	He smiles and thanks me when I guide him to the restroom.
15:22	I	I call again after 5 minutes.
15:22	P	Don't deny the behavior, think about the intention.
15:17	S	Don't get too close, thief.
15:17	O	He wanders around the unit. When I called out to him, his expression became stern.
15:17	I	I watch him out of danger.
15:17	P	I hope him stay awake during the day and create a sleep-wake rhythm.
13:00	O	He sleeps all the time and never wakes up.
13:00	I	I call out him a few times

Time lapse (bottom to top)

③ Enter response to care → Automatic classification

② AI notifies preventive care plans

① AI automatically classifies input sentences into F-SOAIP

S:Subjective   O:Objective   I:Intervention   P:Plan

DeCaAI — Dementia Care-assist AI system which predicts and prevents BPSD

What is need to the DeCaAI?

＊The current BPSD prediction accuracy is about 80% in favorable conditions. We should further improve the system, so that it gets "good" evaluation form users (caregivers).

＊If the BPSD predictions is too frequent, the preventive care may become a burden on caregivers.

＊Even if BPSD can be prevented by the preventive care, it may be difficult to get a sense of accomplishment, because of no show of the BPSD. There is no way to know whether the DeCaAI's prediction is correct or incorrect.

＊In order to acquire vital data (pulse, body movement, etc.), person with dementia should wear a wristwatch-type sensor device.

＊Appropriate internet link environment (speed and security) should be provided to transmit safely large amounts of data to the cloud computer in real time.

＊Currently, we are discussing with care record software vendors and other companies for social implementation of the DeCaAI in 2023. For that, it is necessary to calculate costs of sensors, tablets, hearable devices, Wi-Fi equipment and system usage fees.

Outline of the AMED research and development project

Project name：Development and implementation of the dementia care AI/IoT service, which reduces care burden by predicting/preventing BPSD. (Grant Number：JP22us042001, 2019～2022)

Team：Tokyo Centre for Dementia Care Research and Practices, Senior Dementia Institute, University of Electro-Communications, Japan Advanced Institute of Science and Technology, Gunma University, International University of Health and Welfare, Saitama Prefectural University, Nihon Fukushi University, National Center for Geriatrics and Gerontology, ASPIC

Cooperating companies: WISEMAN CO., CARECOM CO., NTT DATA CO., etc.

Project Secretariat: Tokyo Center for Dementia Care Research and Practices
1-12-1 Takaido-Nishi, Suginami-ku, Tokyo 168-0071, Japan
Tel: 03-3334-2173, E-mail: tokyo_dcrc@dcnet.gr.jp

Contents are based on data at December, 2022.
This document can be obtained at DCnet, https://dcnet.gr.jp/support/bpsd20-22/