Impactful Design is Always an Intervention

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Our Agenda

1. Historical basis of healthcare design's influences
2. The built environment as a dimension of care
3. Review architecture's journeys related to wellbeing
4. Emerging ethical and legal decision frameworks
5. …the Money Talk

Project: *UW Medicine, Center for Behavioral Health and Learning, Seattle, WA, SRG + CannonDesign*

"On the night of May 10, 1941, with one of the last bombs of the last serious raid, our House of Commons was destroyed by the violence of the enemy, and we have now to consider whether we should build it up again, and how, and when.

We shape our buildings, and afterwards our buildings shape us.

Having dwelt and served for more than forty years in the late Chamber, and having derived very great pleasure and advantage therefrom, I, naturally, should like to see it restored in all essentials to its old form, convenience and dignity."

- Winston Churchill (1943 to House of Commons)

Source: *Churchill, Winston. UK Parliament, 28 October 1943. Open Parliament License, https://api.parliament.uk/historic-hansard/commons/1943/oct/28/house-of-commons-rebuilding. Accessed 1 Sep 2025*

Historical Perspective

- *wounds*
- *other causes*
- *preventable or mitigable zymotic diseases*

What was discovered and taught over the last 170 years…

DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY IN THE EAST.

2. APRIL 1855 TO MARCH 1856.

1. APRIL 1854 TO MARCH 1855.

The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.
The blue wedges measured from the centre of the circle represent area for area the deaths from Preventible or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes.
The black line across the red triangle in Nov.r 1854 marks the boundary of the deaths from all other causes during the month.
In October 1854, & April 1855, the black area coincides with the red, in January & February 1855, the blue coincides with the black.
The entire areas may be compared by following the blue, the red & the black lines enclosing them.

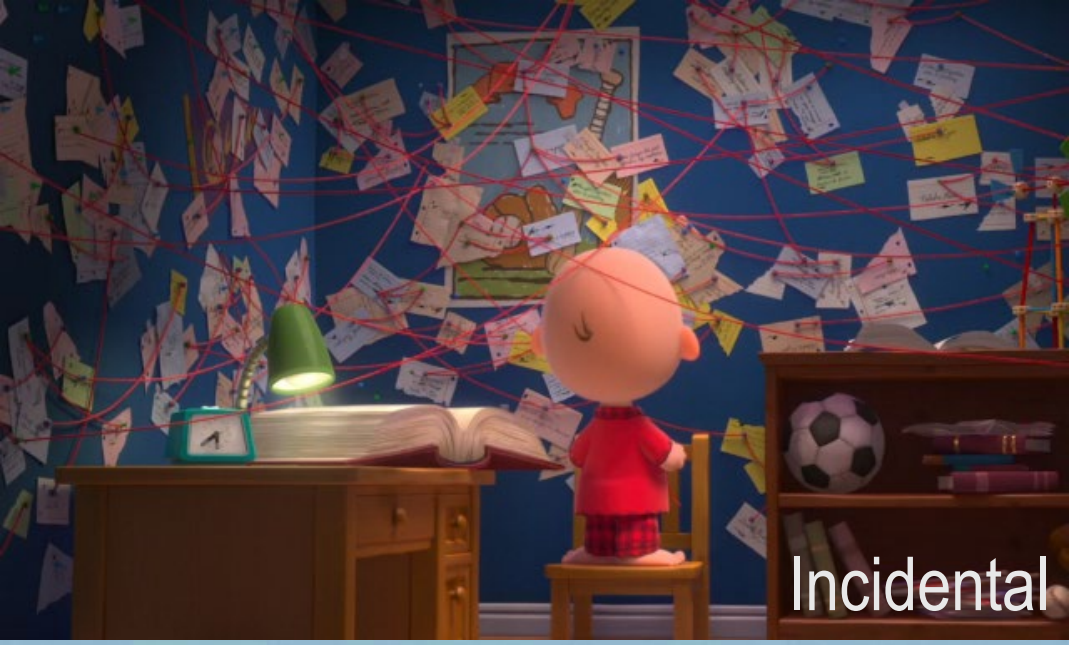
Harrison & Sons, St. Martin's Lane.

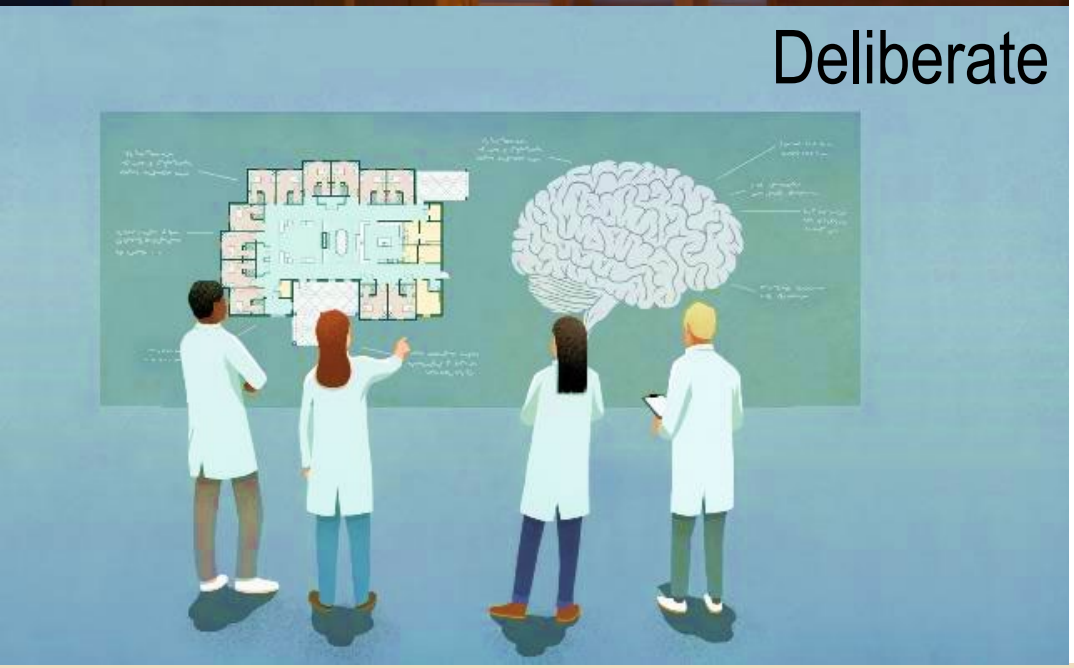
Sources: Nightingale, Florence. Diagram of the Causes of Mortality in the Army in the East. Notes on Matters Affecting Health, Efficiency, and Hospital Administration of the British Army. pg. 311. Harrison & Sons, London, 1858. https://archive.org/details/b20387118/page/n7/mode/2up. Accessed 19 Sep 2024

Historical Perspective

…was never really learned.

Project: Javits Center Coronavirus Field Hospital; New York NY; U.S. Army Corps of Engineers





Our understanding of the role the environment plays in shaping us and our interactions has expanded immensely. Researchers have examined the profound effect social and environmental factors can have on behavior, operational effectiveness, decision-making, and health outcomes.

Yet, design choices in the built healthcare environment raise substantive bioethical issues that demand the attention of bioethicists and ethical inquiry.

All participants in a building project are conducting ***human-subjects research with impunity****.*

The built environment must be considered alongside other parameters of care.

Source: *Anderson D, Teti S, Hercules W, Deemer D. "If Architecture Influences Health Outcomes, How Should Healthcare Systems Respond? Bioethics at the Frontier of the Science of Design". Harvard Medical School Center for Bioethics; Organizational Ethics Consortium. Cambridge MA. 20 Jan 2023. https://www.youtube.com/watch?v=8g8VsimJGis.*

Sources:

Anderson, D. Hercules, W., Teti, S, The Bioethics of Built Health Care Spaces. Hastings Center Bioethics Forum Essay, https://www.thehastingscenter.org/the-bioethics-of-built-health-care-spaces/ 13 Jan 2021. Accessed 29 Aug 2024.

Hercules W, Anderson D, Teti S, Deemer D. Architecture and bioethics. Health Facilities Management Magazine. https://www.hfmmagazine.com/articles/4380-exploring-the-links-between-architecture-and-bioethics. 5 Feb 2022. Accessed 29 Aug 2024

Anderson, Diana; Teti, Stowe-Locke; Hercules, William; Deemer, David. "The Bioethics of Built Space: Healthcare Architecture as a Medical Intervention". Hastings Center Report. Online. 28 Apr 2022. https://www.thehastingscenter.org/centerreports/the-bioethics-of-built-space-health-care-architecture-as-a-medical-intervention/.

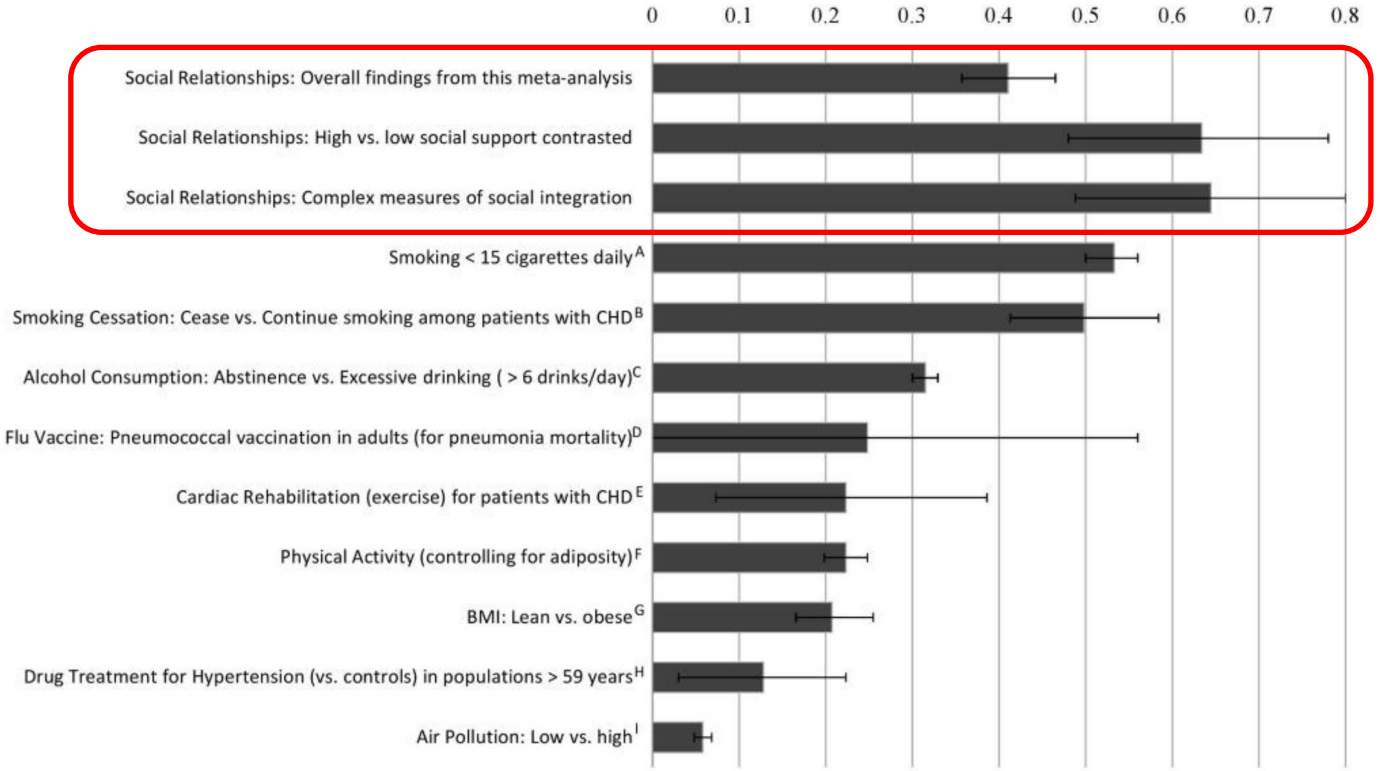
Anderson DC, Teti SL, Hercules WJ, Deemer DA. The Bioethics of Built Space: Health Care Architecture as a Medical Intervention. Hastings Cent Rep. 2022 Mar;52(2):32-40. doi: 10.1002/hast.1353. PMID: 35476356. Accessed 29 Aug 2024.

Deemer, David; Teti, Stowe-Locke; Hercules, William; Peavey, Erin; Wong, Jocelyn; Anderson, Diana. "How Should Organizations Be Held Accountable for Promoting Environments That Foster Social Connection?". American Medical Association Journal of Ethics. 2023;25(11):E825-832. doi: 10.1001/amajethics.2023.825.. Online. 1 Nov 2023. https://journalofethics.ama-assn.org/article/how-should-organizations-be-held-accountable-promoting-environments-foster-social-connection/2023-11. Accessed 19 Sep 2024.

Greenwall Foundation. 2024 Bridging Bioethics Research & Policymaking Grant: "Improving Long-Term Care Facility Design through Bioethical Peer Review", Anderson DC, Teti SL, Hercules WJ, Deemer DA. 16 Sep 2024. https://greenwall.org/making-a-difference-grants/improving-long-term-care-facility-design-through-bioethical-peer-review?tab=project. Accessed 19 Sep 2024.

Priority of Social Connectedness:

Comparison of odds (lnOR) of decreased mortality across several conditions associated with mortality



*Note: This study has been cited **2,193 times** in scientific literature. This study remains relevant.*

Sources: Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: a meta-analytic review. PLoS Med. 2010 Jul 27;7(7):e1000316. doi: 10.1371/journal.pmed.1000316. PMID: 20668659; PMCID: PMC2910600. https://pubmed.ncbi.nlm.nih.gov/20668659/. Accessed 15 Sep 2025.

Review > PLoS Med. 2010 Jul 27;7(7):e1000316. doi: 10.1371/journal.pmed.1000316.

Social relationships and mortality risk: a meta-analytic review

Julianne Holt-Lunstad [1], Timothy B Smith, J Bradley Layton

Affiliations + expand

PMID: 20668659 PMCID: PMC2910600 DOI: 10.1371/journal.pmed.1000316

Free PMC article

Abstract

Background: The quality and quantity of individuals' social relationships has been linked not only to mental health but also to both morbidity and mortality.

Objectives: This meta-analytic review was conducted to determine the extent to which social relationships influence risk for mortality, which aspects of social relationships are most highly predictive, and which factors may moderate the risk.

Data extraction: Data were extracted on several participant characteristics, including cause of mortality, initial health status, and pre-existing health conditions, as well as on study characteristics, including length of follow-up and type of assessment of social relationships.

Results: Across 148 studies (308,849 participants), the random effects weighted average effect size was OR = 1.50 (95% CI 1.42 to 1.59), indicating a 50% increased likelihood of survival for participants with stronger social relationships. This finding remained consistent across age, sex, initial health status, cause of death, and follow-up period. Significant differences were found across the type of social measurement evaluated ($p<0.001$); the association was strongest for complex measures of social integration (OR = 1.91; 95% CI 1.63 to 2.23) and lowest for binary indicators of residential status (living alone versus with others) (OR = 1.19; 95% CI 0.99 to 1.44).

Conclusions: The influence of social relationships on risk for mortality is comparable with well-established risk factors for mortality. Please see later in the article for the Editors' Summary.

Priority of Social Connectedness:

Source: *Holt-Lunstad, J.; et al.. "Our Epidemic of Loneliness and Isolation: The U.S. Surgeon General's Advisory on the Healing Effects of Social Connection and Community." Issued 3 May 2023. https://www.hhs.gov/sites/default/files/surgeon-general-social-connection-advisory.pdf. Accessed 19 Sep 2024.*

Access to Greenspace

Correlation of Epigenetic aging is ***slowed by 2.5 years*** *with regular, long-term greenspace exposure.*

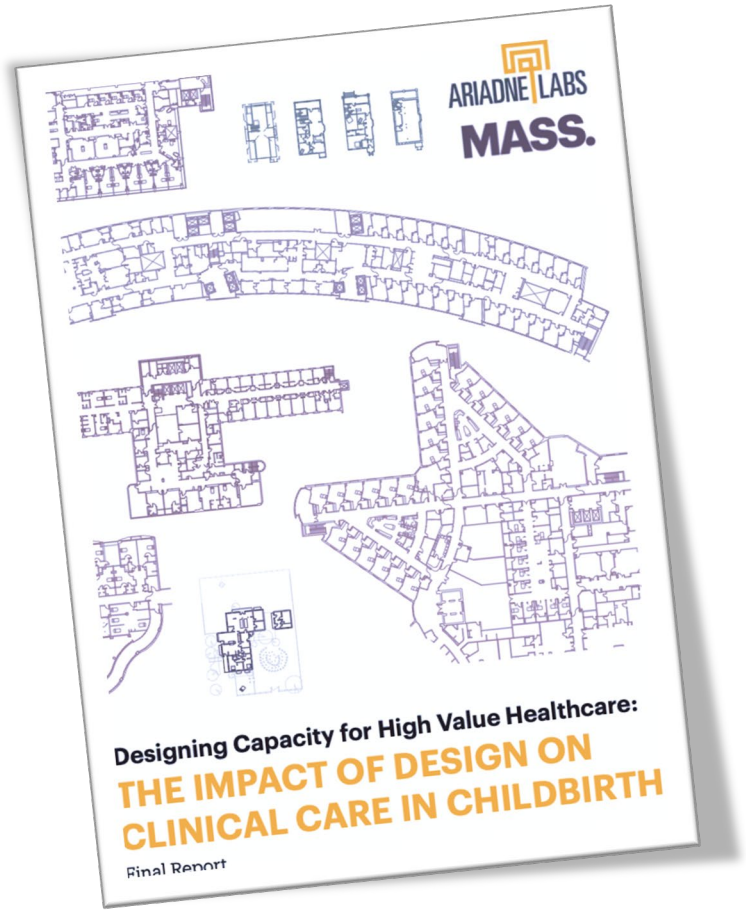
Source: Kim, Kyeezu, et al. "Inequalities in Urban Greenness and Epigenetic Aging: Different Associations By Race And Neighborhood Socioeconomic Status". Science Advances. vol.9, no.26. 28 Jun 2023 DOI: https://www.science.org/doi/10.1126/sciadv.adf8140. Accessed 15 Sep 2025.

Staff Spaces

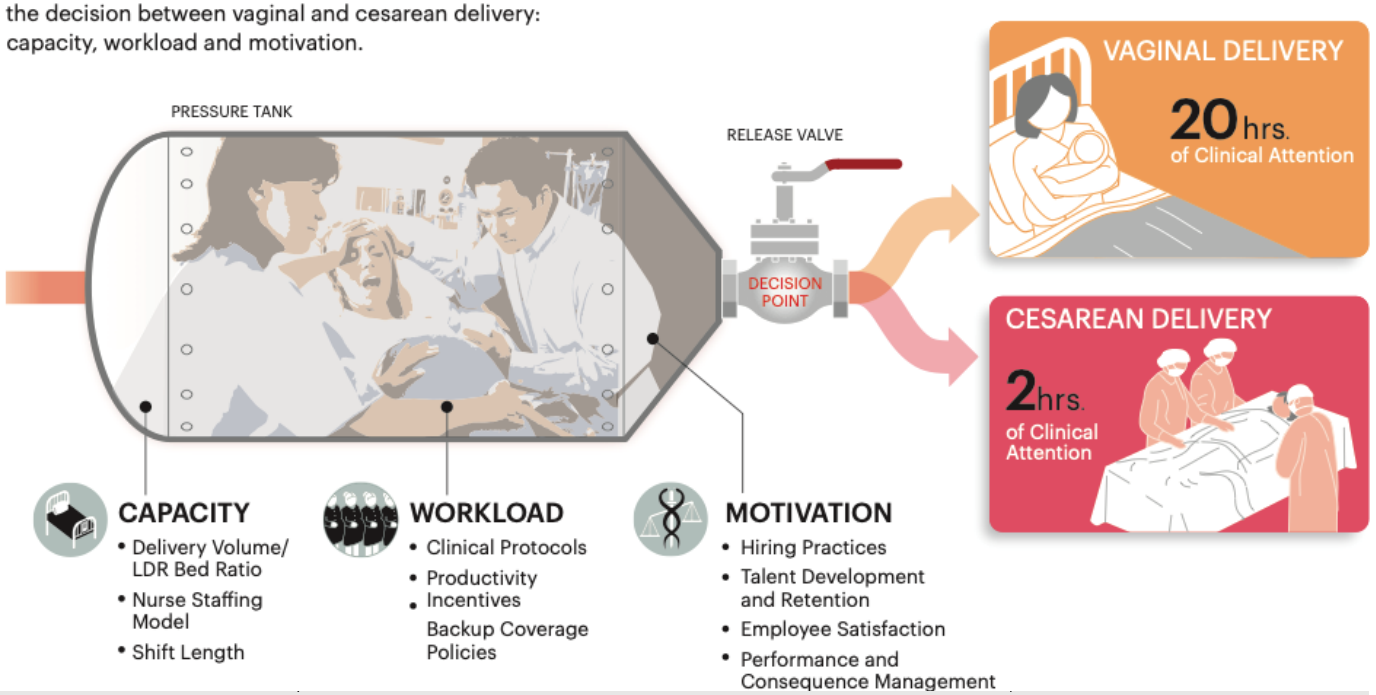
Source: *'I Cry, but No One Cares': Worrying 2023 US Physician Burnout & Depression Report". Physicians Anonymous 5 Nov 2023. https://physicianswhoanonymous.org/physician-burnout-depression-report-2023/. Accessed 16 Sep 2025.*

Image Credit: Diana Anderson

Obstetric Suite Design & Cesarean Section Rates:



In the Ariadne team's original Pressure Tank Model, developed in prior work on management of care processes in childbirth, three system factors influence the decision between vaginal and cesarean delivery: capacity, workload and motivation.



Capacity

Design elements that impact the availability of a facility to accommodate unexpected surges in patient volume or acuity.

> Room Demand: annual deliveries per labor and delivery room

> Overflow Beds: ratio of overflow beds to LDRs

> OR Access: ratio of ORs to LDRs

> Facility Size: ratio of annual delivery volume to total unit area

Workload

Design elements that impact the effort required by clinicians to deliver childbirth care.

> Distance between Patient Rooms: maximum distance between LDRs

> Distance from Workstation to Patient Rooms: average distance from nurse station to labor and delivery room

> Room Standardization: degree of standardization of LDR room interiors

Motivation & Accountability

Design elements that impact the willingness of clinicians to expend effort to deliver childbirth care.

> Collaborative Spaces: ratio of total staff area to collaborative staff spaces

> Accessibility of Call Rooms: maximum distance from call room to labor and delivery room

> Staff Support: ratio of total unit area to staff support area

Contextual & Cultural Factors

Design elements that may impact a number of other contextual and cultural factors that are not easily characterized with quantitative measurements.

> Accessibility of labor support equipment

> Prominence of technology

> Staff access to views and natural light

> Patient accessible circulation

Sources: *Hamilton BE, Martin JA, Osterman MJK. "Births: Preliminary Data for 2015." National Vital Statistics Report. Centers for Disease Control and Prevention. 2016.*

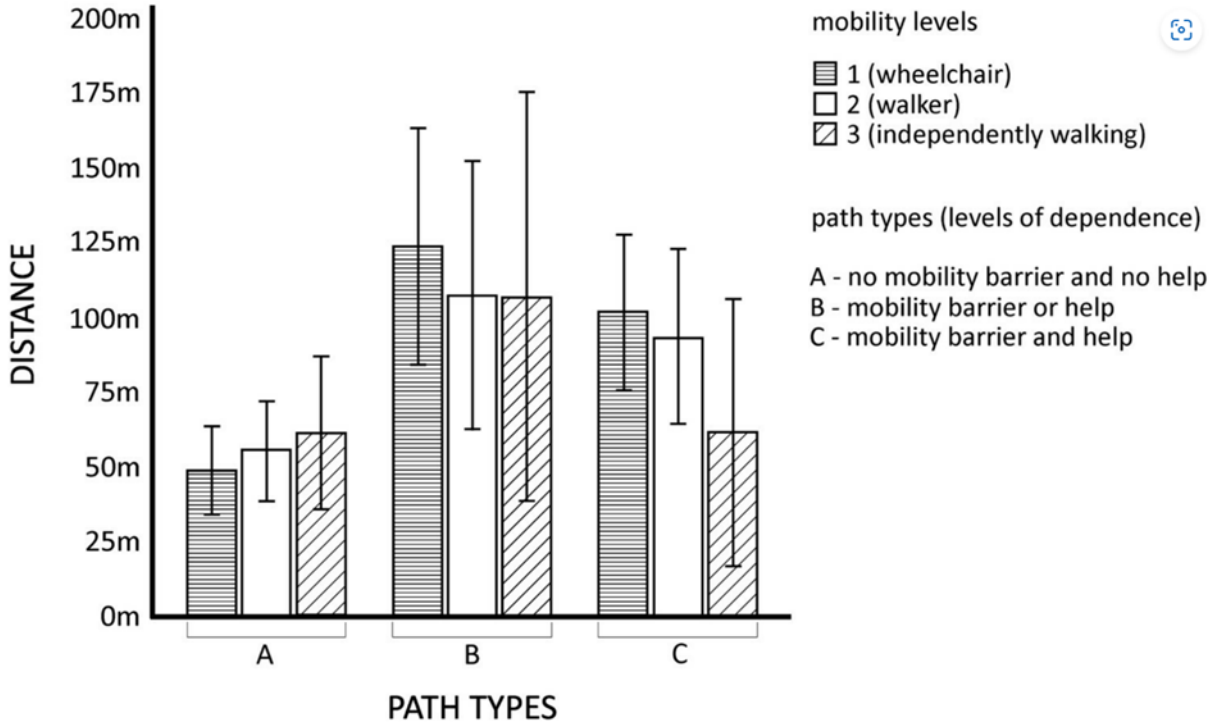
Kozhimannil KB, Law MR, Virnig BA. Cesarean delivery rates vary tenfold among US hospitals; reducing variation may address quality and cost issues. Health Affairs (Millwood). 2013 Mar;32(3):527-35. doi: 10.1377/hlthaff.2012.1030. PMID: 23459732; PMCID: PMC3615450.

Shah N, Galvin G, Plough A, Henrich N, Murphy M, Shao A, Sullivan B, Rosenberg D. "Designing Capacity for High Value Healthcare: The Impact of Design on Clinical Care in Childbirth". Ariadne Labs / Mass Design, Maternal Health Task Force at the Harvard Chan School. April 2017. https://www.mhtf.org/document/designing-capacity-for-high-value-healthcare-the-impact-of-design-on-clinical-care-in-childbirth/. Accessed 19 Sep 2024.

Stroke Rehab Patient Travel Distance

"Shorter distances were recognized as a feature that, if carefully planned, has the potential to facilitate independent mobility for all patients, even those with limited mobility."

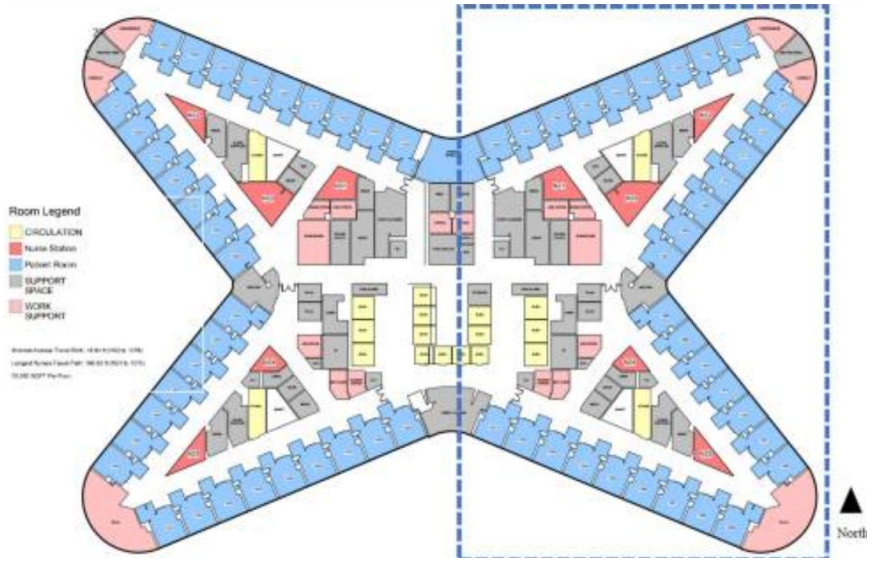
Figure 1. Effect of distance and mobility level on encountering barriers and/or needing help (General Linear Model).

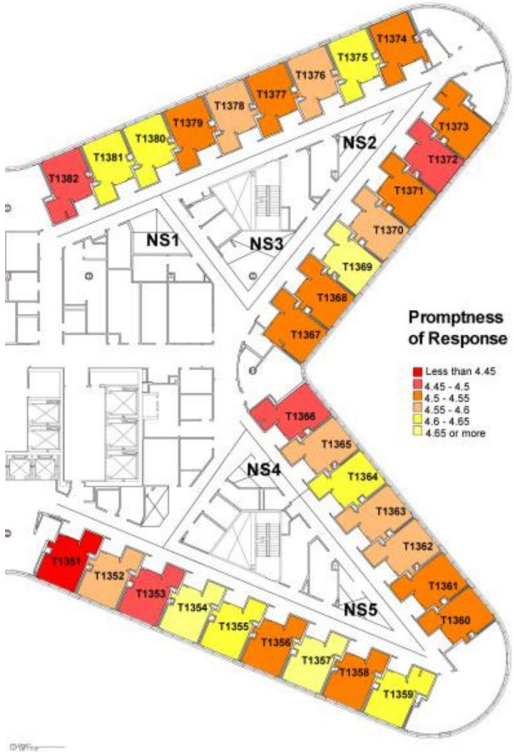


Source: Kevdzija, M., & Marquardt, G. (2021). Impact of distance on stroke inpatients' mobility in rehabilitation clinics: a shadowing study. Building Research & Information, 50(1–2), 74–88. https://doi.org/10.1080/09613218.2021.2001302; https://www.tandfonline.com/doi/full/10.1080/09613218.2021.2001302#d1e1096. Accessed 19 Sep 2024.

Perceived Nurse Call Response

"Hybrid decentralized nursing unit can provide a more optimal patient experience, with patients' perception of faster staff response to patients' requests than centralized nursing units."

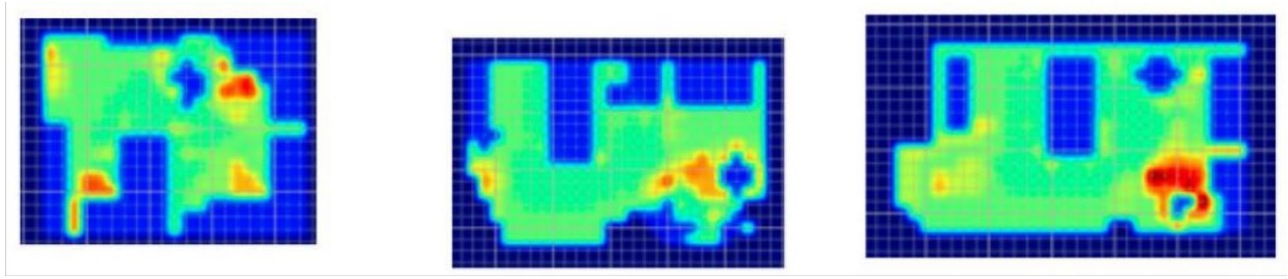




Source: Cai H, Fullam F, MacAllister L, Fogg LF, Canar J, Press I, Weissman C, Velasquez O. Impact of Inpatient Unit Design Features on Overall Patient Experience and Perceived Room-Level Call Button Response. Int J Environ Res Public Health. 2021 Sep 16;18(18):9747. doi: 10.3390/ijerph18189747. PMID: 34574672; PMCID: PMC8469244. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8469244/. Accessed 19 Sep 2024.

Patient Room as Part of a Fall Protection Strategy

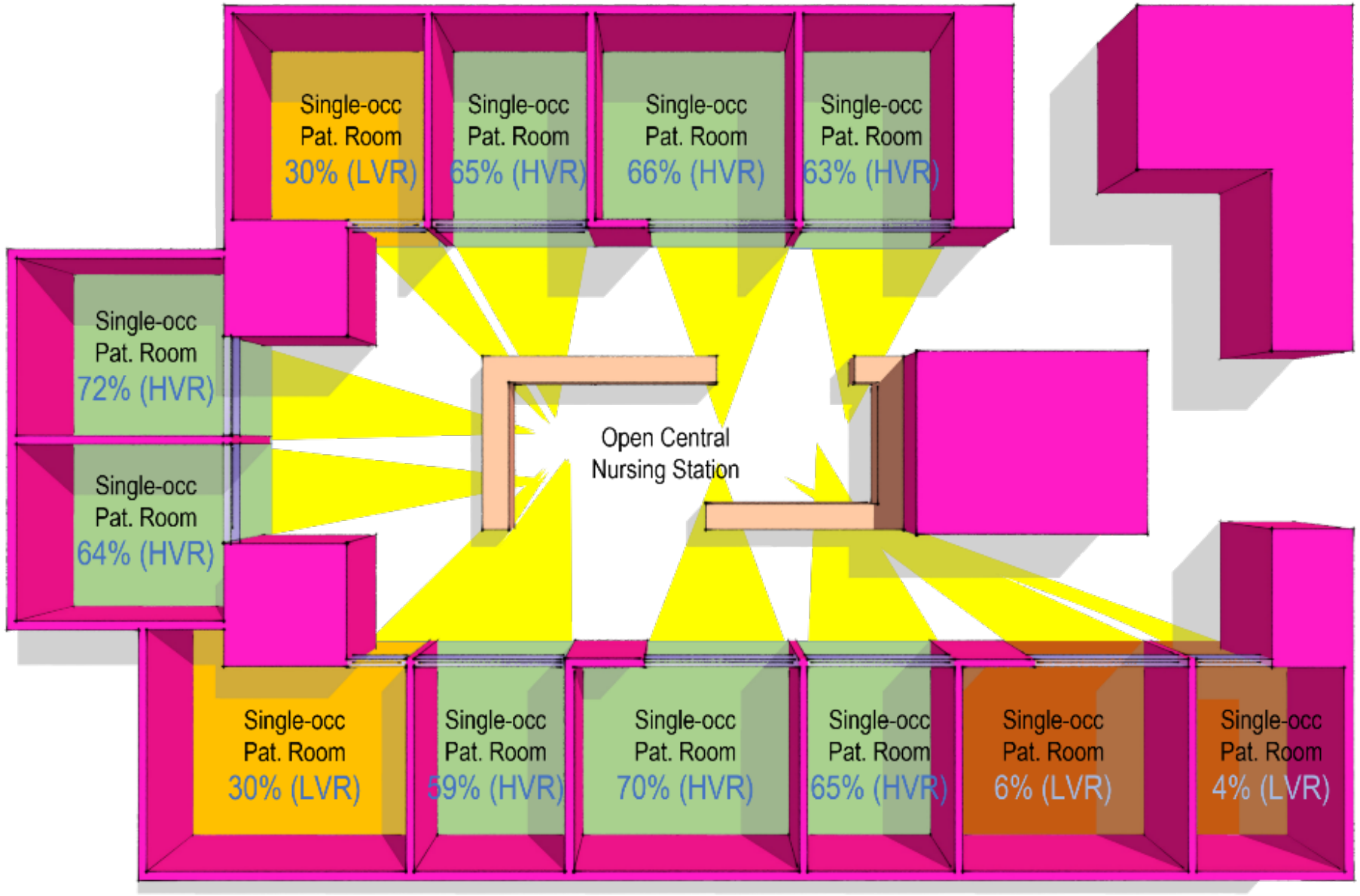
"The environment is a powerful (but often overlooked) tool in creating optimal conditions for safety, whether the patient is ambulating alone or assisted."



Source: Piatkowski M, Taylor E, Wong B, Taylor D, Foreman KB, Merryweather A. Designing a Patient Room as a Fall Protection Strategy: The Perspectives of Healthcare Design Experts. Int J Environ Res Public Health. 2021 Aug 19;18(16):8769. doi: 10.3390/ijerph18168769. PMID: 34444514; PMCID: PMC8392568. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8392568/. Accessed 19 Sep 2024.

ICU Design & Mortality Risk:

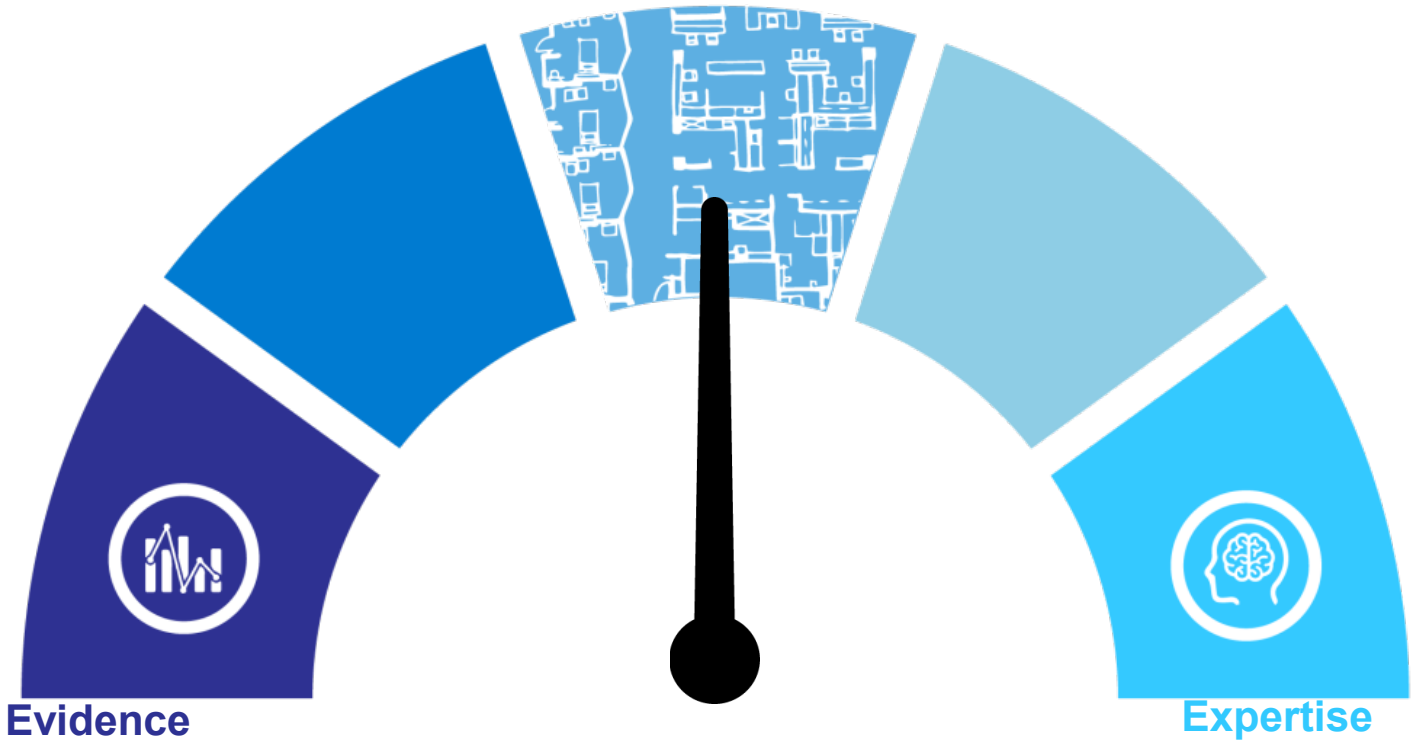
Assigning the sickest patients (APACHE >30) to a low visibility room (LVR vs HVR) resulted in a **28% *higher*** mortality rate.



Sources: *Leaf DE, Homel P, Factor PH. Relationship between ICU design and mortality. Chest. 2010 may;137(5):1022-1027. doi: 10.1378/chest.09-1458.*

Lu Y, Ossman, MM, Leaf D, Factor PH. Patient Visibility and ICU Mortality: A Conceptual Replication. Health Environments Research and Design. Volume: 7 issue: 2, page(s): 92-103.

Evidence-Based Design vs Practice-Based Knowledge



SCCM ICU Design Guideline – Visual abstract with recommendations

Theme 1: ICU Layout

- ✓✓ High visibility layout ⊕⊕◯◯
- ? Centralized or decentralized ICU charting ⊕⊕◯◯
- ✓ Single patient rooms over open-bay layout ⊕◯◯◯
- 👍 Close proximity to critical hospital areas

Theme 2: Room Design

- ✓✓ Windows and natural lighting in all patient rooms ⊕⊕◯◯
- ✓ Noise reduction strategies ⊕◯◯◯
- ? In-room and/or centralized supply areas ⊕◯◯◯

Theme 3: Infection Control

- ? Standard or advanced HVAC systems ⊕◯◯◯
- 👍 Features to prevent airborne, water-borne, and surface transmission

Theme 4: Infrastructure

- ✓ Capacity for controlling devices outside patient rooms ⊕◯◯◯
- ✓ Tele-medicine capacity ⊕◯◯◯
- ✓ Non wall-based life support utilities access ⊕◯◯◯
- 👍 Plan for surges in patient volumes

Theme 5: Staff Space

- ✓ Ergonomic designs in workspaces and patient care areas ⊕⊕◯◯
- ✓ Access to quiet rooms and respite spaces ⊕⊕◯◯
- 👍 Dedicated break rooms
- 👍 Accommodate fixed and mobile workstations

Legend

STRENGTH OF RECOMMENDATION	CERTAINTY OF EVIDENCE (GRADE)
✓✓ Strong Recommendation	⊕⊕⊕⊕ Very high
✓ Conditional Recommendation	⊕⊕⊕◯ Moderate
? No recommendation	⊕⊕◯◯ Low
👍 Best Practice Statement	⊕◯◯◯ Very low

Source: *Hamilton DK, Scruth E, Anderson HL, Cadenhead CD, Oczkowski SJ, Lau VL, Adler J, Bassily-Marcus A, Bassin BS, Boyd J, Busl KM, Crabb J, Harvey C, Hecht J, Herweijer-van Gelder M, Gunnerson KJ, Ibrahim AS, Jabaley CS, Kaplan LJ, Monchar S, Moody A, Lindeman Read J, Renne BC, Sarosi MG, Swoboda SM, Thompson-Brazill KA, Wells CL, Anderson DC. SCCM 2024 Guideline on Adult Intensive Care Unit Design. Critical Care Medicine (Accepted for publication, 2024).*

Research Trauma

Purdue (machine)	*364*
Purdue (human)	*252*
U Michigan (machine)	*411*
Swarthmore (human)	*144*
Ballarmine U (variables)	*175*
NYU (math only)	*1,000*

7X variation

Sources: *Morgan, Will. "How Many Licks to Get to the Center of a Tootsie Pop: The Real Answer!" Sporked. 23 Oct 2023. https://sporked.com/article/how-many-licks-get-center-tootsie-pop/. Accessed 19 Sep 2024*

Luthy, Michael; Carer, Patricia. "Testing the Citizen Cain of Marketing Claims: Just How Many Licks Does it Take to Reach the Center of a Tootsie Pop?" Bellarmine University; Institute for Global Business Research Conference Proceedings. Vol 4, No 2. https://tootsie.com/core/files/tootsie/uploads/files/Bellarmine_University.pdf, Accessed 19 Sep 2024

Image Credit: Doner. Detroit. 1968

Long-term Care Facility Design & Illusion

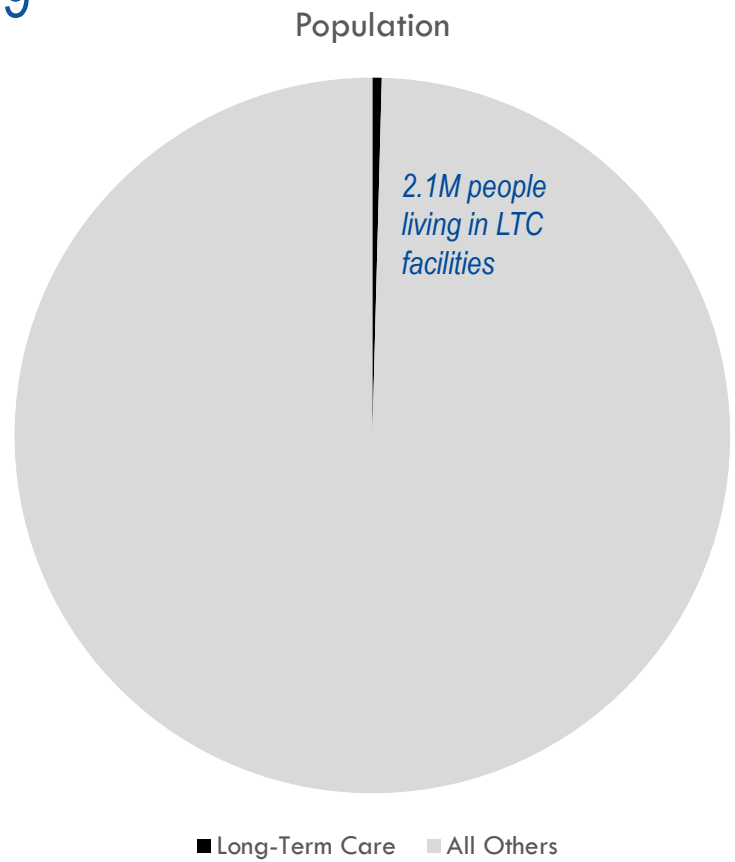
Project: De Hogeweyk, Dementia Village, Weesp, The Netherlands; Molenaar & Bol & VanDillen

Weir, Peter. The Truman Show. Paramount Pictures, 1998.

Long-term Care Facility Design & COVID Mortality:

Differential Impact of COVID-19

Small proportion of the Canadian population produced almost half of COVID deaths.

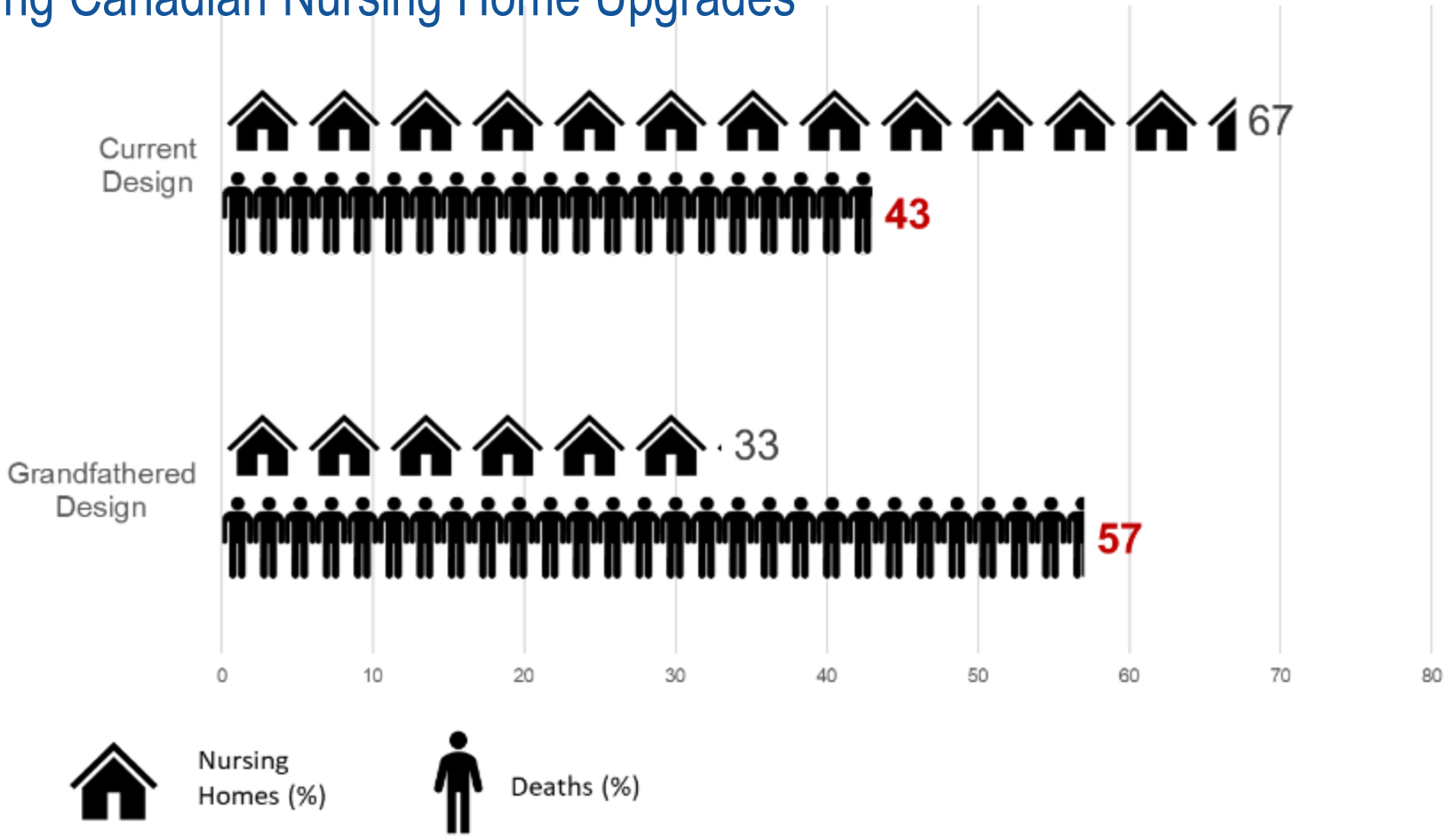


Source: Girvan G, Roy A. Nursing Homes & Assisted Living Facilities Account for 38% of COVID-19 Deaths. FreeOP. 7 May 2020. https://freopp.org/the-covid-19-nursing-home-crisis-by-the-numbers-3a47433c3f70. Accessed 19 Sep 2024.

Long-term Care Facility Design & COVID Mortality:

Deadly Cost of Delay – Comparing Canadian Nursing Home Upgrades

*Living in a Canadian nursing home grandfathered into the 1972 design standard nearly **doubled the risk of death** due to COVID-19.*



Source: Pedersen K, Mancini M, Wolfe-Wylie W. Ontario nursing homes have had 22 years to do safety upgrades. COVID-19 reveals deadly cost of delay. CBC. 9 Jun 2020. https://www.cbc.ca/news/health/covid-19-coronavirus-long-term-care-homes-ontario-1.5604009. Accessed 19 Sep 2024.

Long-term Care Facility Design & Harms:

Compare LTC fall rates of public and resident rooms based on changes in lighting:

- *between static spectrum fluorescent lamps ($0/bed)*
- *dynamically scheduled intensity and spectral variation in lighting ($1,700/bed)*

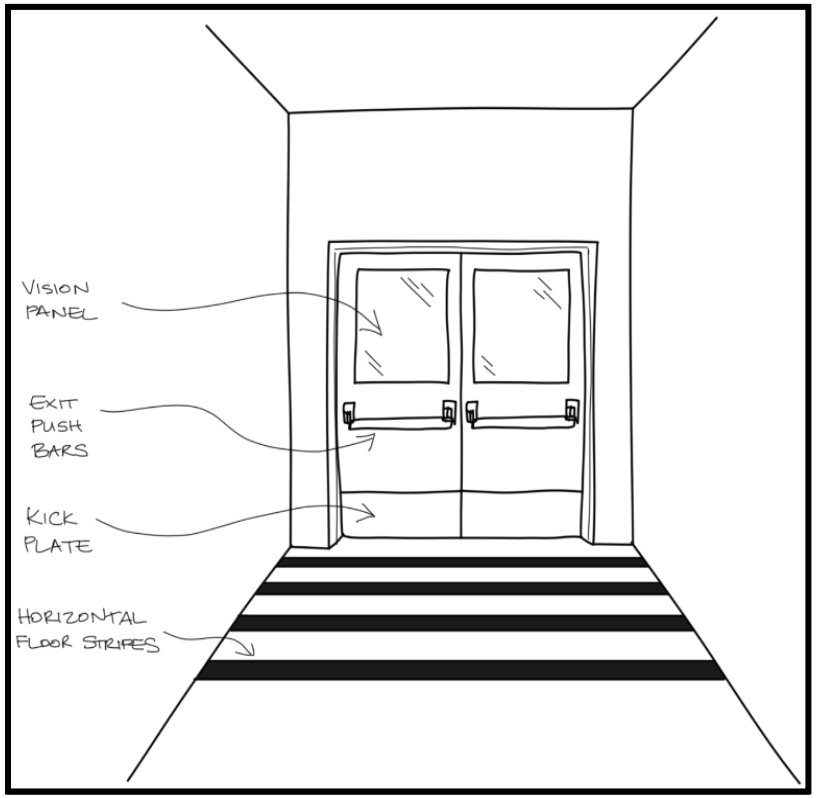
43% reduction in fall rates

Sources: Grant, Leilah; St. Hilaire, Milissa; Heller, Jenna; Heller, Rodney; Lockley, Steven; Rahman, Shadab. "Impact of Upgraded Lighting on Falls in Care Home Residents" . JAMDA: Journal of Post-Acute and Long-term Care Medicine. Vol 23, Is 10, P1698-1704, E2. October 2022. https://www.jamda.com/article/S1525-8610(22)00471-6/fulltext. Accessed 24 Jul 2025.

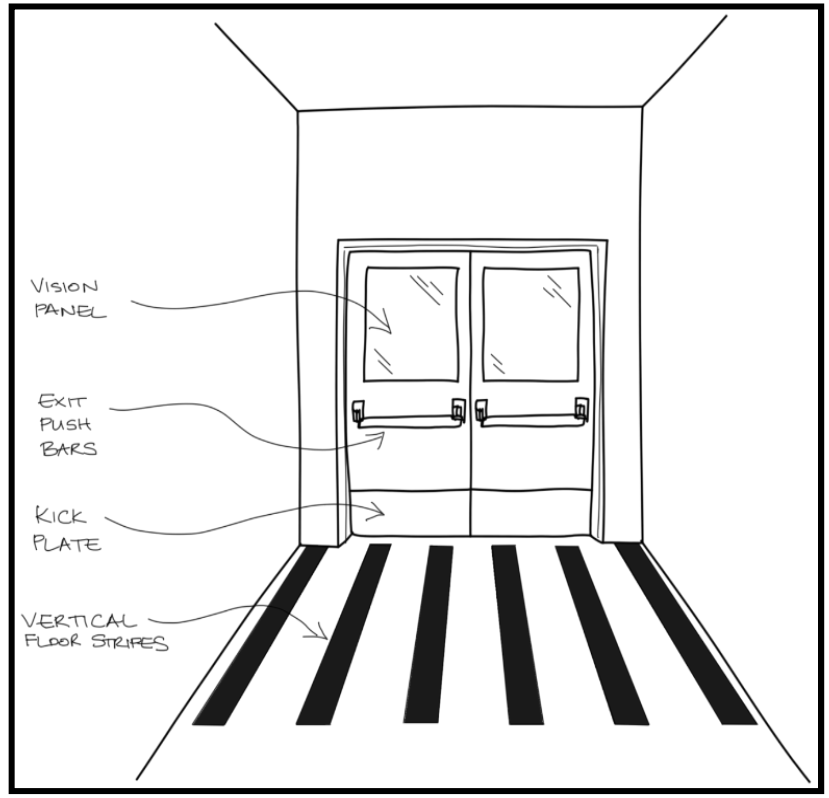
Image Credit: The Lighting Practice. "What is Circadian Lighting?": https://www.thelightingpractice.com/what-is-circadian-lighting/. Accessed 19 Sep 2024.

LTC Design: Science of Control

- *Exiting attempts decreased from **98%** at baseline to **42%** with the addition of horizontal floor tape.*
- *Vertical striping was less effective than the horizontal pattern.*



Lateral striping



Longitudinal striping

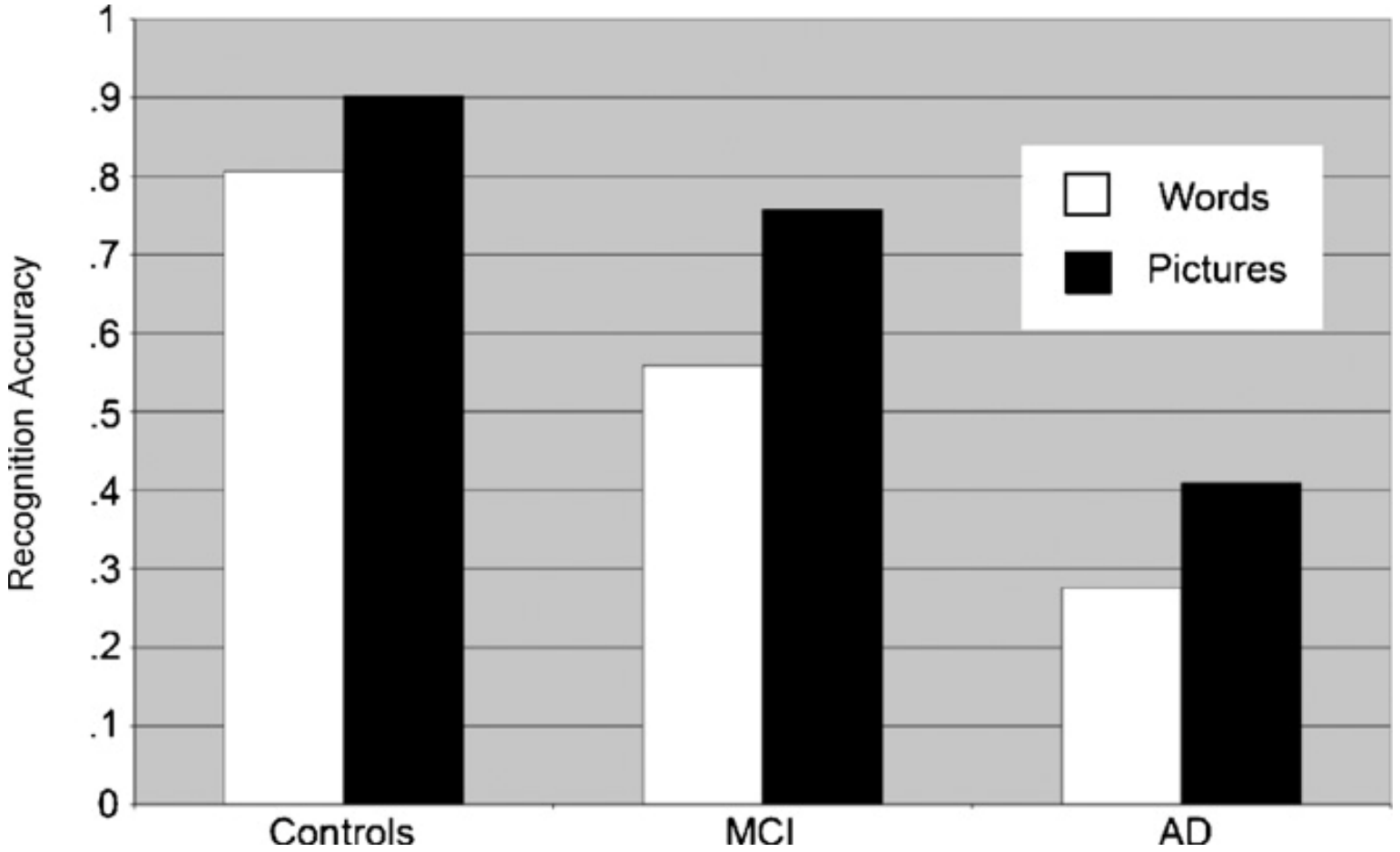
Sources: Hewawasam, L. (1996). Floor patterns limit wandering of people with Alzheimer's. Nurs Times, 92(22), 41-44.

Hussian, R. A., & Brown, D. C. (1987). Use of two-dimensional grid patterns to limit hazardous ambulation in demented patients. J Gerontol, 42(5), 558-560.

LTC Design: The Picture Superiority Effect

- *Pictures are remembered better than words – consistently found in healthy young and older adults*
- *The picture superiority effect is intact in patients with Alzheimer's disease (AD) or mild cognitive impairment (MCI)*

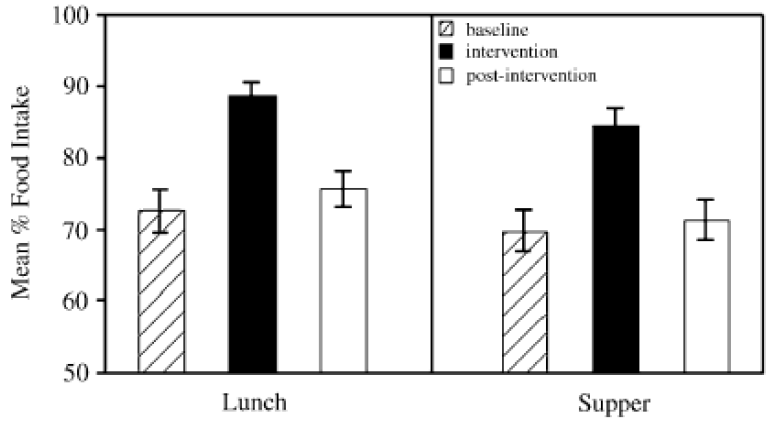
apple

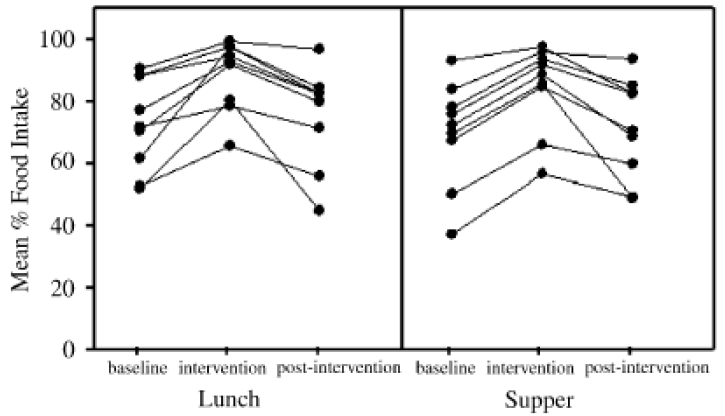


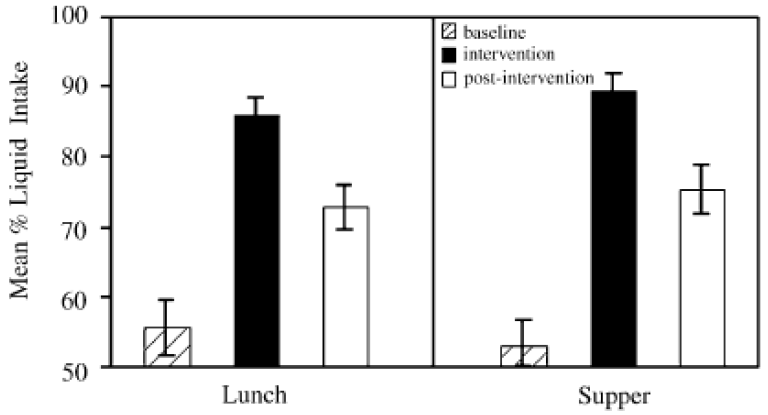
Source: Ally BA, Gold CA, Budson AE. The picture superiority effect in patients with Alzheimer's disease and mild cognitive impairment. Neuropsychologia. 2009;47(2):595-598. doi:10.1016/j.neuropsychologia.2008.10.010

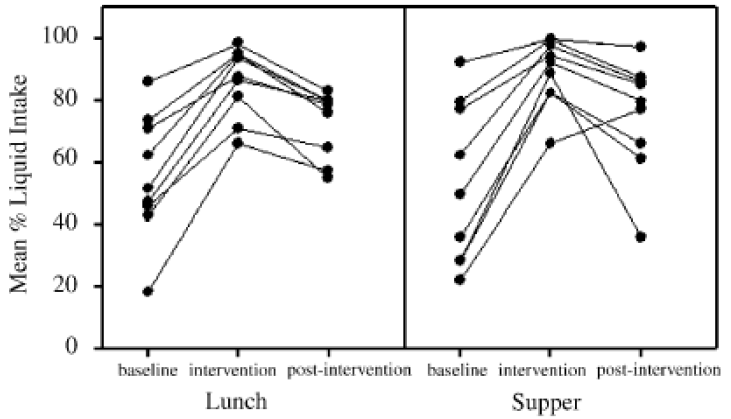
Non-Pharmacologic Treatments in Dementia

- Visual contrast enhances food and liquid intake in advanced Alzheimer's disease. White tableware vs. high contrast red tableware.
- Mean increase was **25% for food and 84% for liquid** for the red tableware.
- 8 of 9 participants exhibited increased intake.









Source: *Dunne TE, Neargarder SA, Cipolloni PB, Cronin-Golomb A. Visual contrast enhances food and liquid intake in advanced Alzheimer's disease. Clin Nutr. 2004 Aug;23(4):533-8.*

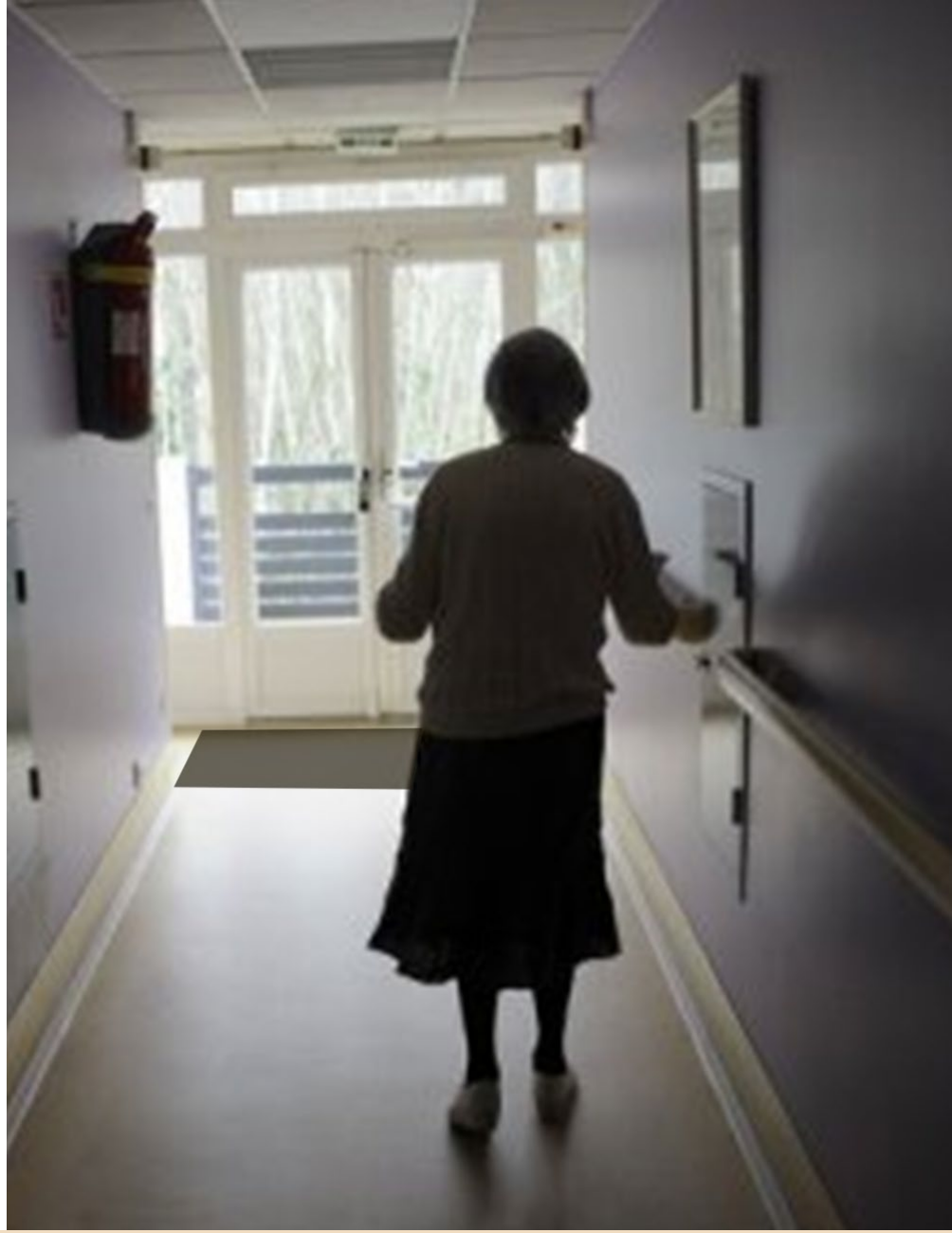
Emerging Ethical Issues in LTC Design:

Long-term care facility design modifies behavior and create illusions that pacify residents, ***without research or oversight****.*

Design interventions may include:

- *The illusion that a patient is free to leave, when they are not.*
- *The illusion of accomplishing goals when they are not.*
- *Immersive environments that convince the residents they are either somewhere else, or in a different time period.*
- *Controlling resident behavior with designs that induce immobility or evoke fear.*

These efforts are no different in kind than interventions undertaken in medical research or pharmaceutical development, either real or placebo.



Source: *Anderson D, Teti S, Hercules W, Deemer D. "If Architecture Influences Health Outcomes, How Should Healthcare Systems Respond? Bioethics at the Frontier of the Science of Design". Harvard Medical School Center for Bioethics; Organizational Ethics Consortium. Cambridge MA. 20 Jan 2023. https://www.youtube.com/watch?v=8g8VsimJGis.Accessed 19 Sep 2024.*

What about the Standard of Professional Care?

From Ethical Ruminations to Legal Theory

What do you already know about this?

What could you know about this?

What should you know about this?

Image: *"Assembling the Unyielding Force of Mind": News Now Nation. 26 Aug 2022. https://www.newsnownation.com/assembling-the-unyielding-force-*

Healthcare Design as an Architectural Specialty

The American Institute of Architects

- (AIA) was founded in 1857 in New York.

Academy of Architecture for Health

- (AAH) was officially chartered by the American Institute of Architects in 1945 (80 years ago) as a response to the demand for federal funds to support hundreds of post-war hospitals, and regulatory oversight.

The Veterans' Administration

- Proposed that hospital architects be screened for competency.
- Federal financial support for the hospital building boom ended in the 1980s, and so did the federal regulations.

State Departments of Health

- Assumed regulatory authority over hospital design and construction, and each adopted various but disparate model building codes.

The AIA's AAH

- Centralized minimum requirements for hospital construction into a model code, which may be adopted by individual states.

The American Hospital Association

- Developed a special interest organization related to the management of healthcare facilities – the American Society for Healthcare Engineering.

The Center for Health Design

- Became the joint knowledge repository for several professional organizations and subsequently launched its certification in Evidence-based Design (EBD) with its EDAC credential.

American College of Healthcare Architects

- Launched in 2000 (25 years ago) as a response to demonstrate individual competence in healthcare architecture that was legally defensible and professionally sound.

Foundation for Health Environments Research

- Launched in 2000 (25 years ago) to cultivate sponsors and fund healthcare design research through various grants.

International Union of Architects & World Health Organization

- Declared 2022 as the "Year of Design for Health"

Sources: *"A Brief History of the AIA's Programs on Health Facilities". American Institute of Architects*

Hercules W. correspondence with American Institute of Architects, Oct 2020.

Ellis S, Hamilton K, Zilm F, Bardwell P, Guimaraes T, Costello B. "A History of the AAH and Related Organizations by Decades". Foundation for Health Environments Research. 18 July 2025.

"2022: UIA Year of Design for Health Launch." International Union of Architects. 27 Jan 2022. https://www.uia-architectes.org/en/news/2022-uia-year-of-design-for-health-launch/.

Are Codes the Savior?

- International Building Code:
  - Glass sizes based on structural characteristics related to wind & lateral loads.
  - Additional limitations based on the types of glass.
  - Smaller than a toddler head
  - Various safety requirements
- Life Safety Code:
  - (is silent)

- 2026 DRAFT FGI Facility Code for Hospitals

1.2-5.1 Delivery of Care Model Concepts *[as part of the Functional Program (1.2-2)]*

- **1.2-5.4.1 Light** How the use and availability of natural light and illumination are to be considered in the design of the physical environment
- **1.2-5.4.2 Views of and Access to Nature** How the use and availability of views and other access to nature are to be considered in the design of the physical environment

2.1-7.2.2.5 Windows in patient rooms

- (1) Each patient room shall be provided with natural light by means of a window to the outside.
- (2) & (3) Various operable restrictions and minimum size requirements.

2.5-2.2.10.6 Outdoor areas

- (6) Security cameras. Where provided, security cameras shall:
- (a) Allow views of the entire outdoor area.

Sources: *"Chapter 24, Glass & Glazing." Eighth Edition Florida Building Code, July 2023. Florida Building Commission. ISBN: 978-1960701107*

"NFPA 101: Life Safety Code - 2024." National Fire Protection Association. Quincy MA. ISBN: 978-1455930562

"2026 DRAFT FGI Facility Code for Hospitals." Facilities Guidelines Institute. 2025 St. Louis MO. https://fgiguidelines.org/wp-content/uploads/2024/06/DRAFT-2026-FGI-Facility-Code-for-Hospitals.pdf.

AIA Design & Health Leadership Group (DHLG)

Six approaches to achieving health through built environment design & policy (2016)

- *Environmental Quality*
- *Natural Systems*
- *Physical Activity*
- *Safety*
- *Sensory Environments*
- *Social Connectedness*

- *Each included:*
  - *Summary*
  - *How to*
  - *Additional Research*

Source: *Design & Health Leadership Group, " Design & Health Topics", American Institute of Architects, Washington DC, May 2016, https://content.aia.org/sites/default/files/2016-05/DH-SixApproaches.pdf. Accessed 19 Sep 2024.*

Project: *Stanford School of Medicine Center for Academic Medicine, Palo Alto CA, HOK*

AIA Framework for Design Excellence

Design for Wellbeing

- How can the design encourage a healthy lifestyle?
- How can the project provide greater occupant comfort?
- How can the project be welcoming and inclusive for all?
- How can the project connect people with place and nature?
- How can material selection reduce hazards to occupants and communities throughout the supply chain?

Focus topics

- Light
- Thermal comfort
- Indoor air quality
- Mental & social well-being
- Acoustics
- Movement
- Nourishment

Design for Well-being toolkit

- High impact +
- Best practices +
- Resources +

Source: *AIA Framework for Design Excellence, American Institute of Architects. https://www.aia.org/design-excellence/aia-framework-design-excellence. Accessed 19 Sep 2024.*

Your guide for designing change

Design for Integration

Good design elevates any project with a thoughtful process that delivers beauty and function.

Design for Equitable Communities

Good design positively impacts future occupants and the larger community.

Design for Ecosystems

Good design mutually benefits human and nonhuman inhabitants. It considers the greater environment for opportunities to create harmony.

Design for Water

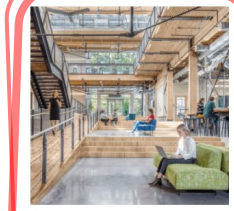
Good design conserves and improves water quality as a precious resource.

Design for Economy

Good design adds value for owners, occupants, community, and planet, regardless of project size and budget.

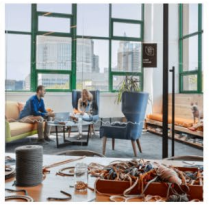
Design for Energy

Good design reduces energy use and eliminates dependence on fossil fuels while improving building performance, function, comfort, and enjoyment.



Design for Well-being

Good design supports health and well-being for all people, considering physical, mental, and emotional effects on occupants and the community.



Design for Resources

Good design utilizes informed material selection, balancing priorities to achieve durable, safe, and healthy projects with an equitable supply.

Design for Change

Good design is resilient and adaptable, it seeks to enhance usability, functionality, and value over time.

Design for Discovery

Good design applies lessons learned from previous projects to refine the design process.

Glossary

Listed terms and definitions to help you better understand these design principles and their goals.

Subject Matter Expert External Affirmation

Q: Is designing for health an ethical imperative, and if so, how should the AIA Code of Ethics be adjusted to require the health effects to be considered?

Andrew Dannenberg, MD MPH
University of Washington

Mindy Fullilove, MD
Author & Urbanist

Ray Pentecost, DPh, FAIA
Texas A&M University

Fatima Cody Stanford, MD, MPH
Massachusetts General Hospital

Allen Wiess, MD
Blue Zones

Liz York, FAIA
Centers for Disease Control

Ellen Taylor, PhD
Center for Health Design

Source: *American Institute of Architects, 2023 Strategic Council, Wellbeing Area of Study, Washington DC*

Project: *Jefferson Health Care Honickman Center, Philadelphia PA, Ennead Architects / Stantec / BLTa*

AIA Action

Resolution 24-1 AIA Architecture and Wellbeing Policy (2024)

- The Board and National Ethics Council will add components to AIA's Code of Ethics and Professional Conduct requiring a focus on wellbeing, promoting related discussions with owners, and utilizing health and wellbeing-related research pertinent to proposed design interventions.
- The Board will modify the Framework for Design Excellence to include Research for Health and Wellbeing as a component.
- The AIA will promote architects' roles supporting health professionals within professional limits.
- The AIA will promote the incorporation of design and research for health and wellbeing in all architecture degree programs with various educational organizations, such as the Association of Collegiate Schools of Architecture (ACSA), and the National Architectural Accrediting Board (NAAB).

INDUSTRY AND TRADE BODIES / Quality improvement

Approval of resolution linking design and health hailed as victory for profession

By Andrew Sansom | 24 Jun 2024 | 0

The American Institute of Architects (AIA) has ratified a draft resolution that embraces evolving knowledge and trends in health and wellbeing, with the aim of strengthening its members' value to clients. The decision has been lauded for its potential in strengthening the importance of the design and health field.

AIA delegates attended the AIA24 Convention in Washington DC earlier this month and voted overwhelmingly to accept the proposed resolution related to the AIA Health and Wellbeing Policy. In particular, the resolution, which required related adjustments to the AIA's Code of Ethics and Professional Conduct, and the Framework for Design Excellence, promotes research-based relationships of architecture's impact on human health and wellbeing.

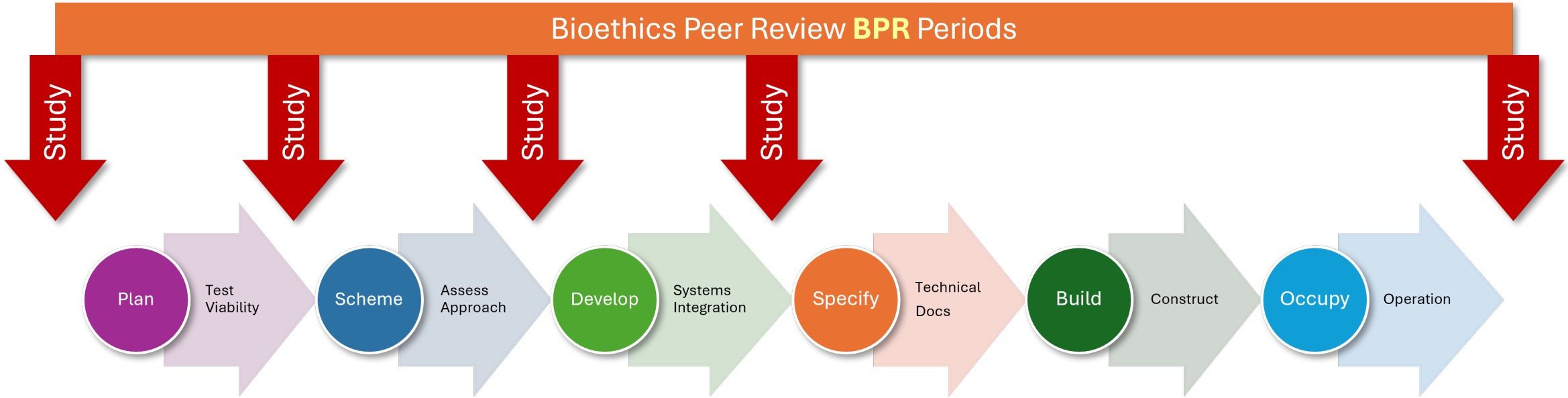
Many architects are unaware of much of the research that links architecture and wellbeing, and it's rare for them to rely on this research in daily practice. The current 2020 Code of Ethics and Professional Conduct contains no reference to human health or wellbeing as a primary goal of practice, except as part of safety and welfare, more broadly, or as a component of environmental equity and justice. Likewise, the Framework for Design Excellence makes no reference to rigorous

Source: *AIA Annual Meeting – Delegate Information Booklet, American Institute of Architects, June 2024, pgs. 14-15. https://www.flipsnack.com/6C7D58DD75E/2024-aia-delegate-booklet/full-view.html. Accessed 19 Sep 2024.*

Sansom, Andrew. "Approval of resolution linking design and health hailed as victory for profession". Salus Magazine. London UK. 26 Jun 2024. https://salus.global/article-show/approval-of-resolution-linking-design-and-health-hailed-as-victory-for-profession. Accessed 19 Sep 2024.

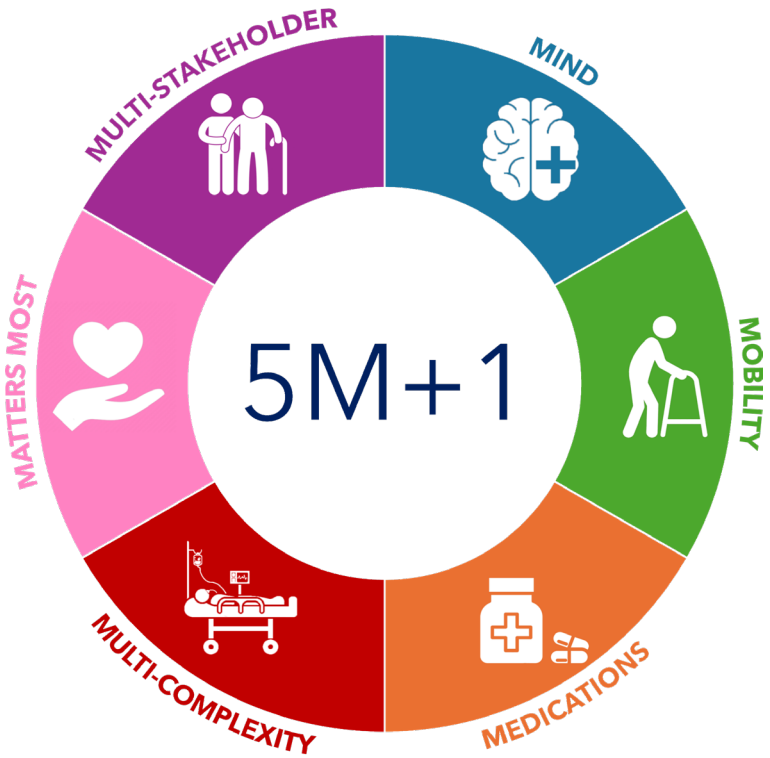
BPR: bioethics peer review

- *Applying available and knowable data to a design from its conception through occupancy using a bioethical rubric*



Practical Applications of Our Work

Applying it with the "5M" framework in LTC.



1. MIND	A. Cognition:	How does this environment consider how persons with cognitive impairment perceive and interact with their world, and how their needs may be different than those without cognitive impairment?
	A. Cognition:	How does it affirm the value of life even with cognitive impairment?
	B. Capacity:	How does this environment enable agency?
	C. Delirium:	How does this environment promote awareness of orientation—time of day, time of the year, family members, important events, etc?
	D. Mood:	How does this environment have a calming effect on inhabitants?
	D. Mood:	How does it help manage common forms of agitation
	D. Mood:	How does it promote a positive mood based on the body of evidence linking design with depression?
2. MOBILITY	A. Function:	How does this environment facilitate and help preserve the ability to do daily tasks?
	A. Function:	How does it assist physical and occupational therapists in their work with inhabitants?
	B. Mobility:	How does this environment encourage inhabitant mobility in a safe manner?
	B. Mobility:	How does it provide an enjoyable environment for walking (i.e. things to look at, places to go, etc).
	C. Falls:	How does this environment incorporate elements to decrease the likelihood of falls?
	C. Falls:	How does it incorporate elements to decrease the harm caused by falls?
3. MEDICATIONS	A. Transfers	How does this environment enable efficient and safe transfers of care between its medical providers and hospitals/other acute care facilities?
	A. Transfers	What physical elements promote safe hand-offs between EMS and facility staff?
	B. Pharmacology:	How does this environment promote safe prescribing practices?
	B. Pharmacology:	How are medication administrations tracked? What safeguards are proposed to prevent accidental
	C. Deprescribing:	How does this environment enable facility staff to use less medications for common indications like agitation, pain, and mood disorders?
	C. Deprescribing:	How does it intentionally aim to make medications for these and similar conditions less necessary?
4. MULTICOMPLEXITY	A. Accomodation:	How does the environment consider and accommodate for persons with disabilities?
	A. Accomodation:	How does it consider and accommodate for a variety of cultural preferences (or can it?).
	A. Accomodation:	How does the environment affirm the inherent value of older age?
	B. Transitions of care:	How does this environment enable efficient and safe transfers of care between its medial providers and hospitals/other acute care facilities?
	B. Transitions of care:	What physical elements promote safe hand-offs between EMS and facility staff?
	C. Hospital hazards (HAI?):	How does this environment enable care to be provided in-house that otherwise would require a hospitalization?
	C. Hospital hazards (HAI?):	How does it intentionally seek to decrease the common causes of hospitalization, like falls, delirium, and common infections like pneumonia and UTIs?
	C. Hospital hazards (HAI?):	
	D. Frailty:	How does this environment reflect the needs of its residents, with respect to their overall frailty?
	D. Frailty:	How does it facilitate the level of care the patients need to maintain health and well-being?
	E. LTC Hazards:	How does the environment facilitate best practices to avoid pressure injuries for bed bound patients?
5. MATTERS MOST	B. Communication/Advance Care Planning:	How does the environment have areas for families to spend time with inhabitants, and for staff to speak with families in private about sensitive matters regarding the health of their loved ones?
	B. Communication/Advance Care Planning:	How does it possess the flexibility to care for patients as their needs change when their illness progresses?
	C. Psychosocial and spiritual needs:	How does the environment facilitate social interaction between inhabitants and the community at large?
	C. Psychosocial and spiritual needs:	How does it facilitate interaction with local faith communities?
	D. Patient Priorities:	How does the environment reflect the unique personality of its inhabitants?
	D. Patient Priorities:	How can residents make the environment feel more like their own homes?

Source: *Molnar F, Frank CC. Optimizing geriatric care with the GERIATRIC 5Ms. Can Fam Physician. 2019;65(1):39.*

Practical Applications of Our Work – BPR

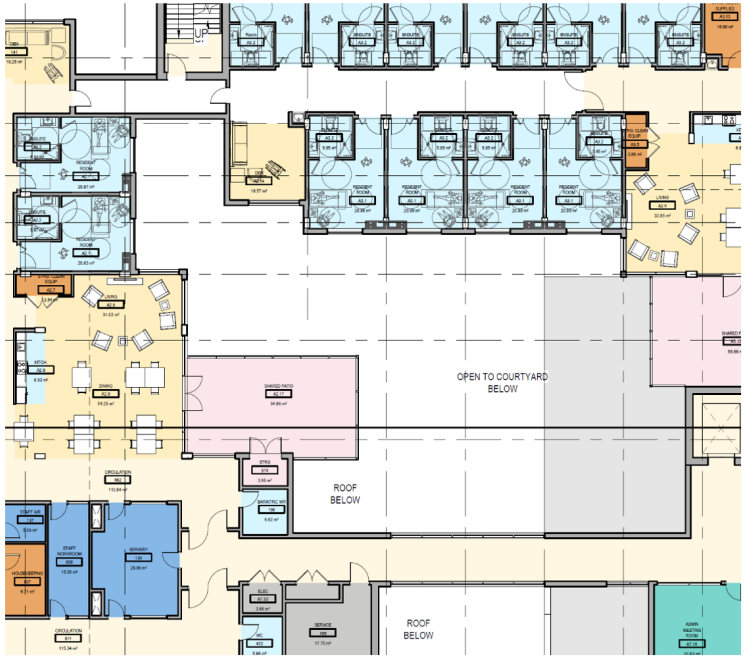
26-4. What is a resident's pathway and experience from the upper floors to the Courtyard on the first floor? What interim destinations will they experience?

26-5. How long of a distance will they traverse without resting?[10,11]

26-6. Will they be able to go outside autonomously?

26-7. How will these characteristics affect staff's management of residents, such as time occupied by accompanying a resident that could be applied elsewhere if wayfinding and access could be enhanced for autonomous navigation to and from the courtyard (for appropriate resident populations)?

26-8. What will they do once they are outside?



"There is benefit from a third-party review, in terms of bringing fresh perspectives from experts from outside the project or Health Authority. This peer review brought perspectives and ideas that had not been considered before."

- health system testimonial

"Your contributions have been greatly appreciated, and we hope to collaborate again in the future."

- health system testimonial

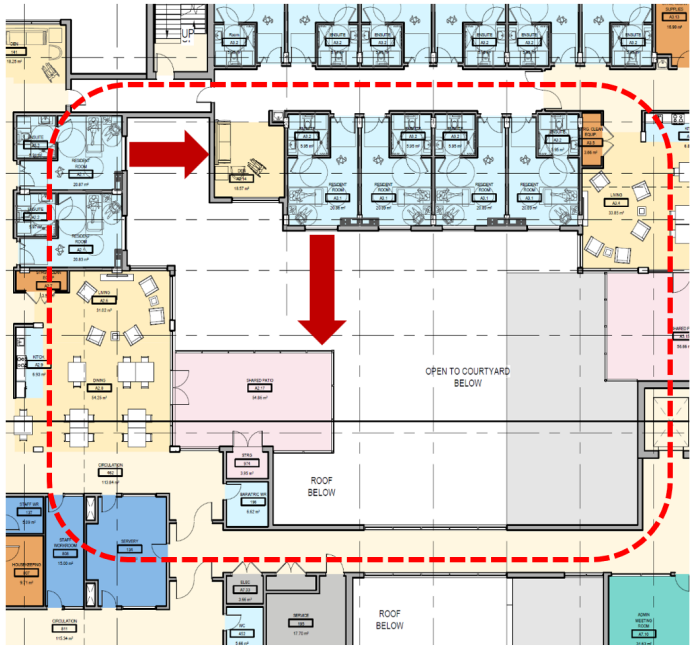
28-1. The Courtyard below appears to not be as large as indicated by comparing it to the Main Level plan. How are these reconciled spatially?

28-2. What are the resident's views toward the outside around this space? Are these windows far enough from opposing walls to allow daylight and views?[23]

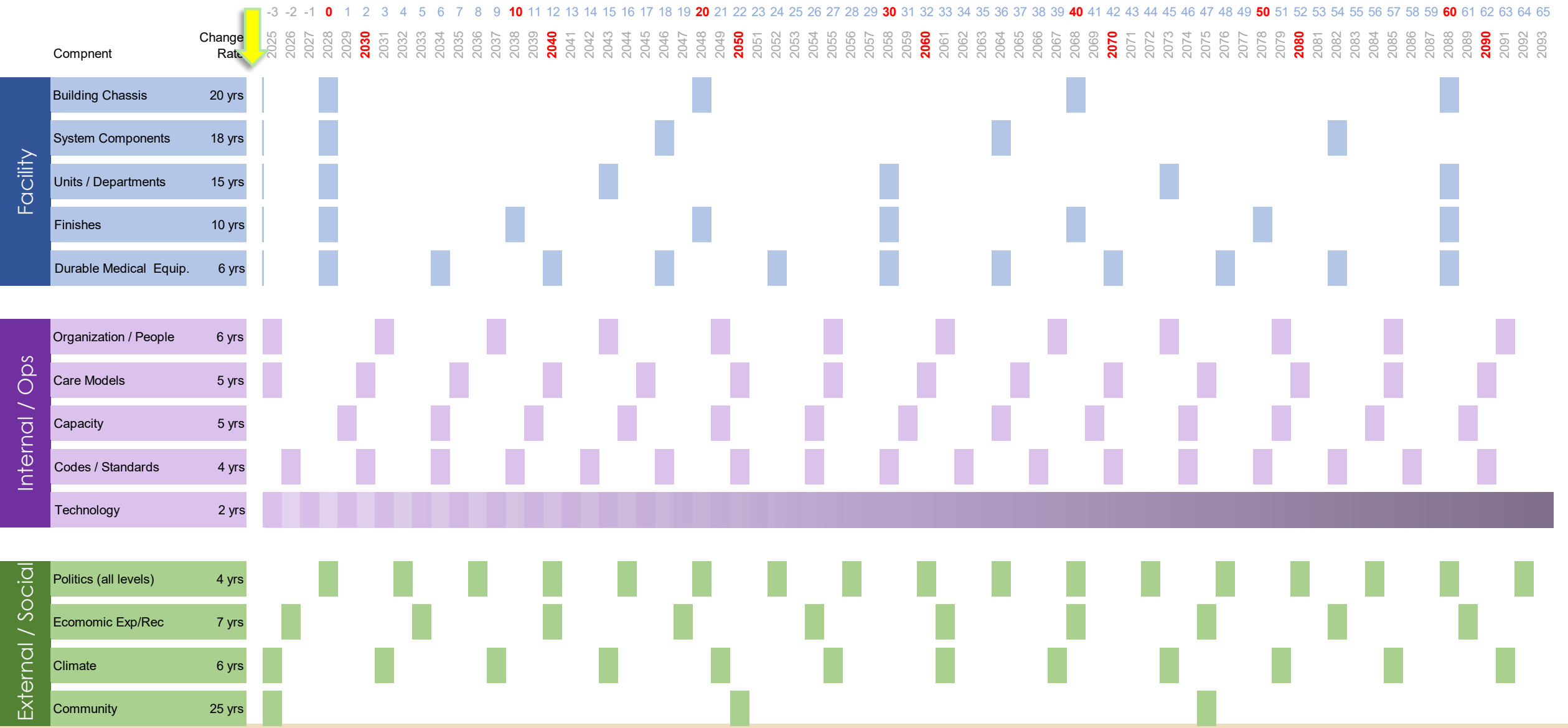
28-3. How will the resident rooms maintain privacy immediately connected to the Courtyard?

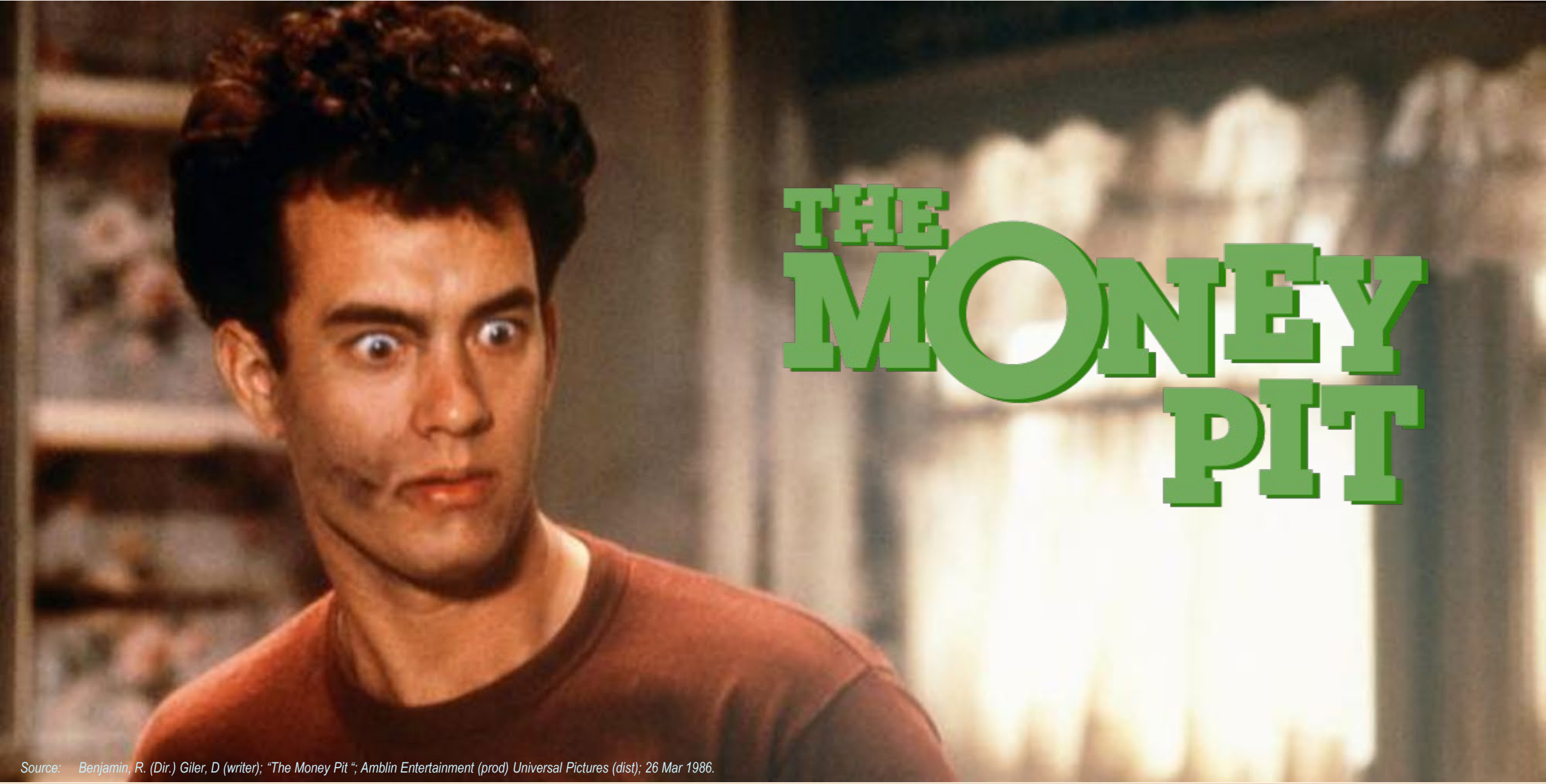
28-4. Are these windows far enough from the opposing walls to not trigger a fire separation?

28-5. Can the roofs below become a terrace? How can residents access it?



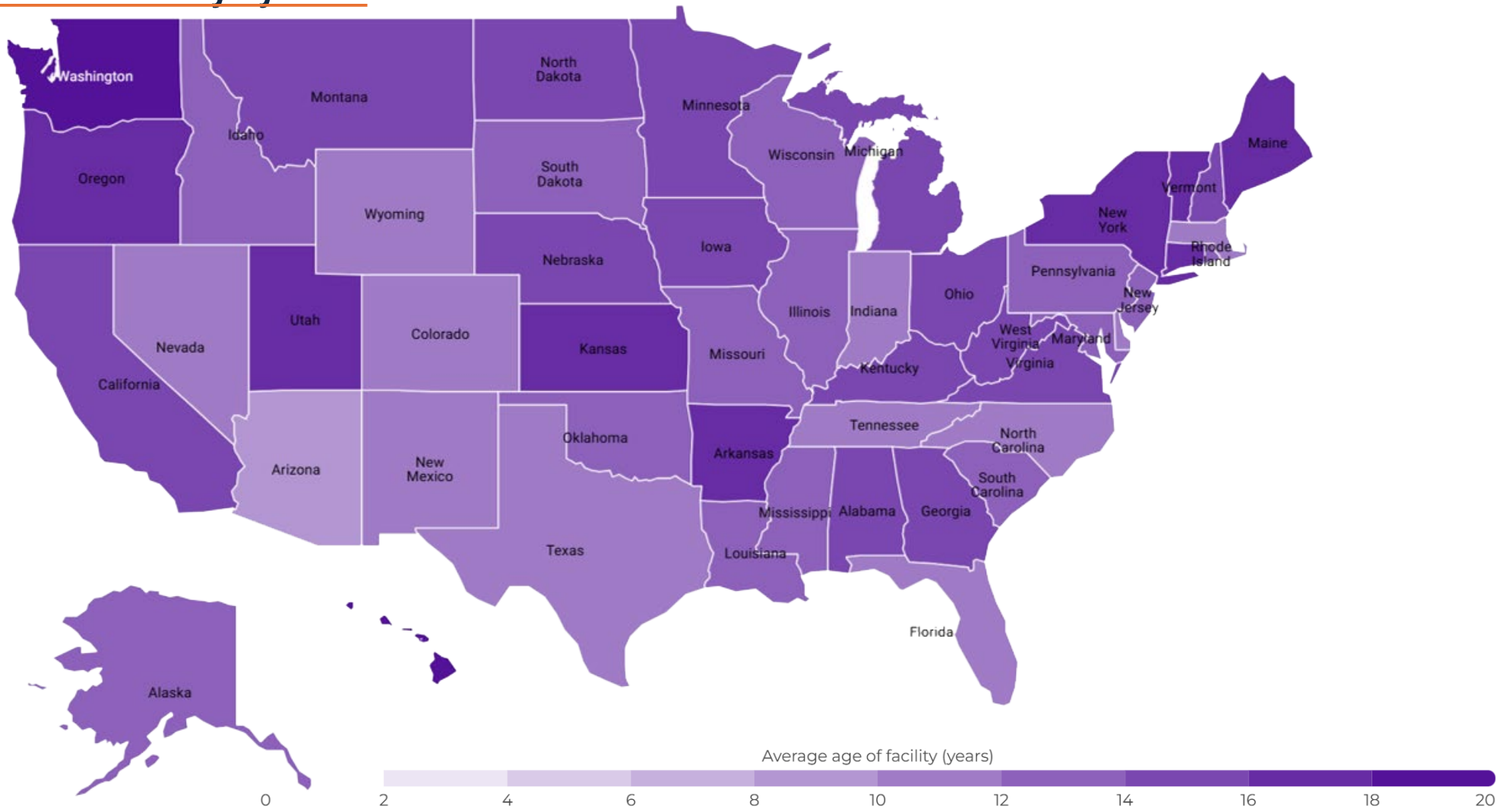
Why is this Important? Context for Flexibility & Complex Adaptive Systems





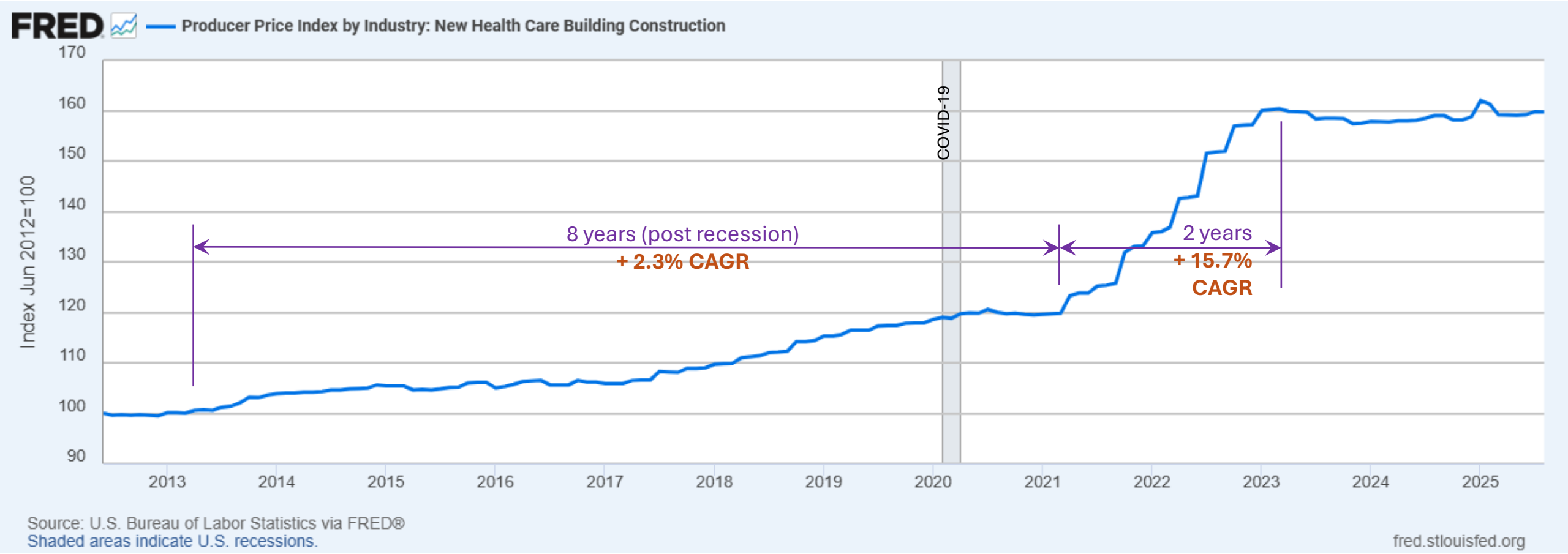
Source: Benjamin, R. (Dir.) Giler, D (writer); "The Money Pit "; Amblin Entertainment (prod) Universal Pictures (dist); 26 Mar 1986.

Average Age of Healthcare Facility by State



Sources: *"State ranking by average age of facility." Definitive Healthcare HospitalView. 10 Jun 2024. https://www.definitivehc.com/resources/healthcare-insights/us-states-average-healthcare-facility-age Accessed 1 Sep 2025.*

Healthcare Construction Costs in Historical Context



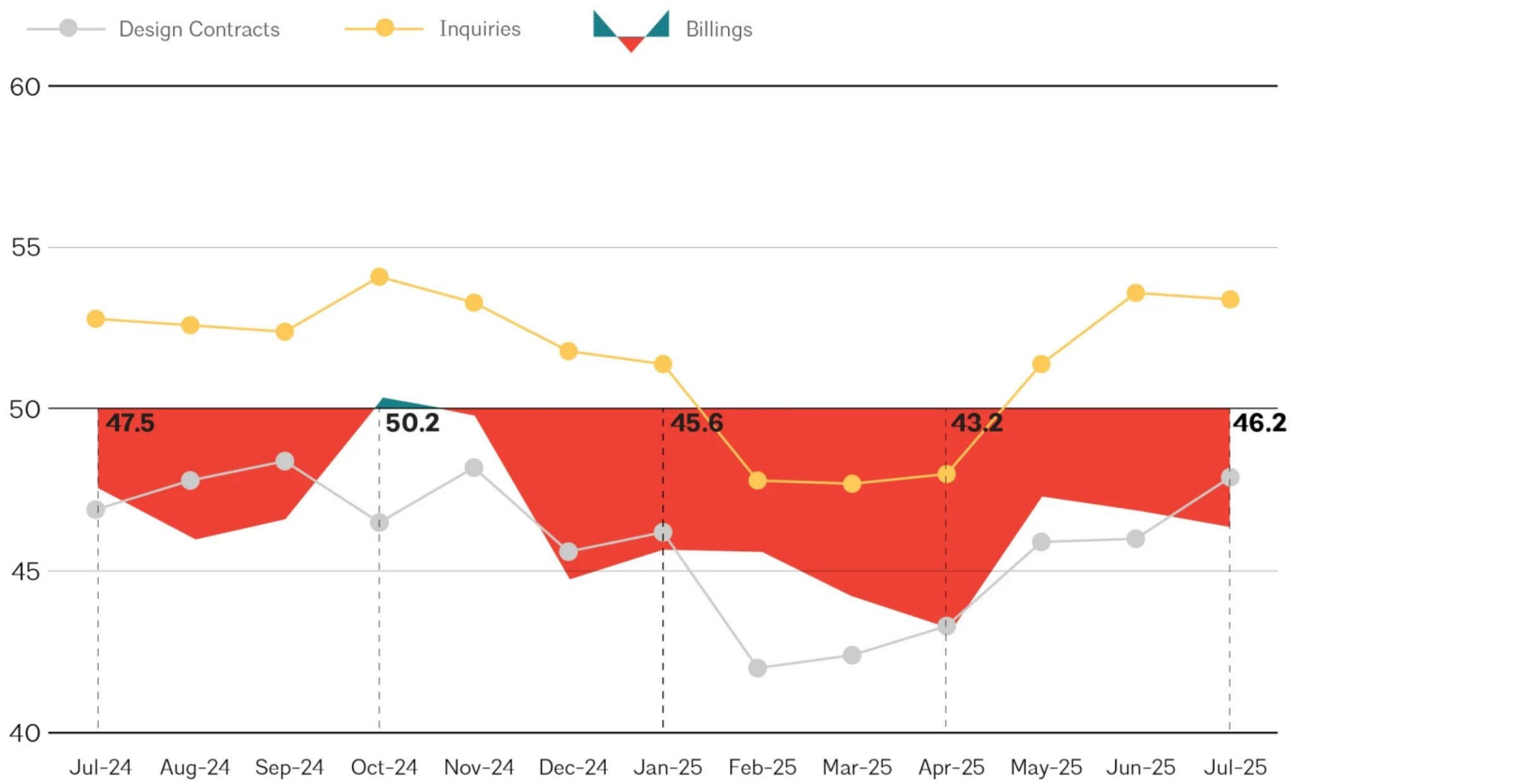
Sources: *"Producer Price Index by Industry: New Health Care Building Construction (PCU236224236224)", Federal Reserve Economic Data, Updated 10 Sep 2025. St. Louis Fed. https://fred.stlouisfed.org/series/PCU236224236224#. Accessed 15 Sep 2025.*

Leading Macro-economic Indicator – Architectural Billing Index

National

Architecture firm billings continue to decline in July.

Graphs represent data from July 2024–July 2025.



ABI has remained below target for 31 of the last 34 months.

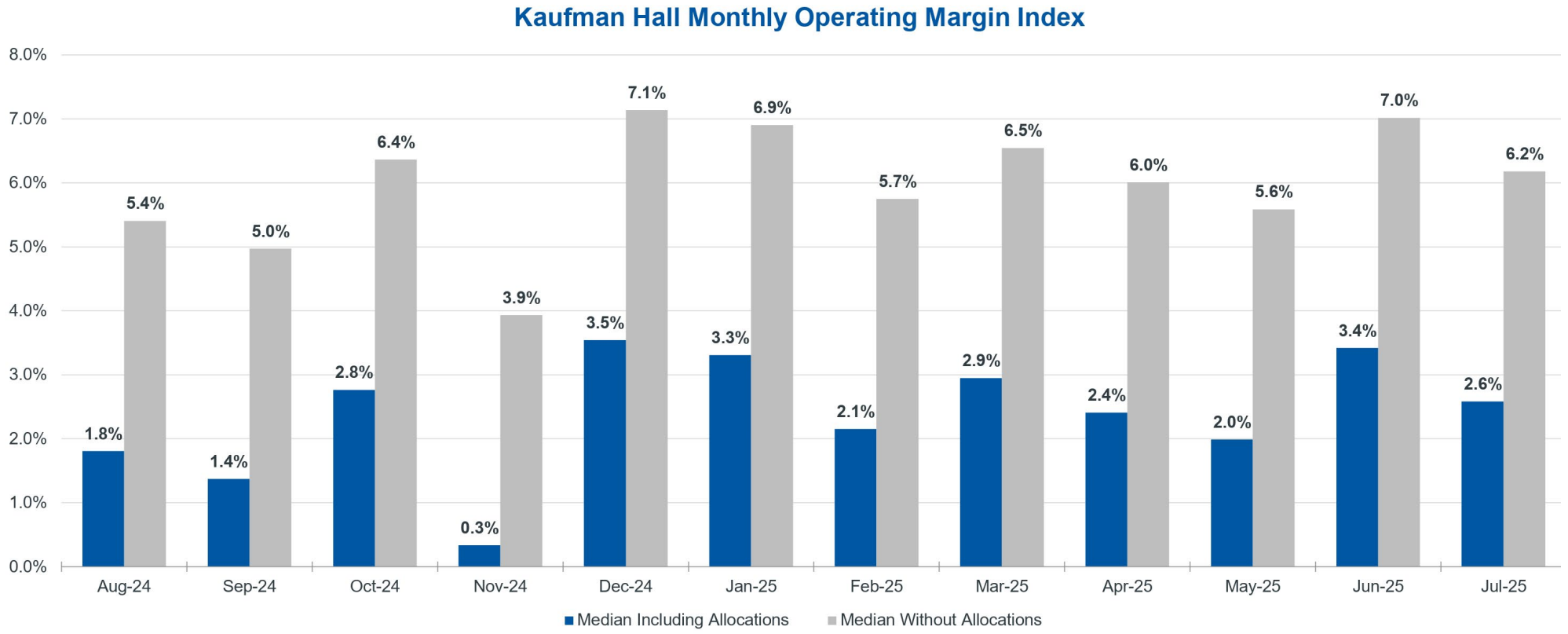
Sources: *"Business conditions at architecture firms remained soft in July." American Institute of Architects / Deltek. 19 Aug 2025. https://www.aia.org/resource-center/abi-july-2025-business-architecture-firms-remains-soft. Accessed 17 Sep 2025.*

Healthcare Operating Margin Index

Key Takeaways

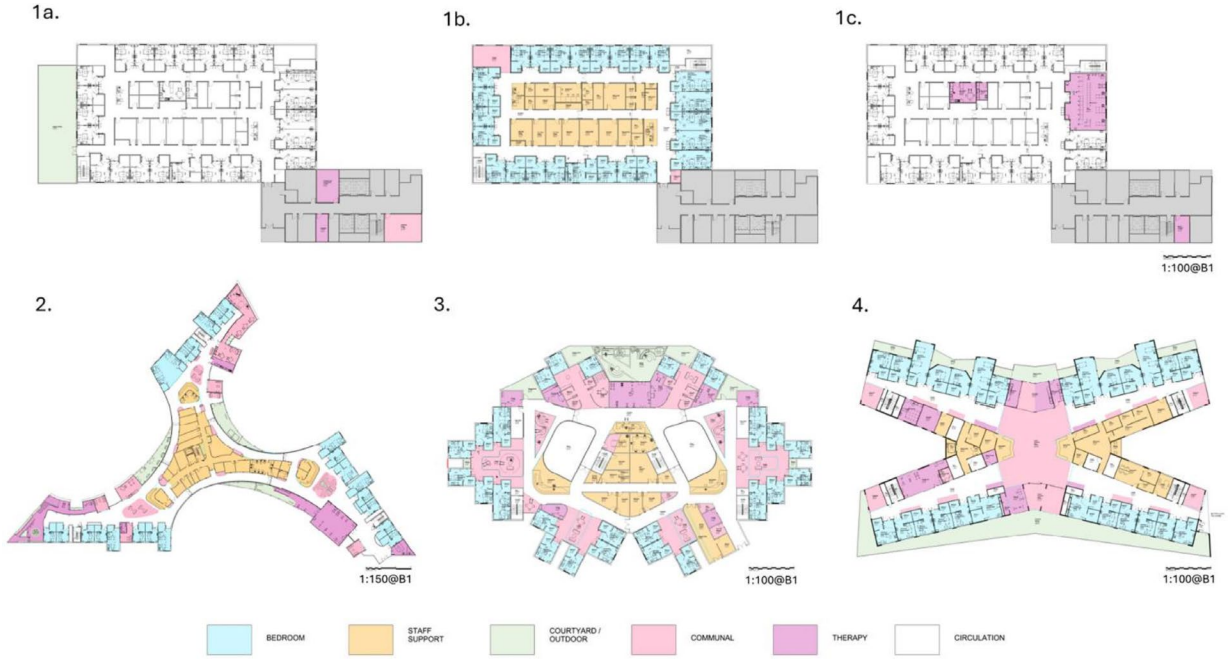
1. Patient volumes and revenues ↑, so are bad debt.
2. Expense growth > revenue growth.
3. Margins ↗.

   Many hospitals are taking steps to build long term resiliency.



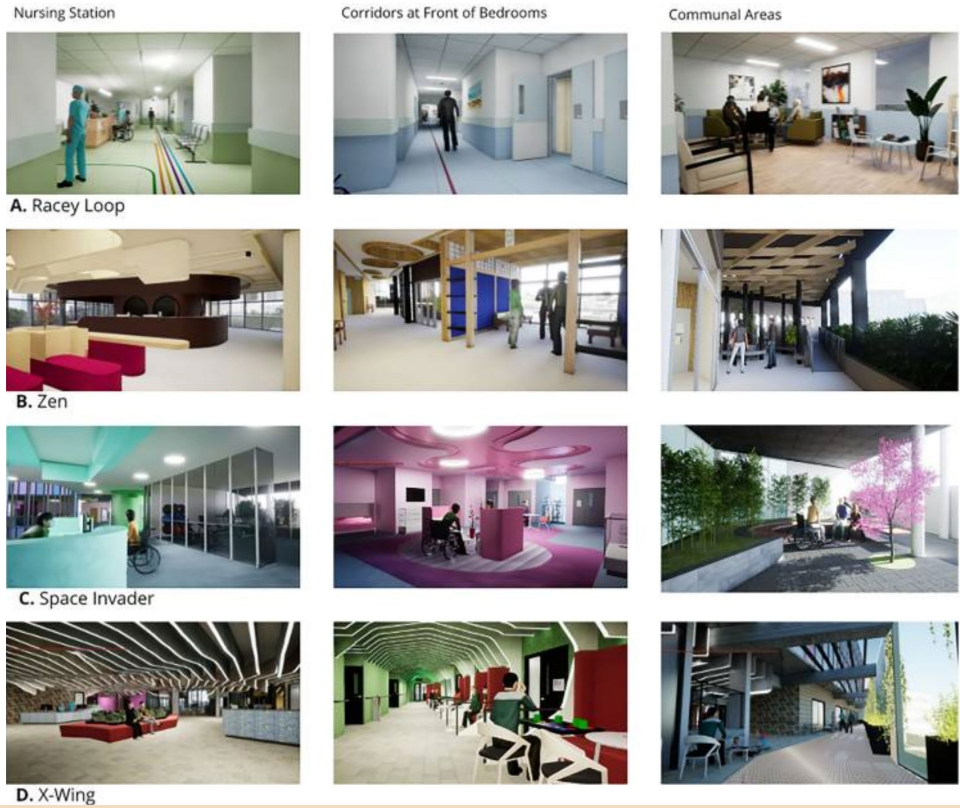
Sources: Kaufmann Hall, Hospital Flash Report – July 2025 Metrics. https://www.kaufmanhall.com/sites/default/files/2025-09/KH-NHFR_Report-July-2025-Metrics.pdf. Accessed 8 Sep 2025

Cost/Benefits Are Becoming Clearer…



Adoption of innovation in design, clinical practice and evidence identification has the capacity to improve clinical effectiveness and patient outcomes.

Economy wide benefits and cost improvements for health funders from the adoption of innovative design have been identified through micro- and macro-economic evaluation.



Source: *Kerr R, Lipson-Smith R, Davis A, White M, Lam M, Bernhardt J, Saa JP, Yang T; NOVELL Redesign Collaboration. Economic Argument for Innovative Design From Valuing Patient-Centered Stroke Rehabilitation. HERD. 2025 Jul;18(3):95-113. doi: 10.1177/19375867251327987. Epub 2025 Apr 17. PMID: 40241604; PMCID: PMC12340140.*

Donaghue Grant Thesis

Despite our resistance to the inherent bias, it's still about the Outcomes!

This study examines how nursing home design impacts resident outcomes, using architectural data and interviews to link evidence-based design features with improved ambulation, physical function, and neuro-psychiatric symptoms using a novel tool against known rubrics and data sets.

The Donaghue Foundation

BOSTON UNIVERSITY

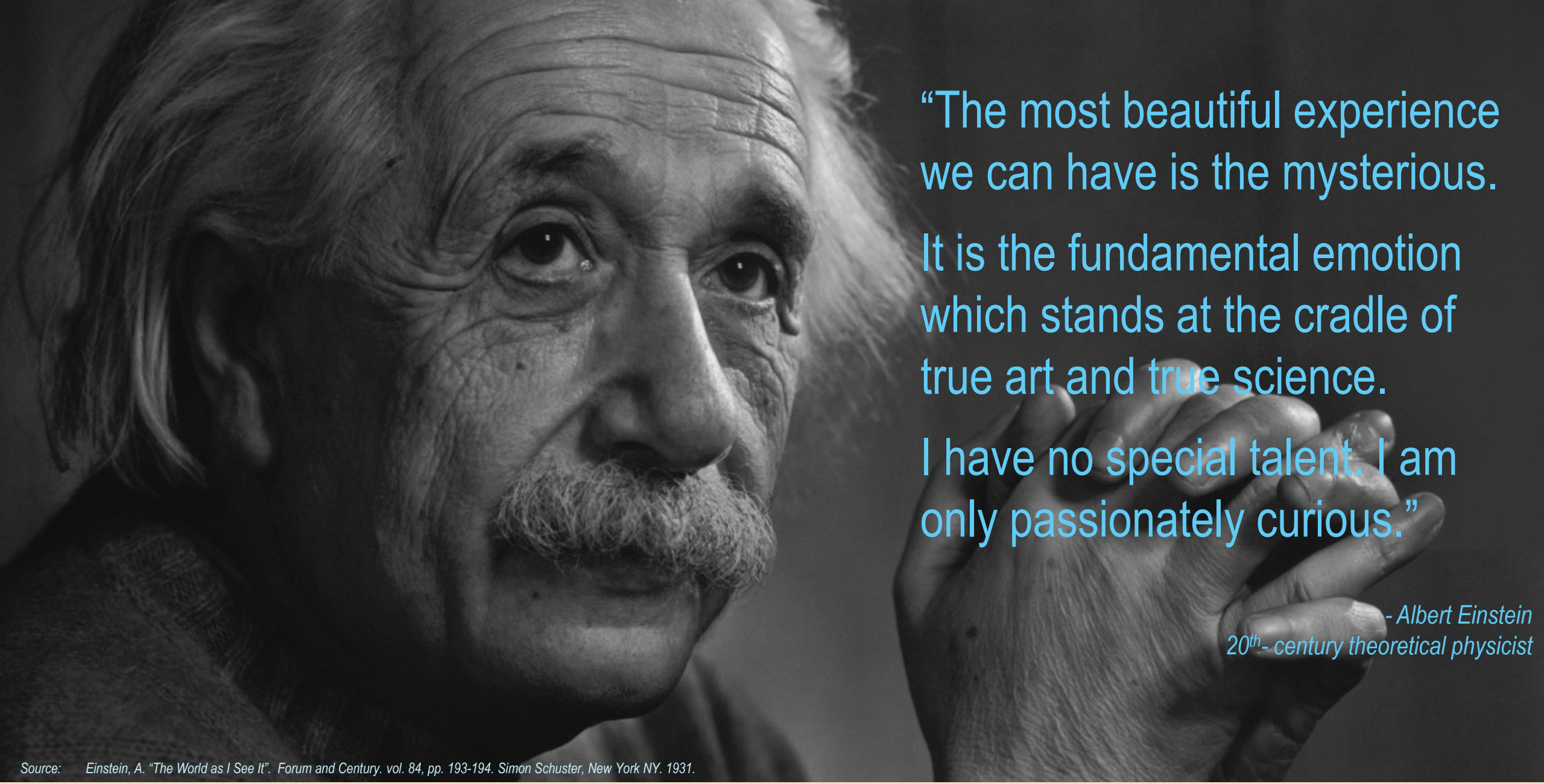
BROWN

BPRlab

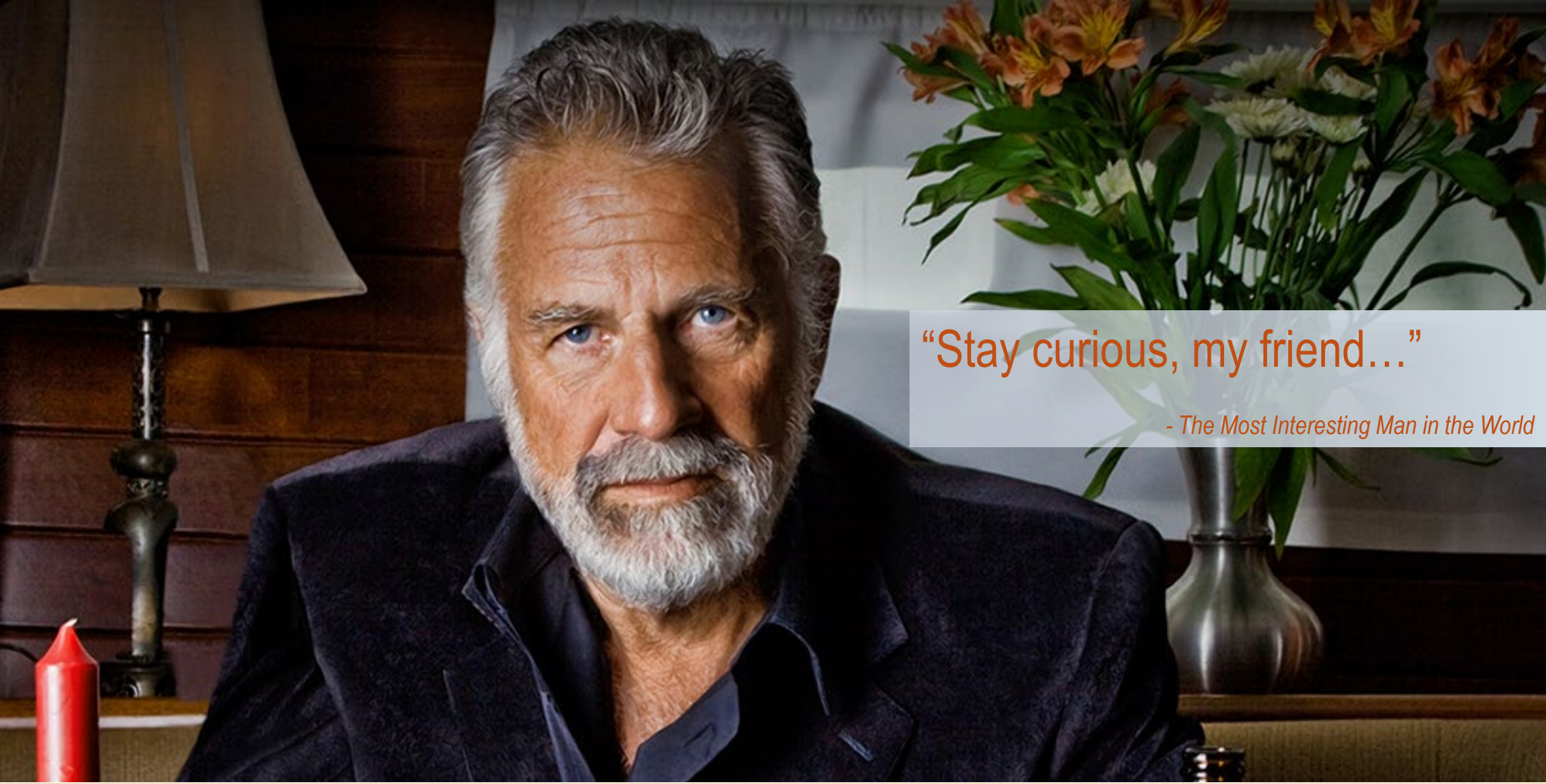
Donaghue Grant Thesis

	Independence of Locomotion	Behavioral Disturbances	Depressive Symptoms	Antipsychotic and Antidepressant Use	Falls	Hospital Transfers
Evidence-Based Design Element						
Activity spaces	x	x	x			
Areas for respite along corridors	x				x	x
Concealed exits		x	x	x		
Convenience of medication room		x				
Dedicated medication rooms		x				
Direct sight lines from rooms to central area				x	x	x
Distance from rooms to central areas	x				x	
Family integration	x	x	x	x	x	x
Floor patterns	x		x	x		
High traffic circulation areas	x	x	x		x	
Number of shower rooms (care model)	x					
Poor visibility (orphaned rooms)			x		x	x
Privacy while toileting	x				x	
Social spaces	x	x	x			x
Staff support areas		x	x			
Therapy rooms (e.g., OT, PT, other)	x			x	x	x
Wayfinding (signage + building layout)	x			x		
Windows with purposeful views		x	x	x		x


What do you think?
WHATDOYOUTHINK?



Source: Einstein, A. "The World as I See It". Forum and Century. vol. 84, pp. 193-194. Simon Schuster, New York NY. 1931.


“Stay curious, my friend…”
- The Most Interesting Man in the World

Faculty

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