

Eir AI - Introduction

Research on dementia and aging, as well as on diseases causing dementia, primarily Alzheimer's, is an area receiving significant attention. Substantial resources are being invested in developing various methods to diagnose patients. Research in this field encompasses different types of neuroimaging, where AI is now used to analyze images to identify markers and trends across patients. Another crucial area is addressing older people's fear of having dementia or Alzheimer's just because they forget things, which can be part of normal aging. Additionally, significant resources are being invested in developing drugs that can slow down or eventually cure diseases like Alzheimer's.

Studies have shown that cognitive ability improves through various forms of cognitive training, primarily a variant of CBT called CRT. This can include simple activities like socializing or games that stimulate the brain. While it's not yet established how long the effect lasts, it's known that it continues if the cognitive activity is maintained. Experiments with different types of computer games haven't yielded the desired results. That's why social interactions and simple activities like playing bridge work better for those who are truly interested.

If resources are invested in understanding the patient's interests and the "interviewer" is skilled in conducting a good conversation, this treatment can work well. Moreover, patience is required, as patients often repeat the same questions or stories. We believe the problem doesn't lie in the treatment itself, but rather in the lack of sufficient resources to cater to everyone who needs this type of treatment. Each patient requires a person who is well prepared and knowledgeable in the patient's areas of interest, and this doesn't even consider the challenge of patience and repetition.

Our goal is to solve this problem by leveraging new technology to offer **cognitive training in a scalable way** through meaningful and relevant conversations. These conversations follow a path that guides the patient towards one or more goals. Diagnosis can be integrated with treatment, and loneliness can be addressed in a more personalized manner.

We call this the "Meaningful Conversation." It's a conversation that is meaningful, relevant, and stimulating for the patient. It contributes to treating and diagnosing dementia diseases and, in the simplest cases, serves as a remedy for loneliness.

We know how to create the conversation, but until now, there hasn't been a scalable method to make it accessible to thousands, and potentially hundreds of thousands, of patients in countries like Sweden, and many millions globally. This is where new technology comes into play. Several technologies (mainly based on recent AI developments) have now reached a maturity level where they can be combined into a system. This system can deliver the meaningful conversation in a scalable way, based on knowledge from experts and researchers.

At the forefront of technologies enabling this are, as mentioned above, various AI platforms being developed to enable other solutions. These technologies provide the ability to quickly gather information that makes the dialogue relevant and interesting, as well as to decode and generate speech.

Complementary we also have techniques for storing and managing information securely and ethically, where individuals or their relatives can decide what type of information they are willing to store for diagnosis or, for example, share for research. Furthermore, there are now several different ways to conduct conversations, starting with using people as communicators effectively. They can be relatives who are willing to invest the time needed and who can get a tool to steer the conversation in a way that is best for the patient. It can also be a "phone call" where one talks to an "artificial person" (a bot) who never gets tired or irritated, and who can return as often as possible or desirable.

Although we often discuss technology, this business idea is primarily based on solving one of humanity's challenges. Technology is just the tool we use, and AI is the component that provides unmatched efficiency and productivity. The most important thing is what we can achieve for patients and their loved ones. Therefore, we emphasize that the solution also improves the quality of life for relatives and for single individuals who are at higher risk of developing dementia due to less cognitive stimulation.

WHY AND WHY NOW?

Dementia is a growing problem for humanity, with several conditions or diseases contributing to this. So far, researchers haven't found pharmaceutical cures or treatments that are successful. In some cases, we have found medication that can slow down the disease's progression but not cure it.

However, diagnostics have taken significant strides forward in recent years, and we will see more effective ways to diagnose patients in the coming years. We know that cognitive therapy works and yields results. We also know how it should be implemented, although there is potential to personalize it more.

One such potential is to make the treatment more persistent and continuous. Moreover, there is an untapped resource in all the relatives who can and want to help many patients. But there are also patients who completely lack this resource.

The problem is more about lacking an effective solution to make cognitive therapy scalable and accessible to everyone without the cost becoming insurmountable. A good example is that dementia specialists are usually needed to perform cognitive training. These specialists are limited in number and don't have time to devote solely to this. This is mainly because this treatment requires a lot of time and should be performed frequently and repetitively, making the method costly, when using traditional manual approaches.

Loneliness contributes to the problem itself. It's known that loneliness increases the risk of dementia and exacerbates the effects if one develops the disease. Of course, loneliness also affects the quality of life for many in our society today. Research suggests that loneliness is increasing, although we don't fully understand the causes and don't have enough solutions. Loneliness is often not planned. A sudden loss of a life partner is a common cause, which suddenly increases the risk of both depression and dementia.

In summary and as an example, there are 150,000 people in a small country like Sweden diagnosed with some form of dementia, and 25,000 new diagnoses are made annually. There is no reason to assume that this distribution would not be proportional to the population size in other countries.

When also considering that 35% of older people (2.6 million people are over 60 years old in Sweden) live alone, and that this number is increasing, it becomes clear that both loneliness and the subsequent depression affect the development of dementia.

Therefore, we believe that our goal should not be limited to just treating dementia but also be able to help with loneliness and depression as these increase the risk. Moreover, it is desirable that we contribute to improving quality of life.

Although improved quality of life is an important goal, we can also directly impact the cost of today's dementia care. We are convinced that we can contribute to better care while lowering costs. Better care at a lower cost may not be something normally associated with today's healthcare debate, but we believe it is entirely possible. In the first step of our business plan, we will substantiate this with expert information and detailed calculations, tailored for each stakeholder.

THE SOLUTION

The core of our solution is to create what we call "the Meaningful Conversation". This is a conversation that is relevant and meaningful for the patient, caregiver, and next-of-kin. The conversation aims to help with diagnosis, slow down and contribute to "healing" by creating a better quality of life.

We are developing two solutions: LifeRecorder and the full solution (currently unnamed). LifeRecorder will guide a conversation and provide tips and advice on questions and topics that will keep the conversation interesting and relevant. It will also transcribe the conversation and format it into a document. The summary will be compiled in two formats, a timeline and interesting stories. Several conversations can be concatenated, and several people can perform the conversations. The full solution will add more functionality targeted towards slowing down dementia, relying on expertise from researchers and health professionals.

We see great value in the information that is collected, sorted, and made usable through AI. We believe that the information is very valuable for training AI, if it is handled ethically and meets privacy requirements. By steering the conversation, we ensure that we can train the

brain's cognitive properties in a positive and constructive way. This helps to slow down the disease's progression and gives relatives confidence and comfort.

The term "Meaningful" implies that the conversation should be interesting, relevant, stimulating, and lively for the patient. It should inspire more interaction and more vibrant dialogues. This is achieved by utilizing AI as an assistant that can retrieve information from external data sources (content from social media, databases, historical documents, film material, music, images, etc.) to the conversation in real-time. This frees the person conducting the dialogue from having to be an expert on the patient's areas of interest.

When we have a conceptual understanding of the meaningful conversation, we can use technology and AI to create an individually tailored conversation for each patient. Through a simple mapping of interests and history, we can start the conversation and ask relevant and inspiring questions that activate the patient. This method can also function as a companion that alleviates loneliness.

The collected information has value in several dimensions, not just for care and diagnosis, but also as a layer of historical information. Each person has a story that deserves to be told and preserved for the future. This information can be interesting for the family, historians, or social anthropologists. However, it's important that the information is handled ethically and securely, and that each individual has control over how their information is stored and used.

As founders, we believe that our solution must deliver high value for both patients and relatives, promote research to create better treatments, and ultimately contribute to a profound value for our society and humanity.

THE FOUNDERS

As founders, we share a passion for contributing to solving the challenge of dementia for everyone involved, from patients to society. This is based on our own experiences with dementia in family and friends, but also on an insight into how we can use technological development to solve practical problems that were previously beyond the realm of possibility.

We understand that we are the first members of a larger team and that we need complementary skills. It should be a young, gender-equal team that can develop this initiative

over several decades. Therefore, we plan to find one or two co-founders as well as identify a management team that handle the operational part when the company starts scaling. We are convinced that this initiative is both a challenge and an opportunity that will attract really good people. It's also worth noting that we intend to share the ownership in the company, as it will contribute powerfully to individuals' motivation and thus increase the likelihood of the company's success.

PER EDSTRÖM

Per is an experienced serial entrepreneur with a background in both the software industry and DeepTech. He has been the founder and CEO of several startups, as well as companies in expansion phase. With over 30 years of experience as CEO of various companies in Sweden, Europe, and the USA, Per has a very relevant background. He has also started and run companies in the US with US investors and lived there for over ten years. Per has a broad network within the technology sector, both among companies and investors. His contribution is primarily commercial focus, technological insight, experience in capital raising, and a documented success in recruiting key personnel and creating high-performing teams.

ANDERS BYLUND

Anders is an expert in communication, sustainability, and leadership with extensive international experience in the field. His background includes politics, leading positions in business, philanthropic activities, and teaching communication theory at Berghs School of Communication. He has worked with innovative digital communication solutions since the 1980s and has been chairman of The European Network of Enterprise Foundations in Brussels. For ten years, he has been ranked as one of the 100 most influential globally in corporate communication.

Anders comes most recently from a role as Head of Communications and Sustainability for Interogo Holding AG and Interogo Foundation, one of the owner foundations within the IKEA ecosystem.

Both founders contribute an extensive and complementary (they have not worked together before) network, and it may be worth mentioning that they have been close friends since high school.

CONNECTIONS TO MEDICINE, RESEARCH, AND ACADEMIA

We have identified a dozen international researchers who work on and have published about dementia and cognitive treatment through various forms of dialogue, conversation, or communication. Our plan is to contact them to explore possibilities for collaboration, and this work has already begun. Additionally, we have contact with several researchers in Sweden, the Nordic countries, and Europe, to whom we have direct recommendations from our network. We are convinced that these contacts will enrich our knowledge and help us improve our solution in more practical steps. This will occur during the company's first phase.

BRIEF ON TECHNOLOGY

There are several technologies that have now reached a maturity level where they can be combined into a solution to the challenge of dementia. Many of them are based on, or variants of, what is colloquially called AI. Generative AI (as we see in ChatGPT from OpenAI, Gemini from Google, Claude from Anthropic, or most recently Llama3 from Meta) is one of the cornerstones. These platforms will make it possible to retrieve information from other sources or use knowledge already available in these large language models. They can be supplemented with lookups in available data sources, which can either be open or commercially available. Two examples that we believe are relevant are address and geographic information from open sources, or information from genealogy solutions (for example, Ancestry.com or MyHeritage, which are strong on Scandinavian data) that are commercially available.

Other related technologies are "Conversational AI," a special AI trained to create a conversation that resembles that between two humans. Here we have talked to several companies, including Swedish Furhat, which is a spin-off from KTH. In general, who have technologies for generating and interpreting speech will be important, as well as general technology for creating different types of bots. Speech-to-text and vice versa is also a mature technology available today. To drive a conversation, we will use a technique called "state machines." It is a proven technique for driving a process forward and taking it back to a predetermined goal if it deviates, something that generative AI typically doesn't do.

On another track, we have researched technology around secure storage, anonymization, privacy, and compliance with regulations such as GDPR. Today, there are several mature solutions to choose from. Connection and integration between these solutions can be solved with the competent integration platforms that have grown based on a need to connect more and more systems over the past decades.

In conclusion, we believe that the major building blocks exist, but that it is then an extensive work to connect them and get them to work together. However, we will focus our innovation work on developing the Meaningful Conversation as an aid against dementia.

HOW IT LOOKS IN PRACTICE

Conceptually, the solution involves a conversation being driven either by a person with support, or entirely by some type of "bot." The direction of the conversation is guided by short-term and long-term goals. In the early stages, it may involve diagnostics, later focusing more on training cognitive ability, and sometimes just being interesting company. The patient is engaged in a meaningful conversation that feels interesting and exciting, and which encourages the use of cognitive abilities, whether it's about remembering things or thinking out answers and solutions or getting support and stimulation to do things.

Information is added to the conversation partly from the process that guides towards a goal, but also in real-time from new sources. This information can be completely unforeseen and doesn't require preparation because Generative AI can retrieve information on a very broad basis. An example could be that during the conversation, you find out what hobby the patient has and can immediately ask informed questions about the subject that can stimulate a passionate dialogue.

The patient's answers, along with questions and comments from the "interviewer," are coded and saved in a format that can be used later. Before they are permanently stored, there is a function where the patient (or their guardian) can decide what level of privacy they want to set on the information and how it can be used. Privacy can, for example, mean that the information is anonymized so that you can't see where it comes from. Usage can be limited to only diagnosis and treatment of the patient or made available for broader research. It's

important that the patient or their representative feels completely secure in making these choices in the way they think is best for them.

A dialogue could look like this after introductions:

"Hello, can you tell me where you grew up?"

"I grew up in a small community north of Umeå called Bygdeå"

"Tell me more about Bygdeå!"

"Bygdeå was a fantastic place. In the summers..."

"Did you possibly know Martin Edström?"

*** (this is based on a response from generative AI and lookups in Ancestry.com. Input is the patient's age and name, and you can see that they were in the same class. The question is made more open to create a response) ***

"Yes, we were actually in the same class! He later became a priest in the church and my sister was married by him. It was in Bygdeå, where I grew up. He was a fantastic man who..."

*** (System detects the repetition and how often it occurs as an indicator of dementia.) ***

"Here's a picture of Bygdeå church with its stately bell tower. Is that where your sister got married?"

"Yes it was, and I was confirmed there. I think it was built as early as the 16th century."

"Yes, that's correct, it was built in 1539 by Storbäcken and is one of Northern Sweden's oldest stone churches. But the bell tower isn't that old, is it?"

"It's from the early 19th century if I remember correctly."

"Yes, you remember correctly, the bell tower is from 1818." And so on...

For a patient with a great interest in, for example, gardening, vintage cars, or jazz, the conversation is built around these subjects, although it naturally follows the patient when they want to talk about something else.

An important part of the solution is that the conversation can be conducted in different ways and by several different "communicators." In the simplest case, it can be a person who, with the help of a digital aid (for example, a tablet), gets support to drive the communication. This person gets help to stay on topic and gets support with information that makes the dialogue more interesting for the patient. The communicator is free to use their own words and can sometimes "digress," but the tool provides support to come back to the topic. The conversation is recorded and stored automatically.

The main advantage here is that the person conducting the conversation doesn't need to be an expert on dementia, may not even need to be a healthcare professional, and doesn't need to be an expert on the subject the patient wants to talk about. It's entirely possible for capable relatives to conduct the conversation with maintained value.

The conversation can also be conducted by an "avatar" on a screen or a "bot" with a physical face. The conversation can be initiated by a human but then taken over by the "bot". The person can then leave to start or end other conversations that are happening in parallel.

Another option is for the conversation to take the form of a phone call where the patient is called, and a "bot" conducts the entire conversation. Here, there's an opportunity to talk often but briefly if the patient gets tired, or to call the patient at a certain time, alternatively for the patient to call when it suits them. What's most important here is that the format is flexible and suits the patient. For many, a person will be best, but there are already indications today that some prefer to talk to a "bot", as they can let go of the social context and be a bit more themselves.

PLAN

The first phase started during the end of 2024 and extends to the beginning of this year. We have conducted basic analysis, identified relevant research, and designed our MVP solution. The MVP will have a limited scope of the intended functionality but will serve as a testbed for,

among other things, the transcribing and collection of information. We will also visualize the vision by creating simple "mock-ups" or videos.

We are creating business plan, which includes a detailed plan, budget, and an assessment of health, societal, and economic impact. We will also validate our business model, identify partners, and establish collaborations. Researchers and relevant health experts will be brought on board to ensure a stable foundation for research and development.

We will identify profiles for a fully operational team and recruit the first key personnel. The initial funding should cover this phase. The goal is to have the company operational with a functioning MVP during 2025 and soon after conducting the first trial installations. We already have several stakeholders who have shown interest in participating in this phase.

Based on this, the next capital raising is done, aiming for the company to generate relevant revenues in the first market (Sweden or the Nordic countries). The goal is for the operation to quickly become revenue generating, but expansion to more geographical areas will require additional capital. This phase extends to 2026, when we are ready to expand outside the Nordic region.

COMPANY STRUCTURE AND OWNERSHIP

The founders are convinced that a joint venture between research, social entrepreneurship, and philanthropy under the umbrella of a commercial company has a unique potential to make a profound difference for dementia patients, relatives, and society.

We have chosen the form of a commercial company, not to maximize profit, but because it is the most proven model for innovations and resource efficiency, as well as for transforming science into a working solution.

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