

UNIVERSIDADE FEDERAL DE MINAS GERAIS



ARTIFICIAL INTELLIGENCE AS A TOOL TO ASSIST THE CHALLENGES FACED BY THE ELDERLY

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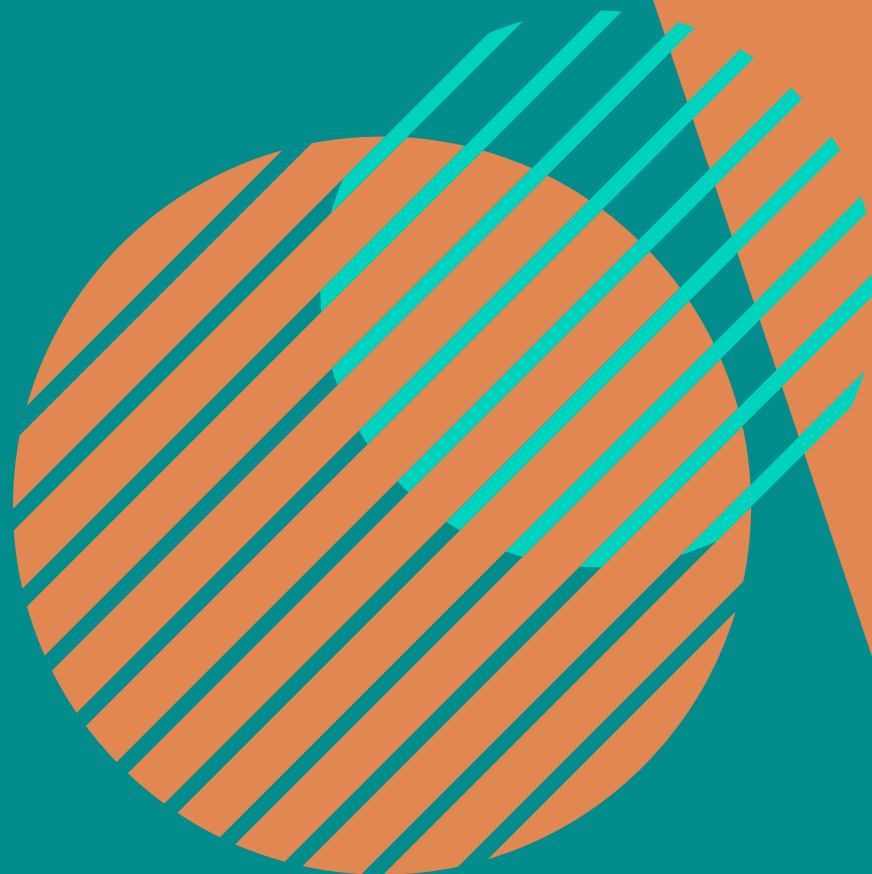
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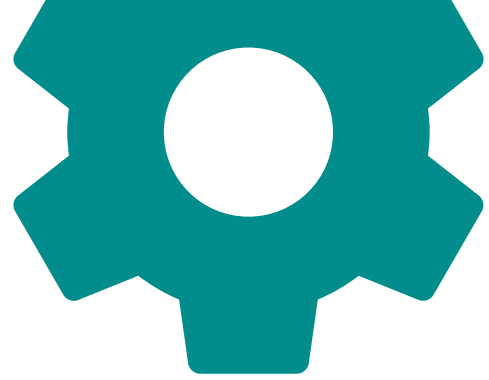
ABSTRACT



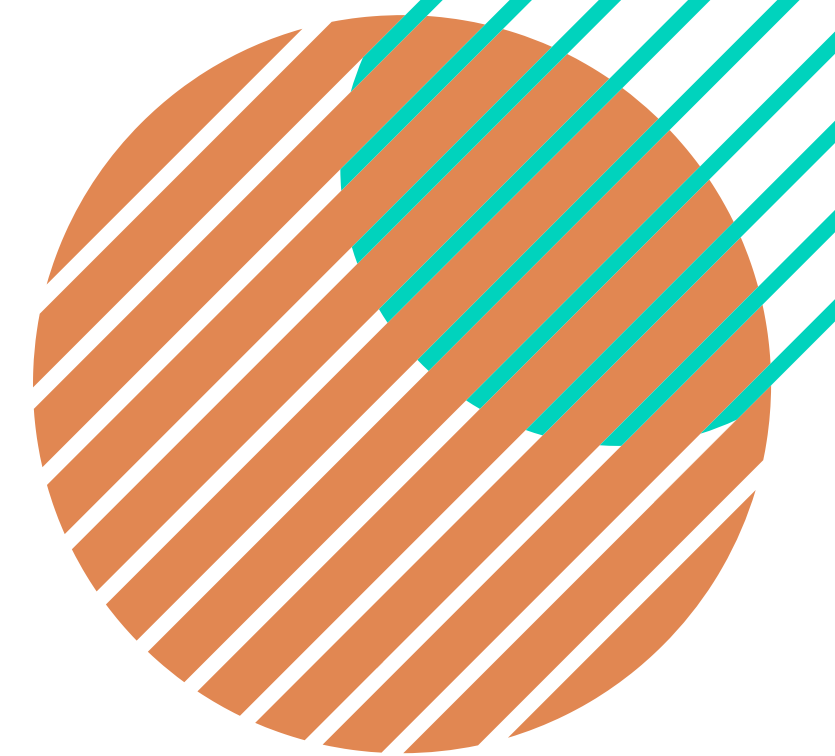
- Overview of the growing aging population and the challenges faced by the elderly

Objectives:

- Explore existing technologies that use Artificial Intelligence (AI) to address these challenges
- Reflect on the contemporary scenario and the obstacles in implementing this technology in the lives of the elderly



METHODOLOGY



QUALITATIVE METHOD

- **Thematic relevance** of the articles, which should be directly related to the central theme of the research.
- **Quality of the publication**, which should have been published in scientifically rigorous journals
- The **publication date** of the articles should be recent to ensure updated information.

QUANTITATIVE METHOD

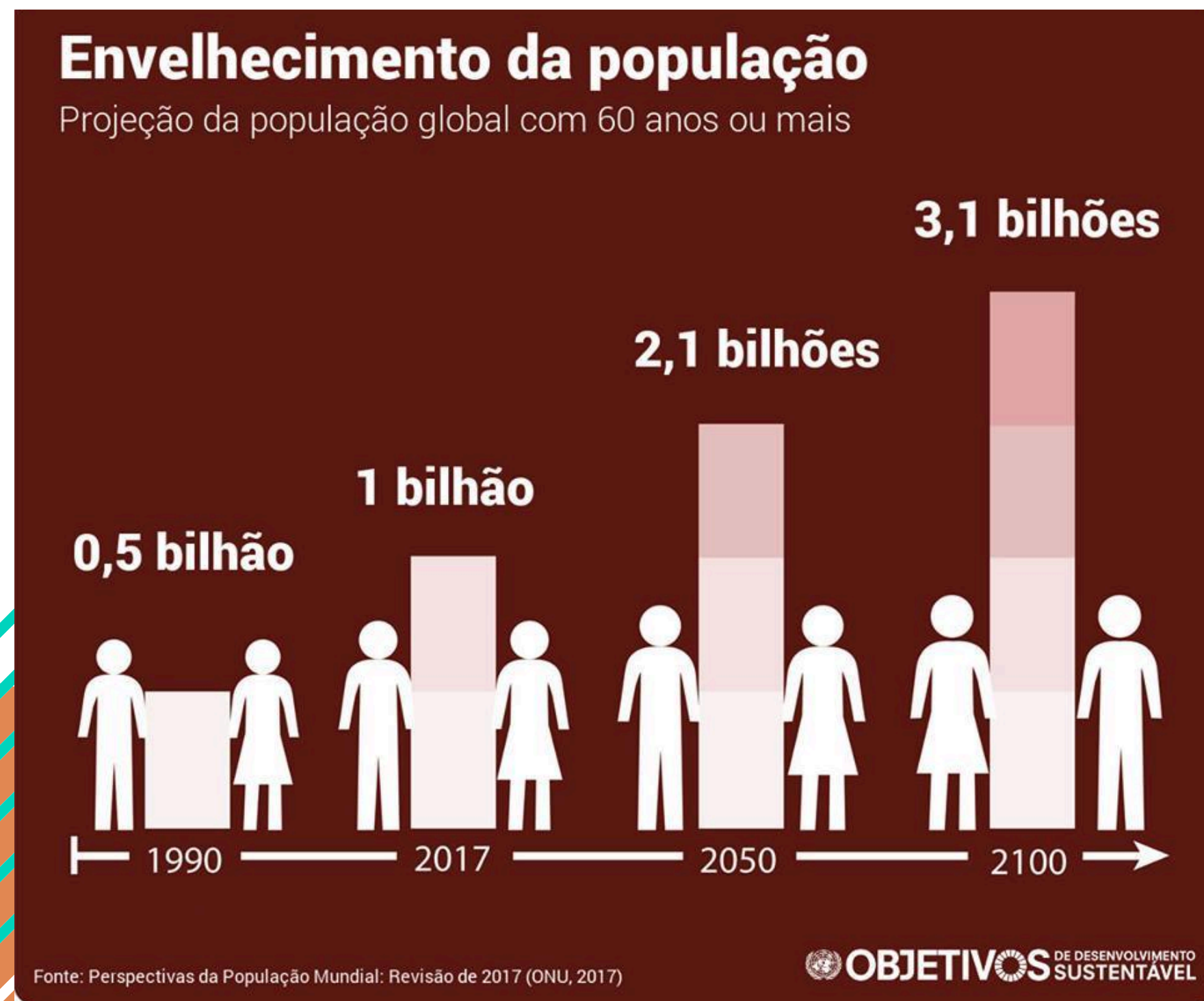
- Theoretical research using **Google Scholar** as the main search tool.

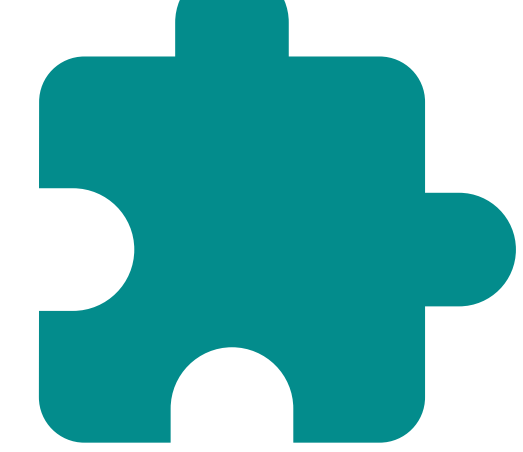
SAMPLE

- A mapping of the existing literature on the topic was possible to be done. The analysis of the collected data provided information for the development of the research, consolidating the theoretical foundation.

INTRODUCTION

Global Population Aging

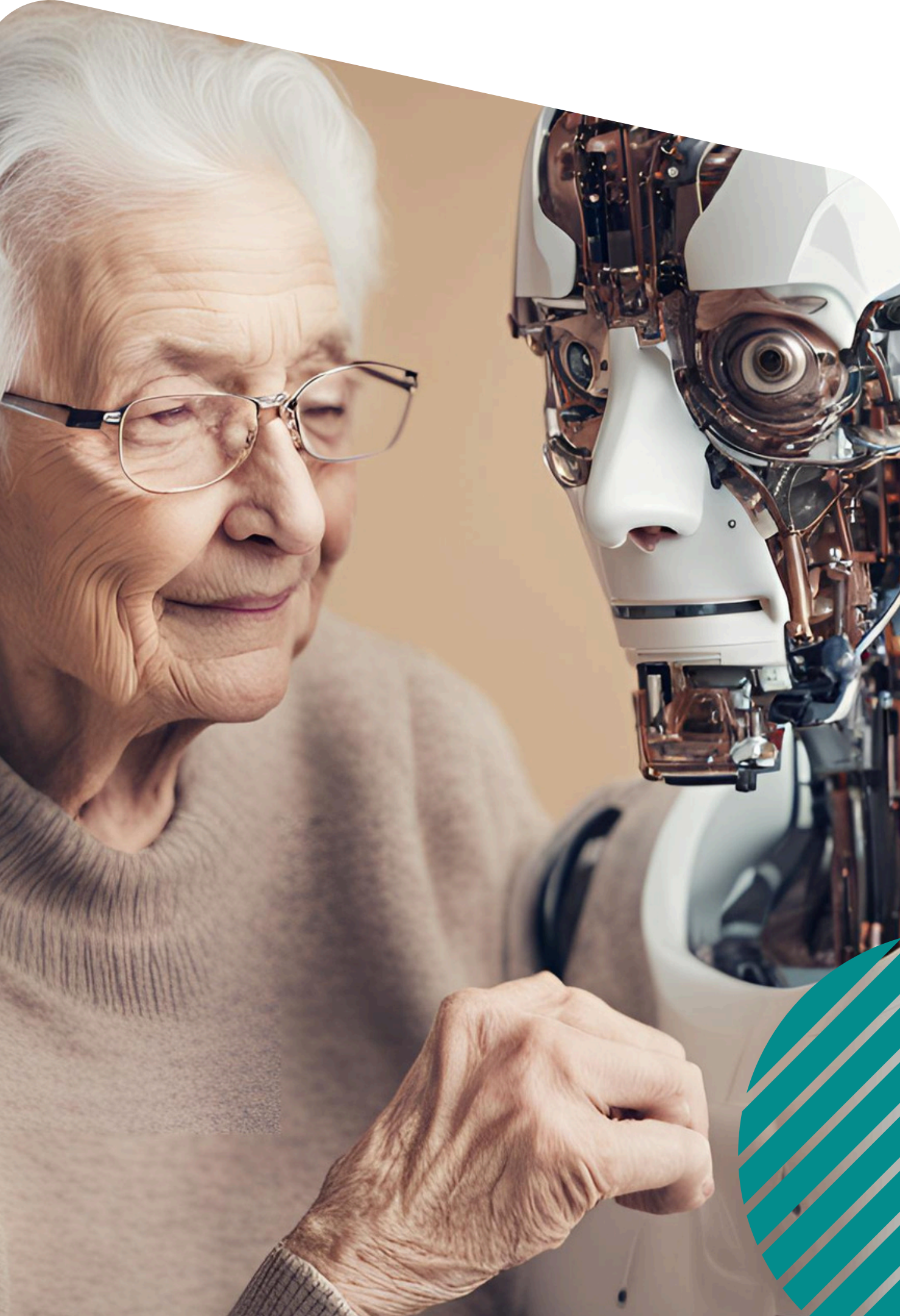




CHALLENGES OF POPULATION AGING

- Overloaded healthcare system unprepared for high demand.
- Lack of housing and spaces adapted to the needs of the elderly.
- Mental health problems - according to the WHO, it is estimated that 16% of the people over the age of 60 have some emotional difficulty. [1]
- Psychophysical transformations inherent to the natural aging process.





WINDOW OF OPPORTUNITY

Artificial Intelligence as a promising resource to help overcome the problems of this societal transformation.



ARTIFICIAL INTELLIGENCE AND ELDERLY HEALTH



- Wearable devices and sensors that can monitor vital parameters, providing real-time data on patient health.
- *Study done by the University of California, San Francisco, on remote blood pressure monitoring in hypertensive elderly: those who used smart bracelets to monitor blood pressure had half the chance of being hospitalized for hypertension-related problems. [2]*



Source: Estado de Minas

- **Pitoco caregiver robot**, developed by computer scientist Gustavo Pantuza Coelho Pinto from the Federal University of Minas Gerais (UFMG), designed to assist the elderly [3]

- **Paige AI system** uses deep learning algorithms to analyze mammography images with 95% accuracy, making it possible to detect signs of cancer in its early stages. [4]

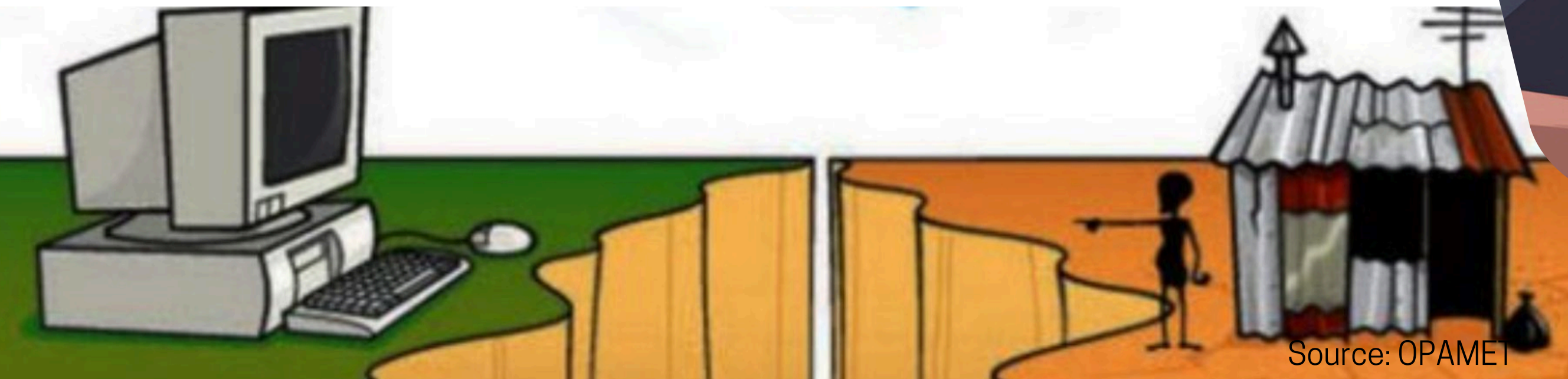


CHALLENGES

- Ensure that innovations are **accessible and easy** to use

- **Digital exclusion and social inequality** in access to artificial intelligence technologies

- *A study done by UFMG concluded that the lack of technical knowledge, the high cost of devices, and difficulty accessing the internet are the main obstacles to digital inclusion for this population. [5]*



Source: OPAMEI



ARTIFICIAL INTELLIGENCE IN THE DAILY LIFE OF THE ELDERLY

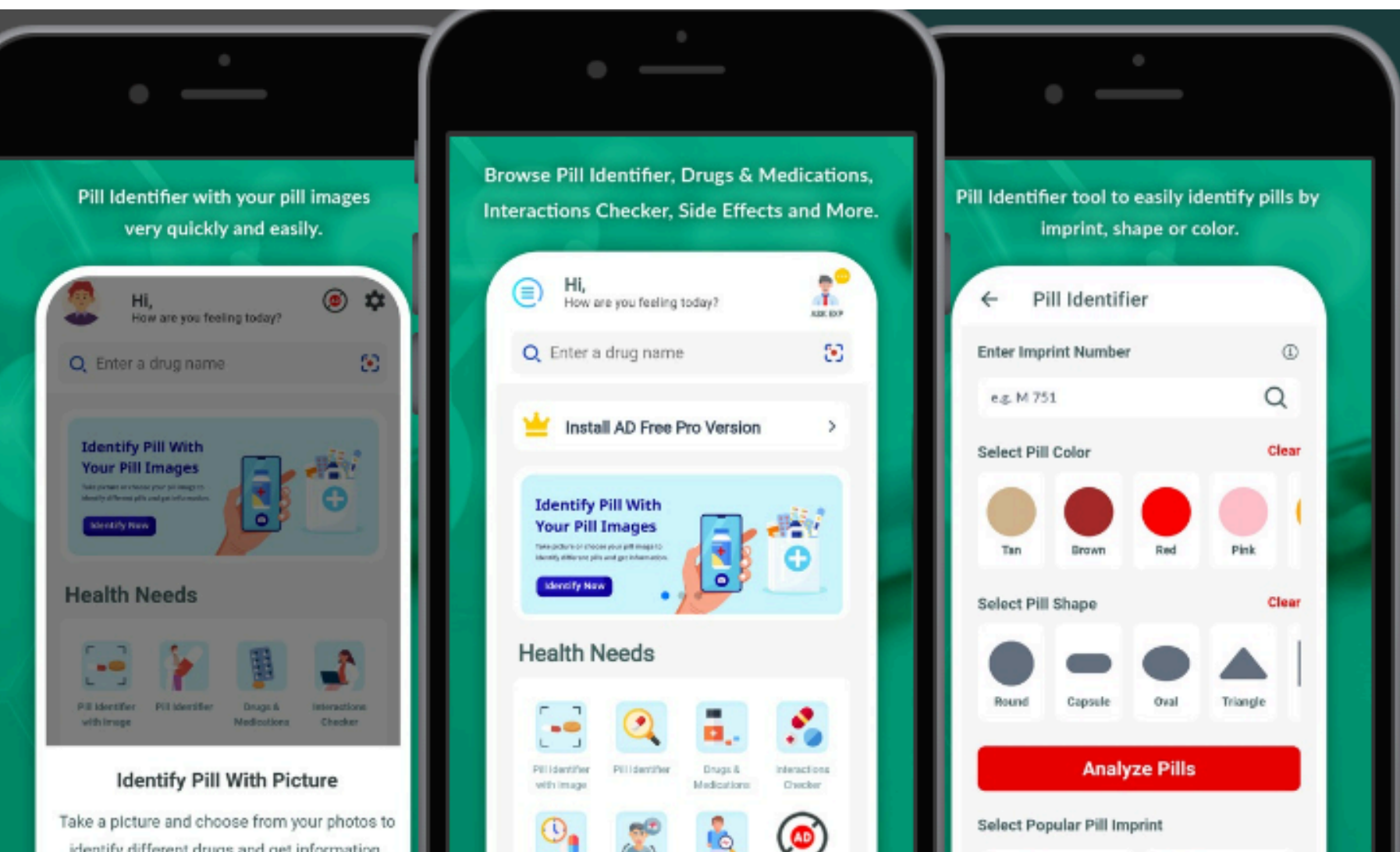
- **Autonomous Vehicles**

- Data from the company Waymo indicates that their autonomous cars have traveled over 40 million miles without any accidents [6].
- Mobility made easier and more autonomous, allowing elderly individuals to maintain their independence and quality of life [7].



- **Exoskeletons** by the Israeli company Rewalk, an assistive technology [8]

- **Medication management** through augmented reality (AR) and apps



- *The app Pill Identifier and Drug Search allows for the identification of pills and capsules by image and provides detailed information about each drug. [9]*

RewalkTM
More Than Walking.

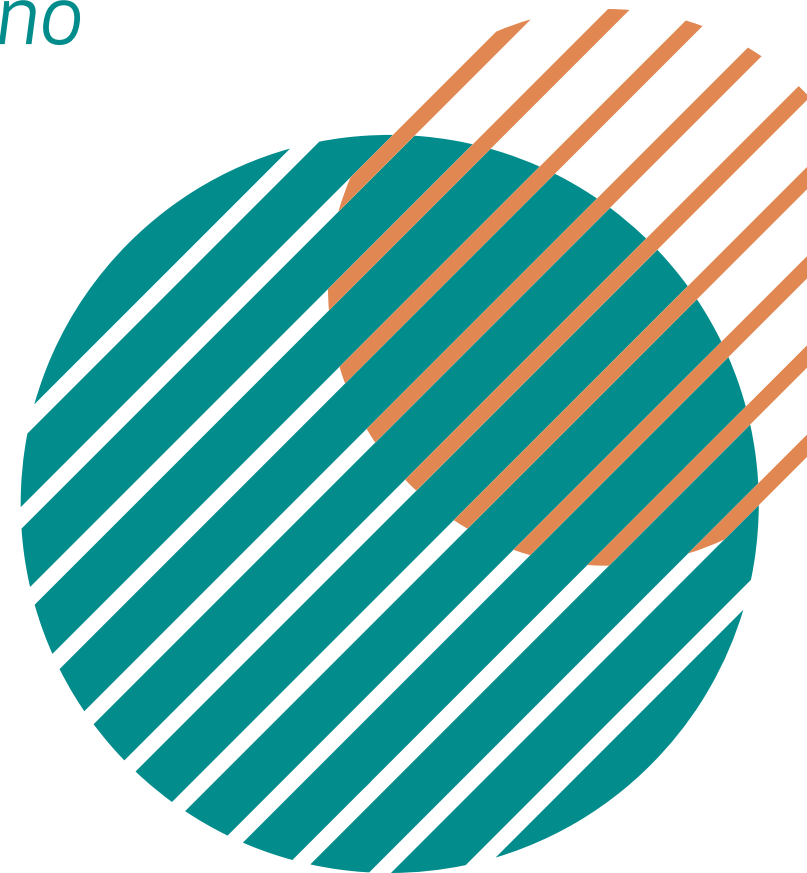


SOURCE: SUKHAMED



CHALLENGES

- High cost of research and development in a context of socioeconomic disparities.
- The exoskeletons developed by ReWalk cost around 100,000 euros [10]
- *57% of elderly individuals live on up to 2 minimum wages per month, and 18% have no personal source of income [11]*





LONELINESS AND SOCIAL ISOLATION

- Significant challenges for the elderly
- ARTIFICIAL companionship as a promising solution
- Study by Moyle, et al. [12]

NAO / Pepper / Paro

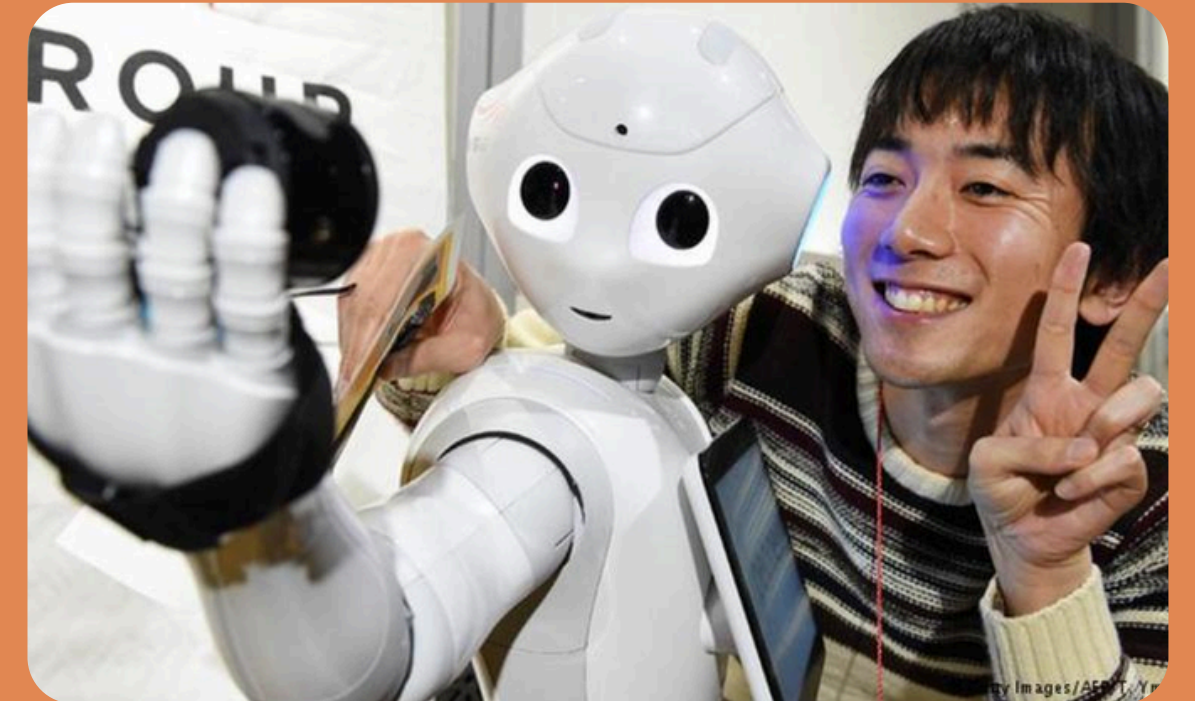
SOURCE: REAB.ME



SOURCE: GLOBO



SOURCE: PORTAL DO HOLANDA



?



SOURCE: REAB.ME



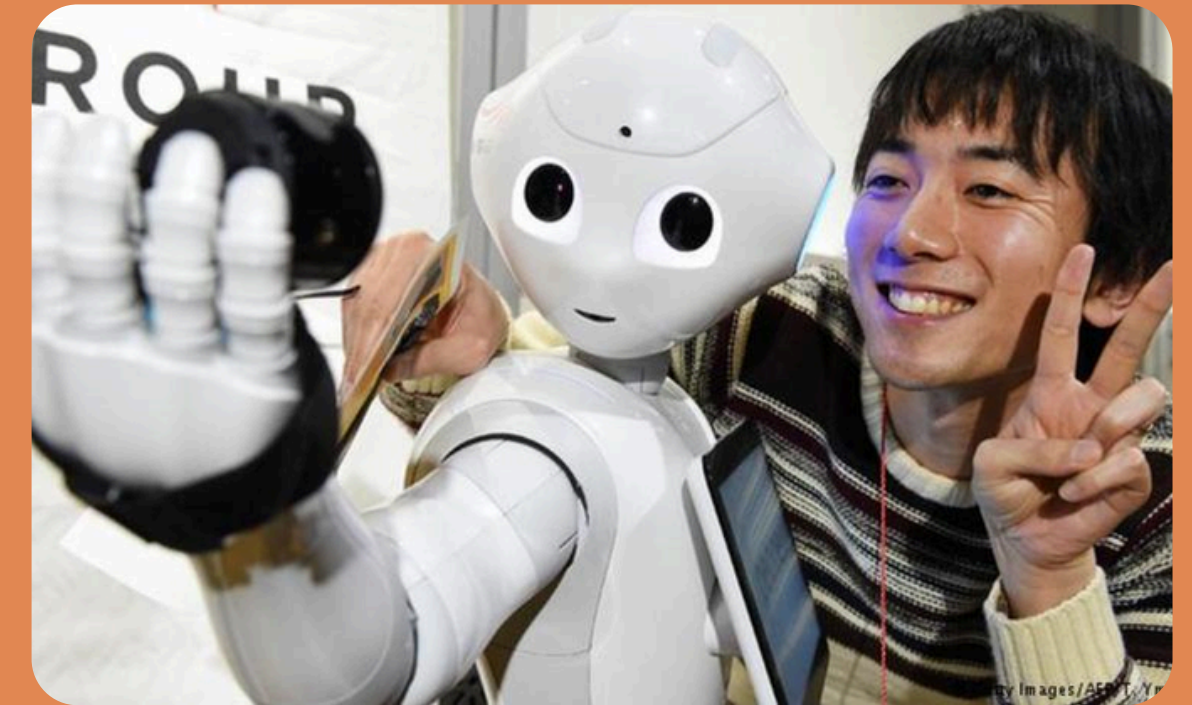
Paro: A therapeutic robot in the form of a baby seal that reacts to touch, sound, and light. Paro is designed to provide emotional comfort and reduce anxiety and loneliness among the elderly.

SOURCE: GLOBO

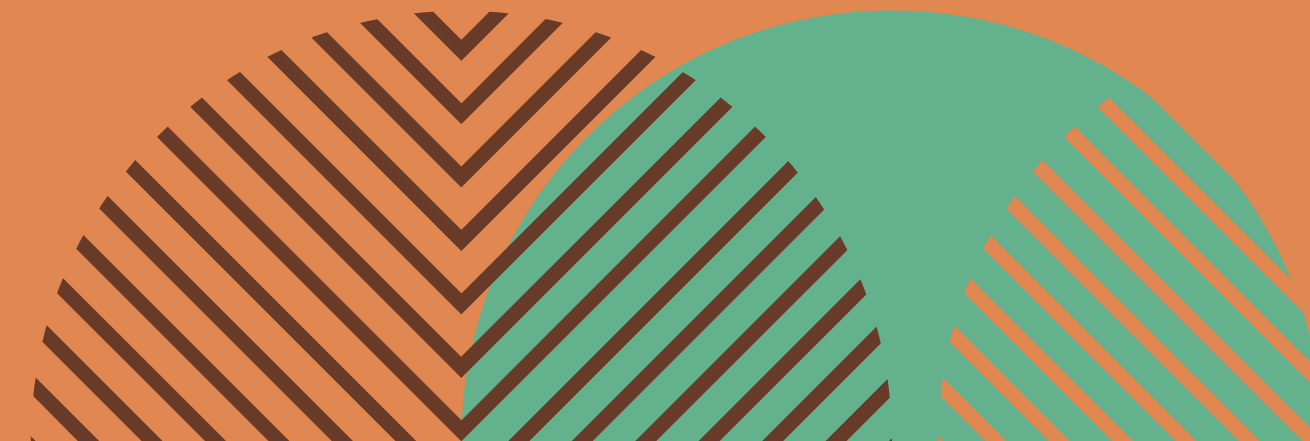


NAO Robot: A humanoid robot that can interact with users through conversations, games, and light physical exercises. NAO is often used in rehabilitation therapies and social engagement activities.

SOURCE: PORTAL DO HOLANDA



Pepper: A humanoid robot that can recognize and respond to human emotions. Pepper is used for social interactions and to facilitate recreational and educational activities.





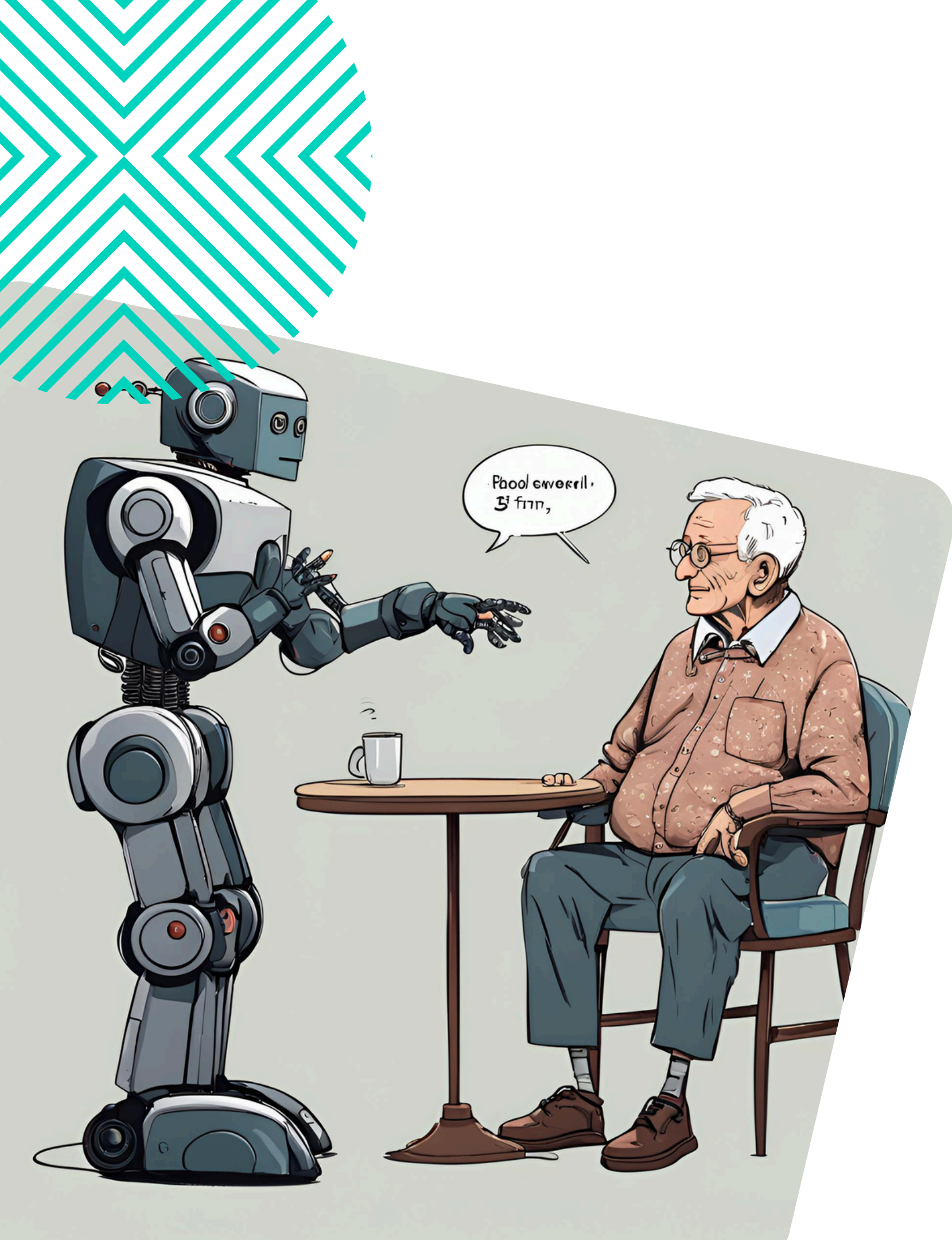
BENEFITS AND ETHICAL CONSIDERATIONS

- Positive Effects of Artificial Companionship
 - Improvement in social interaction and emotional well-being
 - Examples of social robots and virtual assistants
- Ethical and Practical Considerations
 - Balancing technology and human interactions
 - Need to address dependency and reduction of real interactions



SOURCE: WIKIPÉDIA





PRIVACY AND DATA SECURITY

- Data Protection Challenges
 - Transparent collection and informed consent
 - Secure storage and advanced encryption
- Cybersecurity Considerations
 - Proactive measures against fraud and breaches (e.g., PayPal)
 - Compliance with privacy regulations



BEST PRACTICES AND USER TRUST

- Practices to Ensure Privacy
 - User education and regular audits
 - Compliance with GDPR and LGPD
- User Trust and Transparency
 - Clear information on data usage
 - Accessible and understandable privacy policies





ACCESSIBILITY AND PERSONALIZATION

- Adapted interfaces: voice, text, simplification
- Central in the design of assistive technologies
- Study by Wolf C. T. (2020) [13]

**“AI PLAYS A POWERFUL ROLE IN SHAPING
CONTEMPORARY SOCIETY, AND THUS, MANY HAVE
ADVOCATED FOR ITS “DEMOCRATIZATION”.”**

Wolf, C.T. (2020). Democratizing Artificial Intelligence. Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems. DOI: [10.1145/3398370](https://doi.org/10.1145/3398370).





DIGITAL INCLUSION AND BENEFITS

- Connection with society and services
- Improvement in health and social interaction
- Challenges: resistance, digital skills, necessary policies



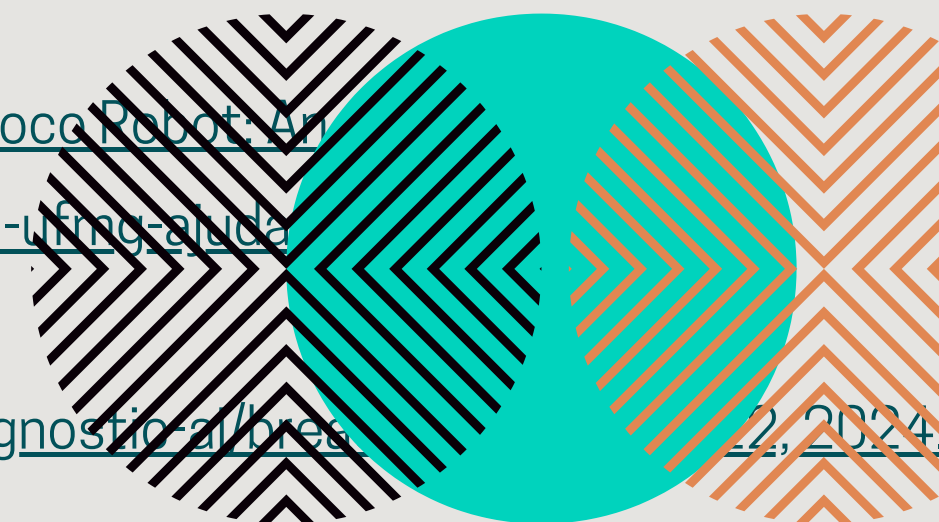


CONCLUSION

- **Positive Impact of AI:** AI can significantly improve the quality of life for the elderly, offering greater autonomy, safety, and well-being.
- **Key Technologies:** Examples such as companion robots (Pitoco from UFMG) and health prediction systems (Paige AI) demonstrate the potential of AI in health management.
- **Challenges and Solutions:** Overcoming barriers to accessibility and digital inclusion is crucial. Public policies for digital inclusion and technological education are essential.
- **Promising Future:** Continuous investments in AI can transform elderly care, promoting active and healthy aging.

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Images not referenced with a source were created by artificial intelligence from Canva.

