Rethinking Technology for Aging Populations

Executive Summary

The growing population of older adults with cognitive impairment faces a critical care gap that traditional healthcare scaling cannot address. While AgeTech solutions proliferate, many fail to address this population's complex, multi-stakeholder needs. This paper introduces an evidence-based “three-pillar” framework that offers an alternative to conventional user-centered design approaches by accounting for cognitive decline patterns, caregiver dynamics, and healthcare system constraints.

Our analysis of pilot implementations demonstrates quantifiable care visit reductions, highlights design principles that address the wide range of cognitive abilities among users, and establishes frameworks for sustainable technology adoption in aging populations. These findings have significant implications for healthcare economics, workforce allocation, and policy development.

These insights inform Idem’s approach, where the realities of cognitive impairment are integrated into every stage of the design process. Our solutions are grounded in the realities of cognitive decline and are developed to support person-centered care models that benefit both individuals and their care partners. By addressing the logistical and emotional demands placed on caregivers and healthcare professionals, we contribute to the creation of more resilient, scalable, and inclusive care environments.

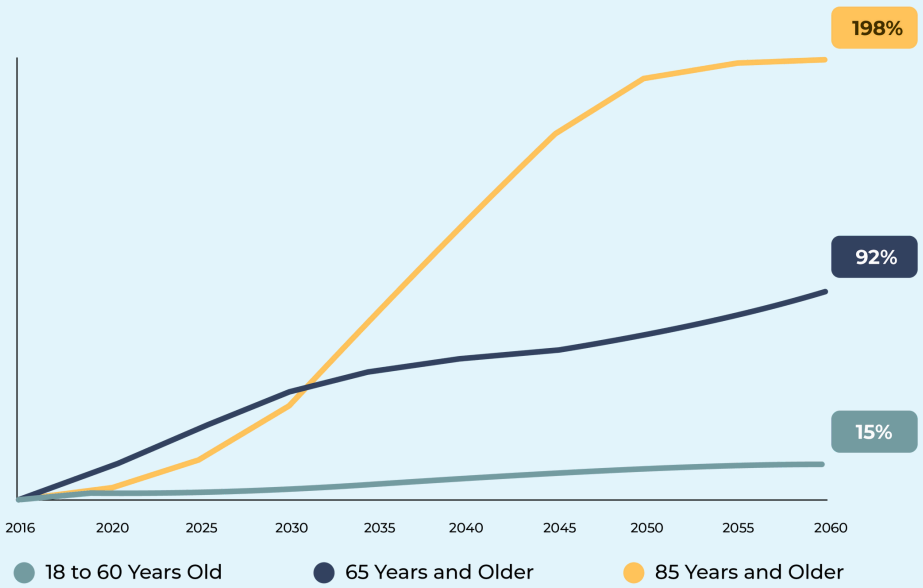
The Scale of the Problem

Demographic Reality

The ongoing global demographic shift presents unprecedented challenges for healthcare systems worldwide. By 2050, the population aged 60 and older will reach 2.1 billion people, with cognitive impairment affecting 15-20% of adults over 65 (World Health Organization, 2023; Alzheimer's Disease International, 2022). This represents not just statistical growth but a fundamental transformation in care needs that current systems are unprepared to handle.

The care needs are outpacing healthcare capacity by a ratio of 3:1 in many developed regions, creating a crisis that requires innovative solutions beyond traditional service expansion. Home care agencies report 40-60% increases in demand (AARP, 2020) for basic assistance tasks like medication reminders and appointment preparation, services that don't require clinical expertise but consume significant labour resources.

Projected Population Growth by Age Group



Source: Argentum report: Value of assisted living for America, USA population

The Care Gap Crisis

Healthcare systems struggle with three interconnected challenges that compound one another. First, resource misallocation occurs when healthcare professionals spend substantial time on routine tasks that could be automated, reducing their availability for complex care requiring human judgment and empathy. Secondly, family caregivers provide the majority of long-term support, and many face serious health consequences as a result. According to the CDC (2024), over 25% of caregivers report having been diagnosed with depression, and frequent emotional distress is significantly more common among caregivers than non-caregivers. Many also experience negative physical health outcomes linked to the sustained demands of their caregiving role. Finally, the lack of scalable solutions for non-clinical support, such as medication reminders or appointment preparation, leaves a growing set of care needs unmet, placing even greater pressure on formal and informal care networks.

This leads to a compounding cycle: as overburdened healthcare systems shift more responsibilities onto family caregivers, those caregivers become overwhelmed and require more professional support, further straining the system. The gap between need and capacity continues to widen, demanding technological interventions that can meaningfully reduce pressure on both professional and family caregivers.

Why Many AgeTech Solutions Fail

The Single-User Fallacy

Traditional user-centered design methodologies assume one primary user whose needs can be identified and addressed. For populations experiencing cognitive impairment, this assumption can lead to mismatches between the technology and the realities of care.

Cognitive function fluctuates dramatically both daily and over time. Someone may have good days where they can prepare meals and manage appointments independently, followed by difficult days where they struggle with basic tasks. This variability means that solutions designed for peak function will fail during decline periods, while solutions designed for worst-case scenarios may feel patronizing during better periods. In addition, anosognosia, a common symptom where individuals are unaware of their cognitive limitations, means that direct user interviews often fail to identify actual needs. A person with memory problems may insist they don't need medication reminders because they're unaware of their memory loss.

Perhaps most critically, care decisions in cognitive impairment contexts are rarely made by individuals alone. Family members, healthcare providers, and sometimes facility staff all play roles in daily care coordination. Technology that ignores these interconnected relationships will struggle to integrate into existing care patterns and may create additional burdens.

The Limits of Technology-First Innovation

Despite rapid growth in the AgeTech sector, many solutions continue to fall short in real-world settings. Industry analyses and expert reviews point to recurring failure patterns rooted in technology-first development approaches that overlook the lived realities of older adults (The Gerontechnologist, 2023; AgeTech Collaborative, 2024).

A common issue lies in interfaces that rely heavily on executive function, memory, and sustained attention: cognitive abilities that are often diminished in individuals living with dementia or related impairments. In practice, these tools often prioritize monitoring and data collection for caregivers, while offering little active support or autonomy to the older adult. The result is a growing class of technologies that may be impressive in demos, but ultimately fail to meet the needs of their intended users.

This disconnect is further reinforced by the industry's emphasis on advanced features like voice control, artificial intelligence, and sensor-driven automation, tools that may work well for younger or neurotypical users but often introduce barriers rather than solutions for those with cognitive challenges.

Addressing this gap requires a fundamental shift in design thinking. Effective cognitive impairment technology must account for the needs of three distinct user groups: the older adult, their family caregivers, and healthcare professionals. Each stakeholder brings unique perspectives, expectations, and constraints that must be reconciled from the very beginning of the design process to ensure usability, relevance, and long-term adoption.

Designing Cognitive Support Technologies: A Three-Pillar Framework

Effective cognitive impairment technology must simultaneously serve three distinct user groups: the older adult, the family caregiver, and healthcare professionals. Each brings unique needs and constraints that must be reconciled in the design process.

Designing for three distinct user groups requires engaging each of them in conversations about the same challenges. Through our pilot programs, we've learned that conducting these parallel dialogues not only uncovers the specific needs of each group but also reveals the complex relationships and interdependencies between family members and professional care teams.

Older adult with cognitive impairments

Faces difficulties with memory, planning, and orientation.

Needs support with daily tasks like medication and appointments.

Designs must empower them through all cognitive stages.

The family caregiver

Bears emotional and physical burden of care.

First to find workarounds to support their loved one.

Needs tools that reduce stress, save time, and integrate naturally.

The healthcare professional

Must balance efficiency with high-quality care.

Needs tools that support caseloads and clinical demands.

Designs must align with healthcare system workflows.

Evidence from Real-World Implementation

A pilot program conducted in collaboration with a regional public care service in Montreal explored how technology can be meaningfully integrated into existing care workflows. The team was facing increasing demand for daily medication reminders, often requiring multiple in-person visits per day, while navigating limited staffing capacity.

To address this, 50 participants with mild to moderate memory challenges, living independently or with a spouse, were equipped with the Idem Smart Clock. These individuals were receiving multiple visits for the sole purpose of administering medications. By introducing a simple, connected reminder system, the goal was to reduce reliance on staff visits for routine tasks while maintaining autonomy and safety. The initiative not only reduced the demands placed on care teams but also reinforced participants' independence.

Follow-up data showed high levels of medication adherence, strong caregiver satisfaction, and measurable reductions in care demands, setting the stage for a scalable, cost-effective model of support.

Several implementation elements proved essential for these positive outcomes:

- Nurse-led setup and training ensured proper installation and initial user education.
- Escalation protocols automatically notified nurses when reminders went unacknowledged, maintaining safety without requiring constant monitoring.
- Regular monthly check-ins allowed nurses to optimize system settings as user needs changed, demonstrating the importance of ongoing professional involvement rather than one-time technology deployment.

These factors highlight that successful cognitive impairment technology requires integration with existing care systems rather than replacement of human support.

Key factors for success

Understanding Your Users and Their Relationships

Successful implementation begins with comprehensive stakeholder identification. Decision-makers and influencers often include adult children living at a distance, multiple healthcare providers, and facility administrators. Understanding communication patterns and dependencies among these stakeholders prevents later implementation obstacles.

Planning for Change Over Time

Effective technology deployment requires understanding not just current cognitive status but also the trajectory of decline and remaining capabilities that can be leveraged. Executive function, memory, and attention abilities each decline at different rates and impact technology use differently

Comprehensive assessment guides both initial setup and long-term adaptation planning. Planning for a decline trajectory helps prevent technology abandonment as cognitive abilities change over time. Systems designed with progressive simplification and multiple ways to interact, such as touch, audio, or visual cues, can evolve alongside users instead of becoming obsolete. This approach requires an initial investment in adaptive features but significantly increases long-term value and user satisfaction.

For example, Idem's smart clock offers four modes of communication (notes, reminders, messages, and events), allowing caregivers and healthcare professionals to adjust how information is delivered as needs evolve. In the early stages of cognitive decline, a reminder for medication may prompt the older adult to press "I understand," actively confirming reception. As interaction becomes more difficult, the same message can be sent as a sticky note that remains visible on the screen without requiring any response, reducing cognitive load while preserving clarity. Similarly, optional text-to-speech functionality ensures that information remains accessible even as reading ability declines, allowing the system to remain supportive through all stages of use.

Working with Healthcare Teams

Technology integration cannot succeed without healthcare provider buy-in and participation. This means engaging care teams directly, meeting with them to understand their daily realities, identify pain points, and collaboratively brainstorm solutions. This early involvement builds trust and ensures the technology responds to actual clinical needs rather than theoretical assumptions.

Professional training is also essential to support proper deployment and long-term use, while thoughtful workflow integration prevents the technology from becoming an added burden. Finally, continuous feedback loops between care teams and technology systems enable ongoing improvements, reinforce engagement, and ensure the technology remains a relevant and reliable part of care delivery.

What This Means for Healthcare Systems

Return on Investment

Building on the Montreal pilot described earlier, further analysis demonstrated the financial and operational impact of integrating the Idem Smart Clock into home care workflows. Over a 7-month period, the clocks enabled the avoidance of 6,365 home visits for medication administration, averaging 40 visits avoided per device per month, and resulting in direct savings of approximately CAD $10,000 per participant annually.

Beyond cost savings, the intervention generated indirect benefits, including fewer emergency interventions, reduced morning care peaks, and improved well-being for family caregivers.

These results highlight the opportunity for simple, scalable technologies to relieve pressure on the healthcare system by enabling a more strategic allocation of resources, shifting professional time away from routine tasks toward higher-value, person-centered care. As non-clinical responsibilities are supported digitally, healthcare professionals can redirect their time toward care activities that require empathy, clinical expertise, and human connection, increasing the number of individuals they can support while also improving care quality and workforce satisfaction.

The Future of Care

The growing population of older adults with cognitive impairment presents challenges that cannot be addressed through traditional healthcare scaling alone. Technology offers significant potential to bridge care gaps, but only when designed with a deep understanding of cognitive impairment's complexity and the interconnected nature of care relationships.

Success requires moving beyond technology-first thinking toward approaches grounded in real human needs and capabilities. The people we serve deserve solutions that honor their dignity while providing practical support. Their families deserve tools that genuinely reduce worry and burden. Healthcare professionals deserve systems that make their important work more effective and satisfying.

Designing effective solutions requires close collaboration between product designers, healthcare professionals, and the families navigating cognitive challenges every day. The demographic trends are undeniable, the need is pressing, and the opportunity to create meaningful impact is real—*but only if we approach this work with the rigor, empathy, and real-world focus our aging population deserves.*

About Idem

At Idem, we are committed to improving the quality of life for older adults living with cognitive impairment and the caregivers who support them.

Our mission is to help individuals maintain their independence, live with dignity, and stay connected to those who matter most.

Our first product, the **Idem Smart Clock**, is already helping thousands of families. It supports people living alone, with a spouse, in senior residences, or long-term care. By clearly displaying the time and date, the clock helps users stay oriented. Paired with a mobile app, it enables caregivers to send personalized reminders, appointments, messages, and photos, making communication simple and meaningful.

For older adults with mild cognitive impairment living at home, the clock provides gentle reminders to take medication, prepare for appointments, or complete daily tasks. These prompts reduce reliance on outside support and allow individuals to remain independent longer. In long-term care, the clock serves as a tool for connection and well-being, helping residents stay in touch with loved ones through messages and photos. Families often share how it brings peace of mind.

Building on this success, we developed the Idem Connected Pill Dispenser to address one of the most complex caregiving challenges: ensuring safe and timely medication adherence. While the clock provides essential reminders, the pill dispenser adds automated delivery and real-time confirmation. Currently being piloted, the dispenser is designed to work seamlessly with the Idem app and clock. Caregivers can schedule doses remotely, receive alerts, and rest assured, without needing to be physically present. Together, the clock and pill dispenser form a simple, scalable system designed to promote independence while relieving pressure on caregivers and the healthcare system alike.

Learn more at idem.care