





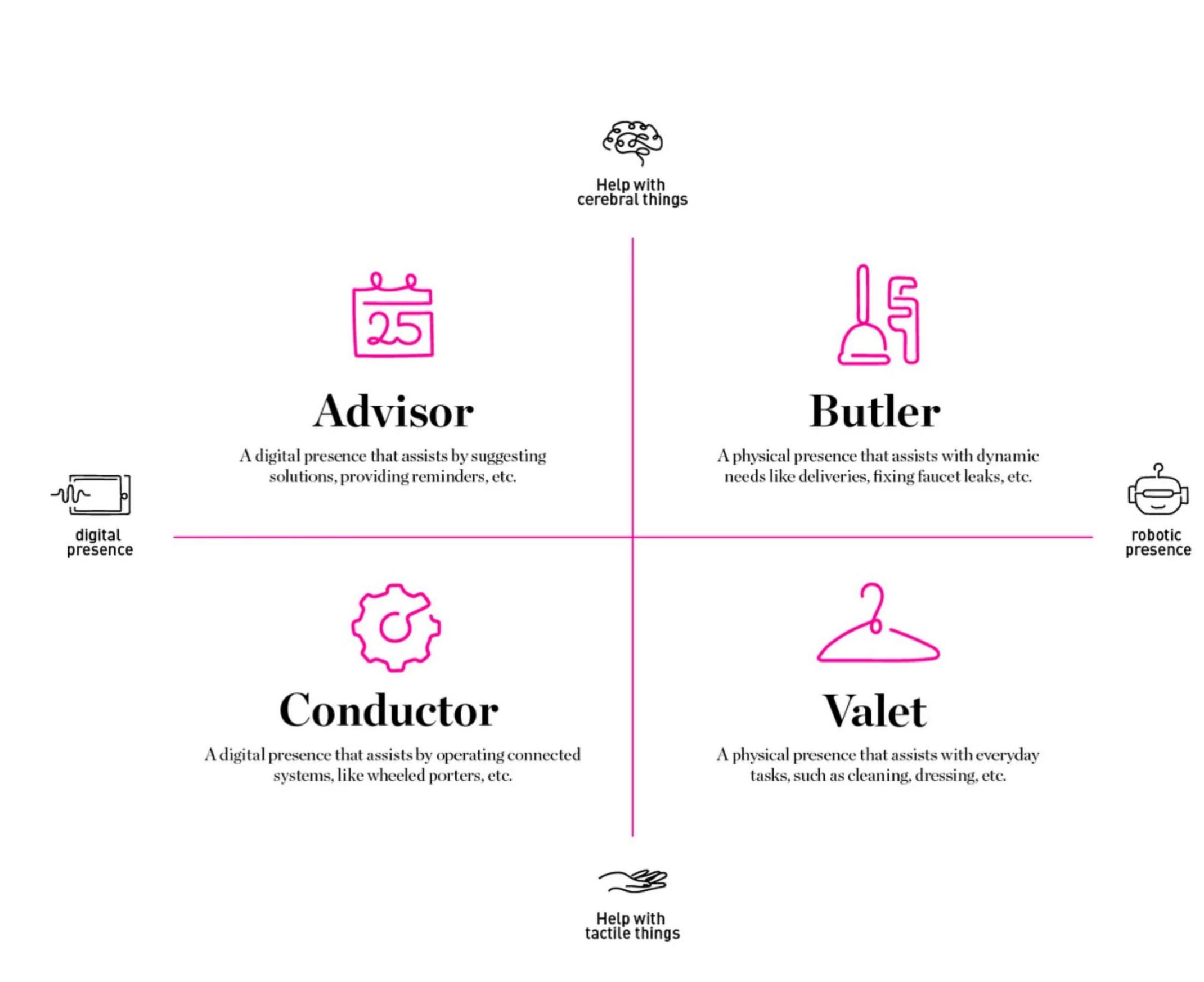
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Most of us want to remain in our existing homes as we grow older. The practice of "aging in place" aligns with preferences for familiar places and routines and preserves our sense of independence. These preferences, though, raise questions about what support seniors want and need in their current homes. Japan has advanced the use of robotics specifically for this purpose, with mixed results. Despite these early results, the continued development of robotics and artificial intelligence (AI) to assist those aging in place seems obvious. What's less obvious is how seniors foresee AI and robots living alongside them and what specifically they envision these things doing.

To begin answering these questions, the Massachusetts Institute of Technology (MIT) and Teague developed a preliminary conceptual framework for understanding the future of AI and robotics in older people's homes. We then used that framework to explore the aspirations—and concerns—of this population through semi-structured interviews with the MIT AgeLab's research cohort of seniors. The result is a landscape view of potential future AI forms along with the key considerations we'll need to account for when designing them.

From brains to muscles, digital voices to physical forms.

The x-axis of the conceptual framework distinguishes between digital and physical presences of future Als in the home, while the y-axis differentiates between cognitive capabilities and tactile proficiencies. In other words, the left side of the framework features digital-only Als, the right side of the framework features Al-powered robots, and the bottom of the framework is extra muscle for help with more tactile things while the top of the framework is extra brain power for help with more cerebral things.



Altogether, this conceptual framework outlines four major archetypes: an Advisor AI, a Butler Robot AI, a Conductor AI, and a Valet Robot AI. Here's what those archetypes would do for future seniors at home, along with essential feedback from present-day seniors.

Advisor AI

A digital presence that suggests solutions to problems, surfaces opportunities, and helps its person remember to do things. Examples: the AI helps verify the veracity of an unfamiliar communications like scam phone calls; identifies activities of interest and assists in planning how to participate; offers timely reminders to take medications, and prompts calls to friends and family members on their birthdays.

What seniors think

Thanks to established assistants like Amazon's Alexa and Apple's Siri, seniors say they're already familiar with this form of AI, both inside and outside their homes, and can easily anticipate its further evolution. Moving forward, though, seniors want more from the Advisor archetype. They want the Advisor to go beyond pragmatic help with reminders about daily life and grow into helping them with their social well-being. This will mean providing actionable support with emotional concerns, especially social isolation, by surfacing and facilitating a senior's human connections.

Butler Robot AI

A physical presence that attends to its person by assisting with dynamic needs, such as deliveries, health and hama manitarine Evamplas the Almahat lifts a delivery from the parch to the favor assists in turnine off the water at the source of a leak in the kitchen; renders assistance—and summons help, if needed—in the event of a fall.

What seniors think

Due to the confluence of connected personal devices like smartwatches and earbuds with connected home devices such as smart thermostats and automated lighting, seniors believe there are increasingly complex interactions between their bodies and their homes. So, they see how an AI robot helping to manage these complexities could reduce their cognitive load. They also acknowledge, though, that this form of AI in the home is far from simple in its creation and requires a lot of features and expansive capabilities. Just like a human butler, here there's a distinct possibility of robots just for rich people, which will require breakthroughs in manufacturability and new business models to avoid.

Conductor AI

A digital presence that operates connected systems of modules such as wheeled porters and object lifters. Examples: the AI responds to voice commands to transport meals from the kitchen to the living room with a wheeled porter; elevates an adjustable-height table adjacent to the dryer to ease folding clothes; summons an autonomous vacuum to address a spill.

What seniors think: This is a challenging archetype for seniors to conceptualize in their homes since it exists the farthest away from any present-day solutions. Nonetheless, they're compelled by the prospect of an overarching, digital administrator of a set of modular, task-driven devices. Perhaps because it's the least familiar to them in terms of having existing corollaries, seniors are less confident in speculative interactions with this archetype because an AI with a lot of control must earn a lot of trust. At the same time, they see this form of AI as capable of adapting to their changing physical needs as they age simply through the addition of new connected devices. This will mean creating sets of modules that can be added and subtracted, potentially through subscription models.

Valet Robot AI

A physical presence that attends to its person by helping with everyday tasks, such as cleaning, dressing, and grooming. Examples: the AI robot replaces a light bulb in high-ceiling recessed lighting; helps a person put on their socks and pants; cleans everyday surfaces such as kitchen and bath countertops, and dusts bookshelves and framed prints.

What seniors think

Seniors equate the possibilities of this form of AI in the home with early home robots such as iRobot's Roomba vacuum. While the focus of this archetype is on "everyday" tasks that include common housecleaning (vs. the "dynamic" tasks of the Butler Robot AI archetype), it also includes help with everyday personal tasks like dressing and grooming. Interestingly, here seniors have some concerns about this form of AI helping in ways that bring it into *physical* contact with their bodies. This will require forms of this AI that are aesthetically compatible with seniors for such personal interactions.

An imperfect framework.

As a landscape view of potential future AI forms in the homes of seniors, the conceptual framework and its four archetypes reveal some inherent blurriness across its vectors. For example, the aforementioned hazy boundary between a Valet Robot AI focused on helping with everyday tasks like putting on socks versus a Butler Robot AI focused on helping with more irregular events like addressing a faucet leak. Or, similarly, the indistinct gap between an Advisor AI, which is meant to serve as an auxiliary *brain*, and a Conductor AI, that could also be perceived as an auxiliary brain even though its domain is all about managing auxiliary *muscle*. Still, the preliminary framework is helpful in mapping both plausible and preferred futures for seniors aging in place through support from many different forms of artificial intelligence and robotics. It's also helpful in revealing the human-centered design considerations we'll need to make when developing them.

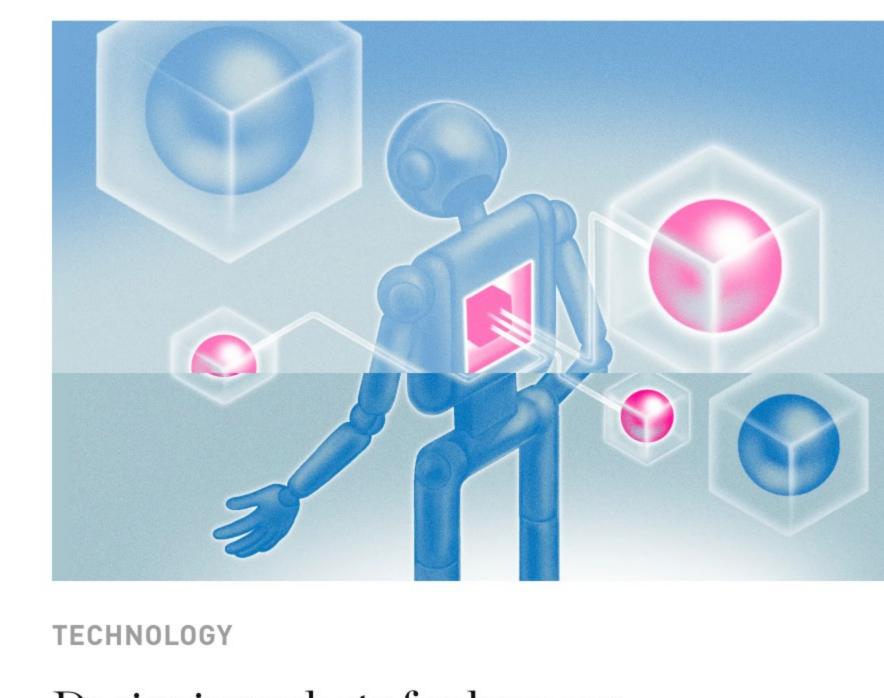
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