

Data Science and Artificial Intelligence Technology developed for Alzheimer's-Dementia Patients and Elderly People to live more comfortably

As we know, the global population continues to increase at a great pace, as the elderly population and Alzheimer's and Dementia diseases are increasing day by day in parallel accordingly. According to the 2023 World Social Report prepared by the United Nations with the slogan "Leaving No One Behind in an Aging World"; the proportion of the elderly in the world population is expected to more than double from 761 million in 2021 to 1.6 billion by 2050. According to these forecasts, by 2050, the incidence of Alzheimer's disease is expected to increase from 47 million in 2020 to 76 million in 2030 and 135.5 million in 2050. The incidence rate of these diseases is inversely correlated with the development of countries. The relationship between the rate of increase is faster in countries with higher levels of development and prosperity. However, today's technological advances have had a positive impact on making the lives of people suffering from such diseases easier. Despite the results achieved by using AI technologies to help Alzheimer's-Dementia patients and/or the elderly population and making their lives easier and more comfortable, there are facing various long-term challenges driven by megatrends such as demographic shifts, increasing security threats, technological advancements. To overcome these challenges and accelerate transformation, AI and Data Science, Technology and Innovation (STI) play a crucial role. However, limited funding, brain drain, inadequate infrastructure, weak intellectual property protection and poor inclusiveness hinder progress and investment in STI for transition. Private sector initiatives have demonstrated successful examples and the potential to lead in this field. There is a consensus around the world on the economic and environmental benefits of developing and utilizing Artificial Intelligence - Human - Machine Hybrid Environment for a sustainable future. To unlock this potential, it is essential to invest more financial resources and create the right policy framework, fostering collaboration between governments, businesses and civil society.

Keywords: *AI, Data Science, Alzheimer's and Dementia patients, seniors, comfortable living.*

Introduction

Science, Technology and Innovation (STI) Accelerating Transformation and technological support is essential to improve the quality of life and comfort of Alzheimer's and dementia patients and the elderly, and to increase their ability to move on their own. So improving the quality of life and comfort of people with Alzheimer's and Dementia through Science, Technology and Innovation (STI) Transformation Acceleration.

According to the German Alzheimer's Patients Association, roughly two-thirds of the estimated 1.8 million people diagnosed with some form of dementia in Germany have Alzheimer's, the most common form. In medicine, "dementia" is

defined as a condition in which more and more nerve cells and connections between nerve cells are destroyed (Iris Blotenberg, 2023)

Often changes occur in behavior and motivation. Dementia can have many causes. The most common cause of dementia is Alzheimer's disease. About 60% of dementias are caused by Alzheimer's disease. Because of this, memory, thinking, navigation and language abilities are increasingly negatively affected.

Alzheimer's and Dementia patients face several long-term challenges driven by megatrends such as demographic growth, evolving security threats and technological development. To overcome these challenges and accelerate Transformation, Science, Technology and Innovation (STI) plays a crucial role. However, limited funding, brain drain, inadequate infrastructure, weak intellectual property protection and poor inclusiveness hinder progress and investment in STI for Transition.

However, successful examples of private sector initiatives show the potential to be leaders. There is a consensus on the economic and environmental benefits of developing and utilizing Artificial Intelligence-Human-Machine Hybrid Environment for a sustainable future on Earth. To unlock this potential, it is essential to invest more financial resources and create the right policy framework, fostering collaboration between governments, businesses and civil society.

Europe and the whole world are partners in the development of an inclusive growth model. Research and innovation, green technologies, capacity building, entrepreneurship and policy dialogue can be promoted to help Alzheimer's and Dementia patients achieve sustainable development in their lives. To control patients' data, progress, aggregate and database their patients' data, and enable them to share the information to the world health organization. It is also vital to find innovative solutions in various sectors.

The coming decades are critical for their countries to increase access to knowledge and foster innovation in these important sectors. Collaboration between industry, academia and governments is essential to create a vibrant science. The EU and the European Union are developing an Innovation Agenda that aims to increase the innovative capacity of researchers and innovators to support sustainable growth and jobs. The EU Program on Scientific and Technological Support for Transition provides a unique opportunity to increase the capacity for Artificial Intelligence - Human-Machine Hybrid Environment in transition sectors.

To achieve this, effective coordination between stakeholders and existing initiatives is crucial. Butur TA projects will leverage existing platforms and partnerships to support Europe's transformation agenda by ensuring coherence and complementarity across sectors and programs. The TA aims to enhance cross-sectoral and cross-regional coordination and the strategic orientation of Regional Centers of Excellence addressing transitional challenges.

Literature Review

With the increase in the aging population worldwide, Alzheimer's disease has become a rapidly increasing public health concern. Monitoring the dementia

disease burden will support health development strategies by providing scientific data.

The 2021 report by Alzheimer's Disease International (AZI) estimates that 75 percent of patients with dementia worldwide remain undiagnosed. It is also predicted that 135.5 million people will have Alzheimer's disease in 2050 (2021 Alzheimer's disease facts and figures, 2021)

More than 55 million people worldwide currently have dementia, more than 60% of whom live in low- and middle-income countries. Every year, there are about 10 million new cases.

Globally, the incidence (147.95%), prevalence (160.84%) and number of deaths (189.29%) due to dementia increased significantly over the study period (GBD 2019 Dementia Forecasting Collaborators, 2022). Globally, the incidence is estimated to be 135.5 million in 2050 (Iris Blotenberg, 2023).

Among developed countries, Japan has the lowest prevalence of both dementia in general and Alzheimer's disease in particular.

About one-third of all people aged 85 and over may have Alzheimer's disease. Scientists are learning how age-related changes in the brain can damage neurons and affect other brain cells to contribute to Alzheimer's damage.

Dementia is an age-related disease and its prevalence has increased significantly across the globe with increasing life expectancy. The incidence, prevalence, mortality and DALYs of dementia increase with age (Global, regional, and national burden of Alzheimer's disease and other dementias, 1990–2019, 2022). Moreover, the most significant increase in incidence, prevalence, mortality and DALYs over time was observed in the 70+ age group. However, due to shorter life spans, people over 90 years of age do not lose as many life years to premature death and disability. During this period, global DALYs increased by 161.7 and ASR by 3.65%. The Alzheimer's Disease World Report 2010 stated that the social cost of dementia is as high as tumors, heart disease and stroke (Wimo & Prince, 2010). According to the World Health Organization (WHO), dementia has become the seventh leading cause of death worldwide (Alzheimer's Association, 2024). Overall, the global burden of dementia has increased over time and this trend will continue in the future with an ageing population.

So far, no effective treatment has been found to definitively reverse dementia and drug therapy has significant limitations (Global, regional, and national burden of Alzheimer's disease and other dementias, 1990–2019). An effective strategy is to address relative risk factors to prevent the condition from developing. Studies have shown that the incidence of metabolic diseases (high systolic blood pressure, high BMI and diabetes) increases significantly with increasing levels of nutrition and quality of life (Institute for Health Metrics and Evaluation, 2022). The rapid development of the social economy has intensified the social competition and life pressure that people experience, which is often accompanied by harmful life habits (smoking, excessive alcohol consumption and lack of physical activity). Our data show that regions with high ESD are more affected by these risk factors than regions with low ESD. In other words, high-income countries and regions have a higher risk of obesity, social stress and lack of physical activity and therefore a higher risk of dementia. There has also been a decrease in the incidence of

dementia in some European countries. This may be due to effective interventions targeting cardiovascular, metabolic, cognitive, behavioral and other factors related to dementia in recent years (Global, regional, and national burden of Alzheimer's disease and other dementias, 1990–2019). In 2019, the WHO established a dementia risk reduction panel, highlighting interventions that can help reduce the incidence of dementia (Institute for Health Metrics and Evaluation, 2022). Relevant departments should improve medical services for people with dementia as soon as possible and raise public awareness. Early screening for risk factors and early diagnosis and treatment of associated diseases should be implemented. The government should integrate various resources and facilities in the region to promote the improvement of the elderly care service system and the elderly health system.

With the spread of COVID-19 over the past 3 years, some studies have revealed an increased risk of Alzheimer's disease in COVID-19 patients (Global, regional, and national burden of Alzheimer's disease and other dementias, 1990–2019). Studies have shown that patients with severe SARS-CoV-2 infection exhibit cognitive decline and may eventually develop AD. This may be due to direct viral involvement of the central nervous system and prolonged pro-inflammatory accumulation.

Cytokines that induce or accelerate the neurodegenerative process; patients are at higher risk of subsequently developing AD (Andreone, Larhammar, & Lewcock, 2020). Delirium is a common symptom of SARS-CoV-2 infection in patients with AD and is associated with high short-term mortality (Delirium as a Presenting Symptom of COVID-19). Patients with AD are associated with increased permeability of the blood-brain barrier, which may facilitate the passage of SARS-CoV2 across the blood-brain barrier (Global, regional, and national burden of Alzheimer's disease and other dementias, 1990–2019). The virus can also enter the brainstem through the olfactory nerve, which may be responsible for the patient's respiratory failure. Once infected, patients with dementia are at risk of intracranial inflammation and increased mortality (Global, regional, and national burden of Alzheimer's disease and other dementias, 1990–2019). However, it is unclear whether AD is a long-term complication of COVID-19 and further studies are needed to elucidate the contribution of COVID-19 to AD.

Traditional limitations have been reported in previous papers and the limitations of this paper are basically as follows. To date, 12 risk factors linked to dementia have been reported (Xue, ve diğerleri, 2022). However, GBD 2019 showed that only metabolic and behavioral factors were associated with dementia and did not provide data on other risk factors. Second, dementia is not classified by subtype; for example, dementia can be classified as vascular dementia or dementia with Lewy bodies. These differ in disease burden and common risk factors, but GBD 2019 does not currently have data classified by pathological subtype. In addition, global diagnostic criteria, biomarkers, medical records and insurance codes for dementia have been updated over time, and there may be heterogeneity over the last three decades (Global, regional, and national burden of Alzheimer's disease and other dementias, 1990–2019). Disease burden biases between our analysis and the real world are inevitable. Therefore, the results of our analysis should be interpreted with caution and further research is needed.

Alzheimer's Disease Statistics 2022 Alzheimer's Disease Statistics

Prevalence

There is a rapid growth in the number of people living with Alzheimer's disease, and only around one in four people with the disease get diagnosed.

It is estimated that there are approximately 44 million people worldwide living with Alzheimer's disease or a related form of dementia. In the U.S., an estimated 5.5 million people of all ages have Alzheimer's disease. Of these, around 5.3 million are 65 and older and 200,000 are younger and have early-onset Alzheimer's disease.

About two-thirds of Americans with Alzheimer's disease are women. This equals to 3.3 million women, age 65 and older having Alzheimer's disease in the U.S. and two million men.

Alzheimer's disease and dementia are most common in Western Europe (with North America close behind) and least common in Sub-Saharan Africa. African-Americans are about twice as likely to have Alzheimer's disease or other forms of dementia as whites. Hispanics are about 1.5 times as likely to have Alzheimer's disease or other forms of dementia as whites.

Reports from the National Institute on Aging indicate that the prevalence of Alzheimer's disease doubles every five years beyond the age of 65. As the population ages, the disease impacts a greater percentage of people. At present, someone in the U.S. develops Alzheimer's disease every 66 seconds. It is thought that by the middle of the century, someone in the U.S. will develop the disease every 33 seconds and the total number of people with Alzheimer's disease in the U.S. could rise to as high as 16 million people by 2050 (Alzheimer's Disease Statistics, n.a).

Mortality

Alzheimer's disease is the sixth-leading cause of death in the U.S. killing more people than breast cancer and prostate cancer combined. Since 2000, deaths from Alzheimer's disease have increased by 89 percent while those from heart disease have decreased. Alzheimer's disease is the fifth-leading cause of death among those aged 65 and older and a leading cause of disability and poor health. Typical life expectancy after an Alzheimer's diagnosis is four to eight years (Alzheimer's Disease Statistics, n.a).

Caregivers

It is estimated that one to four family members act as caregivers for each individual with Alzheimer's disease. In 2016, 15.9 million family and friends provided 18.2 billion hours of unpaid assistance to those with Alzheimer's disease and other forms of dementia in the U.S., a contribution to the nation valued at \$230.1 billion (Alzheimer's Disease Statistics, n.a).

Compared to caregivers of people without dementia, caregivers of those with Alzheimer's disease indicate substantial emotional, financial, and physical

difficulties. About 35 percent of caregivers of people with Alzheimer’s disease or other forms of dementia report that their health has gotten worse due to care responsibilities (Alzheimer’s Disease Statistics, n.a).

Economic Impact

The costs of health care and long-term care for individuals with Alzheimer’s disease or other forms of dementia are substantial. The global cost of Alzheimer’s disease and dementia is estimated to be \$605 billion, which is equivalent to one percent of the entire world’s gross domestic product.

In the U.S., total payments in 2017 for all individuals with Alzheimer’s disease or other forms of dementia are estimated to be around \$259 billion, with \$175 billion covered by Medicare and Medicaid. Out-of-pocket spending is estimated to be \$56 billion. By 2050, Alzheimer’s disease could cost the U.S. as much as \$1.1 trillion (Alzheimer’s Disease Statistics, n.a).

Methodology

Monitoring, Evaluation and Learning Framework

Develop a robust monitoring, evaluation and learning framework to track progress, measure the effectiveness of interventions and capture lessons learned. Regularly assess the impact, outcomes and outputs of the project against predefined indicators. Use it to facilitate Alzheimer Associations (care homes), inform management, make informed decisions and continuously improve project implementation. Communication and Outreach: Implement a comprehensive communication and outreach strategy to ensure clear and effective dissemination of project information. Use digital tools, media and other communication channels to bridge the gap between scientific knowledge and the wider public. Promote awareness, understanding and engagement among stakeholders, policy makers and the public about the importance of Alzheimer’s & Dementia.

Based on the identified key issues, this methodological approach aims to address the various challenges and opportunities related to the implementation of projects.

It provides a structured framework for effective planning, coordination and execution of activities, ultimately leading to the successful achievement of the project's objectives and desired results. It is important to fine-tune the proposed methodology with current expectations and align the business plan and logical framework with the implementation plan.

Besides a participatory approach to the organization of the initial meetings, the Consortium and the Experts team should be in constant contact with the investor to develop a coherent implementation plan that addresses all issues and priorities. We call it a coherent work plan because it will take into account both the activities of the consultants and the specific expectations and internal processes and agendas of the contracting authority, as well as other programs and relevant

stakeholders. In fact, while the kick-off meeting serves to address the priority actions in the inception phase and to clarify procedures, responsibilities and contacts for the smooth implementation of the program, the inception phase is meant to serve to ensure sufficient ownership and know-how to ensure that the activities and outputs of the program are adopted from the outset by all parties involved and tailored to the specific needs of the stakeholders, implementing partners and beneficiaries of the program, Develop methodologies for calculating indicators.

In our experience, in order to increase the effectiveness of Knowledge Management, it is crucial that stakeholders involved at all levels in the execution of the Programme are subsequently involved in communicating results, success stories, achievements and opportunities for improvement to different audiences. The idea is to ensure that Patients are more involved and informed by key factors in the outcomes of the programme and therefore in the benefits that patients' actions can bring.

The first step in developing a Communication and Visibility Strategy is to conduct a stakeholder information needs assessment and a baseline survey on the effectiveness of communication and visibility at Programme level. The aim of this preliminary activity is to establish a common basis for understanding the information and communication needs of different stakeholder groups. The proposed methodology should develop a questionnaire to be filled in by DG INTPA and key institutional actors at regional implementation level.

The questionnaire should aim to identify what is working well, what are the gaps that need to be closed and best practices to be included in the Program's communication activities. DG INTPA, with the support of the Ministry of Health, Municipalities, Health institutions and Alzheimer & Dementia care homes, should identify key institutional, civil society and private sector focal points to discuss lessons learned from STI communication practices. This baseline assessment/situational analysis should provide valuable inputs to the design of the Communication and information strategy.

While the communication and information strategy will be implemented throughout the duration of the Programme, it should be designed at the start of the implementation of operational activities, throughout the life of the Programme and beyond, and should set out tools and approaches that all stakeholders, including regional organizations, can continue to benefit from in the future. In this context, we consider it crucial that the process is "owned" by stakeholders. The communication and information strategy should take into account the existing and desired cooperation and collaboration of all stakeholders and regional organizations.

Ensuring effective coordination. Differences between countries can affect their appropriate development by limiting access to resources, reducing collaboration, leading to brain drain, poor information sharing and limited capacity building. Effective patient, institution and caregiver coordination will enhance countries' cooperation and mutual learning. It allows European Member States to develop regional networks, promote AI-Human-Machine Hybrid Environment, Data Science, increase funding, strengthen institutions and establish a monitoring

and evaluation system. In this way, we believe that patients and countries will be empowered to achieve sustainable processes and goals. To this end, it will work closely with the AI-Human-Machine Hybrid Environment to ensure effective coordination. It can also leverage the power and cohesion of bringing together experts to establish adequate linkages with regional authorities and health institutions.

Encourage stakeholder engagement. Create a network from all regions of the world using Ai and Data Science to gather data, progress and statistics on Alzheimer's & Dementia patients to create a large database that can be made available to healthcare organizations. Innovative start-ups and social enterprises lay the foundation for prosperous, inclusive and resilient economies, and provide more opportunities for young people - especially women - to succeed.

We believe that harnessing the potential for creativity and innovation in civil society, women, youth and community groups is crucial to guarantee the inclusiveness, sustainability and scaling of AI-Human-Machine Hybrid Environment developments. By identifying innovators and their needs, engaging them in research and policy-making processes, supporting their active participation in health improvement initiatives, enabling them to trigger the agendas needed to overcome current challenges and dilemmas;

Developing and implementing a knowledge management strategy that highlights the needs of older people, Alzheimer's and Dementia patients and the opportunities it brings to support new ways of thinking; building on the challenges of ageing and disease and supporting the co-creation of win-win opportunities for all available technology and technology developments to alleviate fatigue between different stakeholder groups.

Communications supported by:

Promoting digital technologies: Supporting the adoption of evidence-based research by end users (policy makers, private sector, general public). Leveraging complementarities with initiatives and programs to create sustainable synergies. In summary, science, technology (Ai and Data Science) will foster coordination and synergies between different programs and initiatives to support and assist the creation of a dedicated backup system and memory that connects innovation to the health of the elderly, Alzheimer's and Dementia patients and their relatives.

Based on this selection, to provide specific capacity building, focusing on areas such as communication, networking, project management and strategic planning. The content and format of the learning should be relevant, practical and applicable to the specific context and focus on skills, techniques, methodologies and processes. With this in mind, it is necessary to mobilize experienced resource persons and subject matter experts with expertise in the targeted areas of capacity building. They should have a deep understanding of the challenges facing the program and be able to effectively test and source data from academia, research institutions, government agencies or international organizations.

Create a supportive learning community by encouraging collaboration and sharing of best practices among the population to increase knowledge sharing about the disease. This can be done through a virtual platform where relatives can

interact, share experiences and learn from each other, and through conferences, seminars and study visits, as well as answers to disease-related questions within the app.

Finally, we will facilitate and promote knowledge exchange and mobility programmes among European researchers by promoting short-term visits, joint workshops and exchange programmes to facilitate the sharing of expertise, methodology and research findings. These activities will promote co-operation and build strong research networks.

Findings/Results

In addition to having many applications developed for elderly people and patients with advanced Alzheimer's, & Dementia, it is also necessary to create a technological project with a social responsibility aspect.

Today, where hundreds of thousands of mobile applications are released every day, most of these applications lose their meaning after a while and are not used. Of course, the purpose of every new application is not to serve our environment and humanity. In fact, we are generally interested in the technical details of all these applications and do not know the limits of using technology as a society.

However, in this sense, it is necessary to make a difference with a slightly different application and product. It is imperative to show that a new Ai & Data Science technology with high-tech features that will make the user's life easier is possible.

Using Ai and the Data science archive, create a database that is crucial for any Alzheimer's and dementia planning. Memory problems in Alzheimer's and dementia (What to look out for and what not to look out for, why is diagnosis important? Can Alzheimer's and dementia be treated, Approach to diagnosis, Living with Alzheimer's and dementia, Precautions, Where to get help when things get difficult, etc.). Making this sharing possible for all ages, genders, education and income groups can help family members better understand the value of time. Not finding the lifeless bodies of our sick and elderly at home and being able to intervene. Being aware of a fire or emergency before families are faced with it. Facilitating Alzheimer's communities (nursing homes). Doing a sustainable job for humanity as long as the world exists. To be a solid source that enables relevant institutions and organizations to use this information for the benefit of the country by evaluating the information, needs, expectations and complaints of families thanks to its measurable database. To contribute to the promotion of the country by taking place in the local and international press as the only structure that fulfills functions other than playing games in artificial intelligence and human-machine hybrid environments, which is the best technology of today and the near future. To provide an important technical infrastructure for these growing and developing sectors, to create employment opportunities for graduates of universities that open departments in this direction,

and to present a new technological invention that provides more comfort to our patients and improves their health.

The knowledge gained internationally and shared with our universities will benefit the industry and pave the way for future inventions. These new inventions, which have a special backup system and memory, are designed to improve the quality of life and the ability to move independently of Alzheimer's dementia patients and the elderly, and it is not wrong to predict that the capacity and popularity of data science will increase, as well as aiming to minimize the impact of the disease. One of the main elements that distinguishes this type of application from similar ones is to create a comfort zone for patients' relatives by enabling them to communicate with their relatives remotely without having to change their own conditions.

Solving the problem

The outlines to address this information are as follows;

- 1- Policy and Institutional Analysis
- 2- Stakeholder Engagement and Participation
- 3- Capacity Building and Knowledge Transfer
- 4- Innovation and Technology Development
- 5- Sustainable Financing Mechanisms
- 6- Monitoring, Evaluation and Learning Framework

Various inventions, applications and ingredients are similar to strengthen the memory of Alzheimer's & Dementia patients or slow down the progression of their disease.

Sometimes people with Alzheimer's and dementia are placed in nursing homes or care villages, such as Weesep in the Netherlands for the elderly. Of course, people with Alzheimer's and dementia live there without limits, but it is still a one-way street, far away from their familiar surroundings, communities and loved ones. This kind of treatment is common.

We often forget about these people, whereas it is our duty, our moral and social responsibility to create a welcoming environment for the young and adult productive population and to take into account their past years of life and their efforts to raise the level of the present. There is a need to be humane and loving in the last phase of people's life journey and technology has always been a supporter of the issues at this point.

These devices track people's activities through bracelets worn on their legs, arms, body or watches. And these solutions are only effective in monitoring their activity and they remain connected as long as these devices are on them. Or a supportive drone or cameras and cameras placed in the home, which unfortunately do not take into account the privacy of the patient and their relatives. There are also care robots that talk to the patient, chat with the patient, for emergencies like fire, 56 There is a reservoir for emergency help. Or the app monitors the patient's

behavior through web monitors and meets the entertainment and shopping needs of family members.

The science, methodology and content of AI and Data should be more comprehensive than previous practices. And another distinctive aspect of this topic is that it aims to provide comfort not only to the patient-centered approach, but also to the family members who bear the burden of the patient and the elderly, which makes the new inventions unique.

This technique is essential to contribute to a comprehensive framework for cooperation with the World Health Organization in the transition of the project to help Alzheimer's and Dementia patients, the elderly, by promoting collaboration, improving the science-policy health interface and the product of results-oriented management, long-term sustainability of program results, partnership and whole community approach, as well as prioritizing promoting synergies and complementarities.

Capacities To develop an application for Alzheimer's and Dementia patients, the elderly and their relatives that will enable a more comfortable transition to life.

Technical Assistance should aim to support Regional Centers of Excellence (RCoEs) to develop their green transition capacity. The focus should be on human development with a gender-sensitive approach, as well as facilitating the generation and uptake of scientific data and minimizing the impacts of diseases, and integrating these into RCoEs' workflows. To achieve these objectives, technical assistance should focus on the following areas:

- 1- Ensuring Effective Coordination
- 2- Encouraging Stakeholder Engagement
- 3- Developing and Implementing a Knowledge Management Strategy
- 4- Promoting Transformational and Digital Technologies
- 5- Leveraging Complementarities with Initiatives and Programs
- 6- Capacity Building and Information Sharing
- 7- Policy Frameworks
- 8- Collaboration and Networking
- 9- Science-Policy Interface
- 10- Knowledge Management
- 11- Communication and Dissemination
- 12- Gender Equality and Social Inclusion
- 13- Monitoring, Evaluation and Learning
- 14- Result-Oriented Management
- 15- Maximizing the Long-Term Sustainability of Program Results
- 16- Partnership and Whole Community Approach
- 17- Promoting Synergies and Complementarities

Discussion

Strengthening regional bodies and networks and promoting public-private partnerships will be key aspects of the strategic approach of the AI-Human-

Machine Hybrid Environment, seeking to increase the resources and funding available for its initiatives to support the disease. To this end, close collaboration with Alzheimer's Associations and care homes will be essential to effectively coordinate policy priorities and align agendas. Furthermore, stakeholder inclusiveness and engagement is crucial to ensure adoption of evidence-based research by end-users, including general Alzheimer's and Dementia patients, care homes, healthcare institutions and policy makers. Therefore, promoting stakeholder engagement of the private sector (Pharmacies, practices), young people and women will be a central element of our strategic approach. Strongly committed to the principle of leaving no one behind and working to build a positive and inclusive vision of what science, innovation and technology can achieve for sustainable health as a foundation for prosperous, inclusive and resilient economies that can serve as an example for other parts of the world.

Conclusions

The sustainability strategy should aim to ensure the implementation and coordination of AI and data science beyond the time frame, taking into account the challenges of the disease.

Sustainability is a concept with many dimensions. In our view, the long-term sustainability of an intervention such as "Scientific and Technological Support for Excellence" will depend on a combination of factors described below:

Ownership Possession depends on the ability of the beneficiaries of an intervention to exercise real control over their own policies, strategies, projects or specific actions. An intervention can only deliver sustainable results if priorities and ways of doing business are chosen or willingly adopted by those responsible, rather than dictated by external actors. Through technical assistance, support to regional implementing organizations and other programme stakeholders, we should seek to ensure that

- 1- Understand their needs and objectives;
- 2- Provide information, knowledge and advice that can lead to more informed decisions and improve the data agenda.
- 3- Help stakeholders identify what works for them.

If stakeholders' conflicting objectives sometimes threaten to derail some aspects of project or programme implementation, use dialogue to support reconciliation of perspectives and achieve transparent compromises.

Strengthening individual, institutional and organizational capacities: Capacity building at all levels, from the individual to the organizational and broader institutional level, is recognized as a key factor to ensure that an externally supported intervention continues to deliver benefits after support ends. In support to program stakeholders, it is necessary to strive for the following;

- Share knowledge and information on how things are done, produce adequate documentation and share it with partners.
- Promote "Alzheimer's and Dementia learning" - encourage people to do it on their own rather than relying on outside help.
- Promote partnerships and networking to encourage knowledge exchange and further learning from peers.
- Support the assessment of capacity needs and the design of capacity development plans as requested. Encourage the adoption of comprehensive, sustainable capacity building approaches that do not rely solely on external expertise, by developing and promoting in-house skills and expertise.
- From the pool of Alzheimer's and Dementia experts, prioritize, where possible, non-key former experts who can benefit from their knowledge.

Encourage partnerships between the public and private sectors to leverage resources and expertise. Encourage businesses to invest in research and development and collaborate with academic and research institutions. Public-private partnerships can help translate scientific discoveries into practical applications and stimulate innovation.

Promoting Resilience

Resilience is the ability of a system, individual or group to absorb disturbances, overcome and recover from a critical situation and adapt to stress and change in general.

Alzheimer's and Dementia is a development priority to increase the resilience of older people, patients and their relatives, which is relevant for transformation in general and makes development interventions more sustainable. In support to program stakeholders, especially those responsible for implementing programs or activities at national and local levels, our technical assistance team will strive to.

- Support the integration of resilience into the design, implementation and monitoring of interventions.
- Encourage and support the identification and documentation of good practices that promote resilience, with a view to transforming them into shareable "knowledge products".

Systematic mainstreaming: Science, Ai, Data science, Knowledge Efficiency, Technology and Innovation are not yet integrated into the policy design, planning and operations of all sectors. Existing weaknesses in collaboration between science and policy organizations are a barrier to communicating objectives, approaches and risk information. Based on our experience, we have identified six gaps at national and international level, which can be summarized as follows:

1. Limited Financing and Investment: Inadequate financing and investment for activities in the health sector pose a significant challenge. Adequate financial resources are needed to support research and development, technology transfer and implementation of innovative solutions. Limited access to finance hinders the

development and diffusion of green technologies and innovative practices, slowing down the transformation process.

2. **Weak Research and Development (R&D) Capacity:** Many countries face limitations in their R&D capacity, including inadequate infrastructure, lack of qualified researchers and limited institutional support. These capacity constraints limit the ability to conduct cutting-edge research, develop innovative technologies and effectively address local environmental challenges.

3. **Limited Cooperation and Knowledge Sharing:** Inadequate collaboration and information-sharing mechanisms between countries, research institutions and private sector organizations hinder effective integration into the agendas of patients and older people with Alzheimer's and Dementia. The fragmented nature of health professionals' efforts reduces opportunities to learn from successful experiences and limits the scale and impact of innovations.

4. **Regulatory Barriers:** Inconsistent or inadequate regulatory barriers are a barrier to scaling up health transformation initiatives. Lack of supportive policies, unclear regulations and bureaucratic barriers can discourage investment in health technologies and innovative solutions. Addressing these barriers is crucial to create an enabling environment for adoption and implementation. Furthermore, while everyone loses some neurons as they age, people with dementia experience much greater losses. Signs and symptoms can vary by type and may include Memory loss, poor judgment and confusion. Difficulty speaking, understanding and expressing thoughts or being lost, as well as difficulty reading and writing, so it is important to check for these.

5. **Technology Transfer and Intellectual Property Rights:** Environmental technologies and intellectual property rights are a major challenge for countries in general. Limited technology transfer mechanisms and high costs associated with technology licensing and intellectual property rights hinder the diffusion and adoption of technologies. Developing effective mechanisms for technology transfer and ensuring equitable and affordable access to human and environmentally friendly technologies is essential to drive the Ai and data science transformation agenda for health.

6. **Limited Awareness and Skills:** Limited awareness and understanding of the potential benefits of technologies among policy makers, businesses and the general public is another barrier. There is a need to increase awareness campaigns, capacity building programs and information dissemination activities to promote the adoption and use of this application in the life challenges of Alzheimer's and Dementia patients.

Addressing these gaps will require the joint efforts of governments, international organizations, research institutions, private sector organizations and civil society. Strengthening financial mechanisms, promoting collaboration and knowledge sharing, improving policy frameworks, facilitating technology transfer and investing in capacity building are necessary steps to overcome these barriers and incorporate them into the transformation agenda for life supports for people with Alzheimer's and Dementia.

Therefore, one should strive for the following:
Best of Form;

- Facilitate dynamic dialogue, collaboration and co-creation of initiatives and products by bringing together multidisciplinary teams from national, regional and international organizations.
- Support national organizations to improve national data governance (collection and dissemination) and support the establishment of a national knowledge sharing platform when the necessary conditions exist.
- Support national and sub-national science and policy stakeholders to conduct re-research, understand AI - Human-Machine Hybrid Environment developments and apply them to health-related policies and investment promotion.
- Mobilize regional expertise and resources to close gaps in data availability.
- Support the development of high resolution and quality regional data platforms.
- An applied product that enables Alzheimer's & Dementia patients and the elderly to perform some skills and movements independently for themselves and their families in the process of combating the disease, and at the same time minimize the effects of the disease, contribute to its transformation and thus promote sustainable development. In this sense, the program fully considers environmental protection and health issues in its activities, in particular to contribute to a more sustainable management of natural resources.

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