Assistive Technology and Senior Housing Design

September 19th, 2017
Introduction

- **Senior Housing Types:**
  - Senior Apartments/Condominiums
  - Assisted Living/Memory Care
  - Niche Assisted Living/Memory Care
  - Independent Living/Assisted Living/Development
  - Urban Development

- **Technology:**
  - Low Voltage Integration
    - WiFi
    - Connected Ecosystems
    - Care Tracking
    - Medication Management
    - Circadian Rhythm & Lighting
  - Cool Stuff
Senior Apartments/Condominiums (no service provider)

- Primarily PUD suburban locations
- Two – 4 Stories 60,000 – 110,000 SF ($195 - $250 per SF)
- Typically part of a mixed aged community adjacent or above retail.
Assisted Living/Memory Care

- Primarily large suburban communities
- Typically 3 - 4 stories concrete & steel framed  
  
  (70,000 – 110,000 SF, $205 - $285 per SF)
- Full service with established Operator and Service provider. Provides various programs including assistance with activities of daily living, assisting with medication, and physical therapy plans.
- Memory care neighborhoods that deal with cognizant difficulties including various forms of dementia.
Niche Assisted Living/Memory Care

- Primarily modest suburban locations
- Single story wood framed structures 40,000 – 70,000 SF ($150 - $185 per SF)
- Fill in gaps of service in otherwise full markets.
CAMPUS SENIOR LIVING

• Primarily large suburban communities
• Typically 3 - 4 stories concrete & steel framed or combination wood frame w/concrete
• 130,000 – 160,000 SF, $175 - $200 per SF
• Two buildings with service connector providing for 130-150 units
• Larger independent living apartment building linked with a “sister” building capable of providing various programs including intensive assisted living, dementia, and/or acute care
• Operated by established healthcare providers
• Primarily owned by REIT’s or speculative development partnerships
Urban Mid-Rise/High Rise

- Typically in large urban areas - pop. 500,000+
- Concrete frame, Post Tensioned or Composite steel and concrete. (5 to 20 stories, 90 – 200 units, 70,000 sf – 250,000 sf)
- $250- $285 per sf)
- Combinations of independent living apartments and care programs
- Multiple configurations, private balconies, and options for larger units.
- Primarily owned by RIET’s or speculative development partnerships
Technology

Low Voltage Integration

- Nurse Call
- Networking & Wi-Fi
- Theater & AV
- Video Surveillance
- Access Control & Intercom Systems
- Structured Cabling & IDF/MDF Build-Out
- Notifications & Metrics
- Electric Door Hardware
- Area of Refuge
- Wander Monitoring

DIRECT SUPPLY
Technology
Connected Ecosystem

- Monitoring Activity areas to increase or decrease outdoor air requirements.
- Adjusting demand requirements for various building systems.
- Monitoring individual HVAC units to maintain a safe and comfortable setting when required.
Technology
Medication Management and Care Tracking

Tablets and Monitors are connected thru WIFI and wired systems to:

- Alerts and notifies caregivers when medications, treatments or care tasks are missed.
- Barcode scanning confirms correct medications in appropriate doses are given to the proper residents.
- Residents identified by their image linked to the appropriate medication protocol.

Wander and Tracking

- Thru RFID technology tracking range is increased to 450 to 1700 feet without the use of GPS and allows control of areas opened or closed to residents both indoors and outdoors.
- Fall alarm monitors and accessories such as bed and chair pressure pads, Weight Sensing Floor Mats and early warning seatbelts all register to tablets or phones.
- Connections thru internet to family members for ease of mind.
The Circadian System

24 hour cycle

Human existence is based on a 24 hour light/dark cycle since our existence and is what establishes our circadian internal clocks.

When to wake up and be productive.

When to sleep and re-energize.

Our hormones and functions are governed by this cycle.

In 2001, scientists discovered a new visual photoreceptor, Melanopsin.

- The photoreceptor does not go to the visual cortex of the brain.
- Is most sensitive to specific frequencies of blue light
- Studies found that there is an effect on organ function.

Resident Physiology
Light affects your daily activities:
- Eating
- Sleeping
- Cognitive Abilities
- Temperaments
Modern Society’s Cycle
(Provided by Lighting Science Group)

Light levels we see indoors fall into the twilight range
• 50 to 300 lux is what we have indoors
• Not enough during the day. Too much at night
• Ideally we get 10,000 lux as an input for daylight signal

Location independent
• A group in San Diego wore battery powered light meters to understand how much light they got during the day
  • Few got more than 20 mins daylight
  • Majority of the day was 300 lux or less

The Aging Eye (Figuiero et al., 1995)
  Age 40: the eye is no longer considered ‘young’
  Age 45: reading glasses generally required
  Age 65: multi-focal lenses generally required
  Retina receives less light, smaller pupils and thicker lenses.
  Age 60: receives 1/3 the light of typical 20 year-old’
  Increased glare sensitivity
Energy and Daylight Modeling

- Underlit: 8%
- Well Lit: 65%
- Overlit: 27%

Percentage of occupied hours where illuminance is at least 28 footcandles, measured at 2.79 feet above the floor plate.
Energy and Daylight Modeling

Percentage of occupied hours where illuminance is at least 28 footcandles, measured at 2.79 feet above the floor plate.
Energy and Daylight Modeling
Baseline vs. Proposed

Baseline (42% VLT)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Baseline</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlit</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td>Well Lit</td>
<td>27%</td>
<td>37%</td>
</tr>
<tr>
<td>Overlit</td>
<td>65%</td>
<td>54%</td>
</tr>
</tbody>
</table>

10% improvement
The future Technology

- Nurse Call
- Wander Monitoring
- Silent Fall Monitoring
- Wi-Fi
- Phone / Voice
- Family Video Chat
- eMenus, Activities & Amenities
- Theatres & A/V
- RTLS
- Environmental Monitoring
- Asset & Rental Tracking
- GPS Tracking
- Fire Alarms
- Room Controls
- Automation & Control
- Point of Sales Systems
- Clock & Time Cards
- Data Cabling
- Telehealth
- Telemedicine
- Interoperable Clinical Equipment
- EMR Integration
- Resident Safety
- Socialization
- Clinical Wellness
- Environmental
- Infrastructure