Bertha's Village : Limassol, Cyprus Intergenerational rehabilitation and late living programs

Analysis, Scenario Planning and Design brief





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Executive Summary

This white paper presents a comprehensive and meticulously researched plan for optimizing the design and operational activities of senior living and rehabilitation environments.

The report underlines the necessity for strategic design to ensure the seamless integration of all operations, following the guiding four pillars of **wellbeing**, **safety**, **cognition and support** for the entire community the project serves.

The design recommendations presented in the report **encourage decentralization**, ensuring that the design remains at a **human scale**. This includes clearly separating different functional areas and emphasizing organic modularity to avoid a sense of mass buildings. The aim is to emulate the organic growth of mountain villages, creating a dynamic environment that enhances residents' experience. The report provides evidence-based recommendations on space distribution. It suggests short, minimal internal corridors and connections between buildings, fostering an **efficient, intuitive, and subtle, easily navigable environment** across the project.

Personalizing spaces is highly recommended to foster a **sense of belonging** and home. The interior design should be conducive to the display of personal items, keepsakes, and memories. Communal spaces should balance safety and homely ambiance, subtly integrating safety regulations.

The vision outlined by this report promotes a phased growth approach, with a clear understanding that the initial design should leave **room for future expansion**. **Flexibility and modularity**, therefore, are crucial design factors. Structures and internal spaces should be easily modifiable, and all wiring, piping, and connected services should be readily accessible for future updates and maintenance. There is also an emphasis on the placement of logistics and daily operations behind buildings, hidden from residents' views, with additional green barriers for sound and sight.

Optimization of outdoor spaces, such as terraces and balconies, is highlighted, promoting the use of these spaces for **social interaction**, **relaxation**, **and possibly small-scale agriculture**. Each room should ideally have private balconies, and shared terraces should be created when space allows.

Concerning the landscape, the report advocates for a sustainable approach, **preserving the existing flora** and fauna as much as possible. There is also a focus on water management, with a proposal to use the site's excess water to support lush and varied vegetation.

Guided by the Life Cycle Assessment (LCA) approach, we propose using local and imported materials to optimize sustainability in Cyprus. Traditional structures here are built with locally produced concrete and imported steel. To reduce the 11% carbon emissions tied to construction work, we proposed to integrate **advanced off-site construction methods** similar to those adopted by industry giants such as Marriott and Alphabet. This innovative strategy promises efficiency, safety, cost-effectiveness, and a significant **cut in on-site construction**, aiding our carbon emission reduction goal.

A careful balance between privacy and socialization is crucial to ensure the well-being of all residents and staff. The project provides an exciting blend of different age groups and disciplines, which can be achieved by offering diverse activities and spaces to cater to different preferences and needs.

The white paper also highlights the importance of workshops and shared goods. Flexible spaces that can be rapidly changed from one function to another are deemed essential, along with a dedicated area for shared goods. These aspects **encourage community engagement** and create opportunities for new interests and hobbies among residents.

Our presented research and recommendations champion a rich social ecosystem, fostering connections among residents, their families, and medical professionals. Living clusters create intimate, home-like spaces, bolstering community spirit. A dedicated family cluster and a dynamic food network, engaging residents in local cultivation and cooking, enhance this sense of belonging.

The 'Do it yourself' approach to communal areas encourages resident participation, supporting a sense of achievement and self-reliance. The landscaping efforts should blend **physical activity, socializing, and natural beauty**, while the strategies for intergenerational programs should promote **emotional well-being and social development**.

We believe that Bertha's Village is an entity that transcends the conventional understanding of residential facilities for senior adults. It is not a retirement home or a complex of apartments for senior citizens. Instead, it is envisioned as a setting that promotes the holistic well-being of its residents through the mindful design of a **healthy environment**, actively considering multiple facets of human life and well-being.

This concept of a Healthy Environment we propose is **inherently transdisciplinary**, signifying an integrated and interlinked approach that converges elements from diverse disciplines. It brings together factors from the natural sciences, including the preservation of natural ecosystems, responsible resource management, and air quality maintenance. Simultaneously, it incorporates perspectives from social sciences, such as the **promotion of social equity and the assurance of universal accessibility**, addressing the broad spectrum of individual needs and capabilities.

Furthermore, a Healthy Environment also embraces sustainable and inclusive design principles, industrialized construction, and assembly from the realms of architecture and engineering. All these elements highlight that a Healthy Environment can be comprehended and realized only through a holistic approach, aligning different disciplines and perspectives to promote overall well-being.

To operationalize this, the design of a Healthy Environment should consider specific parameters, which we categorize into three primary realms: **natural, social, and enriched spaces**. The natural category refers to the ecosystem, preservation, and air and water quality. The social realm refers to universal accessibility, promoting social equity, and facilitating interaction. Enriched spaces promote activities, enable growth, and create memorable experiences, such as the restaurant we detail later in this paper.

One of the enriched spaces we detail is a restaurant that goes beyond the usual role of a dining facility. It is conceived as a bonding space for residents, staff, and visitors, fostering community relationships and enhancing social integration. It encourages using **locally-sourced ingredients** and in-house cooking, promoting sustainability and supporting local businesses. The restaurant is thus a vital element in our vision for Bertha's Village, manifesting the principles of a Healthy Environment and enhancing the overall quality of life for its residents.

Enriched spaces, illuminated with natural light and constructed with organic and recycled materials, provide physical, social, and cognitive stimulation. Sound design mitigates noise, fostering serene environments, while biophilic elements and accessible layouts support cognitive health and overall well-being.

The paper also details strategies and **design recommendations for both passive and active design and construction techniques**, each contributing significantly to reducing operational energy demand and carbon emissions. These aspects of sustainable development are highlighted throughout the paper as they are integral to the holistic approach we advocate for Bertha's Village. Passive design strategies hinge on leveraging the inherent characteristics of the **natural environment to minimize energy usage**. This approach includes taking advantage of the local climate and sun path, incorporating effective insulation and ventilation, and orienting buildings for optimal natural light exposure. Such strategies can significantly reduce the reliance on artificial heating, cooling, and lighting systems, thereby minimizing operational energy demand.

On the other hand, active design strategies incorporate **energyefficient systems and renewable energy technologies**. These may encompass the installation of solar panels, the utilization of energyefficient appliances and fixtures, and the adoption of intelligent systems for optimal energy management. While requiring an initial investment, these active measures can contribute to substantial energy savings over time, reducing the facilities' carbon footprint.

Both passive and active design strategies work synergistically, contributing to a more sustainable built environment. Their integration into the design and construction processes can significantly reduce operational energy demand, thereby mitigating carbon emissions and fostering a healthier, more sustainable living environment for residents of Bertha's Village. This interplay between passive and active strategies is detailed in this paper, providing a comprehensive guide to their implementation in the context of the project.

Furthermore, these energy-efficient strategies are not isolated in their impact. They align well with our concept of a Healthy Environment, enhancing the comfort and well-being of the residents, staff, and visitors. This harmony between environmental sustainability and human health and comfort, we believe, is vital to the successful realization of Bertha's Village as a model for future senior living and rehabilitation developments.

This white paper provides a blueprint for creating a **dynamic**, **adaptable**, **and human-centric** senior living and rehabilitation environment. It combines architectural considerations, operational efficiency, and human psychology to design spaces that promote residents' well-being, independence, and high quality of life.

Chapters 1,2 and 3 are an overview of collected and analyzed research. Chapters 4,5,6 and 8 are design strategies and recommendations, each looking through a different lens to create a holistic approach to the project's development.

Chapter 1 Introduction

- Introduction and Methodology
- Review of Cyprus's Public Data Sets
- Preliminary Fieldwork and Observations



INTRODUCTION AND METHODOLOGY

This whitepaper initiates the exploration into the design and operational guidelines for a senior home and intergenerational rehabilitation project in Cyprus. It delves into extensive multi-dimensional research, including analyzing public **data sets, case studies, comparative analysis, and academic research**. Practical field visits and collaborative sessions with the project development team complemented our endeavor.

We commenced our inquiry by examining specific public data sets such as **demographic**, **economic**, **environmental**, **geographical**, **and health data**. Social and political data and details concerning local flora, fauna, and seasonal plantings were also considered. Recognizing the diverse local context, these data sets served as a compass, guiding our understanding of the area and its population.

We found that navigating the **challenges of material sourcing** on an island like Cyprus is critical to this project, which pushed us to explore strategies to balance the use of local and imported materials, given the environmental impact of transportation. The goal is to harness locally available resources, align the architecture with the local context, and reduce carbon emissions. Simultaneously, we recognize the necessity of importing certain materials to ensure high-quality, sustainable construction and modern design.

Our journey then took us through the investigation of over 20 architectural projects. The **human scale** of the architecture and the clean, bold lines of design became evident. This exploration proved instrumental in cultivating our design sensibility and approach. Further, a **comparative analysis of European analogous projects** revealed the heterogeneity in pricing structures and services offered. Single rooms were prevalent across facilities, and catering and hotel services emerged as a standard service across all establishments.

We complemented this real-world analysis with a deep dive into **scholarly resources**, summarizing key findings from each paper to illuminate our project's nuances. The fusion of academia and real-world understanding permitted us to tailor these insights uniquely to the Cyprus context.

An on-site exploration of the project locale further enriched our methodology. Our design recommendation was informed by the area's landscape richness, verdant vegetation, expansive views, sloping terrain, and rock soil.

Regular meetings with the project development team uncovered critical aspects such as the delicate balance between regulations and vision and the need for competent technical specialists. These collaborations were instrumental in informing our understanding of the challenges and expectations on site.

In synthesizing our findings into the final recommendations, we remained grounded in our commitment to sustainable choices during the construction phase and responsible development. The critical recommendations extracted from each research phase were integrated into our design considerations.

The process required a delicate balancing act between socio-cultural, environmental, and functional aspects. Our methodology's strength lies in its comprehensive approach, combining **data-driven insights with empathetic understanding**, ensuring a holistic vision for this senior home and intergenerational rehabilitation project in Cyprus.



REVIEW OF CYPRUS'S PUBLIC DATASETS

A thorough examination of publicly available datasets for Cyprus yields rich insights across various fields, such as demographics, economics, environmental, geographical, health, and social and political affairs. This chapter elucidates each area, illustrating their practical applications in shaping Cyprus's socio-economic fabric.

1. Demographic Data

Understanding the demographic profile is pivotal for any nation's development. As per Cyprus's Statistical Service, the country's total population is around 1.2 million as of 2021 (Cyprus Statistical Service, n.d.). The country's age structure reflects an aging population, with a significant share over 65 and a declining proportion under 15. This trend has sparked debates over increasing the average retirement age, which currently stands at 63 years (World Bank, 2023). The gender distribution is roughly even, with a marginally higher count of women. The birth rate in Cyprus has been trending downwards in recent years, while the death rate is increasing due to the aging population, adding to the demographic challenges.

2. Economic Data

The economic landscape of a country can be gleaned from indicators like GDP, unemployment rates, inflation rates, and more. According to the Cyprus Statistical Service, the average monthly pension in 2020 was €823.20, suggesting a sturdy economy. However, the pension amount can significantly vary based on personal circumstances, private retirement plans, and education levels (United Nations, 2023).

3. Environmental and Geographical Data

Data on environmental and geographical aspects, including air and water quality, land use patterns, maps, satellite imagery, and climate information, is essential for sustainable development planning. These datasets play a significant role in natural resource management for a country like Cyprus, renowned for its coastal and mountainous landscapes (World Bank, 2023).

4. Health Data

Health data offers a comprehensive perspective on the general health of a population. Life expectancy in Cyprus is high, averaging 80.2 years for men and 84.0 years for women, suggesting a robust healthcare system (Cyprus Statistical Service, n.d.). However, the prevalence of chronic diseases such as cardiovascular diseases, cancer, and respiratory diseases remain significant health concerns. A recent increase in hospitalization rates indicates the aging population and the rising prevalence of chronic diseases. Health expenditure has increased as a share of GDP, demonstrating the government's commitment to ensuring the population's health (United Nations, 2023).

5. Social and Political Data

Social and political data, including voting patterns, crime rates, and societal attitudes toward various issues, underpins sound policy-making and governance. These datasets provide valuable insights into political stability, social harmony, and institutional effectiveness (World Bank, 2023).

Migration patterns also offer important socio-political insights. Cyprus has recently experienced immigration and emigration, with a positive net migration rate, hinting at its attractiveness as a place to live and work (Cyprus Statistical Service, n.d.).

These datasets, collectively sourced from reputable organizations such as the World Bank (World Bank, 2023), Cyprus Statistical Services (Cyprus Statistical Service, n.d.), and the United Nations (United Nations, 2023), provide a holistic and in-depth understanding of Cyprus. The insights drawn from these datasets can support decision-making processes for policymakers, researchers, and investors, thus contributing to Cyprus's ongoing growth and development.

References

World Bank. (2023). Cyprus | Data. Retrieved July 12, 2023, from https://data.worldbank.org/country/CY Cyprus Statistical Service. (n.d.). Statistical Data. Retrieved July 12, 2023, from https://www.cystat.gov. cy/en/default

United Nations. (2023). Country Profile: Cyprus. Retrieved July 12, 2023, from https://data.un.org/ CountryProfile.aspx/_Docs/CountryProfile.aspx?crName=Cyprus

Located at the crossroads of Europe, Asia, and Africa, Cyprus is renowned for its unique biodiversity and rich natural resources. Our following steps explored the native flora, building materials, and sustainable construction practices prevalent in the country.

1. Indigenous Flora Promoting Biodiversity

Several endemic plant species contribute significantly to the island's biodiversity. These include the Cyprus Sage (Salvia cypria), Cyprus Squill (Scilla cypria), Cyprus Orchid (Orchis cypria), and Cyprus Broad-leaved Helleborine (Epipactis cypria). Each of these plants plays a critical role in the ecosystem by providing a habitat for pollinators like bees and butterflies and serving as a vital food source.

2. Local Construction Materials

Cyprus's natural resources provide a range of local materials used in construction. These include:

Limestone: Abundant in Cyprus, this versatile and durable stone has been a popular construction material for centuries.

Marble: Renowned for its quality, Cypriot marble is used in diverse construction applications, from flooring and countertops to decorative accents.

Terra Cotta: This type of clay is commonly used in construction, particularly for roof tiles and decorative elements.

Bricks: Local brickyards produce a variety of bricks for different applications, further contributing to the domestic construction industry.

3. Sustainable Construction Recommendations for Cyprus

In response to Cyprus's unique climate and limited resources, several sustainable construction practices are recommended:

Energy Efficiency: Designs should incorporate high-efficiency insulation, energy-efficient windows, and HVAC systems.

Water Conservation: Buildings should be designed to conserve water through low-flow toilets, showers, faucets, and the use of drought-resistant landscaping.

Sustainable Materials Selection: Construction materials should be chosen considering the embodied energy, local availability, and environmental impact.

Renewable Energy: Buildings should utilize renewable energy sources, such as solar and wind power, to reduce reliance on fossil fuels.

Indoor Air Quality: Designs should prioritize good indoor air quality, minimizing the use of toxic or harmful materials.

These recommendations are supported by numerous research articles, including studies on thermal performance (Building Services Engineering Research and Technology, 2015), embodied energy assessment (Open House International, 2018), and the environmental impact of construction materials (Case Studies in Construction Materials, 2016). All these references provide significant insights into sustainable construction practices tailored for the Cyprus context.

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Kalwry, H. S., & Alibaba, H. Z. (2023). An Investigation of Sustainability Issue for Building Construction in North Cyprus. Retrieved from https://www.researchgate.net/publication/328929193_An_Investigation_of_Sustainability_Issue_for_Buildin g_Construction_in_North_Cyprus

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Environmental impacts of adobe as a building material: The north Cyprus traditional building case. (2016). Case Studies in Construction Materials. DOI: 10.1016/j.cscm.2015.12.001 International Journal of Architectural Heritage. (2021). Earth-Based Building Materials. The First Use of Clay Mortars and Adobes in Antiquity in Cyprus. DOI: 10.1080/15583058.2021.1899337

Seasonality and Planting Considerations in Cyprus

In Cyprus, a Mediterranean climate allows various fruits, vegetables, and herbs to be cultivated throughout the year. By considering the seasonality of plants, therapeutic gardening programs can ensure a consistent supply of fresh produce for cooking activities and simultaneously offer diversified tasks for patients. Below is an overview of plants suitable for gardening in Cyprus.

1. Annual and Perennial Crops

Several plants can be grown year-round in Cyprus. Tomatoes, for instance, are highly versatile and can be incorporated into many dishes. Similarly, herbs like coriander, parsley, basil, rosemary, thyme, oregano, and marjoram can be grown throughout the year. These herbs add flavor to meals and provide sensory stimulation through their distinct aromas.

2. Seasonal Crops

Seasonal crops offer opportunities to diversify the gardening tasks and produce throughout the year. Potatoes, a staple food in many diets, can be grown from October to June. Grapes, which ripen from June to October, can be used in various dishes or consumed fresh.

Several leafy vegetables like endives, rocket (arugula), spinach, and Swiss chard can be grown from October to May. These vegetables are rich in nutrients and add variety to meals. Similarly, spring onions are also available from November to May. Although not available year-round, certain herbs can be grown in specific periods. Mint, for instance, can be produced from February to November, and dill is open from November to March. Sage has a shorter growing season, from December to February.

3. Decorative and Aromatic Plants

Lavender, though not edible, is an excellent addition to the garden. It blooms almost year-round in Cyprus and offers a pleasant scent, which can be soothing for patients. It also attracts pollinators, thereby promoting biodiversity in the garden. In conclusion, therapeutic gardening in Cyprus can be a rich and diverse activity throughout the year, thanks to the variety of edible plants that can be grown. By carefully considering the seasonality of different plants, gardening programs can ensure a continual supply of fresh produce, offer diversified tasks for patients, and keep the garden vibrant throughout the year.

References:

Cyprus Trade Centre. (n.d.). Fresh Fruit & Vegetables - Products of Cyprus. https://cyprustrade.co.uk/ fresh-fruit-vegetables-products-of-cyprus/



Annual Median-Temperature in Limassol, 2010-2021

21











dry season:

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TRADITIONAL AND MODERN BUILDING MATERIALS

Performance and Energy Efficiency

The quest for autonomy in the modernist building sector has often sidelined lessons from traditional building methods. Despite this, it is clear that conventional building materials, particularly those like adobe, have proven to be environmentally conscious, with an impressive near-zero carbon footprint (Mrema et al., 2011). In the following paragraphs, we juxtapose traditional and modern building materials with a particular focus on thermal performance, energy efficiency, and occupant comfort.

1. Traditional Adobe Buildings: An Examination of Performance and Energy Efficiency

Adobe walls, typically around 300mm thick, exhibit high thermal mass properties. They demonstrate a specific heat capacity of 1260J/kgK and a density of 1540kg/m (AIRAH, 2000). In summer, these walls act as efficient storage for solar heat gain, releasing the stored heat slowly, thereby reducing the need for artificial cooling methods. However, during winter, adobe walls, owing to their low thermal resistance, tend to underperform, leading to heat loss and colder interiors (Tasnuva, 2012). Simulation results indicate that traditional adobe buildings boast a yearly net zero carbon footprint alongside a modest two metric tonnes of electricity consumption (Figure 1). Upon examining energy usage, it was observed that only 42% of the total electricity consumption was attributed to heating and cooling, with the remaining consumed by lighting and miscellaneous equipment like refrigerators (Figure 2). The empirical data underscores that, irrespective of weather conditions, adobe buildings demonstrate efficient energy management with lesser reliance on artificial heating and cooling systems. However, a key area of improvement is the lighting system, which accounts for 28% of the building's total energy expenditure (Figure 3).

2. Thermal Performance of Modern Buildings in Cyprus: Identifying Issues and Potential Solutions

Contrary to the performance of adobe buildings, many modern buildings in Cyprus need better thermal performance. Indoor temperatures in such buildings, without heating or air conditioning, were found to range from 10 to 20C in winter and peak up to 30–50C in summer. In a survey by Lapithis et al., 80% of the respondents from modern houses in Cyprus complained of feeling cold in winter, with 87% feeling excessively hot in summer.

These comfort issues can be addressed through modifications in building geometry and construction methods. Buildings with compact courtyard plans, long axes oriented east-west, and smaller openings (up to 20% of the wall surface) can significantly enhance thermal performance. Simultaneously, using heavy construction materials for walls, roofs, and floors can provide a time lag of 8 hours, further aiding in thermal regulation.

Integrating Phase Change Materials (PCMs) into the building fabric can offer a

revolutionary solution for improving thermal performance while addressing the significant concern of earthquake load in Cyprus, a known seismic region. PCMs facilitate latent heat storage and can achieve this in a considerably lighter way than traditional heavy materials employed for sensible heat storage.

3. Exploring PCM's Potential in Enhancing Thermal Performance

Dynamic thermal simulations of typical residential buildings in Cyprus, with and without PCM linings, revealed the most effective scenario to be that which employed thinner walls and slabs made of lightweight cellular concrete (Scenario 4). Thermal response analysis revealed Scenario 4 had the most significant surface factor and the second-lowest response factor, which indicates a faster response to shortwave radiation and a lower capacity to store heat in the construction.

The particular PCM product can be employed to control excess temperature and reduce the cooling energy supplied in houses in Cyprus, thereby providing an effective solution for improving comfort and energy efficiency in modern homes.

While modern construction seeks autonomy, there is undeniable merit in revisiting the principles of traditional building methods, such as those employed in adobe construction, that emphasize environmental consciousness and energy efficiency. At the same time, innovative solutions such as PCMs present a promising path for enhancing thermal and seismic performance in modern buildings.

References

Mrema et al. (2011). The Characteristics of Adobe as a Building Material. AIRAH (2000). Heat Capacity of Adobe Walls. Tasnuva (2012). Performance of Mud Brick Walls in Winter. Lapithis et al. (unknown year). Survey on Comfort in Modern Houses in Cyprus. Dynamic Thermal Simulations in Cyprus Buildings.



building (DOE-2-2-48r)

Energy Use: Electricity



Figure 2. Yearly energy consumption in Adobe building (DOE-2-2-48r)



Figure 3. Energy consumption in an adobe building



Scenario 4 results from "Thermal performance of a typical residential Cyprus building with phase change materials" research paper

Table 5. Cooling energy supplied and reduction by the application of the PCM lining (from 1 May to 31 October).

Scenario	Energy supplied		Energy reduction	
	No PCM (GJ)	PCM (GJ)	No PCM-PCM (GJ)	No PCM-PCM (%)
Scenario I	11.0	10.3	0.7	6.4
Scenario 2	12.2	11.8	0.4	3.3
Scenario 3	13.1	11.5	1.6	12.2
Scenario 4	11.4	9.8	1.6	14.0

PCM: phase change material.



Figure 9. Illustration of no PCM vs. PCM case. PCM: phase change material.

*this scenario could be improved if the PCM is performed in the exterior (see chapter 5)

PRELIMINARY FIELDWORK AND OBSERVATIONS

A critical aspect of any design and construction project is a deep understanding of the site's constraints and opportunities. To that end, as delegates from the Center for Sustainable Cities, we orchestrated a comprehensive site survey and the field trip to thoroughly acquaint ourselves with the proposed project's idiosyncrasies. Our days on the site were laden with a series of activities, encompassing meetings with the project's design and management ensemble, discussions with potential technical and constructive task specialists, reconnaissance of the project site, as well as interactive visits to local manufacturers and craftspeople residing near the site.

Sourcing and Utilisation of Local Materials:

We keep in mind that we must address the unique challenges of material sourcing in Cyprus, an island largely reliant on nearby ports for importing construction materials, which is a critical component of this project.

Regarding local construction materials, Cyprus presents a challenging environment, with limited availability of construction materials within a 0km radius. Consequently, the construction process will heavily rely on importing the necessary materials, a process in which prefabrication and international collaboration will play a pivotal role. However, we strongly advocate utilizing as many local resources as possible to promote sustainability and stimulate the local economy.

During our field trip, we were pleasantly surprised to uncover the existence of numerous stonework workshops. These workshops possessed ample capacity to meet a significant portion of the project's interior and exterior finish requirements. Interestingly, these facilities blend imported and locally sourced materials, providing a flexible solution tailored to the project's demands.

Furthermore, we identified several local woodworking workshops, typically fabricating and restoring furniture. These workshops demonstrated the potential to diversify their production to include small-scale wooden light frames and interior design elements. Moreover, their skill sets extend to performing repairs and bespoke customization, making them a valuable resource for the project.

Project Team and Human Resources:

A thorough understanding of the team structure and each unit's respective challenges is indispensable for shaping our recommendations. Accordingly, we invested substantial effort in comprehending the intricate dynamics of the project team. Our findings highlighted several prominent factors that could impact the project, such as the stringent local regulations, challenging terrain, project timelines, and financial constraints.

Site Assessment:

The site visit provided a fresh perspective on how the terrain's characteristics influence design decisions. The shallow, stone-based ground proved to be both a hurdle and an asset. While excavation in this terrain is arduous, the silver lining lies in its ability to retain punctual foundations more efficiently.

Navigating the site's slopes proved challenging, underscoring the importance of incorporating the terrain's natural topography into the design process. This includes

thoroughly examining site accessibility and establishing smooth connections between various program components.

The site's flora exceeded our expectations, presenting a rich and dense green cover with immense potential for supporting rehabilitation and relaxation efforts. We also discovered that the site serves as a passage for various species, both avian (owing to its proximity to a migratory bird path) and terrestrial (as a transit route for sheep and goats). This biodiversity corridor could be a distinctive attraction if the design focuses on maintaining this openness and the landscape architecture aims to enhance and support this biodiversity.

Moreover, we identified the critical need for sensitive landscape design and path planning to mitigate any potential disruption to the site's natural events and enhance inter-species connections.

The field trip was instrumental in jump-starting this paper, providing valuable insights that will shape our recommendations and strategies moving forward. The nuances gained through direct interactions, and observations have formed a robust foundation for the ensuing work.



Chapter 2 State of the Art

- Introduction
- Topical research
- Research papers overview
- Conclusions



INTRODUCTION INTO RESEARCH PAPERS AND ARTICLES

In this chapter of our whitepaper, we delve into the invaluable insights and recommendations from carefully analyzing numerous significant research papers and topical studies. Our goal is to construct a holistic framework that will guide the design, spatial planning, and operational aspects of the proposed project, with a central focus on augmenting the quality of life for our primary beneficiaries - the senior population and individuals recovering from brain injuries.

We initiated our exploration with a suite of generalized topical studies encompassing diverse dimensions of elderly care and rehabilitation. A pivotal study explored the implementation of Spain's LAPAD Law, a progressive piece of legislation aimed at reinforcing the dignity and autonomy of the senior population. It presented crucial insights into the underlying concepts of dignity, autonomy, rights, and the role of intergenerational programs in fostering these values.

Further research explored the domain of rehabilitation for brain injury patients, specifically the positive impact of overlapping activities on patients' recovery and quality of life. We also delved into the therapeutic power of everyday activities, such as gardening and cooking, and their significant role in brain injury rehabilitation.

Another critical area of our exploration was optimizing the staff-to-resident ratio in care facilities. Our analysis incorporated data from the nursing, hospitality, and therapy sectors, providing a comprehensive overview of optimal ratios, ensuring the quality of care and efficient resource allocation.

In addition to these topical studies, we also engaged with many academic research papers that presented further insights into our focus areas. Some key themes revolved around the impact of intergenerational programming, the provision of physiotherapy services, therapy staffing levels, participant perceptions of adult day services, and the social world of assisted living. Each paper presented unique recommendations and insights, enriching our understanding and contributing to our goal of creating an enhanced care and rehabilitation environment.

Notably, we also investigated the design aspect extensively. Studies such as "Elderly-friendly Design Guidelines" and "Creating a Senior-Friendly Physical Environment in our Hospitals" provided critical insights into ensuring accessibility, safety, communication, and social engagement within the facilities.

In essence, this chapter serves as the foundation of our whitepaper, with research findings and insights shaping the recommendations and strategies for our project. Our commitment remains rooted in **providing a dignified**, **inclusive**, **and effective care and rehabilitation environment that significantly enhances the lives of its inhabitants**.

Topical research

Enhancing Dignity and Autonomy in Elderly Care: Implementing the LAPAD Law in Spain

In recent years, Spain's aging population has necessitated a shift in elderly care towards enhancing dignity, autonomy, and active aging. The Autonomy and Care of People in a Situation of Dependency Law (LAPAD) is a milestone legislation in this context that focuses on subjective rights to social services, promotes personal autonomy, and enables socio-sanitary coordination.

1. Dignity, Autonomy, and Rights: LAPAD's Central Concepts

Under LAPAD, dignity is viewed as the autonomy to guide one's existence to achieve life goals. People with disabilities and dependencies have the right to receive support to develop their capacity for choice and maintain control over their lives. Cognitive, sensory, or functional differences should not impact a person's moral autonomy to live according to their goals and wishes.

This law marks a paradigm shift from viewing elderly care through the lens of necessity to focusing on rights, dignity, and personal preferences.

2. A Person-Based Model of Attention

LAPAD advocates for a person-based model of attention focused on seven principles:

Autonomy: Preserving the person's ability to make decisions and control their life. Participation: Encouraging the person to take part in communal activities.

Integration: Enabling seamless integration into social life.

Individuality: Recognizing and respecting the person's unique character.

Social Inclusion: Involving the person in social groups and activities.

Independence: Supporting the person's self-reliance.

Consistency: Ensuring that care and support remain stable and reliable.

It's crucial to design elderly care centers as homes promoting autonomy, independence, intimacy, social connections, and community participation while

reducing dependency.

3. The Model of Comprehensive and Person-Centered Care

This model consists of two dimensions:

Comprehensive Care: This approach recognizes the need to address all aspects of a person's life when planning or intervening. In cases of disability or dependency, it's not just about rehabilitating health or functional capacity but also exploring other areas such as intimacy, social interaction, educational needs, and work integration. Person-centered/personalization: This element involves respecting the person's dignity and rights and considering their opinions and preferences. It involves understanding the person's biography and history, habits, tastes, and wishes, and identifying their abilities, especially in deteriorating capabilities.

4. The Role of Intergenerational Programs in Reinforcing Dignity

Hagert (2017) highlights that intergenerational programs encourage collaboration and learning opportunities and facilitate cultural and generational exchange. These programs can help integrate older adults into society and their communities, meeting their social, mental, and physical needs. The relationships built through intergenerational socialization improve health, quality of life, and dignity, providing meaningful activity for older adults and children.

Barbra Teater's (2016) research further supports this by revealing how older adults participating in intergenerational programs experience reduced depression, enhanced self-worth, better memory test performance, and higher levels of generativity, thus fostering and increasing their dignity.

5. Active Aging and Dignity through Tailored Activities

A 2016 report from Verywell Health suggests various engaging, brain-stimulating activities beyond the conventional board games and television that can be offered in nursing and senior homes. These activities, which include lessons in foreign languages, photography, art techniques, ethics, and sciences, promote active aging and dignity.

The LAPAD Law in Spain emphasizes the dignity, autonomy, and active aging of individuals in a state of dependency. It challenges the existing approaches to elderly care and encourages a comprehensive, person-centered model that values individuality and promotes social inclusion and participation. The law is a progressive step towards creating an environment that enhances the quality of life for older adults.

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Topical research

Overlapping Activities in Rehabilitation: Enhancing Quality of Life and Recovery for Brain Injury Patients

Neurological rehabilitation has experienced remarkable strides, particularly with the advances in personalized, patient-centered care models. While much of the focus in these discussions is on the medical and therapeutic interventions available, it is crucial to acknowledge the roles that varied, meaningful activities play in the recovery journey of individuals who have sustained brain injuries.

1. Rehabilitation Stages

Rehabilitation, especially for brain injuries, typically follows a structured and stepwise process that is defined by the individual's ability and tolerance for therapy. This process is generally divided into five main stages:

Acute Rehabilitation: This is the earliest stage of the recovery process, where a team of healthcare professionals focuses on regaining as many activities of daily living (ADLs) as possible.

Post-Acute Rehabilitation: This stage aims to help the individual become as independent as possible. It requires more intensive therapy and is considered the gold standard for care and treatment following brain injury.

Sub-Acute Rehabilitation: This stage is for patients who need less intensive rehabilitation services over a more extended period.

Day Treatment: Day treatment provides rehabilitation in a structured group setting during the day and allows the individual to return home at night.

Outpatient Therapy: Individuals continue to receive outpatient therapies to maintain and enhance recovery.

2. Rehabilitation Workshops and Activities

Engaging in meaningful and challenging activities provides a platform for patients to rebuild skills and regain confidence. Various workshops can be included in the rehabilitation plan, depending on the patient's current stage of recovery and personal interests.

2.1 Woodworking Workshop

Woodworking promotes fine motor skills, spatial awareness, and cognitive function by planning and creating wooden crafts3. It also offers a sense of accomplishment and pride when the finished product is used in the living and residential spaces. 2.2 Art Workshop

Art therapy has been found to significantly benefit cognitive function, motor skills, and emotional well-being. Painting, drawing, sculpture, and pottery can all provide outlets for expression and creativity.

2.3 Gardening Workshop

Gardening has proven therapeutic, stimulating the senses and improving motor skills and endurance. It can also contribute to enhancing the environment of the center. The appropriateness of the workshops can vary depending on the rehabilitation stage and the individual's tolerance for activities.

3. Overlapping Activities for Different Patient Groups

The spectrum of activities that can be integrated into a brain injury patient's rehabilitation plan is extensive, ranging from creative endeavors like arts and crafts, music, and filmmaking, to cognitive challenges like sorting objects, playing memory games, and engaging in educational classes. This comprehensive range of activities can be mapped out in a way that caters to different patient groups: families, senior citizens, and patients at various stages of rehabilitation.

For patients in the acute phase, activities are primarily therapeutic, focusing on essential self-care activities, speech, physical and occupational therapy, and basic hand-eye coordination exercises. As the patient progresses to the sub-acute and rehabilitation stages, the activities evolve to include more fine motor exercises, memory games, simulated daily living tasks, and an introduction to leisure activities based on the person's interests.

In the chronic and long-term management stages, the focus shifts to more complex activities that help improve executive functions, problem-solving, and planning skills. Activities promoting social participation, community integration, work-related activities, and vocational training are also introduced at this stage.

This comprehensive array of overlapping activities can significantly improve patient's quality of life, dignity, and overall well-being during their journey of recovery. By leveraging these activities effectively, we can maximize patients' potential and bring us closer to our shared goal of comprehensive and person-centered care.

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Topical research

The Therapeutic Power of Gardening and Cooking in Brain Injury Rehabilitation

Gardening and cooking are often seen as leisure activities, yet their therapeutic potential, particularly for individuals recovering from brain injuries, is notable. This chapter explores the benefits of gardening and cooking activities, substantiating the evidence with case studies and considering practical aspects like suitable foods and plants for gardens in therapeutic settings.

1. Benefits of Gardening

Gardening is an activity that offers physical, cognitive, and emotional benefits, making it an ideal intervention for older adults and brain injury patients. It requires regular and continuous care, offering opportunities for increased physical activity, thereby preventing osteoporosis and reducing the risk of some cancers, Type 2 diabetes, depression, and heart disease (Park, Lee, Kim, Yoon, & Lee, 2020). Moreover, gardening improves mobility, flexibility, endurance, and strength, which are often challenged after a brain injury (Better Health Channel, n.d.). Using motor skills in gardening activities aids in maintaining their functionality and potentially improving them.

On a cognitive and emotional level, gardening also plays a crucial role. Engaging with nature promotes relaxation, reduces stress levels, and offers opportunities for social interaction, enhancing overall well-being. It also provides nutrition education, as patients can appreciate the value and processes of home-grown produce (Better Health Channel, n.d.).

2. Benefits of Cooking

Like gardening, cooking has physical, cognitive, and emotional benefits. It enhances mental function by stimulating various cognitive processes, such as memory, attention, problem-solving, and sequencing skills, which are crucial in brain injury recovery. Additionally, it provides sensory stimulation through the engagement of multiple senses (smell, taste, touch, sight), which is beneficial for sensory integration and recovery.

Therapeutically, cooking serves as an enjoyable activity, promoting a sense of independence, accomplishment, and self-worth. It is inherently social, allowing individuals to bond with family, friends, or caregivers, thus fostering social connections and emotional well-being. Fine motor skills can also be improved through repetitive practice of cooking tasks, such as chopping, stirring, and measuring ingredients.

3. Case Studies

Several healthcare facilities and community centers have already integrated gardening and cooking in their therapeutic offerings. For example, Boston Medical Center has launched its rooftop farm, which serves its cafeteria, inpatient meals, and Preventive Food Pantry3. Similarly, the Bethlem Royal Hospital Occupational Therapy Garden and the Deaver Wellness Farm at Lankenau Medical Center offer therapeutic horticulture and nutrition education.

Community gardens between Soin Medical Center and The Mall at Fairfield Commons promote physical activity and healthy eating among neighbors. The Bishop Gadsden Episcopal Retirement Community encourages its residents to grow their produce and incorporate it into their meals.

4. Suggested Foods and Plants for Garden

Gardening activities in therapeutic settings should be tailored to the specific environment and climate. For example, in Cyprus, crops like potatoes, tomatoes, parsley, and various herbs like rosemary, thyme, oregano, and basil can be grown year-round. Seasonal plants such as grapes, coriander, endives, and others can be produced at specific times of the year.

In conclusion, therapeutic gardening and cooking have significantly positively impacted physical, cognitive, and emotional recovery in brain injury rehabilitation. They contribute to physical and mental skills development and patients' sense of self-worth, independence, and social connections. Therefore, these activities should be considered as part of comprehensive rehabilitation programs.

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Staff-to-Resident Ratio Optimization in Care Facilities: An Analysis of existing documentation

The management of staff-to-resident ratios in nursing homes and care facilities is a crucial determinant of the guality of care, safety, and satisfaction of residents. However, finding the optimal balance between these ratios requires a multifaceted approach, considering resident needs, staff expertise, and economic considerations. Using a 'dependency tool' or 'dependency calculator' is advisable to evaluate and assign staffing needs accurately. It works by categorizing and numbering each resident's level of demand in areas such as eating, changing positions, dressing, verbal aggression, risk level, and frequency of episodes requiring immediate staff intervention. A specific example of a categorization scale can be in toileting, with residents being classified as **needing no help**, **some help**, or **complete assistance**. While Excel-based systems have been prevalent for maintaining such metrics, the trend is gradually shifting towards more integrated, user-friendly, and reliable digital solutions, such as care home management software. This shift in tool preference is due to the software's ability to swiftly set required skills, identify available staff with the necessary skills, and, most importantly, assign them to appropriate shifts. Considering the staff-to-resident ratios, it's important to note that quality of care isn't solely about the number of staff but their professional qualifications. Evaluating the presence of licensed medical professionals, such as Registered Nurses (RNs) and Licensed Professional Nurses (LPNs), and the ratio of Staff-to-Personal Care Assistants (PCAs) can provide a more accurate assessment of a care home's capacity to deliver quality care.

From a numerical perspective, studies suggest that nursing homes with higher staffing levels provide better care. The ideal staff-to-resident ratio often cited is one staff member per six to eight residents. However, this figure can be adjusted based on the state's minimum standards and your facility's or patients' specific needs. The minimum staff-patient ratios are generally considered to be 1:5 during the day, 1:8 in the evening, and 1:13 at night (6). In Finland, a binding ratio of 5 nurses (including practical nurses, care and nursing assistants, and physiotherapists) per 10 patients has been established.

In terms of nursing hours per resident day (hprd), a study by CMS (2001) underscored the importance of having a minimum of 0.75 RN hprd, 0.55 LVN/LPN hprd, and 2.8 to 3.0 CNA hprd, totaling 4.1 nursing hprd to prevent harm or jeopardy to residents.

In the hospitality sector, the optimal ratios vary. For instance, the current ratio can be as low as 1.5 or less in hotels. In contrast, it could be less than 1:19 in restaurants. The restaurant industry often operates with a waiter-to-table ratio of 1:5 to 1:6 and a chef-to-people ratio of 4:50 to 4:60. The cleaning staff usually doubles the number of cooks.

In the therapy sector, it is recommended to maintain ratios of 2.1:10 for occupational therapists, 0.8:10 for speech and language therapists, 1:35 for psychologists, 1:12 for physiotherapists, and 1:65 to 1:75 for nutritionists. Room cleaning staff in a facility typically operate on a ratio of 1:15 rooms.

These ratios become a baseline for managing different professionals in a healthcare

setting, including doctors, rehabilitation nurses, psychologists, physical and occupational therapists, speech-language pathologists, recreation therapists, social workers, nutritionists, and other supportive staff.

Conclusion and Recommendations

The task of optimally managing staff-to-resident ratios in care facilities is multidimensional. Factors such as resident dependency, staff skills, availability, and legislative standards are critical in achieving an effective staff-to-resident ratio. Key recommendations to achieve this balance include:

Utilize a dependency calculator tool to accurately measure and categorize the needs of each resident, providing a systematic approach to staffing.

Transition to user-friendly and reliable digital solutions such as care home management software for easy assigning and managing shifts.

Aim to maintain an ideal staff-to-resident ratio of one staff member per six to eight residents, adjusting as necessary to the unique needs of the facility or patients. Adhere to the CMS recommended minimum nursing hours per resident day to ensure safety and prevent harm.

In therapy services, maintain the recommended therapist-to-patient ratios for occupational therapists, speech and language therapists, psychologists, physiotherapists, and nutritionists.

In the hospitality sector of a care facility, optimize the staff-to-resident ratio following the industry standards.

In conclusion, proper management of staff-to-resident ratios is critical for ensuring quality care, safety, and satisfaction in nursing homes and care facilities. An optimized ratio can meet residents' needs effectively and create a rewarding work environment for staff, resulting in better retention and overall improvement in care quality.

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Roles and Responsibilities of Rehabilitation Staff in Care Facilities: An Analysis

The rehabilitation process in care facilities involves a comprehensive approach, requiring the input of various professionals. These multidisciplinary teams work together to assess, manage, and improve the health of the individuals under their care.

Roles and Responsibilities

Doctor and Physician: they carry out crucial roles in the rehabilitation team,

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undertaking tasks such as: Assessing the patient's physical abilities. Prescribing medicine to manage the patient's mood, sleep, pain, and diet. Prescribing tailored physical, occupational, and speech therapy. Determining tests or treatments for patients.

Rehabilitation Nurse: they bridge the gap between the doctor's office and daily life, offering the following services:

Assessing the patient's self-care, bowel, and bladder function, sexual function, diet, and movement ability.

Assisting with the treatments of other team members.

Educating the patient and their family about their Traumatic Brain Injury (TBI) and any medications they take.

Psychologists or Neuropsychologists: they provide crucial emotional and cognitive support, assessing and treating patients concerning their memory, mood, and behavior. They also counsel and guide the patient's family members about the patient's situation and treatment.

Physical Therapists (PT): they help patients regain and maintain physical abilities, including:

Improving their physical function and ability to move.

Teach the patient how to be independent and safe in their environment.

Determining exercises to retrain muscles and nerves.

Helping the patient strengthen muscles and improve endurance, walking, and balance.

Occupational Therapists (OT) they help patients regain their ability to perform everyday tasks and also:

Assess the patient's cognitive skills (orientation, memory, attention, concentration, calculation, problem-solving, reasoning, and judgment).

Assess the patient's vision.

Help the patient manage more complex tasks (meal prep, cooking, handling money, and engaging in community activities).

Recommend and order any equipment the patient may need before going home.

Speech-language Pathologists (SLP): the pathologists support patients with communication and swallowing issues and they:

Assist with improving communication and understanding skills.

Teach the patient exercises and techniques to improve their ability to speak and express themselves.

Assess the patient's language skills (orientation, memory, attention, concentration, calculation, problem-solving, reasoning, and judgment).

Assess the patient's ability to swallow if they have problems swallowing (dysphagia). If needed, recommend foods and drinks the patient can eat or drink safely.

Recreation Therapists: they support patients' physical and emotional well-being through therapeutic recreational activities and they:

Help patients find activities to help improve their health and well-being.
Integrate the patient back into the community.

Social Workers: provide vital support and guidance for patients and their families and they:

Determine benefits the patient is eligible for.

Help the patient and their family find community resources.

Provide the patient with ongoing and supportive counseling for their journey.

Nutritionists or Dietitians: they oversee the dietary needs of patients and: *Assess the patient's nutritional status.*

Determine the patient's diet according to their status.

Guide the patient and their family about choosing a menu, the right food consistencies, and diet changes that fit their needs.

Assistants and Volunteers: they provide support to patients during rehabilitation and activities. They offer much-needed additional help and time to the rehabilitation process.

Conclusion and Recommendations

The rehabilitation process in care facilities requires a well-coordinated

multidisciplinary team. Each member has unique roles and responsibilities,

collectively contributing to patients' well-being and recovery.

To maintain a successful rehabilitation process in care facilities, it's recommended to:

Ensure each team member understands their roles and responsibilities, fostering a collaborative environment.

Maintain a good ratio of each professional to patients, as outlined in the previous chapter.

Regularly review the effectiveness and efficiency of the rehabilitation process, using feedback from staff, patients, and their families to inform improvements.

Provide ongoing training and development opportunities for staff to ensure they are up-to-date with their field's latest practices and technologies.

In short, a well-structured, multidisciplinary rehabilitation team is critical to effectively delivering care services in care facilities. By understanding the roles and responsibilities of each member, care facilities can optimize their operations to ensure the highest quality of care.

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Intergenerational Programming: Older Persons' Perceptions of Its Impact

Aaron P. C. Weintraub , Timothy S. Killian

Abstract

This qualitative study aimed to examine perceptions held by recipients of adult day services about the impact of intergenerational programming on their emotional well-being. Thirteen recipients of adult day services in a center that provided intergenerational programming participated in guided interviews. These interviews were transcribed and coded for emerging themes. Themes were contextualized in terms of the degree of involvement among study participants. Major themes included peer support, youth and enthusiasm, freedom of choice, familial connections, and being needed. Participants reported overwhelmingly positive experiences in regard to intergenerational programming. Implications for practice include validating the importance of older adults' contributions, encouraging familial connections, and allowing participants to choose their level of involvement. This paper focuses on the impact of intergenerational programming on the emotional well-being of older adults participating in adult day services. The study examines participants' perceptions in an intergenerational center in a northeastern state. The research explores the frequency of contact with children and grandchildren, the participant's experiences in the program, and the implications for practice. The study highlights the importance of allowing older persons to choose their level of involvement with children and the value of recognizing their volunteer efforts as meaningful contributions. While the paper does not provide a comprehensive abstract, it emphasizes the positive experiences reported by participants and suggests potential best practices for incorporating intergenerational programming in adult day services.

Methodology

The methodology explored in this paper is qualitative. The researchers conducted guided interviews with thirteen recipients of adult day services who participated in intergenerational programming at a center. The interviews were transcribed and coded for emerging themes. Data collection took place over three weeks, with initial interviews lasting 45 minutes and follow-up interviews conducted to clarify points and verify participants' perceptions. The interviews were conducted in the multipurpose room of the intergenerational center during times of low activity. The data analysis process involved identifying meaning units in the interview transcripts, collecting additional data, and coding new interviews for previously identified themes. The researchers engaged in discussions and debates to ensure a final set of themes adequately representing participants' perceptions. The result was a final code sheet reflecting the themes evident in the interviews.

Key findings

• Positive impact on emotional well-being: The study found overwhelmingly

positive experiences among participants in intergenerational programming. Themes such as peer support, youth and enthusiasm, freedom of choice, familial connections, and being needed emerged as significant factors contributing to the emotional well-being of older adults.

- Importance of choice and respect: The policy of allowing older persons to choose their level of involvement with children was seen as crucial by participants. This choice was interpreted as a sign of respect, which was closely related to the emotional well-being of older adults.
- Value of recognizing volunteer efforts: Referring to older persons' volunteer efforts as work communicated to them that their contributions were valuable. This recognition further enhanced their sense of purpose and well-being.

Key recommendations:

- Validate the importance of older adults' contributions: Recognize and acknowledge the valuable contributions that older adults make in intergenerational programming. This validation can enhance their sense of purpose and well-being.
- Encourage familial connections: Support and promote opportunities for older adults to connect with their families, including children and grandchildren. These familial connections can provide additional emotional support and strengthen intergenerational bonds.
- Allow participants to choose their level of involvement: Provide older adults with the autonomy to decide their level of involvement in intergenerational activities. This choice empowers them and fosters a sense of respect, which positively impacts their emotional well-being.

Intergenerational Activities Involving Adolescents and Residents of Aged Care Facilities: A Scoping Review

Anita De Bellis, Carolyn Gregoric & Julian Grant

Abstract

This study reviews the published literature on intergenerational activities involving adolescents and residents of aged care facilities. Electronic sources were comprehensively searched, resulting in 14 articles meeting the criteria for review. Three key themes emerged: the impact of intergenerational activities on adolescents and aged care residents and practical intergenerational activities. Thoughtfully planned and implemented activities are the most successful. Intergenerational activities can enrich participants' lives, but the mechanisms of action need to be better understood. Further research is warranted to develop a theoretical understanding of intergenerational activities and rigorous evaluation tools.

Methodology

The specific methodology used in the scoping review is not directly mentioned.

1. The authors searched critical electronic databases, including Ageline, Applied Social Sciences Index and Abstracts (ASSIA), Eric, Informit, Ovid, ProQuest, PsycINFO, Medline, Scopus, and Taylor and Francis.

2. The search included proximity operators to reduce irrelevant results.

3. Only studies published since 2000 and available online were included due to technical and financial constraints.

4. After performing database searches, citations were exported to Endnote, and duplicates were eliminated.

5. Articles were initially screened by title and abstract, and 29 studies were identified for further full-text review.

6. The full texts were reviewed independently by two authors.

7. The study selection criteria outlined in Table 1 were used to determine which articles to include.

Based on this information, it can be inferred that the methodology involved a systematic search of relevant databases, screening of articles based on specific criteria, and a rigorous review process by multiple authors. However, specific methodology details, such as the inclusion and exclusion criteria, should be provided in the texts.

Key findings

The key findings of this scoping review are not explicitly mentioned, but based on the information provided, we can infer some findings from the summary of results:

• Intergenerational design challenges involving technology students and elders in residential aged care showed increased resident engagement during visits, but no

benefits to students were observed

- The program lasted 15 weeks, with students and elders meeting four times.
- The program participants included 24 elders with cognitive impairment and 59 technology students aged 13-15.
- The research study design was quantitative, using a repeated-measures withinsubject design
- The findings did not explore residents' feelings of boredom, and the limited time students spent with elders and the small sample size were identified as limitations.
- Moment-by-moment benefits were observed for elders, suggesting that sustained programs may be more beneficial to students.

Key recommendations

The specific critical recommendations from this paper are not directly mentioned, but we can infer some recommendations based on the information provided:

- **Choice and autonomy**: It is recommended to allow adolescents to choose whether to be involved in intergenerational activities and the level of their involvement. This may help reduce problems arising from a lack of commitment.
- **Reduce academic stressors**: Activities should not place excessive academic pressures or burdens on adolescent participants. It is essential to ensure that the activities do not overly increase academic demands on students.
- **Training:** Training youth about aging and age-related illnesses before engaging with residents is suggested. This will help them develop the necessary skills and knowledge for meaningful interactions.
- Optional activities: Intergenerational activities that are optional for students are preferable. This allows for greater flexibility and participation based on individual preferences.

The Provision of Weekend Physiotherapy Services in Tertiary-Care Hospitals in Canada

Lauren Campbell, Rebecca Bunston, Sarah Colangelo, Dorothy Kim, Jessica Nargi, Kylie Hill, Dina Brooks Type: article

Abstract

Purpose: To describe the provision of weekend physiotherapy (PT) services in tertiary-care hospitals in Canada.

Methods: A prospective cross-sectional survey was conducted across tertiary-care hospitals, defined as those with university affiliations and at least one intensive care unit (ICU). Data were collected via telephone-administered questionnaires addressing hospital demographics, weekend staffing, workload, and weekend referral criteria.

Results: A response rate of 84% (n 1/4 36) was obtained. Of facilities providing weekend PT services (97%), 35 (100%) provided care on Saturdays, 32 (91%) on Sundays, and 33 (94%) on statutory holidays. Weekend services were staffed using permanent full-time (n 1/4 35; 100%) or part-time (n 1/4 28; 80%) in-patient staff or outsourced staff (n 1/4 1; 3%). The number of physiotherapists available on the weekend was smaller than that available during the week (p < 0.001). Standard weekend referral criteria included cardiorespiratory problems (n 1/4 35; 100%), postoperative assessment of patients at risk for deterioration (n 1/4 32; 91%), and patients scheduled for discharge pending PT assessment (n 1/4 30; 86%). **Conclusion**: Both the scope and the number of staff available to provide PT services were less on the weekend than during the week. Despite the use of standard criteria for weekend referral, variability in this service exists. Knowledge about current weekend PT services provides opportunities for harmonization of service delivery.

Methodology

The methodology used in this study involved a cross-sectional survey of tertiarycare hospitals in Canada. The survey was conducted via telephone interviews with physiotherapy department managers or their designates. The survey instrument was developed based on information obtained during a focus-group discussion attended by senior physiotherapists from three large teaching hospitals, with input from faculty advisors. The guestionnaire was piloted by two practicing physiotherapists and modified to optimize its clarity and face validity. The survey collected data on the provision of weekend PT services, including the number of hours worked by physiotherapists and PTAs, the number of staff associated with delivering these services, and the criteria used to select patients most appropriate for weekend PT services. The data collected was analyzed using descriptive statistics, including mean, median, and standard deviations for continuous data and frequency distributions for categorical data. Comparisons of variables across days (Saturday, Sunday, holidays) and management structures (departmental, program-managed, matrix) were performed using analysis of variance (ANOVA) or chi-squared tests for continuous and categorical data, respectively.

Unfortunately, the source does not contain information on the specific ratio between staff and patients for weekend physiotherapy services in Canada's tertiary-care hospitals. The study collected data on the number of physiotherapists and PTAs working on weekends and the number of patients receiving weekend PT services. However, it did not report on the specific ratio between staff and patients. The study found that the number of physiotherapists exceeded the number of PTAs on weekends and holidays and that physiotherapists worked more hours each day than PTAs. However, the study did not provide a specific recommendation for the ideal ratio of staff to patients for weekend PT services.

- There is significant variability in weekend physiotherapy (PT) services across Canada's tertiary-care hospitals.
- The criteria used to determine patient eligibility for weekend PT services need to be more consistent and often open to interpretation by physiotherapists.
- The professional responsibilities of physiotherapists on weekends are similar to those required of physiotherapists who work during the week.
- Outsourcing staff to provide weekend PT services may be appropriate in some facilities.
- Objective criteria for determining patient eligibility for a weekend only a minority of facilities surveyed use PT services.
- Physiotherapists can use the results of this study to advocate for increased resources for weekend care and harmonization of criteria across the country.

Recommandations

- Standardize the definition of weekend physiotherapy service provision across facilities to reduce variability and improve consistency in care.
- Develop objective criteria for determining patient eligibility for weekend PT services to reduce the extent to which eligibility criteria are open to interpretation by physiotherapists and facilitate harmonization of criteria among facilities.
- Consider outsourcing staff to provide weekend PT services, as this model may be appropriate in some facilities and could help ensure consistent and high-quality care.
- Ensure that weekend physiotherapists have the necessary training and support to perform their duties effectively and efficiently.
- Conduct regular evaluations of weekend PT services to monitor their effectiveness and identify areas for improvement.
- Share best practices and lessons learned among facilities to promote knowledge exchange and continuous quality improvement.
- Consider conducting further research to explore the impact of weekend PT services on patient outcomes and healthcare costs.

A comparison between reported therapy staffing levels and the Department of health therapy staffing guidelines for stroke rehabilitation: a national survey

Gabrielle McHugh and Ian D Swain Type: article

Abstract

Background: This study compared reported staffing levels for stroke care within UK in-patient stroke units to stroke strategy staffing guidelines published by the UK Department of Health and the Royal College of Physicians. The purpose was to explore the extent to which stroke teams meet recommended staffing levels. Method: The data analyzed in this report consisted of the detailed therapist staffing levels reported in the demographic section of our national survey to determine upper limb treatment in stroke units (the ATRAS survey). Therefore, a contact list of stroke practitioners was compiled primarily in collaboration with the 28 National Stroke Improvement Networks. Geographic representation of the network areas was obtained by applying the straight-forward systematic sampling method and the Nth name selection technique to each Network list. In total, 192 surveys were emailed to stroke care providers around England. This included multiple contacts within stroke teams (e.g., a stroke consultant and co-coordinator) to increase survey awareness. Results: 53 surveys were returned from stroke teams and represented 20 of the 28 network areas providing 71% national coverage. To compare reported staffing levels to suggested DoH guidelines, analysis was conducted on 19 of the 37 inpatient hospital care units that had no missing data for staff numbers, unit bed numbers, number of stroke patients treated per annum, average unit length-ofstay, and average unit occupancy rates. Only 42% of the units analyzed reached the DoH guideline for physiotherapy, and fewer than 16% reached the guideline for speech & language therapy. By contrast, 84% of units surveyed reached the staffing guideline for occupational therapy. However, a posthoc analysis highlights this as an irregularity in the DoH guidelines, revealing that all therapies are challenged to provide the recommended therapy time.

Conclusions: Most in-patient stroke units operate below the DoH guidelines and are therefore challenged in providing the recommended amount of therapy and patient time to facilitate optimal functional recovery for stroke patients.

Key findings:

- Current staffing levels pose a challenge to providing rehabilitation enabling optimal functional recovery for stroke patients.
- Only 42% of units studied reached the DoH staffing assumptions for physiotherapy.
- A maximum of 16% of the units reached the DoH staffing assumptions for speech and language therapy.

 That 84% reach the staffing assumption for occupational therapy reflects an irregularity in the DoH staffing assumption guide.

In the context of this paper, "staffing assumption" refers to the staffing levels per 10 beds that the UK Department of Health (DoH) recommends for physiotherapy, occupational therapy, and speech and language therapy in in-patient stroke units. These staffing assumptions are based on the Stroke Strategy Staffing Assumptions grid published in the NHS Workforce Planning Resource, National Institute for Health and Clinical Excellence (Nice) Quality Standards Stroke Topic Expert Group Meeting, and the DoH's Progress in Improving Stroke Care. The staffing assumptions are intended to ensure that stroke patients receive optimal rehabilitation enabling functional recovery.

The main challenges that this paper recognizes are:

- Staffing limitations in providing therapy for stroke patients: The paper reveals that most stroke units operate below the DoH staffing assumption levels and are therefore challenged in providing the recommended amount of therapy and patient time to facilitate optimal functional recovery.
- Limited data: The analysis was based on complete data provided by only 19 in-patient hospital care units, although these units did account for over 13,000 patients. This limited data may not represent all in-patient stroke units in the UK.
- Selection bias: The survey requested detailed information about each stroke unit. To maximize participant engagement, the researchers sought out the stroke units they believed would be more likely to collaborate with the study. This may have introduced selection bias into the sample.
- Lack of clarity in staffing guidelines: The paper suggests a need for a clearer understanding of how the staffing guidelines were derived or how relevant and reliable they are.

In Their Own Words: Participants' Perceptions of the Impact of Adult Day Services

Holly Dabelko-Schoeny & Shawn King

Abstract

This research paper examines the impact of adult day services on the lives of older adults, as perceived by the participants themselves. The study, conducted by Holly Dabelko-Schoeny and Shawn King from the College of Social Work at Ohio State University, utilizes grounded theory principles to analyze the experiences and perspectives of individuals who have utilized adult day services. The findings highlight the positive effects of these services on the overall well-being of older adults, including increased social interaction, reduced feelings of isolation, and a sense of purpose and belonging. The paper also discusses the implications of the study's results for policy and practice, emphasizing the importance of supporting and expanding access to adult day services for older adults.

Methodology:

The methodology used in this research paper is a qualitative approach informed by grounded theory. The study aims to discover the lived experiences of older adults who attend adult day programs. It aims to identify emerging concepts and their relationships to develop understandings and theoretical models of program outcomes reflected in the participants' voices. The authors utilized memoing to elaborate categories, define relationships between categories, and identify gaps. The analysis was driven by grounded theory principles, including a line-byline examination of the transcriptions to identify categorical properties such as processes, actions, assumptions, and consequences. The primary author used theoretical coding to sort data into common themes using 36 topic areas identified in the data by both authors to reveal five overarching salient themes that fell into two major categories. The researchers were mindful of using in vivo codes to preserve the meaning of the participant's views of their described experiences.

Key findings:

- Adult day services positively impact the overall well-being of older adults, including increased social interaction, reduced feelings of isolation, and a sense of purpose and belonging.
- The experiences of older adult participants in adult day services can be organized into three main categories: social connections with other participants, empowering relationships with staff, and participation and enjoyment of activities and services.
- The perceived impacts of these experiences include improvements in psychosocial well-being and a perceived decrease in burden or dependence on

the caregiver.

• The study highlights the importance of considering participants' perspectives in outcome studies of adult day services, as starting from the participants' perspectives may provide more validity in future studies.

Key recommendations:

- Policymakers and practitioners should prioritize expanding access to adult day services for older adults, as these services positively impact their overall wellbeing.
- Future research should consider participants' perspectives in outcome studies of adult day services, as starting from the participants' perspectives may provide more validity in future studies.
- The authors suggest that adult day services should focus on creating social connections with other participants, empowering relationships with staff, and participating in and enjoying activities and services to improve older adults' psychosocial well-being.
- The study highlights the importance of considering the perspectives of participants who describe their experience with adult day services as enjoyable but not making a difference in their lives, as this may provide insights into how to improve the services offered.

The impact of intergenerational programs on children and older adults: a review

Maria Rosaria Gualano, Gianluca Voglino, Fabrizio Bert, Robin Thomas, Elisa Camussi and Roberta Siliquini

Abstract

Background: Elderly are at particular risk of social isolation. This condition significantly affects health; however, social involvement can be highly advantageous. In this context, intergenerational programs improve interactions between different ages. Then, the paper reviewed intergenerational programs to summarize these activities' effects on the elderly and children.

Methods: Our review followed the PRISMA statements. We considered papers reporting data about intergenerational programs involving children (preschool and elementary) and the elderly.

Results: The final selection obtained 27 sources. Ten studies evaluated children's outcomes outlining the positive impact of intergenerational programs on children's perception of the elderly. The effects on older participants were variegated, considering well-being, depression, self-reported health, and self-esteem. Moreover, the retrieved studies outlined the importance of careful organization and of specific training for all staff members. The staff involved in similar programs appeared, overall, highly satisfied.

Discussion: The positive impact on children of intergenerational programs is proved in both the short- and long-term. Moreover, despite the different outcomes and the variable results, these programs were overall beneficial to elderly participants. Finally, similar activities were feasible even in older adults with dementia.

Key findings

- Intergenerational programs positively impact children's social development, particularly in terms of their perception of the elderly.
- These programs can also positively impact older adults' well-being, including improvements in self-reported health, self-esteem, and depression.
- The success of intergenerational programs depends on various factors, including program design, implementation, and evaluation.
- There is a need for further research to understand better the long-term effects of intergenerational programs on both children and older adults.

Key recommendations:

- Careful organization: It is essential to carefully plan and organize intergenerational programs, considering the needs and preferences of both children and older adults, appropriate activities, and suitable environments.
- Specific training: Providing specific training for staff members involved in intergenerational programs can enhance their understanding of the unique needs and dynamics of different age groups, improving the program's overall quality.
- Flexibility and adaptability: Intergenerational programs should be flexible and adaptable to accommodate participants' diverse abilities, interests, and preferences. This can help ensure the program is inclusive and engaging for everyone involved.
- Evaluation and monitoring: Regular evaluation and monitoring of intergenerational programs are essential to assess their effectiveness, identify areas for improvement, and make necessary adjustments to enhance the outcomes for children and older adults.

The social world of assisted living

Paula C. Carder

Abstract

This study defines assisted living as a unique social world. It is based on a 22-month ethnography in three facilities and completion of the program required of certified assisted living facility (ALF) managers in Oregon. The focus was on how daily operations are affected by central values (i.e., independence, choice, privacy) defined by Oregon Administrative Rules (OAR). In their efforts to legitimize this newly constructed social world, proponents and providers have developed a package consisting of a unique vocabulary and two organizational practices, the Negotiated Service Agreement (NSA) and Managed Risk Agreement (MRA). This package is integral to maintaining this social world, providing the means for defining and defending assisted living. These organizational tools offer a contemporary perspective on the rights of chronically ill and disabled seniors to make choices about their health care, even choices that medical professionals might define as risky.

Key recommendations:

- Enhancing training programs: Based on the researcher's participation in manager training programs, there could be a recommendation to improve and expand these programs to ensure that ALF providers are well-equipped to address the risks and challenges associated with impaired physical and cognitive function.
- Emphasizing resident strengths and choice: The study highlights the importance of the social model approach in assisted living, which focuses on identifying resident strengths, choices, privacy needs, and potential risks. This could lead to a recommendation to prioritize resident autonomy and decision-making within the ALF setting.
- Managing and negotiating risks: Assisted living practices are designed to negotiate and manage risks associated with impaired physical and cognitive function. This could suggest a recommendation to develop strategies and protocols for effectively managing and minimizing risks while promoting residents' independence and autonomy.
- Clarifying and standardizing policies: The study mentions the interpretation of state rules and the need for ALF manager training workshops instructors to define the principles that future managers must follow. This could indicate a recommendation to clarify and standardize policies and guidelines to ensure consistency and quality of care across different ALFs.

Key challenges:

• Maintaining a stable social world boundary: The social world of assisted living

may face challenges from within or outside. It is unclear what specific challenges are being referred to, but maintaining a stable social world boundary can be challenging.

- Balancing independence with risk: Assisted living facilities strive to balance residents' independence with managing risks associated with impaired physical and cognitive function. Finding the right balance between promoting autonomy and ensuring safety can be challenging.
- Addressing resident needs and preferences: Assisted living providers must address the diverse needs and preferences of residents, including their involvement in the NSA and MRA process, the role of the family, and the participation of ancillary health care providers. Meeting these needs and preferences can be challenging.
- Legal responsibility and risk tolerance: Assisted living providers may face challenges determining their legal responsibility when a Managed Risk Agreement (MRA) fails. Additionally, determining the acceptable level of risk that can be tolerated within the assisted living setting can be a challenge.
- Training and adherence to social model principles: Training managers and direct care staff in assisted living facilities can be challenging. Ensuring these individuals adopt, adapt, or subvert the social model principles appropriately is essential.

Training for assisted living would likely involve a combination of knowledge and skills related to the following areas:

- Understanding the social model of assisted living: Training would likely include understanding the principles and values underpinning the social model of assisted living. This would involve recognizing the importance of resident strengths, choices, privacy needs, and potential risks.
- Risk management and assessment: Given the emphasis on negotiating and managing risks associated with impaired physical and cognitive function, training would likely cover risk assessment techniques and strategies for minimizing risks while promoting resident independence.
- Resident-centered care: Training would likely focus on providing person-centered care that respects residents' needs, preferences, and autonomy. This would involve understanding and implementing resident assessment processes identifying strengths, and supporting resident choice.
- Communication and interpersonal skills: Assisted living staff need training in effective communication and interpersonal skills to interact with residents, their families, and other healthcare providers. This would include skills in active

listening, empathy, and conflict resolution .

• Legal and ethical considerations: Training would cover the legal and ethical responsibilities of assisted living providers, including understanding the legal framework, resident rights, and the boundaries of their responsibilities.

The paper mentions some assisted living practices used to support residents with health and personal care needs:

- Resident assessment: Assisted living providers use a resident assessment process to identify resident strengths, choices, privacy needs, and potential risks. This assessment emphasizes resident autonomy and decision-making rather than functional limitations 11.
- Managed Risk Agreement (MRA): The MRA is a tool-assisted living provider used to negotiate and manage risks associated with impaired physical and cognitive function. The MRA is designed to balance resident independence with safety and risk management.
- Negotiated Service Agreement (NSA): The NSA is a tool-assisted living providers use to identify and address residents' diverse needs and preferences. The NSA is intended to promote resident autonomy and choice in delivering care and services.
- Person-centered care: Assisted living providers strive to provide person-centered care that respects residents' needs, preferences, and autonomy. This involves recognizing each resident's unique strengths and challenges and tailoring care and services accordingly.
- Social model of care: Assisted living providers adopt the social model of care, emphasizing resident autonomy, individuality, dignity, privacy, choice, and a homelike setting. This model promotes a sense of community and belonging among residents.
- Case studies: Case studies are used as an instructional tool in initial manager training and continuing education seminars. These case studies are designed to help providers balance independence with risk and address residents' diverse needs and preferences.

IE Center for Sustainable Cities

Enriched Environments for Healthy Aging: Qualities of Seniors Housing Designs Promoting Brain and Cognitive Health

Aga Burzynska, Laura Malinin

Abstract

Problem: By the year 2050, nearly one in four people in the world will be over the age of 60. Cognitive functioning is the strongest predictor of a person's ability to maintain independence through activities of daily living. Seniors' housing designs do not typically consider users' cognitive health.

The Resolution: We link high-quality experimental research in neuroscience and architectural design through the neuroscience concept of Enriched Environments to support the long-term maintenance of cognitive performance and neural health in the older population.

Tips for Success: Designing seniors housing to promote neurocognitive health requires a sufficient level of environmental complexity, achieved by providing "enriched" spaces that are physically, socially, and cognitively stimulating. Enriched Environments offer therapeutic challenges, complementing universal designs that emphasize accessibility through minimal environmental challenges.

Key findings:

- Seniors' housing designs can be improved to promote neurocognitive health by providing "enriched" spaces that are physically, socially, and cognitively stimulating. Enriched environments offer therapeutic challenges, complementing universal designs emphasizing accessibility through minimal environmental challenges. Specific facility design recommendations include provoking engagement in physical, social, and cognitively challenging activities through spatial proximity, sensory connectivity, variety, flexibility, and aesthetics. Recreation spaces should be within short walking distance of residences (preferred), easily accessible by public transportation, and visible to common gathering areas. Appropriate sounds may travel between recreation and common areas.
- The neuroscience concept of Enriched Environments refers to creating living spaces that provide a sufficient level of environmental complexity, which is achieved by offering physically, socially, and cognitively stimulating elements. In the context of senior housing design, Enriched Environments aim to promote neurocognitive health by providing spaces that provoke engagement in physical, social, and cognitively challenging activities. This can be achieved through spatial proximity, sensory connectivity, variety, flexibility, and aesthetics. By incorporating these elements into seniors' housing design, cognitive performance, and neural health in the older population can be supported and maintained in the long term.
- Cognitive functioning is the strongest predictor of a person's ability to maintain

independence through activities of daily living. Research has shown that cognitive health plays a crucial role in an individual's capacity to perform tasks such as cooking, driving, managing finances, or taking medications independently. While physical and cognitive health become more interdependent with advancing age, cognitive functioning has been identified as the most influential factor in maintaining independence.

The concept of Enriched Environments and its relation to seniors housing design:

The concept of Enriched Environments (EE) refers to creating living spaces that are physically, socially, and cognitively stimulating for individuals. In senior housing design, EE involves designing spaces that promote neurocognitive health and support the long-term maintenance of cognitive performance and neural health in older adults.

Enriched Environments in seniors' housing design can be achieved by providing sufficient environmental complexity. This can be done by including "enriched" spaces that offer therapeutic challenges, such as spatial proximity, sensory connectivity, variety, flexibility, and aesthetics. These spaces should be designed to provoke engagement in physical, social, and cognitively challenging activities.

By incorporating Enriched Environments into seniors housing design, it is believed that cognitive decline can be mitigated, and individuals can maintain their independence and overall well-being.

Practical tips for designing seniors housing that promotes neurocognitive health:

Designing senior housing to promote neurocognitive health involves incorporating certain principles and strategies. Here are some practical tips for designing seniors housing that promotes neurocognitive health:

- Provide spatial proximity: Ensure that recreation spaces and other engaging areas are within short walking distances of residences. This proximity encourages residents to participate in physical, social, and cognitively challenging activities.
- Enhance sensory connectivity: Design spaces to allow visual and auditory connections between recreation areas and common gathering areas. This connectivity helps create a sense of community and encourages engagement in stimulating activities.
- Offer variety and flexibility: Create spaces offering various activities and experiences. This can include providing different recreational spaces, such as areas for physical exercise, social interaction, and cognitive stimulation. Flexibility in the design allows for adaptability to residents' changing needs and preferences.
- Consider aesthetics: Pay attention to the visual appeal of the environment.

Incorporate aesthetically pleasing elements and create a positive and calming atmosphere. This can include natural light, colors, textures, and artwork.

• Promote accessibility: While promoting neurocognitive health, it is essential to ensure that the design also emphasizes accessibility for individuals with varying capabilities. Universal design principles should be incorporated to minimize environmental challenges and enhance accessibility.

By implementing these practical tips, seniors housing can be designed to provide an enriched environment that supports neurocognitive health and enhances the overall well-being of older adults.

Key challenges:

The paper identifies several key challenges in designing senior housing that promotes cognitive health and well-being. One of the main challenges is the need for more awareness and understanding of the importance of cognitive health in senior housing design. Another challenge is balancing accessibility and environmental complexity in the design process. The paper also highlights the importance of addressing the sensory, social, and physical needs of older adults in the design process, which can be challenging due to the heterogeneity of the older population. Finally, the paper emphasizes the need for interdisciplinary collaboration among architects, designers, healthcare professionals, and older adults to create effective and sustainable senior housing designs, which can be challenging due to differences in professional backgrounds and perspectives.

The paper recommends incorporating design features that stimulate curiosity and exploration, enhance spatial memory through navigation activities, introduce novelty to stimulate attention and memory formation and encourage meaningful social interactions. It also highlights the importance of proximity and connectivity in promoting participation in recreational facilities. Overall, the physical space should be designed to support and enhance cognitive functioning in older adults.

IE Center for Sustainable Cities

Elderly-friendly Design Guidelines

Hong Kong Architectural Services Department

Methodology

1. Briefing Session and Consultation: Two briefing sessions were conducted to obtain comments and suggestions from participants from ArchSD, academics, relevant government groups, non-governmental organizations (NGOs), and social service groups on the draft Guidelines. Electronic questionnaires were distributed to collect feedback.

2. Consolidation of Suggestions and Comments: The suggestions and comments collected from the briefing sessions were consolidated to develop the Guidelines further.

3. Development of Guidelines: The Guidelines were developed based on the feedback received and the expertise of the involved stakeholders.

Design recommendations for creating elderly-friendly spaces:

- The layout of the building should be logical and easy to understand, allowing the elderly to identify and locate areas of interest quickly.
- Ensure that the building has clear signage and wayfinding systems to assist the elderly in navigating the space.
- Provide high visual contrasts between seats and floor/wall surfaces to aid in identification.
- Incorporate ample lighting throughout the space to enhance visibility and reduce the risk of falls.
- To support mobility and prevent accidents, Install handrails and grab bars in appropriate locations, such as staircases, ramps, and bathrooms.
- Design entrances and exits to be easily accessible, with ramps or elevators available for those with mobility challenges.
- Create wide and unobstructed pathways to accommodate mobility aids, such as wheelchairs or walkers.
- Ensure comfortable seating areas with appropriate cushioning and back support.
- Provide resting areas at regular intervals to allow the elderly to take breaks and conserve energy.
- To prevent slips and falls, Incorporate non-slip flooring materials in areas prone to moisture, such as bathrooms and kitchens.
- Consider acoustics in the design to minimize noise levels and improve auditory clarity.
- Install bathroom handrails and support bars to assist with balance and stability.
- Design bathrooms with accessible fixtures, such as raised toilets and walk-in showers, to accommodate the needs of individuals with limited mobility.
- Incorporate age-friendly technology, such as adjustable font sizes and voiceactivated controls, to enhance usability for the elderly.
- Provide seating areas with sufficient armrests and back support to aid in sitting and standing.

- Consider using contrasting colors and textures to assist with depth perception and visual clarity.
- Ensure that emergency exits are clearly marked and easily accessible for the elderly in case of evacuation.

Identified challenges identified in the study (through vote):

Outdoor challenges:

- 1. Have trouble finding a proper seating area for resting (100%)
- 2. No overhead shading provided at the seating area (100%)
- 3. Have trouble finding building signage (89%)
- 4. Fear of climbing a long flight of stairs (78%)
- 5. Uneven floor surface (78%)

Indoor challenges:

- 1. Not enough wayfinding signage (100%)
- 2. Text on signage is difficult to read (89%)
- 3. Fear of climbing a long flight of stairs (78%)
- 4. Insufficient seating area (67%)
- 5. Poor lighting (67%)

Key recommendations for safety in an elderly-friendly building environment:

- Ensure the quality of floor surfaces by making them even, level, and slip-resistant to prevent falls.
- Address potential hazards in the built environment that may pose risks to the elderly.
- Implement fall prevention measures, such as installing handrails and grab bars in appropriate areas.
- Consider selecting materials used in the building design to enhance safety.
- Pay attention to lighting to ensure proper visibility and reduce the risk of accidents.

Social Ties and Cognitive Recovery after Stroke: Does Social Integration Promote Cognitive Resilience?

M. Maria Glymour, Jennifer Weuve, Martha E. Fay, Thomas Glass, Lisa F. Berkman

Brief

The study focuses on the role of social ties and support in the recovery of stroke survivors. It examines three domains of social integration: intimate ties, personal relationships, and social engagement. The study also measures received emotional and instrumental support.

The researchers used the Social Support Network Assessment (SSNA) to assess social ties and support. Intimate ties were defined as spouses or live-in partners and confidantes seen at least weekly. Personal ties included children, friends, and relatives. Organizational ties encompassed religious or community group members, volunteers, and social club members.

The study found that baseline social ties and emotional support independently predicted cognitive outcomes at the 6-month mark. Emotional support also predicted more significant improvements in cognitive scores over time. However, no other social exposures were found to significantly impact cognitive recovery.

While the study does not provide specific recommendations on integrating social ties into therapy, it suggests that healthcare providers should assess social ties and support as part of the post-stroke care plan. It also highlights the potential benefits of emotional support in cognitive recovery.

Based on the study's findings and broader literature, it is suggested that healthcare providers educate stroke survivors about the importance of social ties, encourage social engagement, facilitate support networks, involve family and friends in therapy, and collaborate with other professionals specializing in social support.

Social integration contribution to cognitive resilience after a stroke:

According to the study, social integration may contribute to cognitive resilience after stroke through various mechanisms. One potential mechanism is that social interactions, such as receptive and expressive communication, recall of shared experiences, and problem-solving, can directly benefit neurologic function. Engaging in these cognitive demands of social interactions may promote cognitive recovery after stroke.

Additionally, members of close social networks may encourage patients to engage in health-preserving behaviors, such as medication adherence, which can positively impact cognitive function. Furthermore, social interactions and social support may offset the harm to physical and cognitive function that can arise from highly stressful events. It is important to note that while the study suggests a potential association between social integration and cognitive resilience after stroke, the exact mechanisms and causal relationships are still being explored.

The study acknowledges that reverse causation is possible in the relationship between social ties and cognitive recovery after stroke. Reverse causation refers to the idea that cognitive declines may lead to disengagement from social resources rather than social ties directly influencing cognitive changes.

While the study does not definitively rule out reverse causation, examining the relationship between social resources and cognitive recovery among stroke survivors can help circumvent this problem. Since cognitive recovery begins only after the stroke, measures of social connections at the time of the stroke or immediately after that are unlikely to be influenced by the extent of recovery.

In summary, while reverse causation is possible, the study design addresses this issue by focusing on social ties and cognitive recovery after stroke, where the timing of cognitive changes is known. However, further research is needed to fully understand the causal relationship between social ties and cognitive recovery after stroke.

Methodology:

The study used a prospective cohort design to examine the relationship between social ties and cognitive recovery after stroke. The study included 272 stroke survivors who were enrolled in the Framingham Stroke Risk Profile (FIRST) study.

The study assessed social ties and support using a modified Social Support Network Assessment (SSNA) version. The SSNA measures social ties in intimate, personal, and organizational domains. Emotional and instrumental support were also assessed using the SSNA.

Cognitive function was assessed using the Mini-Mental State Examination (MMSE) and a summary battery of seven neuropsychological tests. Median-based regression was used to model cognitive outcomes by level of baseline intimate, personal, and organizational social ties and received emotional and instrumental support.

The study also used statistical methods to control for confounding variables like age, sex, education, and stroke severity. The study followed up with participants 6 months after the stroke to assess cognitive function again.

The study used a prospective cohort design to examine the relationship between social ties and cognitive recovery after stroke. Social ties and support were assessed using the SSNA, and cognitive function was assessed using the MMSE and a summary battery of neuropsychological tests. The study used statistical methods to control for potential confounding variables and followed up with participants 6 months after the stroke to assess cognitive function again.

Key findings:

The study found that stroke survivors who reported social ties in multiple areas and those with higher emotional support immediately after a stroke had better Cognitive Summary Scores 6 months later compared to socially isolated individuals or those with less emotional support. Baseline social ties and emotional support independently predicted 6-month Cognitive Summary Scores, and emotional support also predicted more significant improvements in Cognitive Summary Scores from baseline to the 6-month follow-up.

However, the study did not find that baseline social ties predicted more significant recovery (improvements) during the follow-up period 8. In other words, the advantage at the 6-month follow-up was similar to that of the baseline poststroke assessment. The study also notes that its results should be interpreted cautiously in light of its limitations, such as that FIRST participants may not represent the population of stroke survivors.

Definitions of social support:

The study assessed social ties and support using a modified version of the Social Support Network Assessment (SSNA). The SSNA measures social ties in intimate, personal, and organizational domains. Emotional and instrumental support were also assessed using the SSNA.

Intimate ties were defined as spouses or live-in partners and confidantes seen at least weekly. Personal ties were defined as ties with one or more children, two or more friends, and two or more relatives. Organizational ties were defined as ties with one or more members of a religious or community group, one or more members of a volunteer organization, and one or more members of a social club or other organization.

Emotional support was defined as the availability of someone to talk to about personal problems, and instrumental support was defined as the availability of someone to help with daily tasks such as shopping, transportation, and housework.

In summary, social ties were defined as connections with intimate partners, personal ties such as friends and relatives, and organizational ties such as members of religious or community groups. Emotional support was defined as the availability of someone to talk to about personal problems, and instrumental support was defined as the availability of someone to help with daily tasks.

Integration of social ties into therapy:

The study does not provide specific recommendations on integrating social ties into therapy. However, based on the findings and the broader literature on social support

and therapy, the following suggestions can be made:

- Assess social ties: Healthcare providers should assess stroke survivors' social ties and support networks as part of the therapy process. This can be done using tools like the Social Support Network Assessment (SSNA) mentioned in the study.
- Educate patients: Healthcare providers can educate stroke survivors about the potential benefits of social ties and support in their recovery. This can help patients understand the importance of maintaining and nurturing their social connections.
- Encourage social engagement: Healthcare providers can encourage stroke survivors to engage in social activities and maintain their social ties. This can include participating in community groups, joining support groups, or engaging in hobbies and activities that involve social interaction.
- Facilitate support networks: Healthcare providers can help stroke survivors build and strengthen their support networks. This can involve connecting them with relevant community resources, such as support groups or organizations that provide social activities for stroke survivors.
- Involve family and friends: Healthcare providers can involve family members and close friends in therapy. This can include inviting them to therapy sessions, providing them with education and resources on supporting the stroke survivor, and encouraging their active involvement in the recovery journey.
- Collaborate with other professionals: Healthcare providers can collaborate with other professionals, such as social workers or psychologists, who specialize in social support and therapy. This interdisciplinary approach can help ensure that the social needs of stroke survivors are adequately addressed in therapy.

Creating a Senior-Friendly Physical Environment in our Hospitals

Joanne O'Keeffe BSc, OT

Brief:

This paper emphasizes the importance of creating a senior-friendly physical environment in hospital facilities. It acknowledges the changes associated with aging and the increased prevalence of chronic and acute medical conditions among older adults. The goal is to develop a physical hospital environment that accommodates seniors' needs and is universally friendly for people of all ages, education levels, disability levels, and cultures.

Key areas of work identified by the World Health Organization in their policy for health and aging:

According to the study, the World Health Organization (WHO) has identified the implementation of "aging-friendly" standards in healthcare centers as one of the critical areas of work in their policy for health and aging. This suggests that the WHO emphasizes the need for hospitals to create a senior-friendly environment throughout the entire facility, including emergency departments, acute care, and general service areas. By doing so, hospitals can facilitate the timely recovery and discharge of senior patients to their pre-admission living environment, ultimately reducing care costs.

"Age-friendly" standards:

The concept of "aging-friendly" standards generally refers to creating an environment that caters to the unique needs and challenges older adults face. These standards may include various aspects such as:

- **Accessibility:** Ensuring that the physical environment is accessible and barrier-free for older adults, including ramps, handrails, and wide doorways.
- **Safety:** Implementing measures to prevent accidents and falls, such as non-slip flooring, adequate lighting, and grab bars in bathrooms.
- **Communication:** Providing clear and easy-to-understand information through large print materials, simple non-serif fonts, and hearing amplifiers for those with hearing impairments.
- **Supportive Staff:** Training healthcare professionals and staff to understand and address the specific needs of older adults, including communication techniques and age-appropriate care.
- **Social Engagement:** Promoting social interaction and engagement among older adults through volunteer guides, companionship programs, and activities tailored to their interests.

Changes associated with age:

The study provides information on the aging-related changes that must be considered when planning hospital renovations or new building additions to create a senior-friendly physical environment. These changes include:

- Vision: Reduced visual acuity, reduced fields of vision, sensitivity to glare, reduced speed of accommodation to changing light levels, and increased prevalence of eye conditions such as glaucoma, cataracts, and macular degeneration.
- Hearing: Reduced hearing ability, sensitivity to high-frequency noises, difficulty filtering out background noise, and malfunctioning hearing aids.
- Physical Changes: Loss of muscle strength (up to 40% 60%), reduced balance, reduced reflex/reaction time, reduced dexterity and fine motor coordination, increased response to environmental vibration, and decreased thermal response (tolerance of a lower range of room temperatures).
- Cognitive Function: Increased prevalence of dementia with age, reduced memory, visual perception changes, reduced reasoning and abstract thinking, and communication changes leading to increased susceptibility to delirium.

Design recommendations:

1. Color and Upholstery:

- Use the same colors on exit or "out of bounds" doorways as hallways to reduce unwanted use.

- Avoid visual overstimulation and strongly flecked patterns.
- Opt for plain fabrics with mild patterns.
- Avoid very dark colors and soft pastels.
- Avoid "vibrational" patterns.
- Warm colors are most easily seen and appreciated.

2. Art:

- Use non-glare finishes on artwork.
- Ensure artwork is well-lit with focused light (3-4 times brighter).
- Select pictures that are clear, realistic, and have definitions.
- Use color contrast to help define features/objects in the picture.

- Avoid using mirrors, which may cause confusion and agitation due to visual perception changes.

3. Orientation/Wayfinding:

- Install large clocks and calendars for easy time and date reference.

- Combine visual displays that scroll slowly along with verbal calls to inform patients in large waiting areas.

- Demarcate different functional areas using color, signs, physical layout, or other identifying features.

These above mentioned design recommendations aim to create a visually comfortable and easily navigable environment for older adults in hospital facilities.

Interior and spatial design recommendation:

- Clear and Open Layout: Design spaces with clear pathways and open layouts to minimize obstacles and allow for easy navigation, especially for individuals with mobility aids such as wheelchairs or walkers.
- Adequate Lighting: Ensure that all areas are well-lit to enhance visibility and reduce the risk of falls. Use natural and artificial lighting sources to create a balanced and comfortable environment.
- Non-Slip Flooring: To prevent slips and falls, install non-slip flooring materials in areas prone to moisture, such as bathrooms and entrances.
- Comfortable Seating: Provide comfortable and supportive seating options throughout the facility, considering factors such as cushioning, back support, and seat height to accommodate the needs of older adults.
- Acoustic Considerations: Incorporate sound-absorbing materials and design elements to minimize noise levels and improve acoustic quality, as older adults may be more sensitive to excessive noise.
- Clear Signage: Use clear and easily readable signage with large fonts and highcontrast colors to assist with wayfinding and navigation within the facility.
- Accessible Restrooms: Ensure that restrooms are designed to be accessible, with features such as grab bars, raised toilet seats, and adequate space for maneuvering mobility aids.
- Multi-Sensory Stimulation: Consider incorporating elements that engage multiple senses, such as soothing music, pleasant scents, and tactile materials, to create a calming and stimulating environment.

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Changes Associated with Aging

As one ages into the senior years, vision, mobility, hearing, cognition, perceptual ability, general physical ability and endurance commonly decline. Superimposed upon this normal aging process will be a variety of chronic and acute medical conditions and symptoms that increase in frequency with age, further reducing the senior's functional ability. When planning hospital renovations or new building additions, the following factors regarding changes associated with aging need to be considered to create a senior friendly physical environment:

Vision	Hearing	Physical Changes	Cognitive Function
 Glaucoma, cataracts, macular degeneration Sensitivity to glare Reduced speed of accommodation to changing light levels Reduced vision in low light "Yellowing" of the aging lens Reduced visual acuity Reduced fields of vision 	 Reduced hearing ability Malfunctioning hearing aids Sensitivity to high frequency noises Difficulty filtering out background noise 	 Loss of muscle strength (up to 40% - 60%), flexibility and coordination Reduced balance Reduced reflex /reaction time Reduced dexterity and fine motor coordination Increased response to environmental vibration Decreased thermal response (tolerance of a lower range of room temperatures) 	 Increased prevalence of dementia with age Reduced memory Visual perception changes Reduced reasoning and abstract thinking Communication changes increased susceptibility to delirium
Overall Environment			
Lighting Seniors require 30% more light for equivalent vision, and up 5 times brighter light in areas for reading and task completion 30-70 foot-candles indoor illumination Consider using natural fluorescents ,full spectrum lights(T5 and T8 lamps) Ensure no glare Cove lighting Direct illumination on vertical surfaces No highly polished surfaces Avoid pooled lighting in patient washrooms Ensure consistent levels of brightness in adjacent areas Create gradual changes of light levels when coming in from outdoors awnings or outdoor covered entranceway brighter instrement interior link inside entranceway		 Noise/Sound High noise levels can lead to anxiety, confusion and fatigue from over stimulation and difficulty hearing that which is spoken to the senior. Background noise can create misinterpretations of what is happening in the environment Reduce the use of the public address system as much as possible and turn off in patient bedrooms Combine a visual display that scrolls slowly to inform patients in a waiting area Reduce background ambient noise (eg. ventilation systems, radio) Have hearing amplifiers available in all patient contact areas Reduce the number of hard surfaces and "echoes" Use quality acoustical ceiling and wall products consider heating and ventilation structure to reduce noise when installing 	
 Décor use colours at the warm end of the spectrum (blue tones are difficult to see) pastels and low contrast colours are difficult to see and define use colour to define functional areas (ie yellow hallway, green rooms, amber activity room) use colour contrast to highlight areas such as doors to assist wayfinding. Use the same colors on exit or "out of bounds" doorways as hallways to camouflage and reduce unwanted use. Upholstery 		 Orientation/Wayfinding Large clocks, calendars Combine a visual display that scrolls slowly along with verbal calls to inform patients in a large waiting area Clear demarcation of different functional areas by colour, sign, physical layout, other identifying features (eg. Large distinctive picture, fish tank) Ensure patients can clearly "see their destination" on patient care units (ie dining room doors open, uncluttered hallways) Signage 	
 Avoid visual over stimulation No strongly flecked patterns Plain fabrics with mild patterns Avoid very dark colours and soft pastels Avoid "vibrational " patterns Warm colours most easily seen and appreciated Art Non glare finish Well lit with focussed light(3-4 times brighter) Content with full spectrum colour especially in brighter tones Select pictures that are clear and realistic with definition Colour contrast to help define the features/objects in the picture Avoid the use of mirrors which may cause confusion and agitation due to visual perception changes 		Up to 80% of seniors experienc reading due to less accessibility cultural differences, and cogniti visual and perception changes, cues can create a significant ba level of function within a hospit volunteers to guide within the h seniors. Signs should be: Uncluttered with a simple information on one sign Strong contrast of: Print on sign backg Sign from environ White on dark brown o environment with "whit Black on white or dark g Matte, non-glare finish Include simple explanat Key locations (eg.bathm wall to facilitate identifi	e some degree of difficulty with v to education earlier in this century, ve changes. When combined with inappropriate signs and wayfinding irrier to a senior's accessibility and al. Alternatives to reading such as ospital should be available for e message – avoid too much round nent background r black or black on yellow in a busy e background" green on white for general use tory graphic com) with signs perpendicular to the cation for signage

Safe Mobility				
 Flooring Quiet cushion flooring (eg. vinyl cushion tufted) Matte, non-slip, finish or wax Low pile carpeting Even colour – NO bold patterns that can create visual perception challenges Contrast baseboard or floor border to define floor edge and pathway 	 Doors: All doors wide enough for easy clearance of wheelchair Threshold no more than ¼" beveled edge Lever handles Max. 8 lbs pull, 14 lbs push force Automatic door opening mechanisms for main entrances and hall doorways Seating area just inside entranceways to allow vision time to adjust to light changes Adequate wheelchair availability at entranceways Accessible parking (consider valet service) Covered outside entranceway with drive-up drop-off area 			
Specific Functional Areas				
 Visually distinctive doorways and bed area in shared room Direct sightline to washroom from bed Call bells Remote voice activated is ideal Ability to be fixed to bedside Large, easily activated button 	 Telephone Black phone with large white push buttons with contrast numbers/letters Located within easy reach of bed Volume control Suitable for use with hearing aids Light switches For personal areas – bedside console with clear labels and large buttons 			
 Hallways Clear, unimpeded pathways wide enough for wheelchair/ walker and caregiver in each direction (larger than minimum wheelchair access standard) Avoid shiny surface with glare Avoid long hallways without visual interruption Seating areas at regular intervals along long hallway Hand railings in hallways to assist walking (1.5"daimeter with 2" hand clearance – "easy grip" rounded style Handrails extend beyond top and bottom landings Waiting Areas Quiet small waiting areas without multiple stimuli which allow confidential conversation for the hearing impaired Combine visual and auditory cues in large waiting areas (ie. large electronic number sign to call next patient Washrooms Large enough for wheelchair/walker and caregiver access in accessible stalls in public washrooms (larger than minimum code) Patient room washrooms with full wheelchair turning radius All toilets with minimum of one non-slip grab bar – 45 degree at side of toilet Accessible toilet paper dispenser (19 " heigh, at the side and slightly to front of toilet) with paper not "hidden" within dispenser High toilets(18") available in some public regular stalls Toilets in patient rooms with space for over-toilet commode 	steps • use conventional (7" risers; 11"treads) that will be expected • highlight step edge with contrast colour (yellow) ramps – avoid if possible But if required • 5% - 8% slope • rest area every 30 feet • mark top and bottom with yellow strip • Full turning radius (as per building codes) for wheelchairs/walkers plus space for caregiver to maneuver the wheelchair in seating areas and between seats • Auto flush- or flush lever extending beyond toilet cover • Auto on/ off sink faucets with controlled water temp or lever faucet handles • Sinks with open area beneath and pipes insulated • Tilting or low mirror • Both auto air and easy access towel dry mechanisms • Ensure dispenser is not above a sink or counter (minimum 20" forward reach), max 47 " from floor • Non-slip, non-glare cushion floor (avoid ceramic) • Showers • Walk-in with surround grab bars, room for bath chair/commode • Edge of sloped floor towards drain clearly defined with contrast strip and tactile cue • Non-slip floor surface (avoid ceramic)			
Furniture Tables • Sturdy 4 legged • Rounded corners, • Edges defined with contrasting colour borders • Matte tabletop • Contrast table settings to assist with depth perception Beds • Electric adjustable height to 18" low • Controller with "simple" technology and large easily identified buttons • Pressure relieving mattress • Avoid side railings that fold down to the floor Bedside tables • On glides instead of wheels • Lever handles for easy glide drawers OTHER FACTORS	 Chairs Seat -18-19 in. high, 18-20 in. deep with firm cushion Arms extended to front chair edge, 10 in. above seat height Lumbar support Non-slip easily cleaned fabric Clearance under front of seat to allow feet under front edge Stable/tip-free Minimal back recline and backwards seat tilt Chair legs able to be fit with blocks to further raise seat height 			

- Large print for all written materials provided (minimum 14 font) with simple nonserif characters
 Hearing amplifiers should be available for use with clients by ALL staff
 Volunteer guides to accompany seniors to their destination within a facility instead of relying on verbal directions
 Consider nutrition needs of seniors (diabetic, low salt food in vending machines and gift stores)

Conclusions

SENIOR HOMES

Senior Friendly Environment.

Changes associated with aging, such as vision, mobility, hearing, cognition, perceptual ability, general physical ability, and endurance, commonly decline in the proper environment. The center's design must create a Senior Friendly Environment regarding lightning, noise, sound, decoration, orientation, safe mobility, and furniture. (Source 1)

The four principles for designing a Senior Friendly Environment (SFE) are **safety** (safe mobility and activity), **support** (to foster confidence and independence), **cognition** (to support cognitive ability), and **well-being** (to provide a healthy environment). (Source 2)

In order to enhance **multisensory stimulation** (visual, auditory, olfactory, tactile), a Senior Friendly Environment should have elements based on a biophilic design (Source 3). A building with multiple orientations to allow the entrance of light through windows, courtyards, skylights, or the reflection of materials can provide novelty and a continuous environmental change. In addition, vegetation plays a vital role in any biophilic design. Plants are dynamic. They change every day, and they transform the environment gradually by growing, changing the colors, the odors, through the falling of leaves.

In addition, using materials and products that reflect the evolution of time and aging can help create a more comfortable environment. Well-managed aging of materials such as wood, stone, or the growing of moss can **enhance the feeling of identity** and a hand-crafted environment. Typically, we build a stronger relationship with old rather than new objects.

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BRAIN INJURY

Essentially, there are two types of brain injury: Before Birth Injury or Disorder and Acquired Brain Injury (ABI) (Source 1). The latter can be divided into three categories: Traumatic Brain Injury (TBI), Mild Traumatic Brain Injury (MTBI or MBI), and Non-Traumatic Injury. The effects of brain injury can be summarized as cognitive, physical, behavioral, and emotional. (Source 2)

Socialization can be one of the main challenges of brain injury (Source 3). Different types of socialization disorders include communication challenges, confabulation, disinhibition, fatigue, feeling like a burden, lack of awareness, reading facial and verbal cues, inability to start or follow a conversation, and environmental factors.

The design of the center must **avoid overwhelming or irritating environments**. The acoustic of the interior spaces must be designed to avoid noisy and too loud environments. Typically, most glass, stone, and steel materials reflect the sound and multiply the environmental sound. It is essential to balance the design using materials that reflect and absorb the sound, such as wood, acoustic insulations, fabric, or vegetation. Also, too bright spaces can irritate the residents. Thus, it is necessary to avoid highly reflective materials. Finally, the center's design must be flexible enough to allow the residents to interact with the staff or other residents.

There are different types of therapies for brain injury (Source 4): *occupational therapy*, *physiotherapy*, *psychological therapy*, *speech and language therapy*, *cognitive behavioral therapy*, *vocational rehabilitation therapy*, *art therapy*, *mindful meditation and yoga*, *music therapy*, *and recreational therapy*.

As in the case of senior residents, **recreation therapy** is the most engaging way to stimulate the brain (Source 5). In addition to the above activities, knitting, music therapy, aquatic therapy, adaptive sports, or community and cultural outings.

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Conclusions

INTERGENERATIONAL PROGRAMS

Few studies analyze the effects of intergenerational activities (Source 1). Although, there is a shred of solid evidence that intergenerational programs can enhance social networks and relationships with other residents, neighbors, and family members. Cross-generational activities can improve cognitive functioning and emotional and social well-being.

In the case of seniors, the most common neuropsychiatric disorders are dementia and late-life depression (Source 2), although they often coexist. Implementing intergenerational programs can improve the mental health of the elderly, albeit it is an opportunity for both young and old to build new relationships.

Intergeneration programs help to create a "community as a whole." (Source 2) The main objective is to integrate older adults into society by providing meaningful activities and relationships. Intergenerational programs can enhance the sense of community and improve the health of older and younger adults. In addition, they are considered a social activity that may promote active aging among older adults (Source 3, Source 4) and can reduce depression, negative self-perceptions, social isolation, loneliness, or psychological distress (WHO, 2002).

The members of the residents' social network as family, friends, other residents, or staff, can enhance their physical and cognitive function (Source 5). Researchers define social support as "An exchange of resources between at least two or more individuals perceived by the provider or the recipient to be intended to enhance the well-being of the recipient" (Stowe, 2015). A strong social network can support the physical and mental well-being of the residents.

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FAMILY CAREGIVING

Families are usually the primary support for older relatives (Schulz, 2008) and young people with brain damage, and they are considered critical partners in the plan of care for patients (Reihard, 2008). The caregiver may also experience stress and adverse effects, such as finances and family conflicts, that can lead to psychological distress, poor health habits, and psychiatric or physical illness (Schulz, 2008; Winter, 2005).

Typically, in the early stage of caregiving, negative effects may not occur, and the caregivers may feel good about themselves. There is a gradual progression of adverse effects since the first experiences of caregiving that can lead to physical and psychological health risks (Roth et al. 2014). Although caregiving also has positive outcomes, such as appreciation from patients, family cohesion, resilience development, and a sense of accomplishment (Irfan et al., 2017), it is often associated with levels of caregiver burden. **Caregivers are considered hidden patients themselves** (Reihard, 2008). In this sense, the center can help to find a balance between the caregivers and the patients.

Most centers for the elderly or youth with brain damage focus primarily on individual patients, not family caregivers or other informal care providers (Roth et al. 2014). Family caregivers are expected to decline due to low fertility rates, low marriage rates, higher divorce rates, and greater geographic mobility. (Roth et al. 2014). Caregivers are not only the families but also the informal caregivers as friends, neighbors, or other relatives.

Caregivers must be included as an integral part of the healthcare and **must be considered partners by the center**. (Roth et al. 2014) Caregivers can feel their role as a burden (Vitaliano et al., 2003; Handan, Nur, 2022; Irfan et al., 2017), which includes embarrassment, overload, resentment, isolation from society, loss of control, or poor communication.

Since family caregivers often feel unprepared to provide care due to the lack of knowledge or resources (Reihard, 2008), **it is recommended that the center provides a specific place for supporting family caregivers**. Teaching and supporting caregivers in managing patient problems can improve caregivers' well-being. (Reinhard, 2008). In addition, the center must provide spaces for the relationship between families and patients.

Chapter 3 Case studies

- Design Case Studies
- Conclusions
- Program Case Studies
- Comparative analysis of existing senior homes
- Essential pillars for future senior living communities





92-Bed Nursing Home

Architects: Dominique Coulon & associés Area: 5395 m² Year: 2014 Photographs:David Romero-Uzeda Structural Engineer: Batiserf Electrical & Mechanical Plumbing Engineer: BET G.Jost Cost Estimator: E3 Economie Landscaping: Bruno Kubler Kitchen Expert: Ecotral Client: Lamy-Delettrez nursing home Budget: 9 304 560€ H.T City: Pont-sur-Yonne Country: France

The building blends into the sloping landscape of Pont-sur-Yonne. The dark blocks house the 96 rooms; the main entrance is arranged around a courtyard resembling a village square, facing the Yonne valley.

The common areas of the living spaces are arranged to benefit from the energy of light from the south, with wide openings looking out over the park. Two planted patios provide the building with depth. All traffic routes have natural light, making them ideal for strolling. They widen with changes of direction, accommodating sitting areas in warm shades of pink and red where ergonomically designed banquettes are conducive to group conversations among the residents. Particular attention has been paid to making the collective areas both fluid and transparent. The dining rooms occupy a central balcony position looking towards the lobby, opening broadly to the south. Sheltered terraces are a further addition to the residents' quality of life.

The rooms, each measuring 20 square metres, have been very carefully designed. The combination of bay windows and furnishings reinforces the feeling of thickness of the facade. The diversity of the three types of room is enhanced by the careful attention paid to both colour and solar orientation.

The building is certified to high energy performance standards. The exterior insulation confers good inertia and provides a high level of thermal comfort. In drawing up this project, particular care has been paid to use and functionality. Everything has been done to use routes, natural light and materials to best advantage, producing living spaces which respect the dignity of their residents.







Therapeutic Pools for La Esperanza School

Architects: FUSTER + Architects Year: 2015 Photographs:Jaime Navarro Project Team: Nataniel Fúster, Heather Crichfield, Sadie Winslow, Jose Pagán, Santiago Garramuño, Luis R. Albaladejo Contractor: BIM Contractors City: San Juan Country: Puerto Rico

The Pools are designed as a therapeutic facility for use by children with physical disabilities between the ages of 5 and 16 years. The facilities are open to the public but will be used primarily by students of La Esperanza School; thus the yellowish-green "verde esperanza" color of the exterior and the word "esperanza" ("hope") written on the bottom of the main pool. This is the first structure of its kind in Puerto Rico.

The design focuses on empowering the user, highlighting and promoting the spatial experience rather than the clinical requirements necessary for a therapeutic space, while still meeting all the requirements of universal design. This differentiates this project from other projects of its kind which tend to focus on highly visible clinical requirements such as ramps and handrails, putting in second place the user experience.

The protagonists of the space are the light and the sky. One of the most important intentions of the project was to create a unique space where natural light constantly transforms the atmosphere inside; creating a direct connection between the user and nature and facilitating the healing process.

Every pool is treated as a courtyard; a prototypical Puerto Rican design element rooted in the colonial and vernacular architectures of the island. From within the pools the ceiling apertures with their tall cylindrical parapets frame the sky generating a direct relationship between users and the celestial sphere. This is important because children receive therapies while floating on their backs, looking upwards.



Social Center Luz Soriano

Architects: ARQX Architects Area: 870 m² Year: 2014 Photographs:Sonia Arrepia Construction: CONDURIL, Pedro Ramalho, Albina Neves, Ricardo Miragaia Architects In Charge: Miguel Meirinhos, Pedro da Graça Lopes Collaborators: Pedro Oliveira, Margarida Oliveira Promoter: Ordem dos Médicos SRN Supervision: Fase – Estudos e Projectos S.A., Diogo Porto Carrero, Luísa Jacob, Ana Aguiar Stability: Armandina Reis, Carla Costa, Miguel Coutinho Infrastructure: Armandina Reis, Carla Costa, Miguel Coutinho Stability And Infrastructure: Armandina Reis, Carla Costa, Miguel Coutinho City: Porto Country: Portugal

In the context of a progressive population aging, the growth of eldest part of the society is inevitable. In Portugal, the increase number of the elderly occurred relatively fast during the 1990s and, in 2001, for the first time, the number of elderly (> 64 years) was higher than the number of young (<15 years)

To adapt the architectural production to the needs of the elderly, it is necessary to understand the processes of aging in a physical, social and psychological matter, the behaviour of the elderly and their perception of the environment in the society as well as its form of expression. It's the architect's responsibility to create structures / environments that combat and prevent inertia / inactivity / disability caused by the "less positive" consequences of aging. It is a powerful tool and a great responsibility the maintenance and social healing that can arise from this form of intervention, being this decisive in the attitude of society towards one of the stages of life that has been more marginalized.

The internal organization of the new building part is quite simple. Noteworthy is the introduction of a perpendicular axes system of movement (whose intersection is performed in the main reception hall) that allows access to different areas and a rhythm punctuated with outward openings. The seizure of the inner organization is essential in a social nature framework and using a simple distribution system was crucial to facilitate this process. To each quadrant there is a differentiation of activities: exercise room, locker rooms, offices for medical care and multipurpose room. In the two upper floors, one is reserved for the main hall and the last is the library. This distribution also allows independent and simultaneous use of different valences. The location of the stairs provides an extra informal relationship allowing easy access between the spaces located on different floors.



Residential Care Home Andritz

Architects: Dietger Wissounig Architekten Area: 6950 m² Year: 2015 Photographs:Paul Ott, Helmut Pierer Landscape: Dietger Wissounig Architekten Design Team: Dietger Wissounig, Bettina Gossak-Kowalski, Patrick Steiner, Stephan Brugger, Vojka Mocnik, Thomas Wadl Clients: Gemeinnützige Wohn- u. Siedlungsgenossenschaft Ennstal reg. Gen.m.b.H. Liezen City: Graz Country: Austria

A residential care home for 105 elderly residents has been constructed on Statteggerstraße in Graz on a park-like plot in the immediate vicinity of the Andritzbach brook.

It is a composite construction and features controlled domestic ventilation. Load-bearing ceilings and walls are made of concrete while all other structural elements are wood. The façade elements, each extending across two rooms, were prefabricated, their size determined by the maximum dimensions suitable for transport.

The two-storey building consists of four wings arranged around a semi-public "village square", designed to host various events. This is also the location of the roofed vestibule, the central nurses' station, an oratory, a cafe, a hairdresser as well as an open, tended atrium.

Three residential areas on the ground floor and four on the top floor host one carer and 15 residents each, primarily in single rooms, thereby creating a manageable and friendly atmosphere. A large common living area for each residential group, wide loggias and zoned gardens, some of which are suitable for dementia patients, on the ground floor and atria with tower galleries on the top floor serve as additional living zones. Special attention has been paid to ensure sufficient natural light floods the entire building.

The interweavement of the building with the outside space has been assigned particular significance. The green and open space was designed with the typology of the care home in mind and is based on a sequence of gardens which differ in size and character. The gardens also form the passage into the park bordered by the Andritzbach to the east. A particularly attractive space for recreation has been created by designing a wooden platform that juts out over the water which, together with the manifold zones of a manageable scale inside and around the building, generates a familiar yet invigorating atmosphere.

Nurses' stations and secondary rooms are always nearby, making work processes highly efficient. Shorter and longer walks around the building with varying visual references and pleasant quiet zones ensure diverse free movement opportunities, even outside set therapy sessions.

description text written by the architects







Residence and Day Center for the Mentally Handicapped

Architects: Aldayjover Arquitectura y PaisajeArea: 6950 m² Year: 2010 Photographs:Jordi Bernadó Landscape: Dietger Wissounig Architekten City: Barcelona Country: Spain

Beyond an impeccable functional and spatial interior layout, explained below, the key to this project lies in an appropriate answer to the unusual and difficult urban and volumetric situation into which it is inserted.

Given that the rear facade overlooks an alleyway only 1.5 meters wide, which opens up at higher levels but always faces the rear façades of an educational building, the spaces of the residence and, especially, its circulation and common areas, are structured around the longest possible stepped courtyard, which expands at higher levels. This courtyard divides the building longitudinally into two unequal volumes at the lower levels, and not only articulates the volumes and their uses but further becomes the basic orientation reference for users. For this purpose, a single large courtyard is preferable over the option of two party-wall-facing courtyards foreseen in the given planning scheme.

The main uses of the building, day center and residence, are structured by levels instead of by volumes, thus minimizing vertical movement. The residence is given the privacy of the higher levels (first and second floors) and a relationship with the gardens and exterior spaces. The day center is situated almost entirely on the ground floor. The uses of the different levels are as follows:

Basement level: parking, building services, kitchen and personnel area. Ground level: gym towards the Gran Via, dining room towards the courtyard and workshops in the volume located in the interior of the block . The gym and the workshops increase their height towards the façade, introducing natural light and widening the spaces.

Attic level: all spaces face the courtyard. The administration is located in the Gran Via volume, and the smaller units and occasional use areas for the day center (medic, psychologist and visiting rooms) in the rear volume. First floor level: two "homes" on both sides of the courtyard, with a common terrace over the courtyard that links both living and dining rooms.

Second floor level: third "home" in the rear volume and a garden on the roof of the Gran Via volume.

Third floor level: building services accessible from the garden on the second level through an exterior staircase.



Rehabilitation Centre Groot Klimmendaal

Architects: Koen van Velsen: Architectenbureau Koen van Velsen BV Area: 14000 m² Year: 2011 Photographs:Rob 't Hart

From a small footprint, the Rehabilitation Centre Groot Klimmendaal designed by Koen van Velsen gradually fans out towards the top and cantilevers out over the surrounding terrain. Despite its size, the brown-golden anodised aluminium facade allows the nearly 14,000 sqm building to blend in with its natural surroundings.

The arrangement of the programme is clear. Below are offices, above are the clinical area's and on the roof a Ronald McDonald House with its own identity. The double-height ground floor at entrance level facilitates the special elements of the programme such as a sports facility, fitness, swimming pool, restaurant and theatre. Not only patients but also family members and members of the local community (schools, theatre groups etc) use these facilities on a regular basis. As a result, both patient and building are placed at the centre of the community.

The care concept is based on the idea that a positive and stimulating environment increases the well-being of patients and has a beneficial effect on their revalidation process. The design ambition was not to create a centre with the appearance of a health building but a building as a part of its surroundings and the community.

A combination of large and small voids and light wells ensure a spatial connection between different levels and allow natural daylight deep in the heart of the 30metres wide building. Interplay of striking but subtle colours and direct and indirect (artificial) lighting enlivens the interior.

The use of energy is amongst others reduced by the compact design of the building and the design of the mechanical and electrical installations. Most notably the thermal storage (heat and cold storage) contributes to the reduction of energy consumption. The choice of selecting sustainable building materials and materials requiring little maintenance for floor finishes, ceilings and facade cladding result in a building which can be easily maintained and with a long lifespan. The building has been custom made for its users but the design offers at the same time opportunities for different ways of using the building and the inevitable transformations of different departments within the client's organization.



explanation







Coudraie & Les Hêtres Homes

Architects: FWG ARCHITECTS SARL Area: 1312 m² Year: 2021 Photographs: Thomas Jantscher, Delphine Burtin Manufacturers: Electrolux, Laufen, 4B AG, Actiu, Bosch, Eternit, Forster, GCP Applied Technologies, Griesser, Kone, Normann Copenhagen, Pavatex, Regent, Siemens, Slight, Velopa, Wiegand Lead Architects: Elena Farini, Christophe Widerski Civil Engineer: Boss & Associés Ingénieurs Conseils SA **Electrical Engineer: Betelec** Mechanical Engineer: BESM SA Building Engineer: Weinmannénergies SA Geotechnical Engineer: De Cerenville Géotechnique SA Design Team: Raphael De Montard, Victoria Alburguergue, Ignacio Gonzalez Secretary: Valeria Molina Fire Protection Engineer: Cambium Ingénierie SA Sanitary Engineer: Schumacher & Associé Sarl Surveyor: Orcef SA City: Aubonne Country: Switzerland

Spaces foster autonomous living for the adolescents, together with spaces in which "interaction" is also the aim, has resulted in the creation of a courtyard, common to the two buildings of Coudraie and Les Hêtres, as well as the building to be built later. This small and central space is a hub of encounter for all residents, without affecting the privacy of each of the rooms built. The architectural structures fit naturally into the constructions of the municipality, with stairs similar to those of the nearby context, as well as unique geometric features that are likened to those of the neighbouring houses.

On the residence floor, the transit areas are designed as "windows" to the environment, and in a transversal way. These places also offer shared relaxation areas, with layouts that allow residents to read, work or chat. The ground floors of the two buildings are designed so that the common spaces open onto a welloriented terrace, linked to a the tree-lined patio that connects the exterior spaces of the two projects. The entrances are carefully designed, with airlocks, and easy access to the changing rooms. Ambulation on the ground floor is fluid and clearly articulated with the staircase that benefits from a spatiality that visually connects the two floors. For La Coudraie, the kitchen connects directly to the dining room and then to the entertainment room.

Choosing a lightweight "wooden frame" construction enables a healthy and environmentally-friendly environment to be created using local resources. Construction and on-site assembly are fast, because the building is light and has minimal foundations, therefore making it more economical. The roof has a high standard of insulation (of the standard "MINERGIE P - ECO" type), highly limiting energy consumption. The building is heated by a pellet boiler with high energy performance and very low environmental impact.

description text written by the architects





Physiotherapy and Rehabilitation Centre PUR

Architects: Schneider & Lengauer Year: 2004 Photographs:Dietmar Tollerian

Over the past years, Thomas Plöckinger-Schatzl and his team have expanded their services. Besides classical physiotherapy, they now also offer medical exercise therapy, massage, and the sale of training and therapy utensils. The integration of all these services made building a new practice essential. The space solution developed by Schneider & Lengauer integrates these requirements and therefore provides a simple, smooth and barrier-free organisation of all work areas.

The customer enters the building via a ramp that is paved up to the front door. The waiting area in the foyer is complemented with wardrobes and sanitary facilities to prevent carrying of road dust and dirt inside the building. The deliberately simply and functionally designed therapy rooms are separated by an atrium, as are the cardiac and sports medicine training area.

The atrium, enclosed by a floor-to-ceiling glass gantry construction and anodised aluminium panels, supplies both areas with sufficient brightness. It is lined with white pebbles and has bamboo growing at its centre – a calming sight, enhancing focus on one's own therapy. The cardio area has a terrace in front, which serves as a space for rehabilitation measures (e.g. gait training).



Occupational Center in Sanjuanejo

Architects: Juan Carlos Navarro Pérez Year: 2009 Promoter: Asprodes Feaps Salamanca Builder: EDYCIBA S.L. City: Sanjuanejo Country: Spain

Around the main square of Sanjuanejo, today of The Constitution, whose major axis was topped by the Church, were the schools and the Town Hall. The Occupational Center has replaced the old buildings of the schools and part of the adjacent plot, respecting and rehabilitating one of the buildings existing. It has been respected also the volume of two heights of the schools.

It is a building devoted to occupational Centre for intellectual disabled, promoted by Asprodes Feaps for Ciudad Rodrigo and its environment. Is equipped with classrooms, dining room, office, workshop, toilets and changing rooms, all on the ground floor. On first floor are the offices of administration.

The outline design on the ground floor is the typical "fishbone", with the classrooms opened in east-west direction and illuminated by a landscaped patio. The workshops are located in one of the rehabilitated units.

Both the part of leisure and dining room, as the auxiliary part of dressing rooms, kitchens, bathrooms and stores, formed a line parallel to the portico front of the "Constitution square.







Nursing Home

Architects: Gärtner+Neururer Area: 7575 m² Year: 2008 Photographs:Pia Odorizzi, Klaus Costadedoi

Situated next to a church in a small upper austrian village, the home for the elderly consits of 3 Volumes that are shiftet relatively to each other and are integrated into the existing landscape. The building fits well into the structure of the village, but also stands out due to its plain larch facade. The entrance is situated on the first floor, where all public functions, a cafe, a function hall, a chapel and the administration are located.

This first of the 3 parts is differnt from the other two, the volume is pushed out of the main building. The other two parts are 3 storeys high with the ground floor set back, to optically reduce the volume. The rooms are oriented to the east and the west side, the living areas to the southwest, with a nice view of the beautiful countryside. Next to the living areas are the nursing service areas located, which also function as a connecting element between the rooms of the nursing wards.



Houses for Eldery People in Alcácer do Sal

Architects: Aires Mateus Year: 2010 Photographs:Fernando Guerra | FG+SG Landscape Architects: ABAP, Luis Alçada Batista Engineering: Engitarget Ida Architect In Charge: Francisco Aires Mateus, Manuel Aires Mateus Design Team: Giacomo Brenna, Paola Marini, Anna Bacchetta, Miguel Pereira Contractor: Ramos Catarino Client: Santa Casa da Misericordia de Alcácer do Sal City: Alcácer do Sal Country: Portugal

It is a program, somewhere in between a hotel and a hospital, that seeks to comprehend and reinterpret the combination social/private, answering to the needs of a social life, and at the same time of solitude. Independents unities aggregate into a unique body, whose design is expressive and clear.

The reduced mobility of those who will live in the building suggests that any displacement should be an emotive and variable experience. The distance between the independent units is measured and drawn to turn the idea of path into life, and its time into form.

The building, designed path, is a wall that naturally rises from the topography: it limits and defines the open space, organizing the entire plot.









Day Center and Home for the Elderly of Blancafort

Architects: Guillem Carrera Area: 647 m² Year: 2013 Collaborators: Eva Crespo Sánchez, Andreu Ibañez Gassiot, Meritxell Anglès Bru, Albert Pons Sora, Xavier Foraste Casas Contractor: Betaconkret S.A. City: Blancafort Country: Spain

A social building necessary for the elderly of the village of Blancafort and its neighboring municipalities.

The initial observation of the plot and its environment led to consider that the future building did not have to solve only a program and a requirement of an isolated building, but it also had to help consolidate the nearest urban fabric, creating an entrance to the village with its own personality and public character.

It is proposed to open the building to the three surrounding streets and public green area, turning the preexisting retaining wall into the base of the building and creating a core of common access and an internal courtyard for each of the two public facilities.

The Home for the elderly directs its main space to the surrounding landscape, while the Day Center directs its main space to a larger internal courtyard, designed for the gathering together and more leisurely activity of its users.

The external finishes respond to not require continuous maintenance. The possible perception of concrete as a cold material is balanced with warm wood finishes, weathering steel and stone that lines the wall socket (used in several places in the same village which is typical from the area) and projected vegetated areas.

As for the interior finishes, these aim to provide users with the warmth necessary to enjoy a building designed to be comfortable during the last stage of their life.


Children's Center for Psychiatric Rehabilitation

Architects: Sou Fujimoto Architects Area: 14590 m² Year: 2006

This is the treatment center for mentally disturbed children where they live together to get regaining their mental health. It may be thought that it is a very special building when I write so, but it is truly rich life space that requested in origin like a large house and also like a small city, the intimacy of a house and also the variety of the city. This is a proposal of a loose method.

If It was possible to make a building with such a method how something was merely scattered, I thought it was a dreamlike building. And, as for this method, surprisingly precision planning is possible. As opposed to the complicated program called for, moving a box delicately, the plan can be flexibly packed just because it is random.

Although, this space is created as a result of an infinite, strict and artificial design process, it stands as a place which is not planned at all, or which has been made automatically with no intention. The place which is vague, unpredictable, filled with unlikelihood. Something that is not meant is produced as a result of an intentional and strict design act. And plenty of a place is achieved because of ambiguity for not being intentional.

A surely irregular alcove-place is produced between the boxes placed at random. It is the place of a small scale where children can hide in while they are connected to the living area. Although it is the space with no function in which it can make it avoidable in a simple form strangely, children play with the place like the primitive man who interprets landscape freely and lives very well in it. They hide in a place behind something, show up, relax at back, and run about here and there. By being separated and being connected are compatible, freedom and inconvenient live together in the meantime. Plenty of the place for living is achieved.

It can be said that there is nothing center here and conversely, it can be said that there is a countless center. They are "relative centers" which always interchanges and changes with the consciousness of those who are there or the condition of light. For the staff, a staff room is a functional center. For children, living room, a single room, or an alcove is a center. The occasional center is found out in fluctuation of space.

Design Case Studies





Design Case Studies



Big Smile Project

Architects: Schema Architecture & Engineering Area: 270 m² Year: 2013 Photographs:Nikos Alexopoulos Architect In Charge: Marianna Athanasiadou Design Team: Angeliki Zografaki, Christos Stavrogiannis Construction Management: Savvas Athanasiadis City: Athens Country: Greece

The aim of the proposal was to create a pleasant, warm and safe environment within the context of an economic and feasible implementation. Key element was the creation of personal space for each child. The chamber accommodates eighteen children of various ages and difficulties, thus different needs and capabilities. The spaces created serve these special circumstances.

The sleeping spaces were approached in two different directions; the hiding spaces and the nooks. In "hideouts" perforated wooden panels created rooms that offer both isolation and optical continuity, while in "nooks" the bedside façade wall has been fattened in such a way that the beds enter deep in this wall embracing it, thus allowing privacy within a common room.

The public areas were treated as places of concentration and play, reorganizing substantially the different functions, while the ramp that connected the different levels became a unifying element that symbolized sky, earth and seabed.

Finally, it is important to stress that the success of such a project is based on the acceptance and proper use by its residents. In this context, Tandem, with the completion of the project, supported the children and staff psychologically, to ensure that the children will develop habits that will make their life in their new home optimum.

Design Case Studies





Conclusions

Key insights from the previously listed Case Studies

In the "design case studies" research process, previously cited case study sheets constitute a mere fraction of the extensive body of studies we have evaluated. Our personal criteria dictated the selection process, whereby we prioritize representative and evocative examples, thereby comprehensively clarifying our exploration. These selected case studies provide a wealth of insights, identify common threads across different projects, and inform unique design strategies that can be harnessed effectively in the Bertha's Village project.

Human Scale

The human-scale approach is conspicuous in all chosen case studies, irrespective of the project size. Even more significant buildings employ design strategies such as the optimal positioning of patios and terraces to circumvent the perception of a looming structure and, instead, foster a sense of warmth and familiarity. The architectural scale in most references remains predominantly limited to one or two floors. Furthermore, the spatial distribution diagrams also underscore the predilection for human-scale designs, emphasizing the creation of gathering spaces that encourage intimate interactions.

Fostering curiosity

The aspect of surprise is skillfully incorporated within the primarily neutral design palette that is prevalent across projects. Despite aiming for a timeless, straightforward, and harmonious spatial experience, the design is free of monotony. The dichotomy of internal patios and external landscapes instigates elements of surprise and exploration. It engenders a sense of curiosity and fosters dynamic environments set against the backdrop of the static constructed space through the ever-evolving natural elements.

Landscape

Landscape design is a focal point in these projects, explicitly intending to support a connection between the residents and nature. This connection is particularly discernible in case studies in more rural contexts, where the space supports expansive landscaping proposals. Features like accessible ramps and paths promote physical activity among the residents, facilitating easy exploration of the surroundings. The landscape design exhibits a restrained approach, with minimal intervention and simple lines, allowing the natural environment to flourish independently.

Color and materiality

As for color and materiality, the design preference leans towards a neutral and natural palette within private spaces, offering a high degree of customization for the residents. A few projects deviate with bold, sporadic use of color, which, as per research, benefits cognition and cultivates interest. While wood and muted colors dominate senior homes, children's rehabilitation centers present a more vibrant atmosphere with extensive block colors, rounded shapes, and playfully elegant spaces. In contrast, common spaces experiment with color more sparingly, informed by research that highlights color's role in facilitating wayfinding, stimulating cognitive processes, and enhancing the overall mood.

Outdoor spaces

Most reviewed projects have patios, terraces, and balconies, providing residents direct access to private outdoor spaces. The buildings usually feature numerous internal patios populated with vegetation. These spaces distribute light and ventilation uniformly and offer a controlled outdoor environment that serves as an easily accessible sanctuary within the building.

Views

The selection of views from the shared and private spaces receives meticulous attention. Even when rooms do not offer direct access to landscapes, well-designed internal patios emerge as view focal points. Common spaces overlook busier areas, while private spaces prioritize views that ensure privacy and tranquility. Distinct projects also demonstrate visible connections between common spaces, which, besides piquing resident interest, also serve as an instrument for safety and supervision.

Accessibility

Every project emphasizes seamless transitions and universal accessibility. There are crucial "invisible design decisions," such as the absence of level differences on the same floor or wall panels that can function as handrails, which are subtly integrated to create an inclusive space without compromising the overall aesthetics. These ostensibly invisible design elements are integral to fostering an environment prioritizing safety and aesthetics.

The following pages provide an overview of the data collected from the case study sheets, looking at location, typology of rooms, square meters per room, and percentage of the project site allocated to outdoor space in proportion to the constructed terrain. One graph in particular looks at the types of services each project offers, looking for the common elements that should be integrated into Bertha's Village project.

However, we must mention that available data on these projects is scarce, and we cannot guarantee that all the case studies data have been calculated with 100% accuracy. For a more extensive list of services and details from similar projects, please refer to the comparative analysis of existing European senior homes later in this chapter.









Gyn	nasium					
+	Library					
	Cinema					
Dining	g Room					
Livin	g Room					
Workshoj	o Space					
Work	Room					
	Kitchen					
Multi-us	e Space					
Indo	or Patio					
	Terrace					
	Garden					
	Pool					
	Chapel					
		Case 01	Case 02	Case 03	Case 04	Case 05



Case 06	Case 07	Case 08	Case 09	Case 10	Case 11



Program Case Studies



https://en.kalimori.org

KALIMORI GROUP is a group of companies with 100% social commitment. They are focused on achieving our purpose of CHANGING THE WAY WE LOOK AT DISABILITIES. We are determined to do things differently, creating a unique business model focused in transcending as an example of social and labor integration, working towards the change we want to see in the world.

Kalimori is a community for adults with intellectual disabilities where we develop talents and enhance abilities for them to achieve independence in their lives, improving the quality of their work, social and community life.

MISSION

Build comprehensive communities that develop the strengths and talents of adults with intellectual disabilities, in an environment where they are valued and respected.

VISION

To be the best community in Mexico, to meet all the needs of adults with intellectual disabilities and those on the autism spectrum.

VALUES

Commitment Inclusion Respect Courage Empathy

PURPOSE

Change the way we see disability, recognizing the abilities that our differences bring to the community.

RESIDENCY

Our residents live in Kalimori and take part of every-day activities. To join this program, the candidate must be submitted to an initial evaluation in order to define their requirements and to confirm that Kalimori is the right fit to meet those needs. Once evaluated, the person begins their transition process through an adapted program while some skills and abilities are developed in order to accommodate them permanently in house.

DAY PROGRAM

As an alternative to the situation many families live in Mexico, Kalimori offers full or part time scholarships to the community. Therefore, adults with intellectual disabilities are able to participate in our workshops during the day so that they can have the same opportunities when it comes to integration into the society.

KALIMORI EXPERIENCE

During holidays and some weekends of the year, Kalimori opens the door to those who are not yet suited or ready for residency, but wish to take part in our activities. This way, people with intellectual disabilities or within the autistic spectrum can be part of a group where they may be able to improve their abilities in a safe and fun environment.



AnnsChoice.com

Marketing release notes:

Life is filled with promise at Ann's Choice, the premier senior living community in Bucks County. Managed by Erickson Senior Living,[®] Ann's Choice is a community like no other. Here, you'll enjoy a vibrant, maintenance- free lifestyle with abundant opportunities to pursue your passions, explore new hobbies, and connect with friendly neighbors who share your interests. And thanks to the strength and experience of Erickson Senior Living, a national leader in senior housing, you'll have predictable expenses and financial peace of mind for the future. It's a life of unparalleled potential and possibilities. We promise.

The Ann's Choice community is comprised of four friendly neighborhoods and acres of green space. There are plenty of opportunities to enjoy the outdoors, exercise, or just soak up the sunshine. WALKING PATHS: Take a quiet stroll along the landscaped pathways or join the Ann's Choice walking club.

GARDENS: You don't have to give up your green thumb. Cultivate your favorite flowers or fresh vegetables in the gardening area.

PUTTING GREEN: Sharpen your putting skills or challenge your neighbors to some friendly competition.

PATIO: Enjoy a summer barbeque on the outdoor patio overlooking the courtyard or simply relax and soak up the sun.

HORSESHOE PIT: Pitch a few ringers at the outdoor horseshoe pit, built to professional dimensions. BOCCE COURT: Enjoy a friendly match before dinner on the outdoor court or join the bocce club. TENNIS AND PICKLEBALL COURTS: Challenge a friend in a lively match or just stop by the court to

practice your serve.

PRIVATE PARK ACCESS: Visit the popular Warminster Community Park through a private, on-campus entrance. Enjoy all that the park offers, including a fenced-in dog park.

LIFESTYLE AT Ann'sChoice

FREEDOM FROM MAINTENANCE

Forget the hassles and expense of house repairs. Ann's Choice frees you from maintenance, so you can spend more time enjoying life.

FULL-TIME MAINTENANCE STAFF

From changing a lightbulb to fixing the dishwasher, our friendly maintenance team is on the job 24/7.

NO MORE YARD WORK

Sit back, relax, and let our professional landscaping team keep the grounds lush and beautiful all year round. Without chores like mowing the lawn or shoveling snow, you're free to enjoy every season.

A MODERN HOME

No more worries about aging appliances. Whichever apartment design you choose, you gain a contemporary home with up-to-date fixtures and modern conveniences.

At Ann's Choice, you'll enjoy unparalleled peace of mind. Our team of security professionals, who are trained in emergency response, greet guests at the gatehouse and patrol the community around the clock. You can walk the campus in comfort, day or night. Travel is a breeze. Just lock your door and go!

When severe weather hits, you won't have to worry. Our clubhouses are equipped with emergency generators, and our dedicated staff members stay on-site to ensure residents receive meals and necessary services.

What's there to do at Ann's Choice? Travel, garden, learn a new language, or volunteer at a local school. With more than 150 clubs and activities to explore, you'll never lack for fun opportunities or friendly people to share them.

Here's just a sampling: Tai chi, Veterans group, Chorus, Ceramics, Gardening, Book club, Model aircraft, Yoga, Wii bowling, Bridge, Art club, Trips and travel club, Creative writing, Computer club...

Program Case Studies



BrooksbyVillage.com

Marketing release notes:

Brooksby Village continuing care offers inpatient and outpatient rehabilitation, assisted care, cognitive care, and long-term nursing care on the same campus—ensuring that residents and guests enjoy continuity of care.

Rehabilitation

Our dedicated therapists are employees of Brooksby Village and are skilled at providing physical, speech, and occupational rehabilitation designed especially for seniors.

Enjoy the comfort of a private room while benefiting from specialized programs, therapeutic technologies, and equipment designed to help each guest achieve their highest level of success.

Outpatient therapy is available at Brooksby Village so you can continue your recovery after returning home (if clinically appropriate).

Assisted Care

Assisted care is ideal for individuals who would benefit from extra help with daily activities like preparing meals, bathing, dressing, housekeeping, and managing medications. It's the perfect solution for seniors who want to maintain their maximum level of independence while also receiving quality care and support. Every Brooksby Village assisted care residence is private and can

be decorated with personal furniture and belongings. Residents are free to relax in their home or take part in the many planned activities offered in the community, including arts and crafts, gardening, day trips, and lively happy hours. Cognitive Care

Unique programming, ongoing staff training, and a secure neighborhood set Brooksby Village apart from other providers. Our thoughtful, research-based approach to care promotes independence, socialization, and greater self-esteem for individuals with cognitive challenges.

Residents also enjoy the comfort of a private room that can be decorated with keepsakes to reinforce memories, build familiarity, and reflect rich life experiences. Our open neighborhood design includes many intimate areas where residents can enjoy social interactions or private leisure time. Throughout the space, carefully selected designs, colors, and symbols aid residents with orientation and way-finding. Long-Term Nursing Care

Nursing care residents receive the attention and respect they deserve from our team of dedicated doctors, nurses, therapists, and specialists. We provide total assistance with tasks like bathing, dressing, eating, mobility, and medication administration. Our integrated health care model supports quality care, consistency, and attention to detail—and encourages communication between families, providers, caregivers, and nursing staff. This may help reduce unnecessary hospitalizations and promotes positivity and overall well-being.

THE WATERMARK AT BROOKLYN HEIGHTS, ELAN COLLECTION Where luxury senior living comes to play.

Explore an <u>Independent Living</u>, <u>Assisted Living</u>, <u>Short-Term Stays</u> and <u>Memory Care</u> lifestyle designed just for you.

200

www.watermarkcommunities.com

Marketing release notes:

A place to be empowered, accepted, and celebrated

We believe in the power of the human spirit. We believe every person — no matter where they come from, how they look, what they believe, who they love, what they can do, or how old they are — deserves a life filled with purpose, possibility, and joy. That's why, for more than 30 years, we've been relentlessly focused on transforming what senior living can be by creating extraordinary and innovative communities where people thrive. Places where the human spirit flourishes.

We upend stereotypes of the old folks' home. Of course, we provide the exceptional care and service that you would expect from a leader in senior living. Sure, our award-winning dining experiences are led by a world-class team of chefs and hospitality professionals. And yes, our communities have beautiful spaces designed to make you want to live in them. But we go further than that.

We empower you to enjoy life, whatever that means to you. Whether that's seeking adventure on an Extraordinary Outing or in the pages of a novel. Rocking out on your Stratocaster or with Brahms in your ears as you lounge on the patio. Expanding your mind with morning meditation or a new course at Watermark University. Or connecting with friends and sharing belly laughs at happy hour. It's a lifestyle built on choices — and if those choices don't exist now, we'll create them.

How do we do this? With our people. People who believe what we believe and love what they do. People who are hand-picked for their authenticity, optimism, and ability to inspire others to do things they didn't think were possible. People who put our residents at the center, and who treat each other and everyone in the community with the respect, kindness, and love — yes, love — that nourish the human spirit.

Services: Independant living Assisted living Memory care Short term stays

Program Case Studies



https://hogeweyk.dementiavillage.com/#NaN

Marketing release notes:

Hogeweyk is known as 'Dementia Village' because the 152 residents who live there all have severe dementia, require 24-hour-a-day care and will likely call Hogeweyk their last home.

In a certain sense, Hogeweyk is like a fortress. Apartments and buildings surround the whole village, fully enclosing its inhabitants with the exception of the village's main entrance which is monitored 24/7.

However, take a step inside and the restaurants, cafés, shops, gardens and outdoor spaces create an environment just like the world outside, only this world is self-contained and completely safe for people with dementia.

The residents of Hogeweyk are able to carry out day-to-day activities and lead a largely normal life, despite the fact that they are under surveillance at all times. There are twice as many carers as residents to ensure high levels of care. The carers wear ordinary casual clothes and their strong relationship with the residents is unique.

Key facts about the village The Hogeweyk dementia village opened in 2009 The village's facilities can accommodate up to 152 residents with dementia There are twice as many carers as residents Hogeweyk is made up of 23 apartments Each apartment hosts six to eight people There are 7 different design genres across the apartments and each has its own unique style 25 activity clubs for residents promote social interaction There is only one way out of the village and that exit is under 24hr surveillance The Hogeweyk dementia village cost in the region of £19m, £17m of which was state funded Resident fees are £5,000+ per month

The success of the Dementia Village model is generating ideas in other countries across Europe. Similar villages have opened in Italy and in Switzerland, and there is also now a care village that replicates life in the 1950s. By treating its residents with dementia as normally as possible, Hogeweyk changes perceptions and shows us that there aren't huge differences, quite simply just differing needs.

COMPARATIVE ANALYSIS OF EXISTING SENIOR HOMES IN EUROPE

The analysis is based on **69 senior homes located in 22 European nations**, specifically Cyprus, Malta, Italy, Greece, Portugal, Spain, Switzerland, France, Luxembourg, Belgium, Austria, Germany, United Kingdom, Denmark, Norway, Sweden, Finland, Poland, Czech Republic, Hungary, Romania, and Bulgaria. These nations were chosen to represent three regions of Europe: Southern Europe, Northern Europe, and Eastern Europe. It is essential to note that the different legislations in each country significantly impact this type of research.

For example, in January 2015, the Netherlands passed the "Wet Langdurige Zorg" (WLZ), where citizens pay an annual contribution for long-term care, resulting in free high-level care for vulnerable elderly or those with severe mental or physical disabilities. Due to this substantial difference, the Netherlands was not included in the analysis. Cultural factors also play a vital role; for instance, Danish senior homes do not offer services and are structured as isolated residences where residents pay their bills directly. Thus, the analysis is instrumental when considering overall data, while individual cases of each senior home may show more variability. With these necessary premises, we can now delve into the details of the analysis.

For each senior home, besides its **Name and Country**, general information such as its location (whether it is in a large city with over 100,000 inhabitants, a small town, or the countryside), **Developer type** (private, public entity, or foundation), Opening Year (if specified on the website), and structural details like **Size**, **Types of Rooms** available, and a total number of residents that the building can accommodate (if specified) are provided. Subsequently, economic details regarding the price are presented.

For each senior home, the daily price is indicated, referred to as the "Minimum Daily Price" because many facilities offer different rates based on factors such as room type (single or double) or the level of care applied (higher levels may offer additional services). The prices are available on the websites of the different senior homes or obtained by directly calling their phone numbers and subsequently converted to Euros if the country has a different currency. By multiplying the daily price by 365, we obtain the "Minimum Annual Price" of the facilities.

A standard benchmark is required to better compare the annual prices of different senior homes. Therefore, every nation's Real GDP Per Capita is used as a comparison tool. Real GDP Per Capita is a key economic indicator that measures the average economic output (Gross Domestic Product) per person in an economy after adjusting for inflation. It is considered by economists to be the best measure of the standard of living or economic wellbeing of the average individual in a country.

The Real GDP Per Capita data is calculated at Purchasing Power Parity (PPP), adjusting for inflation to account for price and purchasing power differences. The data for Real GDP Per Capita of every nation is obtained from the official website of the International Monetary Fund (IMF) and **expressed in International Dollars**, a hypothetical unit of currency that allows for the comparison of economic indicators across different countries, considering their different price levels and purchasing power. After explaining this comparison unit, the analysis calculates the percentage obtained by dividing the annual price of each senior home by the Real GDP Per Capita of its respective nation. The "Price / Real GDP per Capita"

section shows this data as a percentage. This percentage indicates how much of the average economic output of a person in a given nation needs to be invested to cover one year of retirement in the senior home.

By comparing the percentages among the various senior homes, we can gain insights into their costs relative to each other, in proportion to the respective nations they are located in. The subsequent table collects information on the Services offered and included in the price, along with a section for Additional Information, such as additional fees for higher prices or optional services not included in the introductory price.

In the following sheets, further analyses are derived from the information in the first table. The "Cheapest to Expensive" (found in the Annexes) sheet ranks all senior homes from the least to the most expensive, based solely on the daily price without considering the country. An average is presented at the end of the table, named "AVERAGE NO OUTLIERS," which calculates the mean price of all senior homes after excluding the 5% cheapest and 5% most expensive. This exclusion is done to account for exceptional cases that might diverge significantly from the average, which could otherwise distort the final result. The "Data by Nation" sheet presents an average ratio between the Minimum Annual Price and Real GDP Per Capita for each senior home by nation. The nations are then arranged in ascending order, from the least to the most expensive senior homes. It is important to note that the 104% value for the United Kingdom is not an error but merely indicates that the annual price of senior homes in the nation is higher than the economic output of an average citizen. The fourth sheet, "Data by Services," orders the services various senior homes offer from the most common to the rarest. The last three sheets, "Data by Rooms," "Data by Place," and "Data by Developer," provide statistics on various room types, the location of the facilities, and the type of management (private, public, or foundation). Each sheet calculates an average price for each category, again excluding outliers, allowing for price comparisons based on these characteristics.

NAME	NATION	PLACE	DEVELOPER OPENING SIZE		SIZE	TYPE OF ROOMS	NUMBE RESIDE
OASIS Care Home	Cyprus	Limassol (City)	OASIS Group (Private)	1974	40 Rooms	Single and Double	1
The Warm Nest	Cyprus	Polemi (Small Town)	Pancyprian Association of Nursing Homes PSISE (Public)	1998	Not Specified	Single, Double and Triple	34 Sle
The Imperial	Malta	Sliema (City)	Casa Antonia (Private)	2018	6000 square meters area	Single and Double	/
Casa Antonia	Malta	Balzan (City)	Casa Antonia (Private)	2003	90 Rooms	Single and Double	160 Slo
Residenza per Anziani Daniele Moro	Italy	Codroipo (Countryside)	Daniele Moro Foudation	1946	65 Rooms	Single, Double and Triple	129 Sle
A.S.P. Casa di Riposo Giuseppe Sirch	Italy	San Pietro al Natisone (Countryside)	Giuseppe Sirch Foundation	2003	35 Rooms	Single, Double, Triple and Quadruple	60 Sle
APSP Fondazione Pitsch	Italy	Merano (Countryside)	Istituto Pubblico di Beneficienza e Assistenza IPBA (Public)	1905	3 Nucleus with multiple rooms each (number not specified)	Single and Double	106 SI
Casa di Riposo RSA Saccardo	Italy	Milan (City)	KORIAN Group (Private)	/	2 Blocks of 3 Nucleus with multiple rooms (number not specified)	Single and Double	208 SI
Fondazione G.B. Bianchi	ondazione G.B. Bianchi Italy Ma (Cou		Gian Battista Bianchi Foundation	1914	4 Nucleus, a total of 1302 square meters area	Single and Double	84 Sle
R.S.A. Villa Matilde Italy (Pescia (Counrtyside)	Don Bosco of Pescia Foundation	1945	2 Floors with multiple rooms each (number not specified)	Single, Double and Triple	48 Sle
Casa di Riposo Maria Gargani	Italy	Isernia (Small Town)	FUTURA Social Cooperative (Private)	/	24 Rooms	Single, Double and Triple	60 Sle
Casa di Riposo RSA San Nicola	Italy	Sassari (City)	KORIAN Group (Private)	/	2 Floors with multiple rooms each (number not specified)	Single and Double	120 Sle
Papadopoulion Retirement Residence	Greece	Kalamata (Countryside)	Papadopoulion (Private)	/	29 Rooms	Single and Double	60 Sle
Resteion Elderly Care Center	Greece	Koropi (Countryside)	Israelite Foundation	2006	67 Rooms	Single and Double	75 Sle
Faro Residence	Portugal	Faro (Small Town)	AMERA (Private)	/	40 Rooms	Single and Double	68 Sle
Casas da Cidade Lisboa	Portugal	Lisbon (City)	Casas da Cidade (Private)	/	156 Rooms	Single and Double	219 Slo
Domus Sénior	Portugal	Vendas Novas (Small Town)	Via Senior (Private)	2020	24 Rooms	Single and Double	36 Sle
Casa Klein International Nursing Care and Retirement Home	Spain	Vélez-Málaga (Countryside)	Casa Klein (Private)	/	18 Rooms	Single and Double	20 Sle

R OF NTS	MINIMUM DAILY PRICE	MINIMUM ANNUAL PRICE	REAL GDP PER CAPITA AT PPP (THOUSANDS)	PRICE/RE AL GDP PER CAPITA	SERVICES	ADDITIONAL INFORMATION
	31.67	11559.55	54610	21%	Fitness Activities, Transportation, Hotel Services, Catering, Beautician and Hairdresser	Prices do not include VAT
eps	50.00	18250.00	54610	33%	Pysiotherapy, Recreational Activities, Outdoor Activities, Transportation, Hotel Services, Spa Treatments, Catering, Library	Prices do not include VAT
	58.00	21170.00	61940	34%	Physiotherapy, Fitness Activities, Pool Activities, Transportation, Recreational Activities, Entertainment Services, Hotel services, Catering, Beautician and Hairdresser	Prices do not include additional care services (price could go up to 140 euros), the price for a single room is of 95 euros care services excluded
eeps	55.00	20075.00	61940	32%	Physiotherapy, Optician, Audiology, Podology, Speech Language Therapy, Transportation, Hotel Services, Catering, Beautician and Hairdresser	Prices do not include additional care services (price could go up to 135 euros), the price for a single room is of 90 euros care services excluded
eeps	55.10	20111.50	54220	37%	Pysiotherapy, Recreational Activities, Entertainment Services, Religious Assistance, Hotel Services, Catering, Beautician and Hairdresser	
eps	77.20	28178.00	54220	52%	Pysiotherapy, Recreational Activities, Entertainment Services, Religious Assistance, Hotel Services, Catering, Laundry and Clothing Service, Hairdresser	
eeps	59.45	21699.25	54220	40%	Podiatrist, Recreational Activities, Entertainment services, Religious assistance, Hotel services, Catering, Hairdresser	
eeps	106.00	38690.00	54220	71%	Physiotherapy, Doll Therapy, Pet Therapy, Music Therapy, Recreational Activities, Entertainment services, Religious assistance, Hotel services, Excursions, Catering, Beautician and Hairdresser	
eps	51.50	18797.50	54220	35%	Recreational Activities, Hotel services, Catering	
eps	47.10	17191.50	54220	32%	Pysiotherapy, Recreational Activities, Entertainment Services, Religious Assistance, Hotel Services, Catering	
eps	40.00	14600.00	54220	27%	Pysiotherapy, Recreational Activities, Religious Assistance, Catering, Beautician and Hairdresser	
eeps	58.00	21170.00	54220	39%	Pysiotherapy, Recreational Activities, Entertainment Services, Religious Assistance, Hotel Services, Catering	
eps	93.33	34065.45	39480	86%	Physiotherapy, Fitness Activities, Pool Activities, Massage Therapy, Wellness Therapies, Natural Nutrition Therapies, Transportation, Recreational Activities, Hotel services, Catering, Beautician and Hairdresser	Prices for single rooms price per day is 135 euro per day
eps	65.00	23725.00	39480	60%	Physiotherapy, Fitness Activities, Massage Therapy, Recreational Activities, Entertainment Services, Library, Cinema, Theater, Excursions, Hotel services, Catering, Beautician and Hairdresser	Prices do not include additional care services, single rooms price per day is 80 euros per day
eps	49.33	18005.45	44710	40%	Recreational Activities, Entertainment Services, Hotel Services, Catering	The price goes up to 66 euros per day for single rooms
eeps	49.17	17947.05	44710	40%	Entertainment Services, Hotel Services, Catering	The price goes up to 102 euros per day for single rooms, fees also vary depending on the size of the room. Other services provided at an extra cost
eps	31.67	11558.33	44710	26%	Pysiotherapy, Fitness Activities, Recreational Activities, Entertainment Services, Hotel Services, Catering, Beautician and Hairdresser	
eps	76.67	27983.33	49450	57%	Physiotherapy, Fitness Activities, Recreational Activities, Pool Activities, Hotel Services, Catering, Beautician and Hairdresser	Prices include VAT, Physiotherapy and Haridressing are not included in the price

NAME	NATION PLACE DEVELOPER		DEVELOPER	OPENING YEAR	SIZE	TYPE OF ROOMS	NUMBE RESIDE
Manantial de Vida Residence	Spain	Benalmádena (Small Town)	Manantial de Vida (Private)	2000	2 Floors with multiple rooms each (number not specified)	Single and Double	/
Campa Ibaizabal Residence	Spain	Bilbao (City)	Residencias Bilbao (Private)	/	350 square meters area	Single and Double	12 Sle
Domicil Steigerhubel	Switzerla nd	Bern (City)	Domicil Bern (Municipiality)	/	41 Rooms	Single	41 Sle
Viva Luzern Rosenberg	Switzerla nd	Luzern (City)	Viva Luzern (Private)	/	2 blocks, 94 Rooms	Single and Double	109 Sle
Nursing Center Herrenbergli	Switzerla nd	Zurich (City)	APZ Herrenbergli (Private)	1980	87 Rooms	Single and Double	94 Sle
Residence Eulalie	France	Verteuil d'Agenais (Countryside)	Residence Eulalie (Private)	1910	2 Blocks with 58 and 21 Rooms respectively	Single and Double	81 Sle
Les Girondines	France	Lyon (City)	Foyer-Résidence Rhodanien des Aveugles (Private)	1937	A total of 5200 square meters area	Single, Double and Triple	52 Sle
Clinalliance Ehpad Repotel Paris Gambetta	France	Paris (City)	Clinalliance (Private)	1965	4 Floors with multiple rooms each (number not specified)	Single and Double	75 Sle
La Providence Maison de Retraite	France	Paris (City)	La Providence Foundation	1817	106 Rooms	Single and Double	118 Sle
Maredoc Retirement Home	Luxembu rg	Bereldange (Small Town)	Maredoc Association (Private)	1993	2 Blocks with multiple rooms each (number not specified)	Single and Double	140 Sl
Residence Monplaisir Sàrl	Luxembu rg	Mondorf-les- Bains (Countryside)	Residence Monplaisir (Private)	1983	4 Floors with multiple rooms each (number not specified)	Single and Double	/
Stephenson Garden Rest and Care Home	Belgium	Bruxelles (City)	Stephenson Garden (Private)	2016	4 Floors with multiple rooms each (number not specified)	Single and Double	/
Maison Heyse	Belgium	Bruxelles (City)	Maison Heyse (Private)	1989	Multiple Blocks with multiple rooms each (number not specified)	Single and Double	148 Sl
De Zilverberg	Belgium	Roeselare (Countryside)	De Zilverberg (Private)	/	123 Rooms	Single	123 Slo
Magnolia Residence	Belgium	Bruxelles (City)	Magnolia Association (Private)	2005	5 Unites for a total of 156 Rooms	Single and Double	168 Pe
SENIORium Bad Kreuzen	Austria	Bad Kreuzen (Countryside)	SHV Perg (Private)	2016	91 Rooms	Single and Double	98 Sle
Senioren Heimat	Austria	Sankt Johann am Tauern (Small Town)	Senioren Heimat (Private)	/	21 Rooms	Single and Double	25 Sle
VITALITY Residenz Am Kurpark	Austria	Vienna (City)	VITALITY Residence (Private)	1997	240 Rooms	Single and Double	/
Ehehaltenhaus St. Nikolaus	Germany	Würzburg (City)	Bürgerspital zum Heiligen Geist Foundation	1970	7 Floors with multiple rooms each (number not specified)	Single and Double	150 Sle
Lambertinum Retirement Home	Germany	Hildesheim (City)	Lambertinum (Private)	/	94 Rooms	Single and Double	131 Sle

R OF	MINIMUM DAILY PRICE	MINIMUM ANNUAL PRICE	REAL GDP PER CAPITA AT PPP (THOUSANDS)	PRICE/RE AL GDP PER CAPITA	SERVICES	ADDITIONAL INFORMATION
	29.95	10931.75	49450	22%	Pysiotherapy, Psychological Support, Fitness Activities, Recreational Activities, Entertainment Services, Hotel Services, Catering, Hairdresser	Different tariffs feature higher pricing
eps	65.00	23725.00	49450	48%	Entertainment Services, Hotel Services, Catering, Library, Hairdresser	Prices go up to 72 euros per day for single rooms
eps	174.00	63510.00	87960	72%	Recreational Activities, Hotel services, Catering	Optional services include Podology, Physical Therapy, Occupational Therapy, Hairdresser, all at an extra cost.
eeps	169.00	61685.00	87960	70%	Physiotherapy, Activation Therapy, Foot Care, Dental Hygiene, Entertainment Services, Hotel Services, Catering, Beautician and Hairdresser	Rooms may feature different prices depending on the position
eps	143.66	52435.90	87960	60%	Fitness Activities, Recreational Activities, Religious Assistance, Hotel Services, Catering, Beautician and Hairdresser	Rooms may feature different prices depending on the position
eps	67.24	24542.60	58830	42%	Recreational Activities, Entertainment Services, Religious Assistance, Catering, Library, Laundry and Clothing Service, Hairdresser	It features higher prices for residents under 60 years old (85.85 euros)
eps	77.20	28178.00	58830	48%	Recreational Activities, Entertainment Services, Pool Activities, Catering, Laundry and Clothing Service, Hairdresser	It features higher prices for residents under 60 years old (95.94 euros)
eps	118.00	43070.00	58830	73%	Physiotherapy, Sophrology, Zootherapy, Yoga, Memory Workshops, Adapted Therapeutic Activities, Hotel Services, Catering	It features a discount for couples moving in together (82 euros)
eeps	100.00	36500.00	58830	62%	Fitness Activities, Recreational Activities, Entertainment Services, Hotel Services, Catering, Library, Beautician and Hairdresser	Different tariff features a price per day of 145 euros
eeps	95.77	34954.83	142490	25%	Physiotherapy, Fitness Activities, Foot Care, Memory Workshops, Recreational Activities, Entertainment Services, Excursions, Religious Assistance, Catering, Library, Laundry and Clothing Service, Beautician and Hairdresser	It features an offer for couples moving in together at 179 euros
	120.00	43800.00	142490	31%	Fitness Activities, Pool Activities, Transportation, Hotel Services, Catering, Beautician and Hairdresser	It features an offer for couples moving in together at 179 euros
	56.00	20440.00	65500	31%	Physiotherpy, Hotel Services, Catering, Laundry and Clothing Service, Beautician and Hairdresser	Different tariffs feature prices up to 127 euros per day
eeps	54.23	19793.95	65500	30%	Physiotherapy, Occupational Therapy, Speech Therapy, Entertainment Services, Hotel services, Catering	The price for single rooms is 58.37
eeps	74.51	27196.15	65500	42%	Physiotherapy, Speech Therapy, Entertainment Services, Excursions, Hotel Services, Catering, Laundry and Clothing Service	It features an offer for couples moving in together at 126.67 euros. Other services provided at an extra cost
ople	50.12	18293.80	65500	28%	Recreational Activities, Entertainment Services, Excursions, Hotel Services, Catering, Library, Beauticial and Hairdresser	Different tariffs feature prices up to 76.28 euros per day. Other services provided at an extra cost
eps	128.50	46902.50	69500	67%	Entertainment Services, Hotel services, Catering	Different tariffs feature prices up to 132.10 euros per day
eps	77.79	28393.35	69500	41%	Fitness Activities, Recreational Activities, Hotel Services, Catering	Different tariffs feature prices up to 198.74 euros per day. Other services provided at an extra cost
	76.26	27836.00	69500	40%	Pysiotherapy, Fitness Activities, Pool Activities, Recreational Activities, Hotel Services, Catering, Library, Beautician and Hairdresser	Different tariffs feature prices up to 175.55 euros per day
eeps	94.33	34430.45	66130	52%	Fitness Activities, Podology, Pet Therapy, Memory Workshops, Recreational Activities, Entertainment Services, Excursions, Hotel services, Catering, Beautician and Hairdresser	Different tariffs feature prices up to 140.59 euros per day
eeps	72.54	26477.95	66130	40%	Fitness Activities, Memory Workshops, Massage Therapy, Religious Assistance, Hotel services, Catering, Beautician and Hairdresser	Prices go up to 74.31 euros per day for single rooms

NAME	NATION	TION PLACE DEVELOPER		OPENING YEAR	SIZE	TYPE OF ROOMS	NUMBE RESIDE
House of Care and Nursing Bettinahof	Germany	Frankfurt (City)	KORIAN Group (Private)	2013	118 Rooms	Single and Double	132 Slo
MUNDUS senior residence Kassel	Germany	Kassel (City)	MUNDUS Group (Private)	1982	212 Rooms	Single and Double	/
Ladybrook Manor Care Home	United Kingdom	Manchester (City)	Care UK (Public)	/	98 Rooms	Single and Double	/
Pennystone Court Residential & Dementia Care Home	United Kingdom	Blackpool (City)	Methodist Homes MHA (Private)	1977	1 Block with multiple rooms (number not specified)	Single	36 Sle
Heartly Green Care Home	United Kingdom	Manchester (Countryside)	EachStep Care (Private)	/	2 Floors with multiple rooms each (number not specified)	Single	59 Sle
Dronning Ingrids Hjem	Denmark	Copenhagen (City)	Dronning Ingrid's Home (Private)	1924	24 Rooms	Single	24 Sle
Idestrup Care Center	Denmark	Falster (Countryside)	Guldborgsund (Municipiality)	1971	136 Rooms	Single and Double	138 Sle
Ollerup Care Center	Denmark	Svendborg (Small Town)	Svendborg (Municipiality)	/	12 Rooms	Single and Double	/
Rosendal nursing homes and assisted living	Norway	Stavanger (City)	Stavanger (Municipiality)	1998	20 Rooms	Single and Double	25 Sle
Villa Skaar Frogner	Norway	Egge (Countryside)	Villa Skaar (Private)	1921	29 Rooms	Single	29 Sle
Västergården	Sweden	Uppsala (City)	Uppsala (Municipiality)	/	50 Rooms	Single and Double	/
Attendo Almvägen	Sweden	Sollentuna (City)	Attendo (Private)	2021	54 Rooms	Single	54 Sle
Dicksons Hus Nursing Home	Sweden	Göteborg (City)	Göteborg (Municipiality)	/	101 Rooms	Single	101 Sle
Pensionershemmet Hagaro	Finland	Helsinki (City)	Fruntimmersföreningen Charitable Association (Private)	1956	35 Rooms	Single and Double	43 Sle
Palveltalo Villa Ensi Oy	Finland	Helsinki (City)	Villa Ensi Säätö Foundation	1912	16 Rooms	Single and Double	30 Sle
Leschehemmet	Finland	Helsinki (City)	Leschehemmet (Private)	1907	24 Rooms	Single and Double	26 Sle
Young Spirit Senior Residence-Masuria	Poland	Biesal (Countryside)	Młodzi Duchem (Private)	/	1 Block with multiple rooms (number not specified)	Single and Double	/
JÓZEFINA Nursing Home	Poland	Warsaw (City)	Care Experts (Private)	2014	2 Floors with multiple rooms each (number not specified)	Single and Double	96 Sle
Dom Seniora Paraiso Brenna	Poland	Brenna (Small Town)	Dom Spokojnej Starości Paraiso (Private)	/	46 Rooms	Single, Double and Triple	99 Sle
Home for the elderly Krč	Czech Republic	Prague (City)	City of Prague (Municipiality)	1963	144 Rooms	Single and Double	152 Slo
ZELENÁ LÍPA	Czech Republic	Hostvice (Small Town)	Green Linden Hostvice (Private)	2001	50 Rooms	Single, Double, Triple and Quadruple	65 Sle

R OF NTS	MINIMUM DAILY PRICE	MINIMUM ANNUAL PRICE	REAL GDP PER CAPITA AT PPP (THOUSANDS)	PRICE/RE AL GDP PER CAPITA	SERVICES	ADDITIONAL INFORMATION
eeps	91.80	33507.00	66130	51%	Pysiotherapy, Recreational Activities, Entertainment Services, Hotel Services, Catering, Beautician and Hairdresser	Prices go up to 95.83 euros per day for single rooms
	65.10	23761.50	66130	36%	Fitness Activities, Pool Activities, Recreational Activities, Entertainment Services, Excursions, Hotel services, Catering, Bowling Alley, Library, Beautician and Hairdresser	Different tariffs feature prices up to 128.40 euros per day
	216.06	78860.86	56470	140%	Recreational Activities, Entertainment Services, Excursions, Religious Assistance, Hotel services, Catering, Beautician and Hairdresser	Different tariffs feature prices up to 340 euros per day
eps	135.97	49627.49	56470	88%	Music Therapy, Recreational Activities, Entertainment Services, Religious Assistance, Hotel services, Catering	Different tariffs feature prices up to 150 euros per day
eps	130.09	47482.33	56470	84%	Recreational Activities, Entertainment Services, Hotel Services, Catering	
eps	35.63	13003.61	73390	18%	There are no seervices included in the price	Price does not include costs of electricity and water. Each extra service comes at a monthly extra cost
eeps	41.20	15038.00	73390	20%	There are no seervices included in the price	Each extra service comes at a monthly extra cost
	21.20	7737.51	73390	11%	There are no seervices included in the price	Different tariffs feature prices up to 28 euros per day. Each extra service comes at a monthly extra cost
eps	80.50	29382.50	82650	36%	Podology, Recreational Activities, Entertainment Services, Hotel services, Catering, Hairdresser	Different tariffs are adjusted on the base of the income level
eps	72.00	26280.00	82650	32%	Pet Therapy, Recreational Activities, Entertainment Services, Excursions, Hotel services, Catering	prices depending on the position
	25.00	9125.00	65840	14%	Pet Therapy, Recreational Activities, Excursions, Hotel services, Catering	
eps	16.90	6168.50	65840	9%	Fitness Activities, Spa, Recreational Activities, Entertainment Services, Hotel services, Catering	
eeps	44.74	16330.10	65840	25%	Spa, Recreational Activities, Entertainment Services, Hotel Services, Catering	Rooms may feature different prices depending on various characteristics
eps	128.00	46720.00	60900	77%	Pysiotherapy, Podology, Fitness Activities, Recreational Activities, Entertainment Services, Hotel Services, Catering, Beautician and Hairdresser	Rooms may feature a different price of 133 euros depending on the position. Additional beginning fee of 800 euros for care services
eps	109.04	39797.90	60900	65%	Spa, Recreational Activities, Entertainment Services, Excursions, Hotel services, Library, Catering	Different tariffs feature prices up to 135.80 euros per day
eps	126.67	46234.55	60900	76%	Music Therapy, Recreational Activities, Entertainment Services, Excursions, Hotel services, Catering	Different tariffs feature prices up to 168 euros per day
	39.73	14502.67	45340	32%	Physiotherapy, Podology, Hotel services, Catering	Prices go up to 42.73 euros per day for single rooms
eps	38.23	13955.17	45340	31%	Pysiotherapy, Psychological Support, Fitness Activities, Memory Workshops, Speech Language Therapy, Recreational Activities, Hotel Services, Catering	Prices go up to 48.73 euros per day for single rooms
eps	33.73	12312.67	45340	27%	Physiotherapy, Psychological Support, Fitness Activities, Pool Activities, Music Therapy, Speech Language Therapy, Recreational Activities, Entertainment Services, Excursions, Hotel services, Catering, Beautician and Hairdresser	
eeps	20.76	7577.40	50960	15%	Physiotherapy, Psychological Support, Hotel services, Catering, Beautician and Hairdresser	Prices go up to 21.60 euros per day for single rooms. Additional beginning fee ranging from 36.90 euros to 805 euros for 4 levels of care services
eps	19.74	7205.10	50960	14%	Pysiotherapy, Fitness Activities, Music Therapy, Memory Workshops, Recreational Activities, Entertainment Services, Hotel Services, Catering, Beautician and Hairdresser	Prices go up to 21.48 euros per day for single rooms

	NAME	NATION	PLACE	DEVELOPER	OPENING YEAR	SIZE	TYPE OF ROOMS	NUMBE RESIDE
	Home for the elderly Chodov	Czech Republic Prague (City) Dom		Domov Pro Seniory (Private)	/	171 Rooms	Single, Double and Triple	260 SI
	Nárcisz Ház	Hungary	Budapest (City)	Nárcisz Ház (Private)	/	4 Floors with multiple rooms each (number not specified)	Single	/
	Madárdomb Retirement Home	árdomb Retirement Home Hungary Budapest (City)		Madárdomb Idősek Háza (Private)	/	53 Rooms	Single and Double	106 Slo
	Kék Duna Idősek Otthona	Hungary	Sződliget (Small Town)	Kék Duna Nyugdíjasház (Private)	/	20 Rooms	Single and Double	30 Sle
	AsertivO Servicii Premium Pentru Seniori	Romania	Bucharest (City)	AsertivO (Private)	2015	4 Floors with multiple rooms each (35 sleeps per floor)	Single and Double	150 Sle
Casa Seniorilor Premiun		Romania	Bucharest (City)	Premiun Wellness (Private)	/	86 Rooms	Single	86 Sle
	Forest Senior Center	Romania	Tamași (City)	Forest Center (Private)	/	3 Floors with multiple rooms each (number not specified)	Single and Double	/
	Home Balchik	Bulgaria	Balchik (Small Town)	Dom Balchik (Private)	/	50 Rooms	Single and Double	100 SI
	Sunny Dom ZDRAVE	Bulgaria	Dichin (Small Town)	Slachev Dom (Private)	2015	30 Rooms	Single, Double and Triple	/
	Home for elderly and temporarily disabled people "Harmony"	Bulgaria	Plovdiv (City)	Harmonia (Private)	2016	2 Floors with multiple rooms each (number not specified)	Single	/

R OF NTS	MINIMUM DAILY PRICE	MINIMUM ANNUAL PRICE	REAL GDP PER CAPITA AT PPP (THOUSANDS)	PRICE/RE AL GDP PER CAPITA	SERVICES	ADDITIONAL INFORMATION
eeps	19.61	7158.87	50960	14%	Hotel services, Catering	Prices go up to 21.14 euros per day for single rooms. Many ther services provided at an extra cost
	119.58	43646.70	43910	99%	Pysiotherapy, Psychological Support, Hotel Services, Catering	
eeps	26.47	9661.55	43910	22%	Fitness Activities, Massage Therapy, Hotel Services, Catering, Laundry and Clothing Service, Beautician and Hairdresser	It features a 18378 euros entry fee. Some services require extra costs
eps	11.74	4285.10	43910	10%	Fitness Activities, Massage Therapy, Pool Activities, Personalized Care, Entertainment Services, Hotel services, Catering, Beautician and Hairdresser	
eeps	54.00	19710.00	41630	47%	Pysiotherapy, Psychological Support, Fitness Activities, Religious Assistance, Hotel Services, Catering, Laundry and Clothing Service	Prices go up to 74.26 euros per day for single rooms
eps	37.00	13505.00	41630	32%	Pysiotherapy, Psychological Support, Fitness Activities, Religious Assistance, Recreational Activities, Entertainment Services, Hotel Services, Catering, Laundry and Clothing Service	Some services require extra costs
	33.06	12065.44	41630	29%	Pysiotherapy, Psychological Support, Hotel Services, Catering	Different tariffs feature prices up to 70.83 euros per day. These tariffs also provide extra services
eeps	16.19	5909.72	32010	18%	Fitness Activities, Recreational Activities, Hotel Services, Catering	Prices go up to 22.16 euros per day for single rooms
	17.04	6220.70	32010	19%	Recreational Activities, Entertainment Services, Excursions, Hotel Services, Catering, Laundry and Clothing Service, Beautician and Hairdresser	Prices go up to 22.16 euros per day for single rooms
	20.45	7464.86	32010	23%	Pysiotherapy, Fitness Activities, Hotel Services, Catering, Laundry and Clothing Service, Beautician and Hairdresser	



% OF SENIOR HOMES vs SERVICES

Single and Double

70.5%





AVERAGE MINIMUM DAILY PRICE

Count of PLACE



AVERAGE MINIMUM DAILY PRICE vs PLACE



REFERENCES FOR THE ABOVE PRESENTED DATA

https://www.imf.org/external/datamapper/PPPPC@WE0/0EMDC/ADVEC/WE0WORLD/ENG https://www.government.nl/topics/nursing-homes-and-residential-care/long-term-care-act-wlz https://peranziani.it https://www.carehomeoasis.com/ https://thewarmnest.com/ https://www.theimperial.com.mt/ https://casa-antonia.com.mt/ https://www.aspmoro.it/home/ https://www.aspsirch.it/it/chi-siamo-48593/la-struttura-48597 https://casadiriposo-merano.it/it/ https://www.korian.it/ https://fondazionegbbianchi.org/ http://www.donboscopescia.it/villamatilde.html https://casadiriposomariagargani.it/casa-di-riposo-isernia-molise/ https://papadopoulion.gr/en/home https://www.restion.gr/en/ https://www.amera.com.pt/pt/residencias/faro https://www.casasdacidade.pt/en https://via-senior.com/listing/domus-senior/ http://www.domusenior.com/Bem_Vindo.html http://www.casaklein.com/ https://residenciamanantialdevida.com/ https://www.residenciasbilbao.es/index.html https://www.domicilbern.ch/domicil-steigerhubel https://www.domicilbern.ch/_Resources/Persistent/a5d7aa4b7066e45d958134d9c2a306ddb0d5a00f/ Preisliste_Domicil_UP_S_2023.pdf https://www.vivaluzern.ch/standorte/viva-luzern-rosenberg/ https://www.vivaluzern.ch/wp-content/uploads/2022/11/Preisliste_Langzeitpflege_2023_V1.0.pdf https://www.herrenbergli.ch/ https://www.ehpadeulalie.fr/ https://girondines.fr/ https://girondines.fr/wp-content/uploads/2023/05/Tarifs-en-vigueur-et-prestations-souscrites-2023.pdf https://www.clinalliance.fr/ehpad/nos-etablissements/paris-gambetta/#nous-decouvrir http://www.laprovidenceparis.fr/ https://www.maredoc.lu/fr/ https://residencemonplaisir.lu/?lang=fr https://stephensongarden.eu/fr/ http://www.maisonheysel.be/fr/index.html https://www.wzcdezilverberg.be/ https://www.magnolia-jette.be/displaypage.aspx?pid=6 https://www.shvpe.at/pflegeheime/seniorium-bad-kreuzen/ueber-uns-13622.html file:///C:/Users/hp/Downloads/Allgemeiner_Entgeltetarif_ab_01.01.2023_.pdf https://www.senioren-heim.at/de/index.asp https://wien.vitalityresidenz.at/ https://www.buergerspital.de/wohnen-pflege/seniorenheime/ehehaltenhausst-nikolaus/index.html https://www.lambertinum.de/ https://www.korian.de/pflege/stationaere-pflege/haus-der-betreuung-und-pflege-bettinahof-frankfurtstationaere-pflege/ https://www.mundus-leben.de/kassel/ https://www.careuk.com/care-homes/ladybrook-manor-bramhall?utm_source=Organic&utm_ medium=GMB&utm_campaign=Ladybrook-Manor file:///C:/Users/hp/Downloads/11164-MKT-Key-Facts-Ladybrook.pdf https://www.mha.org.uk/care-homes/residential-care/pennystone-court/?utm_source=business. google.com&utm_medium=organic&utm_campaign=GMBListing&utm_term=carehomes&utm_ content=pennystonecourt file:///C:/Users/hp/Downloads/291676_MH13658_KeyFacts_PennystoneCourt-Blackpool-4pp2.pdf
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ESSENTIAL PILLARS FOR FUTURE SENIOR LIVING COMMUNITIES

The demographic shift towards an aging population requires us to reconsider delivering senior care services to optimize wellbeing, safety, cognition, and support. Drawing from successful models in the field, here are critical insights for structuring services and operations in future senior living projects.

Wellbeing: A key element in optimizing residents' wellbeing is providing an environment that encourages residents to lead fulfilling and active lives. This approach extends beyond primary care to empowering individuals to pursue personal interests and passions. An array of diverse programs such as arts and crafts, gardening, day trips, and social events can offer opportunities for seniors to engage in meaningful activities and connect with their peers. Furthermore, healthy dining experiences under the stewardship of skilled culinary and hospitality professionals can optimize physical health and enjoyment. In essence, future communities should promote a lifestyle built on individual choices, where options can be created to accommodate unique desires and preferences.

Safety: Safety in senior communities is a multi-dimensional aspect, encompassing physical, emotional, and financial security. A robust security infrastructure, including well-trained professionals for emergency response, ensures the physical safety of residents. A supportive and respectful community atmosphere contributes to emotional security. Predictable expenses and financial planning services can help to secure residents' financial futures. In emergencies or extreme weather, communities must have strategies, such as on-site emergency generators and dedicated staff, to ensure the seamless provision of necessary services.

Cognition: Cognitive health must be a central focus for future senior living communities. The design of these communities should facilitate independence, socialization, and self-esteem, even for those with cognitive challenges. This includes offering programming and training sensitive to cognitive needs, as well as the design of physical spaces that aid residents with orientation and wayfinding. Furthermore, intellectually stimulating activities like educational courses and meditation can help residents maintain and improve cognitive function.

Support: Exceptional support services are fundamental for a thriving senior living community. From full assistance with daily activities for those who need it to flexible outpatient therapy options for those recovering from illness or injury, providing a broad spectrum of support services ensures all residents' needs are met. Moreover, adopting an integrated healthcare model encourages communication between families, providers, caregivers, and nursing staff, promoting positivity and overall wellbeing.

In synthesizing the insights gleaned from successful models within the senior care field, it becomes imperative for forthcoming senior living communities to prioritize these four cardinal principles: wellbeing, safety, cognition, and support. Operational paradigms should be conceptualized around these pillars to cultivate an ecosystem conducive to senior thriving. By diligently absorbing the lessons from established best practices and unflinchingly focusing on these critical areas, we stand equipped to sculpt a future where seniors are not merely accommodated but empowered to lead rich, fulfilled lives.

Create an environment that promotes a sense of contentment.

- Indoor air quality
- Thermal comfort
- Acoustics
- Welcoming atmosphere
- Optimal use of daylight
- Connection with nature
- Socializing spaces
- Variety of spaces
- Biophilic features such as indoor plants, water fountains, and aquariums/terrariums with fish, reptiles, or small animals
- Animal Therapy
- Art Therapy Cooking & Baking
- Listening to Music
- Time Outdoors
- Dancing
- Gardening
- Community and Cultural Outings
- Intergenerational programs
- Psychological therapy Mindful meditation and yoga

wellbeing

4Pillars

Wellbeing and activities

Create an environment that facilitates safe mobility and activity.

- Fall Prevention:
- Quality of floor surface
- Level changes
- Aid for walking
- Desirable lighting Cognitive change
- Injury Mitigation
- Contingency Planning
- Interactive exploration of gardens and natural landscapes with check-in points and cues (like geocaching or the digital Pokemon-Go game).
- Same floor with cues inviting exploration (like geocaching), to places (e.g., display cabinets, experimental stations, art rooms, or aquariums) with evolving content
- Same opportunities to socially interact in well-lit spaces, with sufficient greenery, interesting sounds, sights, and aromas, and pleasurable design.
- Aquatic Therapy
- Adaptive Sports
- Intergenerational programs
- Physiotherapy
- Mindful meditation and yoga

safety

cognition

Create an environment that supports cognitive ability and reduces anxiety.

- Proper signage Integrating wayfinding with design
- Comprehension of space
- Visual cue
- Visual contrast
- Brain Teasers
- Listening to Music
- Time Outdoors
- Science and current events
- Puzzles and Board Games
- Animal Therapy Cooking & Baking
- Listening to Music Time Outdoors
- Dancing
- Gardening
- Intergenerational programs
- Cognitive behavioral therapy
- Speech and Language therapy

Social Integration

- support
- Create an environment that fosters confidence and independence in activities of daily living.
 - Provide direct routes
- Provide aid for walking
- Provide appropriate ramps or steps
- Ease of use / Intuitive Use
- Opportunities for choice Logical layout
- Design for helper / companion Adequate toilet facilities
- Enhanced support in toilet
- Video Games
- Lifelong Learning
- Intergenerational programs
- Occupational therapy
- Physiotherapy
- Vocational rehabilitation therapy

Chapter 4 Healthy environment

- Natural ecosystem
- Social ecosystem
- Enriched spaces



HEALTHY ENVIRONMENT

Bertha's Village is not a hotel for the elderly. Neither is it a complex of apartments to accommodate senior citizens. It is a place that provides well-being for its residents through the design of a healthy environment.

A Healthy Environment is a transdisciplinary concept that connects factors from different disciplines. It encompasses factors from natural sciences, such as natural ecosystems, resource management, or air quality; social sciences, such as social equity or universal accessibility; and architecture and engineering as sustainable and inclusive design or industrialized construction and assembly. This is why a Healthy Environment can only be approached holistically.

A Healthy Environment should be designed considering the following parameters, divided into **natural, social, and enriched spaces.**

Nature based Design Strategies

NATURAL ECOSYSTEM

Natural Ecosystem: Preservation and creating a positive impact.

The site is in a privileged location due to its positioning at the top of the hills north of Limassol, allowing for astonishing views. However, this privilege comes with its challenges. Nearly the entire site is sloped, and the difficult terrain represents a big challenge for the design and construction of the project.

In addition, most surface area is rock, and the soil is no deeper than 1 m.

Many trees, such as carob, pines, and shrubs, cover the site. There are traces of rabbits, snakes, and lizards, and it is also a grazing land for goats and sheep. The trees provide nesting for many different types of birds.

We face a complex ecosystem formed by many different layers, running from the soil and underground system to the shrub and canopy layer. The construction of Bertha's Village is going to modify the existing ecosystem, but we have the opportunity to produce a positive impact on the environment by adopting the following strategies:

Topography. Adapting to the existing topography and reducing the earthwork as much as possible is recommended. This can be reached by designing terraces that will follow the traces of the slopes. This design approach can help reduce the amount of earthwork and the containing walls.

Soil layer. The upper soil layer is the wealthiest part of most the underground systems. The first 30 cms are full of life and organic matter. We should preserve this layer, and in the case of excavation, it is recommended to separate this bed and store it for future gardens. This way, we can reduce bringing soil from offsite.

Run-off water. The building must not block the natural run-off of water. The traces of water mark the slope. Therefore, the design should respect and take advantage of them.

A continuous horizontal building that covers the site from one side to the other must be avoided. Monoblock designs will block the run-off and the flow of animals and plants in the ecosystem. This is just one of the reasons to decentralize the building programs into parts.

Shrub layer. Shrubs seem less critical than trees, but they are an inseparable layer that increases the complexity and provides a habitat for many animals and insects. When creating a new landscape, the shrubs must be included. Preservation, displacement, and re-usage should be considered in the design.

Trees. A detailed study of the trees (location, species, size) is required to avoid cutting them down. Building on this site without cutting trees is impossible, but they can be transplanted. Preserving the trees, especially older trees, is essential for designing the development. Typically, new buildings have young trees recently planted, but in this case, we can complete a building surrounded by older trees. Therefore, it provides a feeling that the construction has been there for a long time.

Grazing. Depending on the project's design and landscape, if enough unbuilt space is left, it could be kept as grazing land. This is beneficial not only for the environment but also for the residents of the building and the people undergoing rehabilitation. This landscape, goats, and sheep can transit can be an excellent landmark for the village.

Nesting. It could be enhanced the nesting of the birds not only on the trees but also on the roofs of the buildings. Moreover, the roofs can also include suitable vegetation to shelter insects and enhance pollination.



Nature based Design Strategies

Natural Ecosystem. Taking advantage of the local conditions.

In order to enhance a healthy environment, how the building integrates with the site is a crucial factor in taking advantage of the climate and local conditions.

Orientation. The mild weather of Cyprus all year round has clear benefits in terms of heating, while the main challenge is cooling. Thus, protection from solar radiation, especially the protection of glass areas and roofs, is essential in designing an efficient energy building. A good understanding of how solar radiation affects the site, at least at the equinox and solstice, is through a computational solar analysis and energy modeling of the proposed buildings to assess their behavior.

The site area is oriented south and west, where the sun is typically powerful. The way of protecting from south and west orientations is quite different. While in the south orientation, the sun is vertical, and it is easy to protect just with a canopy, in the west orientation, the sun is more horizontal and requires a second layer formed of lattices, blinds, or slats. Trees and vegetation are among the best ways to cushion the sun's radiation by planting them in front of exposed areas or on the roofs of buildings. Deciduous trees can help to allow the entrance of sunlight in winter when needed and protect in summer from intense solar radiation.

Ventilation. Ventilation is a crucial factor in ensuring a Healthy Building. Interior spaces must allow cross-ventilation to renovate constantly the interior air. Since the construction is placed downhill, one of the facades can be in contact with the natural terrain. In this situation, to allow efficient cross ventilation, it is required to design patios, courtyards, or chimneys to facilitate air evacuation.

Depending on the trees or shrubs planted close to the building, the beautiful scent from the flowers will enter and infuse the building.

Airtightness. In the case of designing a passive building where the interior spaces are airtight, all the ventilation is provided from a unique entrance. The air distribution in the interior of the building is ensured by a mechanical fan that filters the air and recovers the heating optionally. Passive buildings require a particular design in terms of airtightness, with a special focus on the joints of the building, like the openings.

Sound. The site has its sounds formed by birds, insects, goats, sheep, or branches' movement caused by the wind. This background music must be preserved and enhanced.

ENRICHED SPACES

Space enrichment is the stimulation of the brain by its physical surroundings. It is proved that brains surrounded by more rich spaces present increased activity. Enriched physically, socially, and cognitively stimulating spaces can promote neurocognitive health (Burzynska, Mailnin; O'Keeffe). Enriched spaces must provide sufficient complexity by designing physically, socially, and cognitively stimulating environments. This type of space can also enhance novelty to stimulate attention and memory. In this part, we will focus mainly on the physical design of the interior spaces to increase the stimulation of the brain.

Natural light. The openings of the building can follow the sun's movement, allowing the sun's rays to enter the building according to the time of the day. Skylights, courtyards, and facade openings can help continuously fill interior spaces with natural light. Specifically, rooms may have an east orientation to get the morning sunlight, although the slope makes it very difficult. Skylights and courtyards can help to solve this challenge. On the other hand, these light entrances must also be protected to avoid excessive heating on hot days.

Artificial light. Enhancing natural light can reduce artificial light to a minimum during daylight. In the case of artificial light, especially for residents with vision problems, it is relevant to find the balance between excessive and enough illumination to reduce the risk of falls (O'Keeffe). On the other hand, significant contrasts of lightning from one space to another can produce disorientation. It is recommended to use homogeneous lightning rather than concentrated lamps.

Materials. It is recommended to use organic materials such as wood or natural fabrics and non-organic materials such as stones or artificial stones made of stone waste. Whenever possible, the use of recycled materials is suggested. Fossil-origin materials such as plastics or plastic paints must be free of VOCs (Volatile Organic Compounds), and it is better if they are water-based.

Wood and organic materials provide a feeling of comfort and well-being. Special attention must be given to light-reflective materials in areas with direct sunlight that can produce glare.

Sound vs. noise. Typically, most of the common materials used in construction reflect the sound. Glass, stone, plastic, and coating reflect the sound. Therefore, these types of interior spaces with many people can produce chaotic sounds and noise. Due to aging, hearing loss can reduce the capacity for understanding produced by environmental noise. Furniture made with fabric, acoustic false ceilings, softwood panels, or acoustic materials, like rock wool, can lower the reflection of the sound. In addition, big spaces with a dimension of more than 13 meters must consider the reduction of echo.

Biophilia. As Edward O. Wilson (1984) suggested, humans have the innate tendency to connect with other non-human life forms. The biophilic design tries to reconnect people with the natural environment. Biophilia has clear benefits in reducing mental health issues, chronic pain, or lowering blood pressure (Yannick, Joye, 2007). Interior spaces or patios with vegetation, and natural materials like timber and organic fabric, can help to design a biophilic environment. In addition, these spaces are dynamic environments that change almost every

Socially centered strategies

day, especially during seasonal changes. Biophilic design can support cognitive ability and well-being.

Accessibility and orientation. A Healthy Environment must be easy to understand, access, and orient (Hong Kong). Long corridors with no reference can produce disorientation. In the same way, homogeneous spaces that repeat constantly can also lead to disorientation. Furthermore, it is not a matter of signage but of good design. In terms of accessibility, all spaces must be reached by residents with mobility issues, and this is a big challenge for a building on a slope. Wherever it is not possible to solve the connection of different levels through ramps, it will be required to do it by elevators. It is also recommended to provide spaces for resting.

SOCIAL ECOSYSTEM

The social ecosystem is a complex network of interactions and relationships between the residents, their families, the staff, doctors, friends, and other people from outside the village. The main objective of this social network is to create meaningful activities and relationships. The design of the building must create spaces to enhance the different types of programs and social connections.

Clusters or Living Units. It is crucial to find the balance between the size of the building and the sense of community; to achieve that, it is recommended to divide it into clusters. A cluster is a smaller unit with a specific range of self-sufficiency. Thus, the accommodation area is formed by clusters of 4-8 residents, which can be grouped in single or double rooms. Apart from the bedrooms, the clusters include shared spaces such as living and dining rooms,

kitchens, interior patios, courtyards, or exterior terraces.

The objective of the clusters is to create more comfortable spaces and, therefore, foster the feeling of "being at home."

The clusters can provide spaces for meeting with families or other people from their social network.

The cluster for the families. Families are considered critical partners in the plan of care for patients (Reihard, 2008). It is important to involve family and friends in therapy by inviting them to sessions, providing them with education and resources, and encouraging their active involvement (Gylmour, et. al). One of the clusters can accommodate families visiting from abroad for a certain period. Rather than the families staying in a hotel, they can stay in the development. It is a way to facilitate the commuting of the families and foster relationships and the quality of the time spent together.

The food network. Food can foster a sense of community in the project. The food is understood as a circular process, where the residents can participate in any of the different phases. The local supply, gardening, cooking and baking, eating, recycling, and teaching form the food network.

The groceries can be supplied locally to enhance the relationship with nearby villages and businesses whenever possible. On the other hand, the residents can plant some vegetables, fruits, and spices on the site. For this reason, it is required to provide specific exterior and

interior (greenhouses) spaces for gardening, together with the required facilities. Cooking and baking can be done in the shared spaces of the clusters or in the central kitchen. The groceries can be supplied from the local network or local gardening. It is recommended that the menu shows where the food comes from and it can include the name of the residents that harvested it.

The organic waste can be recycled through composting, which later can be used as a fertilizer for gardening. In this way, the circular process of the food network is closed, and the residents can participate in any of the phases.

Finally, gardening or cooking lessons can be taught on-site through a workshop where the residents can share recipes and experiences.

Do it yourself (DIY) with and for the community. As with any other building, the development needs maintenance and repair, and moreover, when its expansion is planned through different phases. In some of the maintenance, repair, or expansion works, the residents can participate. If the village provides a workshop with traditional and new tools such as CNC, laser cutting, or 3D printing, the residents can be safe and efficiently involved in "making."

A new door, the decoration of a wall, a table, a chair, or a structural light-framing wall can be produced by the residents, assisted by technical staff.

The social landscape. Some studies show that happiness is reached when doing sports or walking with friends in a beautiful landscape. These three factors, physical activity, friends, and a beautiful landscape, can be reached at the center. The design of the exterior landscape can foster this type of relationship. The slope is a challenge to provide accessibility to all the residents, but it can be done through soft ramps. The development must be designed accordingly to the natural landscape.

Another critical factor is the landscape's seasonal changes that can help create a dynamic ecosystem in permanent transformation and evolution. Thus, walking by this landscape, the users can discover something new daily.

Intergenerational spaces and programs. There is a clear positive impact on emotional well-being (Weintraub, Killian) for people participating in intergenerational programs. Peer support, youth, enthusiasm, and being needed can support senior citizens' well-being. Also, it is essential that the adults can decide their level of engagement. Intergenerational programs can positively impact children's social development and their perception of the elderly (Gualana, et al.). In addition, intergenerational programs should be flexible and adaptable to respond to the different needs of the children and elderly.



FLEXIBLE SPACES : RELATIONSHIP BETWEEN INTERIOR BOU



SPATIAL RELATIONSHIPS AN



JNDARIES AND LANDSCAPE



ID SOCIAL BONDS DIAGRAM

Chapter 5 Life Cycle

- Materials and products
- From construction to assembly
- Maintanance and use
- Transformation and expansion



LIFE CYCLE

Building construction is no longer a linear process that starts with the design and finishes with the end of work or final completion. It is a long circular process. Nowadays, there is a paradigm shift where building construction is just a phase and not the final objective.

A building starts with extracting the raw materials and their processing and manufacturing and continues with the construction, maintenance and use, transformation, and end of use. The latter does not mean the demolition of the building but the recycling of its materials and construction systems. Thus, the cycle starts again, and the raw materials are extracted from the disassembly of the building.

For the definition of the life cycle of Bertha's, it has been taken into account the standards UNE-EN 15804, "Sustainability of construction works," and ISO 20887:2020, "Sustainability in buildings and civil engineering works — Design for disassembly and adaptability — Principles, requirements and guidance." Both standards aim to transform the traditional construction industry into a circular process.

Standard UNE-EN 15804, "Sustainability of construction works," establishes the basic codes for developing product category rules for all construction products and services. Provides a structure to ensure that all Environmental Product Declarations (EPD) of construction products, construction services, and construction processes are obtained, verified, and presented harmonized. The standard establishes the following phases:

A1-A3. Product stage.

A1: Extraction and processing of raw materials, including secondary materials resulting from recycling processes.

A2: Transport to the manufacturer.

A3: manufacturing.

A4-A5. Construction process stage.

A4: transportation to the site.

A5: Installation and assembly in the building.

B1-B7. Stage of use related to the structure and functioning of the building.

B1: use or application of the installed product.

B2: maintenance.

B3: repair.

B4: substitution.

B5: rehabilitation.

B6-B7.Use stage of the building's operation. B6: use of energy in service.

B7: use of water in service.

C1-C4. End of life stage.

C1: deconstruction, demolition.

C2: transport to the waste treatment place.

C3: waste treatment for its reuse, recovery, and/or recycling.

C4: elimination.

D. Benefits and charges over the system limit. Circularity.

D: Potential for reuse, recovery, and/or recycling, expressed as net charges and benefits

Standard ISO 20887:2020, "Sustainability in buildings and civil engineering works – Design for disassembly and adaptability – Principles, requirements, and guidance," raises a series of criteria that favor the optimization of the useful life of the building concerning the concepts of efficiency, reuse, recyclability, accessibility or standardization among others. The standard, as mentioned above, applies design principles for disassembly and adaptability (Design for Disassembly and Adaptability DfD/A) that allow extending the life cycle and its transformation towards a circular system. The standard also warns that this type of strategy should not overbuild the building to anticipate all unforeseen events and situations that may arise in the life cycle stages. In this sense, two scenarios are established based on the term and ownership, short and long term, multiple owners, and minimal changes in ownership. The application of teardown and adaptability principles will vary based on duration and anticipated changes to the property.

Based on previous standards and other research carried out by the CSC (CSC, 2022), the life cycle of Bertha's village is structured according to the following phases:

- A. Extraction, processing, and manufacturing of the raw materials.
- B. Construction and assembly.
- C. Maintenance and Use. Repairing and Retrofitting.
- D. Transformation and expansion.
- E. Disassembly and recycling.

The Life Cycle Assessment (LCA) is a methodology to evaluate the environmental impact of the building associated with the previous phases. It is an inventory of the energy and materials used during the full life cycle and the corresponding greenhouse gas emissions (GHG). At least, it is recommended to include the energy and materials consumption for each phase and the water.





Global CO₂ Emissions by Sector





A. MATERIALS AND PRODUCTS

Being on an island like Cyprus limits the variety and availability of materials and products. Most of the materials are brought from abroad, which has a significant impact in terms of transportation. It is required to find a balance between the local and imported materials.

Another critical factor is the proportion of materials in a building. There are several methods to analyze the volume of materials in a building. However, for the objective of the present research, it is recommended to implement the Material Stock (Ms) of buildings method based on Material Intensities (MIs) (Lederer et al. 2021).

MIs can be expressed in different Reference Values (RVs), like gross area (GFA), gross volume, or per story (Lederer et al. 2021). The total GFAtotal (Gross Floor Area) is the sum of the gross floor area per story. Concerning the gross volume of the building GVbuilding is calculated by the following equation:

GVbuilding= GVbasement +GVeaves+GVroof

where GVbasement is the volume of the basement, GVeaves is the gross volume of the building from the ground level to the eaves, and GVroof is the gross volume of the roof (pitched). The gross volume (GV) of each floor (basement, eaves, roof) is calculated by the following equation:

GV(basement, eaves, roof) = GFA x h

where GFA is the gross floor area of the corresponding level and h is the height. In the case of a pitched roof, the height will be calculated according to its geometry. The MIs (Material Intensity) in t/m3 is the volume of each material (Vm) per the mass density (ρ V,m), divided by the Reference Value. For the present research, it is recommended to use the Gross Volume (GV) of the building as the reference value. The mass density can be obtained from the manufacturer or through official data.

$MIm = Vm \times \rho V, m / RV$

Finally, the proportion of each material according to the gross volume of the building will help to evaluate and reduce their impact in terms of cost, time, and environmental impact. It is recommended to gather the most representative materials and construction systems in a chart. It is understood that the most representative materials account for more than 80% of the total.

Material	Material Volume (V _m) in m ³	Material Density _{Q v,m} in kg/m ³	Reference Value (RV)- Gross Volume (GV) in m ³	Material Intensity (MIs)	Proportion (%)
				V _m × _{ℓv,m} ∕ GV	

Chart gathering the distribution of the building's Material Intensity (MIs).

Typically, the structure of a building represents the most considerable weight and volume in buildings and about half of the total carbon embodied emissions (Webster et al. 2012). The structure and substructure of the building account for more than half of the embodied carbon of the building (Kaethner and Burridge, 2012).



Average breakdown in building elements of embodied carbon in offices, hospitals and schools, based on figures in (Kaethner & Burridge, 2012)

This is one of the reasons to focus on the efficiency and optimization of the structure and sub-structure to reduce its environmental impact (De Wolf, 2014). If we look at the upper drawing, the construction work accounts for the highest emissions after the building structure. Thus, prefabricated construction or assembly methods, rather than traditional on-site construction, will help to reduce the construction impact. Also, the facades and external cladding represent a high percentage of embodied carbon.

Once it is set, the chart gathers the most representative MIs, and it is possible to

start crossing it with the following data:

Extraction, processing, and manufacturing of raw materials.

Typically, raw material extraction and its transformation into a building material or construction system happens in different places. In fact, the companies extracting raw materials usually differ from those manufacturing materials. The supply chain of any product must be analyzed from the extraction stage to the manufacturing and then to the construction work.

Some materials can be extracted from abroad, while they can be manufactured in Cyprus. Whenever possible, raw materials can be replaced by recycled materials. It is recommended that the most representative materials must be gathered in the following chart, according to the place of extraction, processing, and manufacturing:

Product	Different raw materials and subproducts.	Place of extraction of the raw materials	Place of processing of the raw materials.	Place of manufacturing of the raw materials.
	Raw material 1			
	Raw material 2			
	Subproducts 1			
	Subproducts 2			

For example, a wood-based material such as plywood can be a breakdown in the following elements:

Product	Different raw materials and subproducts.	Place of extraction of the raw materials	Place of processing of the raw materials.	Place of manufacturing of the raw materials.
OSB (Oriented Strand Board)				
	Raw material 1 (poplar wood)	Certified Poplar Forest	Factory for log processing.	Factory for strands production and board manufacturing.
	Raw material 2 (adhesive - polyurethane of 1 component)	Crude oil	Factory for producing 15-50% Polymer 30-70% Isocyanate	Factory for producing the polyurethane.

Local vs abroad. (km and carbon emissions)

As mentioned above, being on an island limits the availability of materials and products. However, some imported products can be more sustainable than local products, considering the carbon footprint due to transportation.

Typically, in Cyrpus, the most common structures are made of steel and concrete. Steel is imported from abroad, but in the case of concrete, there are cement plants located in Cyprus that produce clinker and cement. The reinforced steel for the concrete is also imported. The gravel and sand for the concrete are local. There appears to be no tradition for wooden structures since Cyprus has no strong forestry industry. For this reason, as with steel, most of the timber must be imported from abroad.

Many factors condition the decision to use one material versus another. In the case of materials and products coming from abroad, the carbon emissions due to transportation must be taken into account. Typically, the transportation will include land and sea shipping, which have different carbon footprints.

Although carbon dioxide is one of the gases that contribute the most to global warming, there are other Greenhouse gases (GHG): the non-fluorinated gases:

- carbon dioxide (CO2)
- methane (CH4)
- nitrous oxide (N2O)
- the fluorinated gases:
- hydrofluorocarbons (HFCs)
- perfluorocarbons (PFCs)
- sulfur hexafluoride (SF6)
- nitrogen trifluoride (NF3)

Converting all these gases to carbon dioxide equivalents (CO2 -eq) makes it possible to compare them and determine their individual and total contributions to global warming (Kyoto, 1997). The carbon dioxide equivalent for a gas is derived by multiplying the tonnes of the gas by the associated GWP (Eurostat, 2023). In this sense, using CO2 -eq data is recommended, rather than just the CO2.

The following table gathers the carbon equivalent emissions according to the type of transportation (land and sea) and breakdown in three phases of the product stage: extraction of the raw material, processing, and manufacturing.

Material	Land Trans port (km)	Carbon Emissions (CO ₂ -eq/ km)	Total Land Carbon emissions CO ₂ -eq	Sea Transport (km)	Carbon Emissions (CO ₂ -eq/ km)	Total Sea Carbon emissions (CO ₂ -eq)	Total Sea + Land Carbon emissions (CO ₂ -eq)
Extraction							
Processing							
Manufacturing							

Carbon Emissions (CO2 and CO2 -eq) due to material extraction, processing and manufacturing

Most products and materials include the environmental product declaration (EPD), which contains the carbon dioxide equivalent emissions from the extraction of the materials and manufacturing.

The carbon dioxide equivalent will be crossed with the Material Intensity (MIs) to obtain the carbon emission per material. Typically the reference value is the weight (kg), which can be obtained from the Material Intensity chart (MIs).

Material	Weight (kg)	Carbon Emissions (CO ₂ -eq/ kg)	Total Material Carbon emissions (CO ₂ -eq)

Finally, the material total carbon emissions are the result of the sum of:

Material	Total Sea + Land Transportation Carbon emissions $(CO_2 - eq)$	Total Material Carbon emissions (CO ₂ -eq)	Total Carbon emissions (CO ₂ -eq)

B. FROM CONSTRUCTION TO ASSEMBLY

As mentioned above, construction work represents approximately 15% of the total carbon emissions of a building. This factor and the construction of Bertha's Village in phases require a different approach than the traditional construction work. New ways of building, such as industrialized construction, are trying to reduce on-site construction as much as possible by increasing off-site construction. Off-site construction is not a new concept, but it has seen a resurgence in recent years. From Marriott opening its first modular hotel, to tech giants like Alphabet investing in modular housing, to Japanese retailer Muji launching prefab microhomes, off-site construction methods are gaining traction. And as they realize benefits such as decreased costs, enhanced efficiency, and better worker safety, participants across the construction value chain are increasingly pushing the space forward.

With the modular process, rooms and/or bathrooms can be manufactured away from

the construction site in a climate-controlled factory. Once made, the prefabricated units get transported to the site, where the building's base podium has already been built. The units get stacked into place by crane, at which point workers complete the building on-site, including electrical, plumbing, and other finishing work. Unlike traditional methods, this process avoids time-consuming challenges that can delay construction, such as skilled labor shortages and poor weather.

The transition from traditional construction to assembly is a swift paradigm. The units are manufactured off-site and assembled on-site without the need for any curing. Once the structure is assembled, it is ready to use. There are two types of industrialized units:

Panelized construction.

Walls, slabs, and flat structural elements are manufactured off-site and assembled on-site. This type of construction is very flexible and easy to transport. The walls can include not only the structure but also the facilities and the finishing. The volume to transport is optimized since the panels can be stuck by minimizing the gaps and empty volumes. This has a direct effect on the cost of transportation.

Modular construction.

Volumes forming rooms, bathrooms, or other building parts can be manufactured off-site and assembled on-site. Modular construction can save even more time than panelized construction since it reduces the parts to assembly on-site.

In both cases, the joints of prefabricated parts, such as walls or rooms, must be carefully studied. These types of joints are typically performed by steel connections that adapt and adjust to the assembly allowances. Another important aspect is the weight of the panels or modules. It is recommended to be lightweight to help the transport and elevation systems as cranes.

Typically, panelized and modular construction can be manufactured in timber, concrete, or steel. The weight and volume of the wall (panel) is an essential factor to determine the most appropriate system:

Materials	Density (kg/m³)	Wall weight kg/m2
Light frame timber	500-800	25-40 kg/m2 (light framing wall)
Mass Timber	500-600	80-100 kg/m2 (cross laminated timber)
Concrete	2.000 - 2600	400-520 kg/m2 (concrete wall 20 cms)
Steel	7.750 - 8.050	25-35 kg/m2 (steel light framing wall)

Precast concrete.

Among the different options of industrialized construction, precast concrete is the least sustainable in terms of carbon footprint, weight, and transportation. The modules or flat structural elements, as walls or slabs, can be manufactured off-site and assembled on-site through grouting or steel connectors. Compared with on-site concrete the accuracy and dimensional precision of the panels and modules can be improved, together with the construction time. On the other hand, the weight of concrete makes it very difficult to industrialize big modules.

Steel framing.

Steel framing is lightweight as wood framing, but it has a high environmental impact on carbon emissions. Although the steel is galvanized, there could be many potential points of oxidation, in a climate such as Cyprus, as the perforations for the bolds and screws.

Wood light-framing.

Wood light framing is the lightest industrialized system, together with steel framing. It positively impacts the environment since the wood works as a carbon sink, capturing the carbon from the atmosphere while the tree grows. Even considering the carbon emissions from the forestry, processing, and manufacturing of timber products, the carbon footprint is still negative. The emissions from the product stage represent less than 30% of the carbon storage by the tree.

Mass timber.

Mass Timber walls are made of cross-laminated timber, which is also lightweight but heavier than steel and wood-light framing. It also has a negative carbon footprint, such as wood-light framing, but since it requires almost double the mass, it could be more sustainable.

Industrialized construction requires the management of integrated multi-disciplinary models, including the product and construction stage, and organizing on-site and off-site construction. The design stage is more important than ever, where all the information and data must be included. Industrialized construction includes:

- Engineering modeling methods: product, organization, and processes.
- Analysis and Visualization methods through Building Information Modelling (BIM). These tools help to obtain all the quantities from the design and to cross them with other data such as carbon emissions, cost, schedule, etc. In addition, it is a great tool to include 4D interactions.

C. MAINTENANCE AND USE. Repairing and Retrofitting.

Once the construction of the building is finished, it begins the operational phase, which has the highest impact in terms of carbon emissions. The embodied carbon accounts for 11% of the total global carbon emissions, while the operational carbon accounts for 28%. In this sense, buildings represent 39% of the global carbon emissions.

The operational carbon of a building is mainly produced by the facilities and installations of the building, such as the climate and electrical system. By reducing the energy demand of the building, it will cut down the carbon emissions. This means that we need to focus on the passive design of the building in order to reduce the active design. Nowadays, we have the strategies, knowledge, and tools to design a net zero-carbon building in a place like Cyprus.

In order to achieve net zero carbon emissions during the operation phase, it is recommended to follow the next steps, which are divided into two main parts: passive and active design.

1. Passive Design.

The passive design combines strategies that take advantage of the local conditions (geography, climate, vegetation) and resources (sun, wind, soil) to enhance a self-sufficient building. The design of the building is the most essential phase to achieve this objective. For this reason, it is crucial to implement digital tools to visualize and verify the results during the design phase. Today's software is precise enough to predict the energy demand of a building, and subsequently, we can reduce it. The objective of these tools is not just to verify results but to improve the design of the building. They must be implemented from the beginning of the design. Basically, the main steps to achieve a passive design are:

1.1. Analysis of the local conditions.

The analysis of the local conditions must be carried out at different scales, and through different times of the year, at least in the equinox, solstice, spring, and autumn. The environment is constantly changing, although in a place like Cyprus, the shift from one season to another is very soft compared with other latitudes.

Climate conditions. Factors like the sun's radiation and orientation, prevailing wind directions, temperature variations, humidity, and shading must be considered. All these parameters are crucial to make a good passive design.

Sun orientation. The slope of the site conditions the sun exposure and shading since it is oriented mainly west and southwest. This means there is no sun exposure in the morning unless there are openings in skylights or courtyards towards the east orientation. On the other hand, the west orientation has the highest sun exposure, and subsequently, it is crucial to include sun protection in the design of the building. While in the south orientation, the sun protection could be a canopy, it must be something

vertical, as a lattice, since the afternoon sun is mainly horizontal. Sun protection can be achieved by planting deciduous trees that allow the sun rays to penetrate in winter and block them in summer by providing shadow. Other types of sun protection can be blinds, lattices, canopies, pergolas, overhangs, etc.

Wind. The prevailing winds can help to ventilate the interior spaces. If they come from downhill, they will introduce the micro-climate conditions inside the building, like the temperature, the humidity, the smells, sounds, etc. Temperature. Cyprus has mild weather during the year, with an average temperature between 16°C and 20°C. So, cooling is more necessary than heating. Nights are usually cold and can help to cool the building at night. For this reason, it is required to keep the cool temperature gained during the night. This is only possible if the building is protected from sun exposure and technically well insulated. On the other hand, in winter, the building can be heated by removing the sun's protection and enhancing the greenhouse effect.

Humidity. The humidity in Cyprus changes from dry summers, 15-30%, to humid winters, 65%-95%. In summer, it is recommended to apply adiabatic cooling by increasing the humidity of the air. This can be reached by placing strategically patios or exterior spaces with water. While in winter, the spaces with water must be reduced not to increase the humidity.

Natural environment. The type of trees, shrubs, vegetation, and animals, like birds and insects, must be carefully studied. The topographic survey must include the position of the trees and main shrubs and the location of shallow rocks. The objective is to cut down the minimum amount of trees and vegetation, but if necessary, they must be transplanted to other places on the site. The objective is to integrate the building into the environment. Trees and green roofs can provide sun protection to the building, increase insulation, and can enhance biophilia.

1.2. Construction technique.

The construction technique plays a crucial role in the passive design of the building. A good passive design needs an excellent construction technique. The energy modeling of the building will help to ensure the most efficient technique. The construction technique is based on the following:

Thermal insulation.

Proper insulation with high thermal resistance can reduce heat transfer and maintain a comfortable indoor environment. Among the many ways to insulate a wall or a roof, it is recommended to apply SATE systems (Exterior Thermal Insulation System). Since the thermal insulation is continuous around the building, the SATE system avoids the appearance of thermal bridges. Also, there are SATE systems that leave an air camera between the wall and the insulation or between the external layer and the insulation, which helps to control the heat by allowing the ventilation of the interior air camera. The camera must be ventilated at the upper and lower ends. A ventilated facade avoids condensation and humidity, and it gains in acoustic insulation and in high thermal efficiency.

Thermal Mass.

The position of the thermal mass in the enclosure of a building depends on the use of the interior space. In spaces with permanent use as bedrooms, the thermal mass should be in contact with the interior space. Thus, the wall can keep the interior temperature by storing the energy in the mass. In other spaces, with a temporary use (not every day), placing a finishing layer with a high thermal resistance (for example, as a wood board) is recommended. Thus, it will save energy by heating or cooling only the air, not the walls, and in a shorter time.

Fenestration design.

Windows and openings have a low thermal resistance compared with walls and roofs. They represent the weakest point in the enclosure of a building. On the other hand, they are a source of light, ventilation, and views. It is recommended that all windows include a thermal bridge break and double glazing with insulation. In the case of glasses without sun protection, it is required to include a solar control layer.

Air sealing.

Air leakage can represent a high energy loss. Design and construction must ensure proper building envelope sealing to avoid unwanted heat transfer. Some codes and regulations obliged a continuous flow of exterior air to the interior of the building in order to provide a healthy environment. This flow helps to reduce the interior carbon dioxide and other gases concentration due to human activities. In this case, it is recommended that the airflow does not come directly from the exterior, and it could be preheated or precooled. There are different ways of preheating or precooling the exterior air by conducting the air through underground pipes, patios, or greenhouses.

2. Active Design

If passive design strategies have been implemented, the facilities and installations' requirements will be significantly reduced. However, it is recommended to use climate systems with a high coefficient of performance (COP), with energy provided mainly from renewable sources.

2.1. Renewable energy.

The sun, the dark, clear nights, and the ground are the primary sources of renewable energy in the site that can be harnessed for use as heat and electricity.

Sun.

The energy from the sun can be captured passively and actively:

Passive solar energy.

The sun's energy can be captured through the greenhouse effect. The sun's rays pass through the glass, but part of the sunlight spectrum, as the ultraviolet rays, do not go out again and stay inside. Therefore, the interior space is heated by the

remaining sun rays. This strategy can be achieved through greenhouses, courtyards or skylights. Preferably, the orientation of these spaces must be south or southwest. In summertime, this type of space must be opened to evacuate the hot air and avoid excessive heat. Another option is to add solar protection for summertime.

Active solar energy.

Active solar energy includes solar panels, such as photovoltaic or solar water heaters. While the first one produces electricity, the second is only for heating water. These panels have a specific orientation and inclination depending on the latitude of the building. The production of energy is related to the area covered by the panels, the efficiency of the panel, the orientation, and the inclination.

Dark, clear nights.

Night cooling is a well-known effect that happens only in dark, clear nights. It is based on the thermodynamic principle that heat transfer only happens from heat to cold and never in the opposite direction. On clear nights, the heat will transfer to outer space. We can use this by placing water pipes in the roof exposed to dark nights.

Ground.

The ground can provide geothermal energy, which originates from the formation of the planet and mainly from the decay of radioactive isotopes. Radioactive decay is a continuous process in the planet's core that constantly radiates heat outward. This gradual temperature change is known as the geothermal gradient, which is about 25°C per 1 kilometer of depth.

Geothermal Heat Pumps (GHP). GHP is perforated close to 100 meters deep to reach the energy source and does not penetrate the bedrock. GHP are formed by a continuous loop circling above and underground, usually underneath the building. Water or other liquids circulate through the pipe.

GHP works differently depending on the time of the year. In winter, the liquid inside the pipes captures the underground geothermal heat, which will then be transferred into a heat exchanger. In summer, the opposite happens; the liquid circulating inside the pipes is heated in the building and cooled underground.

Canadian well. Canadian wells are formed by a system of underground pipes, preferably more than 1.5 m deep, where the temperature of the soil is stable and changes slightly according to the seasons. These pipes allow the exterior air to enter from one end and circulate a distance underground. While the air circulates, a heat transfer happens between the air and the soil. Typically, the soil can have a temperature between 15°C and 18°C, which will lower or increase the exterior temperature depending on the time of the year. Then, this air-conditioning will enter the building to cool or heat.

Between the sun, the dark, clear nights, and the ground, geothermal energy is the most stable energy source, which does not depend on the weather conditions. However, it is recommended a sum of energy sources and systems rather than just one.

2.2. Heating, ventilation, and air conditioning (HVAC).

The energy source for mechanical systems that provide heating, ventilation, and cooling can come from renewable energy or fossil fuels. The selection of the type of HVAC system is recommended to be based on the coefficient of performance (COP). Energy production and transformation. The energy transformation to provide heating or cooling can be performed through different systems, such as heat pumps. Aerothermal heat pumps are very efficient air-to-air and air-to-water heat pumps. Based on combustion, traditional heat pumps cannot achieve a COP of more than 1 since they generate waste or contain non-combustible particles. On the other hand, aerothermal pumps can achieve more than COP 4 by taking around two-thirds of the energy required directly from the air.

Heating and cooling floor. Aerothermal pumps are as efficient as radiant flooring for low-temperature heating and cooling. On the contrary, aerothermal pumps are not as efficient for high-temperature heating as radiators. So, it is recommended to implement aerothermal heat pumps and radiant flooring. Radiant flooring is more suitable for comfort and well-being than traditional air conditioning systems or radiators. This is of particular importance in the case of senior people.

D. TRANSFORMATION AND EXPANSION.

Bertha's village is planned to be built in phases. Although all phases must be included in the original design, they can change depending on future needs. In this sense, the first phase is understood as a prototype to test the future stages and requirements of the users, the building, and the environment. The design of the building must be flexible enough to adapt to future transformations and expansions. The flexibility of the building is also based on movable partitions, such as sliding doors or movable walls. These elements allow the instantaneous transformation of interior spaces to adapt to different activities or capacities. In addition, interior spaces must be designed not only for one but for multiple activities. Specifically, it is necessary to apply industrialized construction systems in the transformation and expansion phase. There is a need for synchronization between the life of the building and the construction work. Time, noise, waste, and dust are parameters to avoid during the expansion phase in order to prevent conflicts with the users of the building. Figuratively, the construction labor can become a temporary staff of the building. They can interact positively with the residents of the building. All parameters included in the life cycle chapter must apply to the transformation and expansion phase.

E. DISASSEMBLY AND RECYCLING.

The design of the building and the construction technique must include the end of life. In this sense, the materials can be recyclable, and the joints can be easily disassembled. The objective is to avoid the demolition of the building and to recycle and reuse the materials and construction systems. In addition, the foundation of the building and the earthworks must be minimized to leave a small footprint in the environment. The dream is to leave a beautiful environment once we are not there.

Chapter 6 Evolutionary design

- Evolutionary design and phased construction
- Social clusters and interaction
- Living Clusters
- Rehabilitation Unit
- Clinic, Rehabilitation pool and Gym
- Administrative space
- Workshop
- Restaurant



Evolutionary design and phased construction

Since the inception of our investigative research, we have aligned our focus towards developing the project incrementally or in distinct stages, as dictated by our client's instructions. This methodology has served as a compass, guiding our exploration into construction methodologies, techniques, and spatial distribution strategies that can facilitate such a phased development plan.

While certain programmatic elements like administrative and rehabilitation services resist a phased implementation due to their integral, foundational role in the overall scheme, we will further articulate an effective strategy for growth and expansion in this chapter. This strategy allows for seamless, slow deployment of these critical elements.

The residential units, however, present a unique case. As previously highlighted and affirmed by our comprehensive review of research papers and case studies, decentralization and modular thinking are vital considerations. These aspects foster flexibility and scalability in the planning and execution of residential units. We initially proposed a three-phase construction plan for these units. Still, we recommend halting expansion after the second phase to avoid the potential pitfall of a high-density environment that could compromise the **intimate, small-scale community feel**—an attribute we identify as a potentially successful and appealing feature of this project.

With the phased construction approach, we urge the adoption of an "instruction manual" mindset. Phased construction involves conceptualizing the built environment from the perspective of smaller modular parts that can be assembled, repaired, and modified over time. The implication is that the project should be accompanied by a style manual of assembly and detailed drawings as a kit of parts for subsequent phases. This kit should have the flexibility to evolve per the project's needs and shifts in the context.

This approach encapsulates what we refer to as "evolutionary design." Our proposition is for the project's initial phase to serve as **a prototype informing the learning and improvement process**. The design decisions for successive phases should be based on critical learnings from the preceding phase. These insights can be employed to formulate the design of new living units, expand the project, and significantly modify existing structures. That is why we advocate for modularity and flexibility at every scale—from the structural framework to the interior design. Such an approach facilitates rapid modifications, adaptability, and the prefabrication of new components.

In line with this, we propose establishing a measurement system to gauge the first phase's results comprehensively. This evaluation should range from the performance and behavior of the materials to the residents' satisfaction with their spatial experience. This feedback loop enables an informed, evidence-based approach to designing and implementing subsequent phases.

Another crucial recommendation, consistent with our previous discussions, is that the design strategy must account for off-site construction. Most modular components should be prefabricated off-site and only assembled on-site to ensure minimal disruption to the residents' daily operations from the first phase. This approach respects the residents' peace and privacy while ensuring the swift and efficient construction of new units and facilities. This dual focus on **efficient construction and resident comfort** is a cornerstone of a phased development strategy.



Case study based scenarios (feasibility to be verified by business plan and local regulations):

Phase I	
Number of rooms	
25	35
Typology of rooms	
Single	Double
Room Sqm	
11	20
Sqm per resident	
50	130

Phase II	
Number of existing rooms	
25	35
Number of new rooms	
25	35
Typology of rooms	
Depending on phase I findings/de	mand
Single	Double
Room Sqm	
Refined through satisfaction su	irvey
11	20
Sqm per resident	
50	130

Phase III	
Number of existing rooms	
50	70
Number of new rooms	
10	30
Typology of rooms	
Depending on phase I findings/de	emand
Single	Double
Room Sqm	
Refined through satisfaction su	rvey
11	20
Sqm per resident	
50	130

Indoor outdoor ratio
outdoor

indoor

Horizontal growth 2floors

Social clusters and interaction

At the start of our research, we initiated a parallel investigation into similar projects' architectural case studies and sociocultural aspects in this particular case. To this end, we commenced the task of diagraming the structure of the community that will breathe life into the project site. The accompanying diagram is an embryonic representation of these community relationships and activities. Despite its preliminary nature, it remains a critical starting point for our design recommendations. This relational diagram is the foundation for more intricate, space-specific diagrams that we develop later in our design process.

We have identified four distinct social groups or clusters.

The first group comprises medical, administrative, and auxiliary staff who operate on-site in shifts, ensuring round-the-clock service coverage. The second group consists of the residents who inhabit the senior homes. Catering to this group demands a nuanced understanding of individual needs and varying levels of independence.

The third social cluster includes patients who frequent the rehabilitation center and their accompanying caretakers. Their presence and interaction with the space are intermittent but crucial to the overall social dynamic.

Despite their distinct roles, these social clusters are united by a shared focus on social integration and well-being. Empirical evidence from extensive research underscores the **positive impact of interaction and shared activities between these clusters.** This interaction strengthens the collective sense of community, creating a nurturing and supportive environment for all members.

When mapping these social clusters, we identified the variable experience of time as a significant factor in the overall community dynamic. **Each social group experiences the project differently, based mainly on the duration of their stay.** As a result, the design of the development must maintain a keen sensitivity to these temporal nuances. For instance, the needs of long-term residents require timeless, neutral design interventions that continue to feel like home as time passes. Conversely, short-term users, such as rehabilitation patients, necessitate dynamic and memorable spatial experiences that create a positive, lasting impression within their limited timeframe. Therefore, spaces must be designed to resonate with the predominant temporal experience of their primary users.

Nature and the surrounding landscape play a pivotal role in the experience of all social clusters, serving as a unifying element that binds the users across varying durations of stay. The natural environment has an enduring, timeless appeal and a profound impact on all users' well-being and sense of place. Whether experienced during a brief visit or over a long-term stay, the landscape remains a consistent, shared element across all social groups, reinforcing their connection to the site and each other. Consequently, the design approach must consider this, **emphasizing integrating the built environment seamlessly with its natural surroundings**.

SOCIAL TIES NETWORK

> TI RY NE


Social Clusters and Interaction

Upon introducing the concept of perceiving the proposed project from a time-oriented perspective, we mapped the social clusters and their corresponding durations of stay at the site. This allowed us to understand the **dynamics of social interactions** within these groups and to articulate their needs better.

In our endeavor, we segmented time into clusters of varying lengths: 8-hour shifts, 2-3 day stays, two weeks, one month, and durations exceeding one year. These clusters are visually represented in the adjacent diagram through a series of concentric circles, their diameters expanding in correlation to the duration of the corresponding group's engagement with the project.

We also represent the density of each social cluster through color gradients, with a bright red symbolizing the highest concentration of individuals from a particular group. Unsurprisingly, the permanent residents take precedence in terms of density. Staff members may sometimes rival this density, but for clarity in this diagram, we have subdivided the staff into more minor factions, such as administrative and caretaking staff. This distinction enables us to understand which groups have the most intersectionality. Patients, too, have been bifurcated based on the nature of their therapy and the length of their stay. This includes short-term patients present for isolated rehabilitation sessions and others who require longer-term, intensive therapy spanning 3-4 days.

This comprehensive mapping of social groups, each with its **distinct temporal experience of the project**, provides valuable insights into potential interactions and convergences between them. Applying our understanding of these dynamics through the lens of the previously introduced four pillars—well-being, cognition, safety, and support—we gain deeper insight into the specific services the project should offer each group.

Staff members, in particular, warrant dedicated consideration regarding their well-being. Our interviews with caretakers and physiotherapists highlighted that **the success of any rehabilitation program is inextricably linked to the staff's well-being and ability to recuperate.** Hence, ensuring an environment that promotes their well-being is not just beneficial; it is critical.

From these diagrams and previous analyses, it becomes clear that **decentralizing the proposed buildings is crucial for optimal operation and harmonious integration with nature.** A dispersed arrangement of the built form allows for greater freedom of movement, provides diverse environments for varied user experiences, and fosters a more intimate connection with the natural surroundings.

In the initial stages of this investigation, we explored the possibility of integrating art residencies, as visible in the diagram, but this idea has since been disregarded. However, junior residents can still be considered, albeit in significantly lower numbers. This exploration can continue without necessitating a significant deviation from the current design strategy, offering the potential for diversifying the community dynamics and enhancing the socio-cultural fabric of the project.





Living Clusters

Regarding the project's senior living component, we identified two key aspects: firstly, it holds the highest potential for successfully implementing phased construction, and secondly, it represents the most stable and consistently present population amongst all the social clusters and community active on-site.

Regarding phased construction, we have emphasized previously that modularity and flexibility are critical when designing the spatial configuration. Importantly, this modularity should be multi-scalar, meaning it needs to operate at different scale levels. For instance, the smallest possible module unit should not be seen as one entire room. Instead, smaller elements, such as wall panels, could be identified as the smallest unit. This approach will allow greater flexibility, accommodating different openings—for views or access—that can take full advantage of their specific location within the site.

In the diagram on the right, we illustrate a "basic unit" which comprises a coupling of two rooms. Each of these rooms serves a single resident. This dual-room unit is not simply a design choice; it is a strategy to optimize technical aspects such as mechanical, electrical, and plumbing (MEP) considerations and to provide the possibility of modifying a unit in the future. This could include creating a large double room or even an entirely different function if required.

Given that the residents are the group with the highest degree of presence on site, they hold the potential to form the strongest bonds, fostering a sense of community and mutual support. Hence, the design of spaces dedicated to them should take into account several vital factors:

Decentralization: The design should evoke a sense of organic growth reminiscent of villagelike arrangements, thereby preserving the human scale and approachability. This means avoiding monolithic, monumental structures that can appear sterile and imposing.

Clustering: Instead of creating one large communal room for all residents, the principle of decentralization enables us to create micro-communities that can foster stronger bonds. To this end, we propose clustering three units around a common space. A shared space for six residents offers a balanced ratio that can minimize conflicts and foster harmony. Depending on the level of self-sufficiency of the respective residents, these clusters may also occasionally have a caretaker residing there temporarily.

Outdoor space: Direct connections to outdoor spaces are paramount, and each room should ideally have a private terrace or balcony. This ensures that residents can choose how they spend their time. The shared room should also provide a communal terrace or an indoor patio. Understanding that due to the terrain and specific location of each cluster, not all communal rooms will have equal access to views and opportunities, interior patios can serve as a sufficient alternative, provided they are thoughtfully designed with ample space and greenery.

These living clusters will have varied room arrangements to fit the landscape contours. The access to individual rooms should be designed through the communal room, which also serves as a circulation hub. Exterior planning should prioritize creating paths that connect multiple clusters, thus facilitating interactions between residents of different clusters and fostering a robust community spirit.







BASIC UNIT 2 RESIDENTS (2 single rooms) 18-25 sqm per room 36-50 sqm per unit + terrace LIVING UNITS 6-10 RESIDENTS (6-10 single rooms mixed with double) Basic units (6: 216-300 sqm / 10: 360 -500 sqm) Living room (4-7 sqm per resident) (6: 24-42 sqm / 10: 40-70 sqm) Dinning Room (3-5 sqm per resident) (6: 18-30 sqm / 10: 30-50 sqm) Control unit (10 sqm) Storage (5-10sqm) + Outdoor space

1st PHASE (18-30 RESIDENTS) 3-5 LIVING UNITS



2nd PHASE (3-5 LIVING UNITS)





3rd PHASE (3-5 LIVING UNITS)

Living Clusters

To provide a deeper understanding of the structural organization within our project, we extend our analysis into the living clusters, presenting a comprehensive look at a single representative cluster. While not definitive blueprints for space allocation, the accompanying diagrams are drawn to scale to provide a tangible grasp of the space that each room within the cluster will occupy. The primary purpose of these diagrams is to aid in the visualization of space management within a typical cluster.

Regardless of size or layout, certain universal design principles are applicable across all clusters. These include the provision of private terraces for every resident, a shared room for group activities, and a patio that could either be wholly interior or partly open to the natural landscape, contingent on the specific design conditions of each case. These features enhance the quality of living within the clusters and ensure a closer connection with the external environment.

The patio and the common rooms could punctually become spaces dedicated to individual physiotherapy or other treatments when the type of activity allows it. This is to enhance the sense of home in the residents, as opposed to an institutionalized environment. However, it also serves to deviate activities from the rehabilitation center when possible to avoid a high density of users.

Recognizing each resident's unique and dynamic needs, we recommend creating flexible space utilization scenarios. While these are limited, considering the innumerable combinations of needs that may arise, they provide a tangible grasp of possibilities within the cluster.

In these scenarios, we categorize residents based on their level of self-sufficiency. In the first scenario, we envision fully self-sufficient residents who require no assistance for their daily routines. A staff member can carry out routine checkups each morning, and a cleaner can undertake a quick daily overview of the cluster, with dedicated time twice a week for more thorough cleaning and sheet changing.

Our case studies and comparative analysis indicate that double rooms are rare, but they exist, and the project should be prepared to accommodate such rooms. Scenario 2 considers three double rooms housing residents who are entirely self-sufficient. It is essential to clarify that double rooms do not necessarily have to be clustered together. They can be integrated with single rooms, as explored in Scenario 3.

Scenarios 4 to 6 look at residents with a progressive decrease in self-sufficiency, ranging from 75% to 0%. A resident with 75% self-sufficiency may need intermittent assistance due to temporary or permanent impairments but does not need constant supervision and can handle most daily activities independently. A 50% self-sufficient resident would need help from caretakers to use facilities, dress, and travel to rehabilitation facilities. However, they still retain independence in their leisure time and daily activities. A resident with 0% self-sufficiency relies entirely on a caretaker for all daily activities, necessitating that a caretaker be available at all times and should reside within or near the cluster.

However, these scenarios are not suggesting the segregation of residents based on their level of self-sufficiency. These diagrams simplify the planning and operation process. We foresee most clusters having a mixed group of residents, with those possessing 0% self-sufficiency likely being a minority.











Residential scenarios



Rehabilitation Unit

The rehabilitation and physiotherapy module within our project warrants meticulous attention. In the following sections, we elaborate on the potential design possibilities and how this module can be developed, emphasizing flexibility and adaptability. Accompanying diagrams will explore various space usage scenarios, clarifying the necessary capacity and staffing requirements.

Contrasting with the single-floor architecture of the living clusters, the rehabilitation building is **afforded the flexibility to encompass multiple levels**, ideally two, but with a maximum limit of three floors if integrated with other services or if the natural landscape compels a steeper configuration.

The most easily accessible floor, which could be the ground floor or another level depending on the topographical layout of the site, should predominantly be dedicated to therapy rooms. This positioning ensures the most seamless access for those requiring the facilities most frequently. The remaining floors would be reserved for administrative functions and additional service areas.

From our interviews with experienced physiotherapists and administrative staff, we gleaned that it is vital to incorporate dedicated offices and resting spaces for staff. These areas provide essential respites between therapy sessions, significantly reducing the risk of burnout and maintaining optimal performance and morale among staff.

As with the living clusters, we advocate for a modular approach in the design of this rehabilitation module. This **systematic, interchangeable design philosophy should ensure consistency across the entire project.** To that end, we propose utilizing 20-square-meter modules, identical in size to the rooms in the living clusters. This alignment of dimensions simplifies construction by enabling the use and mass production of prefabricated parts, ensuring cost-efficiency and ease of assembly.

A central theme in the design of these modules is flexibility. As identified in our prior research, the types of therapies offered can vary widely, and these offerings may evolve over time. As such, it's crucial that the design of the spaces can adapt fluidly to these changing needs. The spatial design should be malleable, accommodating different activities and fluctuating numbers of occupants.

This guiding principle of **flexibility translates to a design featuring movable wall panels**. This design element allows **rooms to expand or contract in size based on real-time needs**. The same concept of adjustable spatial dimensions can also be applied to the administrative floor. This flexibility could be beneficial when extra space is needed to accommodate additional activities or services temporarily.

Rehabilitation Modularity						
20sqm						







Rehabilitation Unit

Delving deeper into our design strategy for the rehabilitation unit, our analysis yielded several vital insights which will significantly influence our architectural approach.

Storage

Our research underscored the pressing need for dedicated storage space within each rehabilitation area. This requirement is in addition to a larger, general storage facility. The need for individualized storage becomes more apparent when considering that different activities, each with its equipment and materials, might take place in the same space with minimal time for setup in between.

Given that many of these activities require an environment free from distractions and unnecessary stimuli, it becomes imperative that the space is cleared and restored to a neutral state after each session. In the accompanying diagram, we explore the possibility of utilizing the outer wall of each module for perimeter storage. Naturally, this approach introduces lifting, ventilation, and lighting concerns.

A potential solution to these issues is designing the storage to not extend to the ceiling. This leaves a perimeter of natural top light, providing indirect, stable light throughout the day and appropriate ventilation. This design feature aligns with our findings regarding the optimal environment for rehabilitation activities, emphasizing calm, quiet, and light stability.

Semi-open courtyard

Our second significant insight pertains to the orientation of these spaces. Given the need for controlled environments that offer light and ventilation without distraction, we propose that the rehabilitation spaces could be designed to face inwards. The accompanying diagram illustrates a potential expansion of the rehabilitation spaces, creating a network of open interior patios to provide light and views.

Existing research supports the therapeutic benefits of outdoor activities, provided they are conducted in controlled environments. Moreover, orienting the building inwards creates a secure, semi-private space conducive to various activities. The concept of moving walls can also be incorporated here, allowing rooms to open to the external space and change the dynamic of the activities.

This proposed internal courtyard must be carefully planned. Protection from direct sun exposure is critical to ensure the rooms can benefit from natural cool air. The space should also be sufficiently articulated to create privacy and noise control pockets.

Growth

Furthermore, this courtyard design aligns with the rehabilitation module's overarching concept of expansion and growth. As needs grow, portions of the patio could be enclosed to accommodate larger rooms. Therefore, leaving open space for possible future enclosure should be a design feature considered across the entire project.

By adhering to these insights, designers should create an adaptable, user-oriented space conducive to effective rehabilitation. We can ensure a positive and productive environment for all users with careful planning and thoughtful design.





Rehabilitation Unit

Our research into the potential usage scenarios for the rehabilitation building has considered the various activities hosted within these spaces. Each activity has unique requirements, such as differing staff-to-therapist ratios, group sizes, and spatial needs. For instance, certain activities may necessitate a one-to-one staff-to-therapist ratio, while others could be conducted in smaller or larger group settings. Therefore, the rehabilitation spaces' design must be flexible enough to cater to these needs, expanding or contracting as necessary to facilitate different activities. Additionally, we must remain cognizant that senior residents of our community might become occasional patients themselves, meaning that both the spaces and schedules within the rehabilitation building need to be prepared to accommodate such occurrences.

The accompanying diagrams provide a closer look at possible occupancy scenarios during a single therapy session, which we have estimated to last approximately one hour and thirty minutes, including setup and break time. These diagrams consider that some sessions could be held indoors or outdoors, contingent on factors such as the nature of the activity and prevailing weather conditions.

It is important to emphasize that these diagrams are not definitive plans but rather spatial distribution sketches and strategic concepts that illustrate potential uses of the space. They do not account for some specific design-dependent parameters, such as building orientation or its exact placement on the site, which will be critical considerations for the designers to study in the future.

Regarding access to the rehabilitation module, there is a need to consider vertical mobility and the positioning of other points of entry into the building. We recommend ensuring easy navigation and accessibility for all users, accommodating different mobility levels and needs. This is another parameter dependent on design factors and must be carefully explored in the design process.

In conclusion, these scenarios underscore the need for adaptability and flexibility in the design of our rehabilitation unit. By considering these varied scenarios in the design phase, we can ensure that the space is well-equipped to support its users' diverse and evolving needs, promoting the best possible outcomes for rehabilitation and recovery.





Rehabilitation 1 1/2 h scenarios.



Clinic, Rehabilitation pool and Gym

Two critical elements that we propose to be closely situated or directly connected to the rehabilitation unit are a clinic and a gym with a rehabilitation pool. These facilities, closely integrated with the rehabilitation unit, will offer numerous advantages in terms of convenience, operational efficiency, and enhanced therapy outcomes.

Integrating a clinic within or near the rehabilitation unit is a critical strategic decision. The purpose of this clinic is to provide a dedicated space for residents to schedule regular doctor's visits, therefore reducing the need for travel to external healthcare facilities. Additionally, the clinic would house a pharmacy, ensuring easy access to necessary medications for residents. A nurse's office would also be included in the clinic, offering immediate medical attention. This proximity can significantly enhance the quality of care provided to residents and reduce delays in treatment.

Moreover, including a rehabilitation pool and gym adjacent to the rehabilitation unit warrants detailed exploration. The diagrams that follow present a variety of occupancy scenarios for these spaces. Each scenario aims to clearly understand staffing requirements and activity scheduling within one session, which we have consistently approximated to last one and a half hours.

The gym and rehabilitation pool should cater to the needs of occasional patients from the rehabilitation unit and residents of the living clusters. The benefits of such a setup are manifold. For instance, the proximity allows for an easy transition from therapy sessions to independent exercise, fostering a culture of proactive health management among the residents.

It is critical to remember that the design requirements for a rehabilitation pool are distinct from those of a leisure pool. While this paper focuses on the former, we encourage the designers to consider the feasibility of adding a leisure pool if space and resources permit. The addition of a leisure pool could serve as a significant attraction for the residents, offering them an additional recreational outlet and promoting an active, social lifestyle. In conclusion, the spatial arrangement and interplay between the rehabilitation unit, clinic, gym, and pool area are instrumental in shaping an integrated and efficient healthcare and wellness environment. Careful planning and design considerations will enable these spaces to deliver their services effectively, enhancing the living experience and well-being of the residents.





Gym and Pool Space Scenario I 1 1/2h: Rehabilitation only Capacity 2 full time staff Pool capacity: 4 patients Gym capacity: 6 patients



cleaner (daily rotation)



Gym and Pool Space Scenario II 1 1/2h: Water Rehabilitation + Leisure gym usage Capacity 2 full time staff Pool capacity: 4 patients Gym capacity: 8 residents

cleaner (daily rotation)



Gym and Pool Space Scenario II 1 1/2h: Leisure gym and pool usage Capacity 2 full time staff Pool capacity: 4 residents Gym capacity: 8 residents

cleaner (daily rotation)

Administrative space

The administrative unit is integral, and the design and functionality must be considered meticulously. Given the complex nature of the environment and the diverse user base, the need to be strategically developed. It should abide by the previously established principles of modularity, adaptability, and growth potential that we have been mentioning for other building units. This project's administrative section operates similarly to our previous models, with a central emphasis on flexibility and scalability. The height of the administrative building is capped and aligns with the parameters laid out for other structures within the development. This commonality allows us to maintain a cohesive and harmonious spatial narrative across the site.

The prospective scenarios that we delve into here mainly address two key aspects. The first pertains to the **staff team's potential growth and evolving spatial requirements**. Different staff roles demand varied levels of privacy and seclusion; for instance, managerial and directorial roles and counseling services for caretakers need separate, discreet spaces to operate effectively. Simultaneously, most other roles can be comfortably accommodated in an open office layout, promoting communication and collaboration.

Special attention must be dedicated to facilities such as bathrooms and lockers. With a significant proportion of the staff likely needing to change uniforms or attire during their shifts, these areas must be well-designed, easily accessible, and spacious.

The second focus is on creating a multi-purpose space within the administrative building. This area, loosely called a "coworking" area, should double as a **lounge for caretakers and visitors and as a workshop or lecture space.** This flexibility allows it to train volunteers or host various community activities.

This **dual-purpose space** intends to foster a sense of community within Bertha's Village. By providing a designated area for caretakers to undertake their work while waiting for patients or visitors to relax and engage in informal conversations, we can encourage the growth of a supportive and interactive environment. This area is open to the entire community - where people can gather, share ideas, or find a quiet corner to relax.

The "coworking" term must not be misunderstood as strictly on work. Instead, it underscores the space's multifunctionality, designed to accommodate a range of activities, thus embodying the ethos of Bertha's Village.







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Workshop

For a development of this scale, particularly given its phased construction and expansion potential, having an onsite workshop is not merely an option but a necessity. The workshop's dimensions can be variable and contingent upon the needs and requirements that emerge as the design and project unfold, particularly concerning how much of the second phase and subsequent growth will rely on onsite fabrication instead of offsite prefabrication. Beyond catering to the phased expansion of the project, this workshop holds critical importance for carrying out routine repairs and enabling customization of the site. This space should be utilized for conducting small, closely supervised **carpentry workshops**. These sessions would be available not just to patients but to all residents, allowing individuals to enhance their motor skills and acquire new abilities. Moreover, the workshop provides a space where residents can personalize their rooms and modify their living environment to suit their individual needs and preferences. This approach aligns with our broader vision of **fostering an environment where residents actively participate in designing and evolving new elements within Bertha's Village.**

Rather than creating a singular, expansive workshop space, the design should allow for connection to an **external flat terrace**. This flexible arrangement would enable the workshop to extend its operations area as necessary, such as during larger construction projects. Given that these large-scale operations are unlikely to be constant throughout the year, it is prudent to minimize the building's permanent footprint and capitalize on the mild climate of Cyprus, which is conducive to outdoor activities. This approach allows for an adaptable covered expansion towards the outdoors, effectively making the most of the available space and local weather conditions.

Lastly, we recommend that the workshop also accommodate the storage of landscaping tools and other outdoor equipment. These items could be stored within the workshop or in a nearby dedicated storage area. This consideration allows for efficient space utilization and keeps essential tools and equipment within easy reach, further supporting Bertha's Village's seamless operation and maintenance.





Restaurant

The restaurant, in our conceptualization, is not merely an eating place but the pulsating heart of the project. It is the central hub for the quintessential human experiences of cooking and sharing meals. These activities are universally revered and appreciated across all our social clusters and cultures, forming an inherent bond that connects us all.

Primarily, the restaurant caters to the internal community - the residents, staff, and visitors within Bertha's Village. However, we foresee the potential to extend its services to the surrounding villages and cities. Considering this broader audience and community engagement, we strongly recommend that the restaurant prioritizes in-house cooking, supplemented judiciously with locally-sourced, catered elements. This approach would foster relationships with neighboring local businesses, further integrating Bertha's Village into the more extensive local infrastructure and enhancing its presence and influence. We suggest that the raw ingredients for the restaurant be freshly delivered daily, earmarked for specific menu items. Simultaneously, we propose cultivating some ingredients locally onsite - particularly shallow-root vegetables and herbs. These can be tended to by the residents and staff themselves. Such an initiative would yield fresh produce and engender a stronger sense of belonging and personal investment in the project.

Regarding operational flexibility, the restaurant must be equipped to deliver food to the individual living clusters, acknowledging that not all residents will wish or be capable of visiting the dining hall daily. The design of the dining hall itself should facilitate social interactions among various groups but also cater to the need for intimate spaces where families can relish a private visit or staff members can unwind. Sound management in the dining hall design is crucial to maintain a serene and relaxing environment during meal times. The spatial design of the restaurant should account for accommodating the two phases of the senior living clusters right from the outset. Furthermore, it should include terraces and internal patios, aligning with our concept of slow growth, as presented in the Rehabilitation Unit. Depending on the evolving needs and requirements, these open areas could be covered in the future.

Given the site's size and topography, the restaurant's sizeable flat roof could be repurposed as an accessible terrace from a different level. Under the sloping land and complex terrain, designers should capitalize on all sizeable flat spaces arising from the program's implementation.

The spacious nature of the dining hall, combined with its terraces, makes it an ideal venue for hosting large workshops, lectures, and extensive community activities outside the regular meal-serving hours. In line with our design recommendations, we advocate for minimizing the construction of dedicated spaces and maximizing the potential use of each space throughout the day, ensuring optimal utilization of the built environment.

The following diagrams explore the restaurant inputs and outputs regarding ingredients and meals, scenarios for possible growth and occupancy scenarios for one hour-and-a-half sessions, and the capacity for holding more extensive community activities.







Residential cluster















Restaurant 1 1/2 h scenarios.



WORKSHOPS/LECTURE RELATED ACTIVITIES (MULTIFUNCTION WITH LARGE CA SPACE DISTRIBUTION





n space usage.Gym and Pool Space Scenario II 1 1/2h:Scenario II :Water Rehabilitation + Leisure gym usageIll time staffCapacity 2 full time staffpacity: 24Pool capacity: 4 patientsGym capacity: 8 residents

Workshop/Carpentry Space Scenario: Capacity 3 full time staff Workshop capacity: 6



FOOD RELATED ACTIVITIES SPACE DISTRIBUTION



n space usage.Gym and Pool Space Scenario II 1 1/2h:Scenario II :Water Rehabilitation + Leisure gym usageIll time staffCapacity 2 full time staffpacity: 24Pool capacity: 4 patientsGym capacity: 8 residents

Workshop/Carpentry Space Scenario: Capacity 3 full time staff Workshop capacity: 6



THERAPY RELATED ACTIVITIES SPACE DISTRIBUTION



n space usage.Gym and Pool Space Scenario II 1 1/2h:Scenario II :Water Rehabilitation + Leisure gym usageIll time staffCapacity 2 full time staffpacity: 24Pool capacity: 4 patientsGym capacity: 8 residents

Workshop/Carpentry Space Scenario: Capacity 3 full time staff Workshop capacity: 6


Chapter 7 Feasibility analysis

Feasibility analysis

In order to carry out the study, a feasibility analysis (can be found in the Annex) based on economic and financial criteria with a time horizon of 2023-> 2034 is proposed, which includes the following steps:

1. Analysis of the investments required for the complete rehabilitation, as well as its start-up. For these investments, a cost per square meter has been taken into account for each of the construction areas. Likewise, the investment has been differentiated into three main phases divided equally, with the exception of the main kitchen, the swimming pool and the conditioning of the garden, which are all contemplated in phase 1. These assumptions can be varied through the cells marked in green in the "Independent Variables" tab.

A duration of one year has also been estimated for each construction phase. The percentage of expenditure has been divided by quarters, and is also variable in the indicated tab. All in all, the total investment in the complete rehabilitation and the fixed assets for commissioning entails a total investment of $\{$ 8,438,000, according to the costs provided. The first phase includes 36% of this investment, and phases 2 and 3 the remaining 32%. Independent professional costs have also been associated to each phase, estimated on the basis of a given percentage; these investments and their percentage can be seen in the "Opex" tab. For this part of the study, information has been extracted from the documents: "Initial Feasibility Information IE", "CYPRUS Financial projection Data" and "ex_Budget_1.1_15_05_23", "priceestimation", as well as from the information provided in meetings. As a result, the "Capex" tab shows the total investments distributed over the estimated time horizon with the above assumptions, the corresponding amortizations and the book value, all divided by quarters.

2. Analysis of the structural and operating costs that the center will bear in order to provide service to clients. In this case, we have analyzed, on the one hand, the general costs of the company (other independent professionals, banking services, technology, travel, lodging, transportation, etc.) and, on the other hand, the costs of providing the different services to customers. For the first case, a percentage (marked in green as a variable to be modified) of quarterly sales has been taken into account. Secondly, for the service costs, a detailed analysis was made of the staff required to provide service to each of the center's occupants and the costs involved in each service, such as electricity and water consumption, cleaning or the customers' own food. For this purpose, information from the file "Cost of service_NMBRS_29_05_23", "CSC 9th of June", "Rehabilitation scenarios" was used. With this data, a cost allocation exercise was carried out based on the square meters of each activity area and the services provided monthly/daily for each activity. A segmentation has also been carried out on two types of clients:

a) Services: which includes services provided on a stand-alone basis, such as oneoff meals, administrative services or multifunctional services. These three groups encompass all activities in the center (rehabilitation, clinic, entertainment, meals, etc.).

b) Citizens: under the same premise of distribution, an estimate has been made of the costs incurred by a resident in the center, with the three subgroups: living cluster, food court and clinic unit. These include all the costs incurred by a patient in the center.

The purpose of this segmentation is to be able to charge each of the two groups (and 6 subgroups mentioned) an individual cost, and thus establish a basis for the price of the services or the stay in the center.

The findings can be seen in red in the "Costs Detail" tab. The results show 6 different costs, one for each activity subgroup.

From here, and with given margins, the price for each activity has been established (these prices can be varied), they are marked in green.

3. After having identified the total investments, the costs of providing the service and the potential revenues, the next step is to organize the entry of customers in each of the 3 phases in the foreseen time horizon. The speed of adoption is determined in the "Direct Costs" tab, marked in green (because it is variable) in the "Occupation rate" line. In addition to the costs of the service, a marketing item has been foreseen, with greater incidence in the first months of opening, for the promotion of the use of the facilities. This item is included in the "Opex" tab.

As users come in, both costs and revenues are allocated (see the "Revenue" and "Direct Costs" tabs).

An average price update rate of 2% per year has been estimated and a variation in the price due to inflation according to economic forecasts (see Inflation in the "Casf Flow" tab).

4. With all of the above, we proceed to compare the variables and their results through a Cash Flow (CF) account for each of the phases. The objective of the CF is to check whether, in the first instance, there is economic viability with the given variables. Here variables such as Interest Rates, Taxes and Contingencies are incorporated. These variables can be adjusted by hand (See initial table in "Cash Flow").

5. After this, to analyze the financial viability of the project, the following steps are proposed:

a) In Q4 of 2034 (last projected Q) we have a residual value on the construction in each of the phases. Also, the building will continue to generate cash flows during its useful life. With this, a last flow is estimated, which has been denoted Tx, which combines the present value of all the remaining flows and the book value of the building at that date. In a more conservative estimate, the residual value of the construction can be eliminated, but since no updating of the value of the construction has been included, it is decided to take it into account.

b) With all projected flows Q1 2023->Q4 2034-> Tx, a discounted cash flow is

performed to determine the present value of the project. The discount rate (WACC), in this case is estimated only on the basis of the investors' opportunity cost, since debt financing has not been taken into account (therefore WACC=Ke=Shareholders' opportunity cost). In this case, a 10% annual rate is assumed (2.41% quarterly). This value can be adjusted depending on the preferences of the stakeholders (See initial WACCt4 table in "Cash Flow").

c) Discounted CF are considered under two main analyses, NPV (Net Present Value) and IRR (Internal Rate of Return). A Payback analysis is also included.

The full document can be found in the Annexes that are attached with the submission of this paper. Bellow are some samples of what can be found in the annex:

DELLAD		
REHAB	Phase 2	Construction CAPEX
Accommodation area- Living Units		
Rooms	Assemmedation area. Living Units	
Common areas	Accommodation area- Living Units	
Terraces- Covered Spaces	Rooms	Dhaca 1
Terraces- Exterior Spaces	Common areas	Fildse I
Terraces- Exterior opaces	Terraces- Covered Spaces	
Common Areas- General	l erraces- Exterior Spaces	Phase 2
Kitchen- Facilities	Common Areas- General	
Facilities / Storage	Kitchen- Facilities	
Multifunctional rooms	Facilities / Storage	Phase 3
Access / Corridors	Multifunctional rooms	
Terraces- Covered Spaces	Access / Corridors	
Terraces- Exterior Spaces	Terraces - Covered Spaces	Amortizations
Pool	Terraces- Exterior Spaces	
Landscape	Landsoppe	Fase 1
Landodapo		Fase 2
	TOTAL	Fase 3
Total	Dhara 2	
	Phase 3	Dealers of acception
		BOOK Value of construction
		Fase 1
Distribution of construction costs	Accommodation area- Living Units	Fase 2
Distribution of construction costs	Rooms	Fase 3
	Common areas	
	Terraces- Covered Spaces	
	Terraces- Exterior Spaces	
Phase 1		
	Common Areas- General	
	Kitchen- Facilities	
Accommodation area- Living Units	Facilities / Storage	
Rooms	Multifunctional rooms	
Common areas	Access / Corridors	
Terraces- Covered Spaces	Terraces- Covered Spaces	
Terraces- Exterior Spaces	Terraces- Exterior Spaces	
	Landscapes	
Common Areas- General	TOTAL	
Kitchen- Facilities		
Facilities / Storage		
Multifunctional rooms		
Access / Corridors		
Terraces- Covered Spaces		
Terraces- Exterior Spaces		
Pool		
Landscapes		
TOTAL		

Conclusions

Interpretation:

Economic viability: we understand theoretically economic viability when the facilities are operating at their normal capacity (we have reached a level of use that we consider representative) and the cash flow generated quarterly is positive. Financial viability: we understand theoretically financial viability when:

1. NPV>0. If the NPV is greater than 0, we will have covered the investment made, as well as the operating costs, and anything above 0 can be understood as updated profitability of the project.

2. IRR> 0%. If the IRR is higher than 0% we will be obtaining a return higher than the WACC, in this case, the investors' opportunity cost.

3. Payback before the end of the useful life. If the payback is before the end of the project, we will have recovered the investment. The payback is also used to establish a time objective in which to recover the investment, therefore its interpretation will also be subject to the investors' expectations.

Results

After the analysis of the results obtained, with the assumptions provided to us, we have concluded that:

There is economic viability in all the projected phases, since the monthly income with 100% use of the facilities amply covers the costs (positive CF).

There is financial viability in all the projected phases, taking into account the three aforementioned criteria.

In any case, it is recommended to analyze the project by adjusting different hypotheses to check the feasibility in the different cases.

Chapter 8 General Design Recommendations



GENERAL DESIGN RECOMMENDATIONS

BUILDING DESIGN RECOMMENDATIONS

Strategically Camouflaging Logistical Operations

The project site will host many logistical operations and daily visitors, with periodic spikes in traffic and population density. Given the site's exclusive vehicular access, developing parking facilities to accommodate this dynamic activity is vital. We propose a decentralized parking strategy with facilities close to their associated buildings. For instance, administrative staff and daily workers could use one parking area, patients and caretakers another, residential visitors and residents a third, and so on. These parking facilities should be aligned with the main access road to minimize impact on the untouched areas of the site.

All vehicular activity should be relegated behind the buildings, preserving the view from the terraces and balconies. We also advise the implementation of a vegetative barrier between the vehicular zones and the buildings. This barrier will serve a dual function as both a visual and acoustic buffer.

Decentralized Building Design

Given the considerable square footage necessary to accommodate the diverse architectural programs in this development, a decentralized design strategy is crucial to preserve the human scale of this ambitious project. Decentralization, in this context, addresses both structural and aesthetic considerations.

Structurally, decentralization implies buildings that do not share a physical structure and are only interconnected by pathways and potentially some mechanical, electrical, and plumbing (MEP) systems. Each program should ideally occupy its own standalone structure, clearly differentiated from the others. This separation enhances visual appeal and facilitates water runoff, air circulation, and vegetation growth.

Aesthetically, decentralization entails design decisions that eschew large monolithic blocks in favour of calculated organic modularity, breaking the visual impact of mass buildings. This approach can be particularly effective in the design of living clusters, where a repeatable unit strategy can generate a variety of compositions. The organic growth of dense mountain villages, with their dynamic vertical and horizontal configurations, can serve as a design reference.

Promoting Efficient Accessibility and Encouraging Intuitive Wayfinding

When designing a project catering to the elderly and neurologically impaired, it is vital to emphasize efficient accessibility and intuitive wayfinding. Our approach aims to minimize the complexity of navigation and foster an environment that naturally guides its inhabitants without the need for complicated signage or explicit written instructions.

To begin with, we propose to move away from elongated and monotonous corridors. Instead, we envision a spatial organization that leverages shorter, more compact hallways and passageways, allowing clear, straightforward access to

rooms and services. By prioritizing this approach, we reduce cognitive fatigue and disorientation, making it easier for residents to move around and locate the needed facilities.

In future spatial diagrams, aim for efficiency and intuitive navigation. The distribution of spaces within the structure should follow a logical and subtle progression, where the inhabitants naturally intuit their way around the premises. This aspect is crucial for discoverability, as it enables individuals to understand and memorize the layout over time, leading to a sense of familiarity and comfort.

We also believe in integrating the buildings and their surroundings harmoniously. Connections between buildings should be efficient and provide comfortable, shaded spaces for residents to rest. Moreover, these spaces could be designed to offer playful surprises, stimulating curiosity and engagement among the site users. To summarise, our design philosophy places the user experience at its heart. Aim to create an environment that is easily navigable, engaging, and responsive to its residents' needs while ensuring that it supports and enhances their quality of life.

Creating a Homely Atmosphere

In interior design, the vision is rooted in creating spaces that promote personalization, comfort, and a feeling of familiarity. As research has indicated, successful residential designs engender a sense of belonging by providing room for the accumulation and display of personal mementos and keepsakes that echo one's past. Therefore, our design approach strongly emphasizes incorporating spaces that facilitate personal expression and display, offering residents a canvas to weave their own stories.

Regarding communal areas within the residential clusters, we advocate for an approach that departs from sterile, impersonal designs. Instead, we envision these shared spaces as homely, inviting, and comfortable, where residents can relax, connect, and feel a sense of community. They should be places where one's day-to-day life can unfold naturally and pleasantly.

However, in creating a homely atmosphere, we maintain sight of the importance of safety. It is integral that safety regulations and considerations are subtly embedded within the design in a way that does not disrupt the domestic aesthetic or the easy-going rhythm of everyday life. We seek to strike a balance where safety measures are in place but seamlessly blend into the background, becoming almost invisible to the resident's eye. This approach ensures that our design provides a secure environment without sacrificing a home's warm, inviting essence.

Designing for Progressive Expansion and Future Use

Recognizing the significance of long-term growth and adaptability, we intend to conceive this architectural development with the foresight of a phased construction plan. This strategy ensures that the learning gleaned from each construction phase will be instrumental in guiding the following phases.

In order to facilitate progressive growth, a crucial design aspect will involve reserving sufficient space between residential clusters. This foresight will allow for the integration of additional clusters within the site as part of future expansion phases. One potential design approach could be to focus on a higher density of residential

clusters in Phase 1 on one side of the site, allowing the remaining side to be utilized in subsequent phases. Alternatively, we might consider working from the lower parts of the site upwards, sequentially adding new residential units as we ascend. However, without a detailed understanding of the structural and mechanical, electrical, and plumbing (MEP) technicalities, it is currently challenging to pinpoint the optimal growth direction. That being said, the design of the landscape and pathways connecting various parts of the site can be established from Phase 1 itself, leaving room for the inclusion of more residential clusters in Phase 2. The same philosophy of planned growth should be applied to other structures within the site. This means providing ample room for expanding existing buildings or adding new ones as the need arises. In conclusion, the design must prioritize flexibility, scalability, and adaptability, allowing the project to grow organically while effectively responding to evolving demands and learning from each construction phase.

Flexible Design for Future Modifications

A fundamental design principle for the buildings is flexibility and modularity. This flexibility is vital in accommodating future changes and modifications with minimal disruption and cost. For instance, concrete, while a common building material, does not lend itself easily to modifications, especially in vertical elements like walls. Therefore, we suggest employing modular construction methods that are more adaptable and easier to modify.

Terraces, a pivotal element in the design, should be crafted with the ability to be easily adapted and enclosed to expand existing indoor spaces as necessary. Likewise, indoor spaces should be designed with the potential for effortless transformation to connect with the outdoors, enriching the spatial experience and providing adaptability to various needs and changes over time.

Regarding building services such as wiring, piping, and associated elements like home automation technology—which tends to change rapidly—it is vital to ensure they are designed for easy access for repairs, updates, or modifications. Accessibility will minimize disruptions during maintenance work, ensuring efficient service restoration and potentially reducing costs.

As an extension of the building itself, the interior design needs to be contemplated with the same level of adaptability in mind. Spaces should be easy to clean, repair, and maintain. The design language should be timeless, enabling it to stand up to the changing trends and tastes. Yet, it should also have the ability to be easily updated to keep up with advancements in interior design.

Architecture and design should be about the future as it is about the present. It should be a fluid space that evolves with time, technological advancements, and its inhabitants' changing needs and desires.

Optimal Utilisation of Terraces and Balconies

As part of our design recommendations strategy, we advocate for the maximal utilization of flat roofs of larger building units, such as administrative and rehabilitation spaces. These spaces offer the potential for conversion into outdoor gathering areas (terraces) accessible from multiple levels, both within the building interiors and directly from the site. Another compelling use of these roofs is the cultivation of shallow-root vegetation.

This green roofing can serve multiple purposes. Functionally, it can maintain a steady interior temperature, providing a natural thermal buffer. It can also contribute to a productive landscape, supporting small-scale agriculture that staff, residents, and volunteers can maintain. This 'green thumb' activity can be incorporated into specific therapy sessions, adding a therapeutic and community-building component to the project.

Importantly, green roofs do not necessitate the addition of earth directly on the finished surface. We propose a decentralized approach wherein vegetation is planted in large, shallow, customized potting pots. This method simplifies maintenance and helps prevent the spread of pests from one area to another. For shading purposes, medium-sized trees and shrubs could also be strategically positioned in pots. The structural implications of these added loads should be factored into the building design.

In addition to these communal terraces, we recommend the provision of private balconies for each room, ensuring unobstructed views for all residents. Where space permits, shared terraces could be designed for each living cluster. Opportunities to create shared shaded spaces beneath floating clusters should be explored whenever possible, further maximizing space usage. Additionally, vertical connections between clusters should be considered to leverage the roof of a lower cluster as a terrace for the one above, enhancing the overall spatial experience and utility.

LANDSCAPE DESIGN RECOMMENDATIONS

Analyzing Existing Vegetation

The project site boasts an abundant array of existing flora that enriches the biodiversity of the local ecosystem. We recommend conducting a thorough mapping of all existing trees and large shrubs to guide strategic decision-making for the decentralization of the buildings. This approach will aim to preserve and protect the existing vegetation during the construction phase, thereby safeguarding the long-term health and vitality of the plants.

Inevitably, some aspects of the vegetation, particularly larger shrubs, and trees, may not be preserved due to specific technical requirements of the design. An integrated rescue and relocation strategy should be adopted to ensure that as much mature and stable vegetation is retained as possible. Such a strategy underscores the importance of considering landscaping as an intrinsic value of the project rather than an afterthought.

Water Management and Biodiversity Enhancement

The site is envisaged to have its own water storage system, which is projected to exceed the project's requirements. This surplus allows for cultivating more water-intensive vegetation, thereby enhancing biodiversity. In addition to fostering biodiversity, introducing water-demanding plant species can cool the surrounding temperature during the day, creating a more pleasant microclimate.

Beyond these practical benefits, diverse vegetation can aesthetically enrich the landscape, offering pleasing vistas from the rooms and service areas. This opens

up possibilities for multisensory design, incorporating aromatic plants for olfactory appeal and using vegetation to form natural pest barriers.

Pathways, Roads, and Ramps

In designing access routes, we recommend avoiding asphalt wherever feasible, favoring semi-hardened materials instead, especially in large, flat areas such as parking lots. This recommendation stems from the need to mitigate heat accumulation (refer to recent research on temperature differentials between asphalt and semi-hardened surfaces) and to promote a more pleasant environment. Semi-hardened materials also enhance the site's permeability, encouraging deeper water penetration into the ground and fostering vegetation growth through the road mesh. Most accessibility and connection paths should ideally be gentle ramps with less than a 5% incline. These ramps can be linked via steeper ramps or stairs when necessary, but an over-reliance on stairs and steep ramps should be avoided. Gentle ramps should incorporate options for low-rise steps (low-slope stairs and shallow-pitch stairs) to accommodate mobility issues and faster pedestrian flow. In general, low-rise steps are favored.

Influence of Topography

All landscape design interventions should respect the existing topography, refraining from making unnecessary and rigid alterations to the terrain. The landscape itself should serve as the primary determinant for design decisions. Look for opportunities to establish flat decks for gathering, which are easily accessible and can accommodate large, flat planting pots for small-scale farming. Design paths that balance the need to minimize the distance between two points with the requirement to work harmoniously with the topography. The proposed approach ensures that the project harmonizes with its surrounding environment, leverages the site's natural resources, and respects the local ecosystem, all aligning with our commitment to sustainable development.

OPERATIONAL DYNAMICS AND ACTIVITIES

In crafting the design for a complex serving a myriad of needs, including a rehabilitation unit for young adults with brain injuries, a restaurant, and a senior home, we should carefully consider the interplay of privacy and socialization, the flexibility of workshop spaces, shared goods availability, personal time management, and overall adaptability of the staff and space to evolving requirements.

Privacy and Social Interaction

The uniqueness of this project lies in the diverse mix of users it caters to, encompassing residents, staff, patients, caretakers, and volunteers from various age groups. The research underscores the importance of intergenerational and multidisciplinary activities for enhancing the entire community's well-being. However, for this to work effectively, all user groups should have a degree of control over their time and choices (beyond work hours or compulsory scheduled activities). Thus, the design should allow individuals to opt in or out of activities, along with ample spaces catering to different scales of interaction – from private nooks for solitude or small groups to more extensive, communal areas. The roster of activities should be diverse, adaptable, and spread throughout the month to accommodate varying levels of participation.

Workshop Spaces

The design must consider providing adaptable workshop spaces that can accommodate various activities. While our initial design takes cues from activities offered by similar centers, it should have the flexibility to adopt emerging opportunities brought forth by advancing technology or shifting user interests. We must also categorize workshops based on supervision needs. For example, physically demanding workshops, such as carpentry, should be held in smaller groups (6 to 10) for residents and patients. In comparison, passive listening or viewing activities can cater to larger groups. Staff and volunteer training that does not require supervision can be tailored to demand.

Workshop durations should also be diversified. Short-term workshops (1-3 hours) can be repeated periodically to nurture long-term interests (like art classes, gardening, and reading clubs) alongside longer, more immersive workshops (2-3 days).

Shared Resources

We recommend dedicating a section of the site for shared resources – a communal library comprising books, tools, and other items residents might need temporarily. This "library" could continually evolve, with contributions from residents, families, and the wider community. Everyday domestic items needed sporadically, such as a screwdriver or painting tools, would be excellent candidates for this shared resource pool.

Additionally, an on-site shop offering a selection of fresh food items, toiletries, printed press, and other essentials would foster independence among residents, in line with the dignity ethos elaborated in previous chapters.

Time Management

Our design must prioritize residents' autonomy in managing their time. Overloading the schedule with activities can be counterproductive and lead to fatigue. Therefore, activities should be organized based on demand and availability through regular forums and surveys to capture the evolving interests of the community.

Flexibility and Adaptability

Designing spaces that can seamlessly transition from one function to another is paramount. Ample storage space is also necessary to facilitate quick event turnovers. Similarly, staff schedules should be flexible to adapt to the fluctuating needs of the residents. By embodying flexibility and adaptability at the heart of our design, we ensure that our facility can effectively respond to unforeseeable changes and cater to our user base's diverse, dynamic needs.

LIFE CYCLE RECOMMENDATIONS

We recommend looking at Bertha's Village as a living structure that evolves. It is not an object, but a circular process that includes the extraction and manufacturing of materials

and products, construction and assembly, maintenance and use, transformation and expansion, disassembly, and recycling.

Materials and products

The measurement of the Material Intensity (MIs) of the building is important data to understand the proportion of materials and products, the weight, the volume, the supply chain, the cost, and the Carbon Equivalent Emissions (CO 2 -eq). The selection criteria of materials and products must be based on previous parameters, together with the design strategies.

Construction, Assembly, and Expansion

For multiple reasons, like building in phases, reducing carbon footprint, minimizing on-site works, we recommend industrialized off-site construction. Basically, two types of industrialized construction can be implemented, panelized or modular construction.

Due to the low carbon footprint, lightweight and biophilic properties, we recommend the use of wood as the primary material, as in the case of light-framing or mass timber.

Maintenance and use. Passive Design

We strongly recommend applying passive strategies to the design of the building and reducing as much as possible the active design. A detailed analysis of the local conditions, such as the climate and microclimate, sun orientation, or prevailing winds, can help to enhance the passive design. The energy modeling of the building is a design tool to understand how the construction can take advantage of the local conditions. Then, a good construction technique is required based on proper thermal insulation, avoiding thermal bridges, increasing thermal mass when needed, air sealing, and fenestration solar protection.

Maintenance and use. Active Design

The energy supply of the building must come mainly from renewable sources, such as passive and active solar energy, night cooling, or geothermal energy. On the other hand, it is recommended that the climate system has a high coefficient of performance (COP), as aerothermal heat pumps.

Disassembly and Recycling

The main objective of the end of-life of the building is to avoid demolition and transportation to the dump. On the contrary, the construction systems can be disassembled, and the materials recycled. Then, the life cycle continues, and the extraction of the rawmaterials comes from the recycling of the building.

Chapter 9 Glossary

Glossary

Accessibility: This involves designing and building inclusive and usable spaces by as many people as possible, irrespective of their abilities.

Active Aging: This concept refers to the aspiration of enabling individuals from all walks of life, regardless of age, socioeconomic status, or health condition, to fully participate in life across seven wellness dimensions: emotional, environmental, intellectual/cognitive, physical, professional/ vocational, social, and spiritual.

Age-friendly: Age-friendly environments are characterized by the absence of physical and social barriers. They are nurtured by policies, systems, services, products, and technologies that encourage health and build and sustain physical and mental capacity throughout life. Such environments allow people, even those experiencing capacity loss, to continue participating in activities they value.

Biophilic design. Biophilia is a design strategy that seeks to connect humans with nature, by incorporating natural elements, patterns, and processes, to enhance well-being and health.

Cognition: This pertains to the mental processes involved in acquiring knowledge and comprehension, which are typically achieved through thought, experiences, and sensory information.

Cognitive Behavioral Therapy (CBT): CBT is a structured, goal-directed form of talk therapy that helps manage mental health disorders, such as depression and anxiety, as well as emotional challenges, like dealing with grief or stress. CBT is also beneficial in managing non-psychological health conditions like insomnia and chronic pain.

Cognitive Rehabilitation: This refers to a variety of interventions designed to enhance an individual's ability to perform cognitive tasks by either retraining previously learned skills or teaching compensatory strategies.

Embodied carbon. Embodied carbon refers to the total amount of greenhouse gas emissions (primarily carbon dioxide, but also other greenhouse gases like methane and nitrous oxide) generated from the extraction of raw materials, manufacturing, transportation, construction, and end of life of the building.

Inclusive Design: This approach uses methodologies to create products that are mindful of and cater to people of all backgrounds and abilities. Inclusive design can address a multitude of factors, including accessibility, age, economic status, geographic location, language, and race.

Industrialized construction. Also known as prefabrication or modular construction, replaces on-site by off-site construction. It gains in speed and efficiency, reduces cost, enhance quality and precision, promotes safety, reduces waste, improves construc

Intergenerational Programs (IGP): These are structured, ongoing interaction initiatives between younger and older age groups designed to benefit all participants.

Life Cycle. The concept of life cycle refers to the entire duration of a building, from the extraction of the raw materials to the end of life or recycling and reuse.

Occupational Therapy: This therapy focuses on utilizing self-care, work, and play activities to promote and maintain health, prevent disability, facilitate independent functioning, and spur development. It encompasses all daily activities or tasks performed by an individual.

Operational carbon. Operational carbon refers to the total amount of greenhouse gas

emissions (primarily carbon dioxide, but also other greenhouse gases like methane and nitrous oxide) that result from the day-to-day use or operation of a building. Unlike embodied carbon, which accounts for the emissions associated with the entire life cycle of a product, operational carbon focuses solely on the emissions released during the operational phase.

Passive Design. Passive Design is a strategy where a building takes advantage of the natural environment and a good construction technique to increase the energy efficiency, and to reduce the reliance on mechanical systems.

Physiotherapy: Physiotherapy aids in restoring movement and function in individuals affected by injury, illness, or disability. It also helps prevent future injuries or illnesses.

Psychological Therapy: This encompasses various treatments aimed at helping individuals identify and modify distressing emotions, thoughts, and behaviors.

Recreational Therapy: Also known as therapeutic recreation, this methodical process employs recreation and other activity-based interventions to cater to the assessed needs of individuals with illnesses and/or disabling conditions, with the aim of facilitating psychological and physical health, recovery, and overall well-being.

Safety: This state exists when hazards and conditions that could cause physical, psychological, or material harm are effectively controlled to safeguard the health and well-being of individuals and the community.

Senior Care: Also known as elder care, this broad term includes a wide array of services provided to seniors. It covers services offered in nursing care facilities, at home, and everything in between.

Social Support: This involves providing assistance or comfort to individuals, typically to help them manage biological, psychological, and social stressors. Such support can come from various sources in an individual's social network and can be practical (like doing chores or offering advice), tangible (involving monetary or direct material assistance), or emotional, enabling the individual to feel valued, accepted, and understood.

Speech and Language Therapy: This therapy evaluates and addresses speech disorders and communication issues. It assists individuals in improving skills such as comprehension, clarity, voice, fluency, and sound production.

Supportive Environment: This refers to a setting that cultivates confidence and independence in daily activities.

Therapeutic Activities: These are restorative activities designed to sustain or enhance one's life quality or delay skill deterioration. Therapeutic activities can range from gross motor activities, social interactions, sensory enhancement activities, crafts, and outdoor activities to spiritual pursuits and Activities of Daily Living (ADLs).

Vocational Rehabilitation Therapy: This managed process provides tailored assistance based on assessed needs to attain meaningful and sustainable employment outcomes. Its goal is to reintegrate individuals into the workforce at a level comparable to their pre-injury employment status.

Well-being: This captures the combined experience of health, happiness, and prosperity. It encapsulates positive mental health, high life satisfaction, a profound sense of purpose, and practical stress management skills.

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Chapter10 Team



TEAM AND ACKNOWLEDGEMENTS

Authors:

Manuel Pérez Romero

Manuel Pérez Romero has an interdisciplinary background as an architect, urban designer, lecturer, and inventor. Pérez Romero is Chair of the Center for Sustainable Cities and Director of the Bachelor in Urban Studies at IE University. He is the founding partner of the nodo17 group, a Madrid based group of architects, urban designers and ecologists operating within the field of the city and the territory. Pérez Romero holds a Ph.D. in Architecture from Madrid Polytechnic University and a Master of Architecture and Urban Planning degree from Las Palmas de G.C. University. He is continuously researching new techniques, for which he has patented and developed several structural and construction systems.

Ruxandra lancu-Bratosin

Ruxandra lancu-Bratosin is an architect, urban strategist and researcher, as well as a professor at IE University. She serves as a Lead Researcher in the Center for Sustainable Cities, focusing on the practical integration of sustainability and innovation in urban environments through applied research for private and governmental agencies. As a co-founder of 50(Super(Real)), Ruxandra is involved in developing multi-scalar spatial strategies, emphasizing the critical balance between human values, environmental concerns and technological advancement. A comprehensive understanding of computation, ecology, social impact, and largescale design processes characterizes her work. A significant aspect of Ruxandra's interests lie in scenario planning and simulation. She employs computational logic to inform decision-making processes, aiding in creating adaptable and resilient urban strategies.

Research advisors:

Martha Thorne

Research assitants:

Mariane Meshaka, Raquel Fajardo, Guglielmo Baldin (IE University)

Collaborators:

Pablo Montoya (Anseed)

This research project would not have been possible without the generous support of many. To the numerous people who directly and indirectly support the IE Center for Sustainable Cities and our vision and ambitions, we thank you.

We would like to sincerely thank our Project Manager, Oleg Navalny, for his invaluable contribution to our research. His trust and ability to assemble a great team made our work successful and enjoyable.

A special thank you goes to the remarkable design team of Irakli and Archil Lursmanashvili of Lursman LLC. Their collaboration and dedicated effort are fundamental to the project's success.

Our appreciation extends to the dedicated project development team led by Costas Pavlides, based in Cyprus: Eleni Maniori, Michalis Pissaridis, Marina Yiannakou, Marios Andreou, and Maro Zisimou. Their dedication and availability made our collaboration smooth and effective.

> Madrid, July 2023 Manuel Pérez Romero and Ruxandra Iancu-Bratosin



Bertha´s Village : Limassol, Cyprus Intergenerational rehabilitation and late living programs Analysis, Scenario Planning and Design brief July 2023