Towards Trustworthy AI-assisted Planning of Art-based Technology Interventions in Residential Aged Care

A Conceptual Framework

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This poster proposes a human-governed research framework for using AI to assist Art-Based Technology planning in residential aged-care environments supporting people living with dementia, without handing over therapeutic, cultural, aesthetic, safety or rights-based decisions to AI.

THE AGED CARE DESIGN PROBLEM

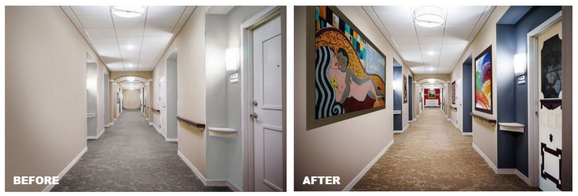
The starting point is the environment, not AI

- Residential aged care, including dementia care environments, has inherited outdated clinical and institutional facilities, as well as newer hotel-style interiors that have not consistently improved well-being, reduced behavioural distress or more sustainable costs [1].
- The 2024 Aged Care Design Principles and Guidelines support home-like design, way-finding, intuitive objects and artworks as landmarks, simple circulation, distinctive routes, fewer dead ends, discreet locked/staff-only doors, distinctive toilet doors and legible shared destinations [2].
- The 2025 Strengthened Aged Care Quality Standards add dignity, individuality, diversity, independence, choice, control and safety [3].
- The challenge is translating these aims into coherent facility-wide visual systems while aged care is also asked to innovate and attract investment [4].

WHAT ARE ART-BASED TECHNOLOGIES?

ABTs make the environment part of everyday care

- ABTs are Neuro-aesthetically informed visual and sensory interventions that integrate artistic elements with technology to enhance well-being, behavioural orientation and spatial navigation [5].
- Neuro-aesthetics examines how brains process and respond to art, beauty, music and nature, and how these sensory inputs influence emotion, physical well-being and health [7].
- In this use, technology means a systematic, reproducible way of designing and embedding landmarks, intuitive signage, personalised room-door treatments, destination imagery and environmental graphics [5,6].
- ABTs help residents read where they are, where they are going, what belongs to them and which destinations are meaningful; in this way, spaces become part of everyday care [8-11].



Example of a human-designed deployment of Art-based Technologies



Examples of ABT intuitive signage

WHY AI-ASSISTED ABT PLANNING?

Because of a bottleneck.

The bottleneck is that ABT assessment and specification still require specialist artist/designer expertise, implementation capability and financial resources [5,11]. This conceptual framework asks whether AI-assisted tools could support measurable parts of ABT planning without delegating therapeutic, cultural, aesthetic, safety or rights-based judgements to AI. AI may assist with corridor length, seating intervals, landmark placement, route complexity, cue density, tonal contrast, exit visibility and visual clutter. However, AI has not been shown to independently evaluate emotional tone, beauty, dignity, cultural meaning, perceived materiality or dementia-informed artistic judgement [12–15].

While machine learning has been applied to dementia-friendly architectural design evaluation using visual access metrics [16], this framework focuses on AI-assisted planning and proposal of multi-domain ABT interventions in existing residential aged-care facilities.

CORE CONCEPT 1: THREE CLASSES

AI may assist assessment.

Human experts retain authority.

The proposed framework separates decision-making into three classes:
Deterministic computation, probabilistic inference and human judgement.

CORE CONCEPT 2: SIX PHASES

It also proposes six assessment phases: spatial mapping, way-finding and orientation, stimulation balance, tonal contrast and visibility, materiality, and risk/restricted access.

These phases preserve human review where mobility, local use patterns, cultural meaning, safety, materiality or therapeutic suitability may affect the decision [21–24].

Human-in-the-loop review is therefore not an optional final layer. It is the safety mechanism that confirms, modifies or vetoes AI-assisted recommendations.

THE VALIDATION PATHWAY

Evaluation must precede claims.

The proposed research pathway is to validate whether AI-assisted assessment can make ABT planning more consistent, timely and cost-effective by comparing AI-assisted outputs with expert review, safety review and later post-installation outcome evidence, consistent with health-AI governance principles of transparency, accountability, privacy, human autonomy and risk management [17–20].

AI may assist with measurable environmental assessment, but therapeutic, cultural, aesthetic, safety and rights-based authority must remain with human experts. This preserves the human and artistic intelligence required for therapeutic residential aged-care environments.

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