

# Autism and Design

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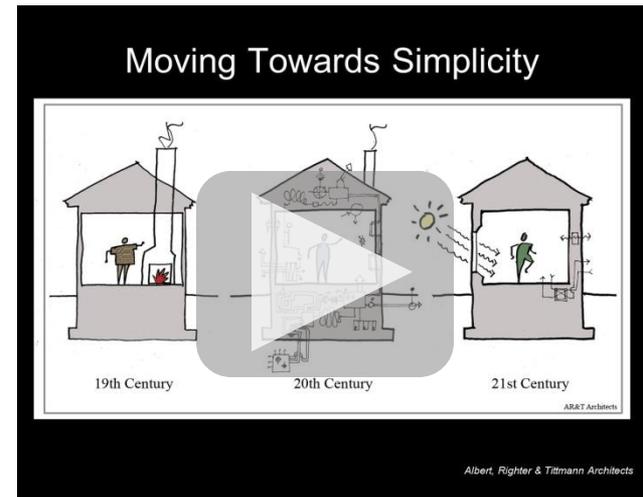
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# Course Description

Over the past thirty years the incidence of autism has climbed from 1 in 10,000 children in the 1970s to the present rate of 1 in 88 (CDC). With the spike in numbers of children with autism, a spike in the number of adults with autism will follow causing parents, social workers, health care providers, service providers and others to wrestle with how best to support this rapidly growing segment of our population. Recently, attention has begun to focus on developing supportive residential environments that address the specific needs of post-school-age autistic adults: over the past year a series of national town hall meetings conducted by a consortium of autism groups, housing agencies, developers, service providers and parents of adults with autism have identified housing as a primary concern. This webinar provides instruction in evidence-based design for residential environments for adults with autism and other cognitive disabilities.



# Learning Objectives

1. Participants will be able to identify the specific spatial and perceptual needs of individuals of autism.
2. Participants will be able to work effectively with housing providers, service agencies, developers and families to create appropriate housing for autistic individuals.
3. Participants will be able to advocate for appropriate design solutions for individuals with autism as a means to improve quality of life and reduce lifetime costs.
4. Participants will be able to assess suitability of existing buildings and develop design proposals for new and existing structures for inhabitation by individuals with autism.





**Sherry Ahrentzen, Ph.D.**

Shimberg Professor of Housing Studies  
Rinker School of Building Construction  
Gainesville, FL  
Speaker



**Kim Steele, MArch, MLA, MA**

Community and Architectural Design  
Consultant  
Tempe, AZ  
Speaker



**Kathleen A. Dorgan, AIA**

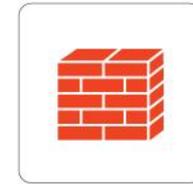
Dorgan Architecture & Planning  
Storrs, CT  
Moderator

Submit a question to the moderator via the Chat box. They will be answered as time allows.



# Design for **Autism**

Sherry Ahrentzen, PhD  
and  
Kim Steele



## Learning to *share*

is one of the first lessons a child learns but as we age, the **lesson fades**...what are the implications of not sharing?



# Understanding **Autism**

**Lifelong** neurobiological condition: **NOT** just for KIDS

*3 primary areas of difficulty:*

**Social Interaction** difficulty with social interactions and in understanding social conventions

**Communication** difficulty understanding others limited or no verbal ability

**Restricted or Repetitive Behaviors**

strong preference for routine, tendency to repeat movements, narrow interests

**Autism** is a **Spectrum** condition: **EVERYONE** is different!

## *Additional common challenges*

affects **some** people and **not others**

**Sensory** processing

**Attention** difficulties

**Behavioral** issues

**Perceptual** difficulties

**Anxiety** and **depression**

**Cognitive disability**

**Co-occurring** medical problems: epilepsy, cerebral palsy, etc

**Autism** can make understanding and living in today's world **challenging**

# Temple Grandin

***Thinking in Pictures:  
My Life with Autism***

Autobiography made  
into HBO movie  
starring Clare Danes

Professor of Animal  
Sciences at Colorado  
State University

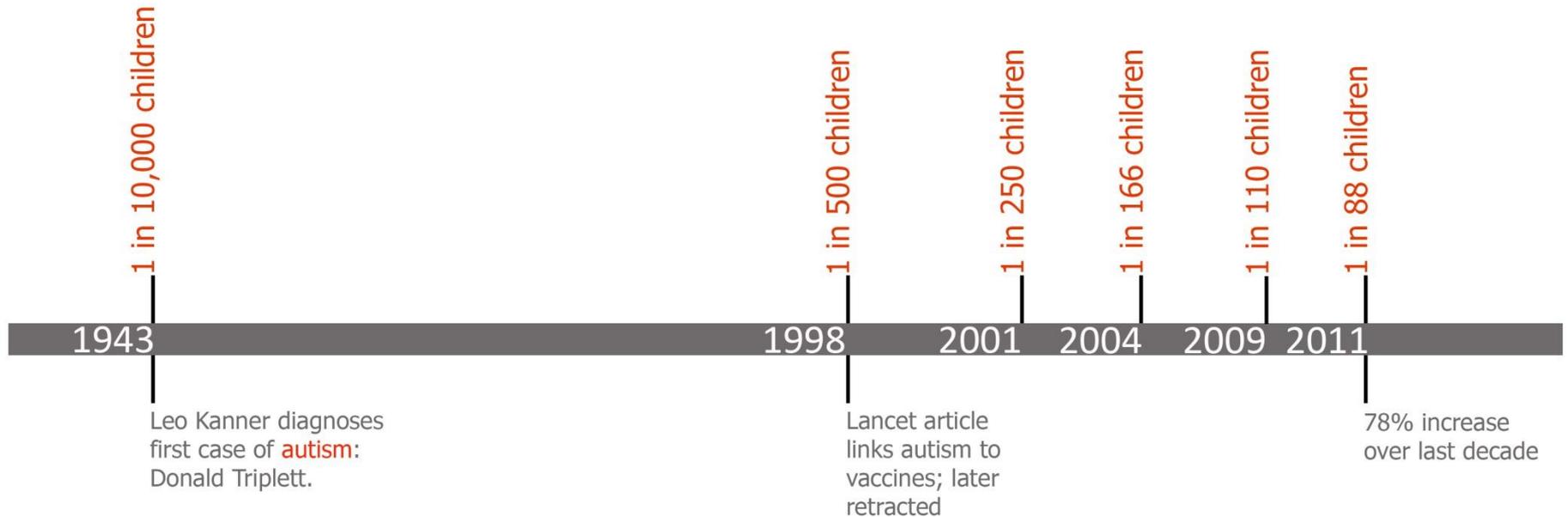
Known for designing  
humane slaughter  
chutes for cattle





**Autism** by the **Numbers**

# Autism prevalence rates over the years





Children with **autism** grow into adults with **autism**



Over the next **7 years**

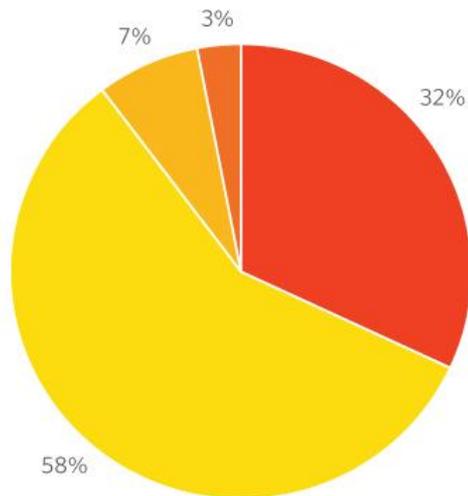
**500,000**  
**autistic adolescents**

will age out of the school  
system  
and enter the world of

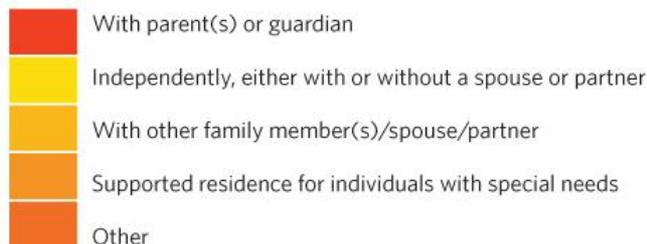
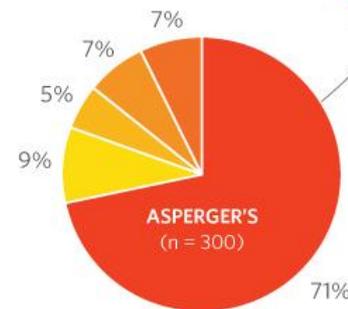
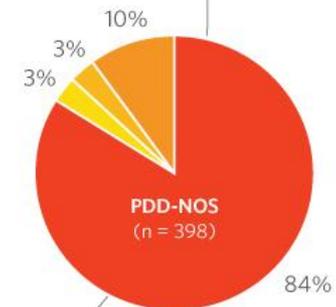
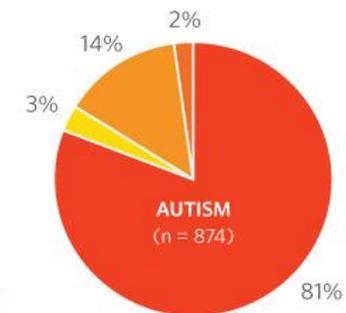
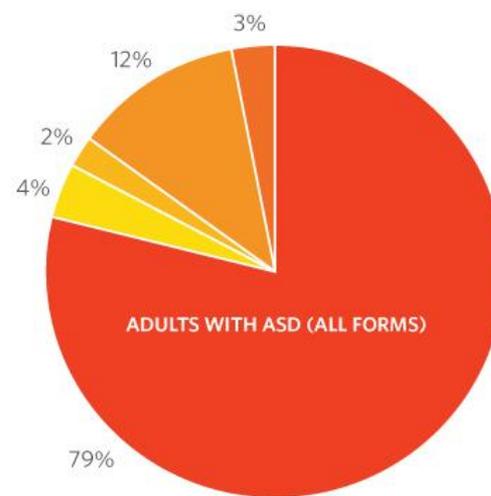
**adulthood.**

# Current living situation for **adults with autism** compared with those without special needs - 2008

**ADULTS (19–30) WITH NO SPECIAL NEEDS**  
(n = 917)



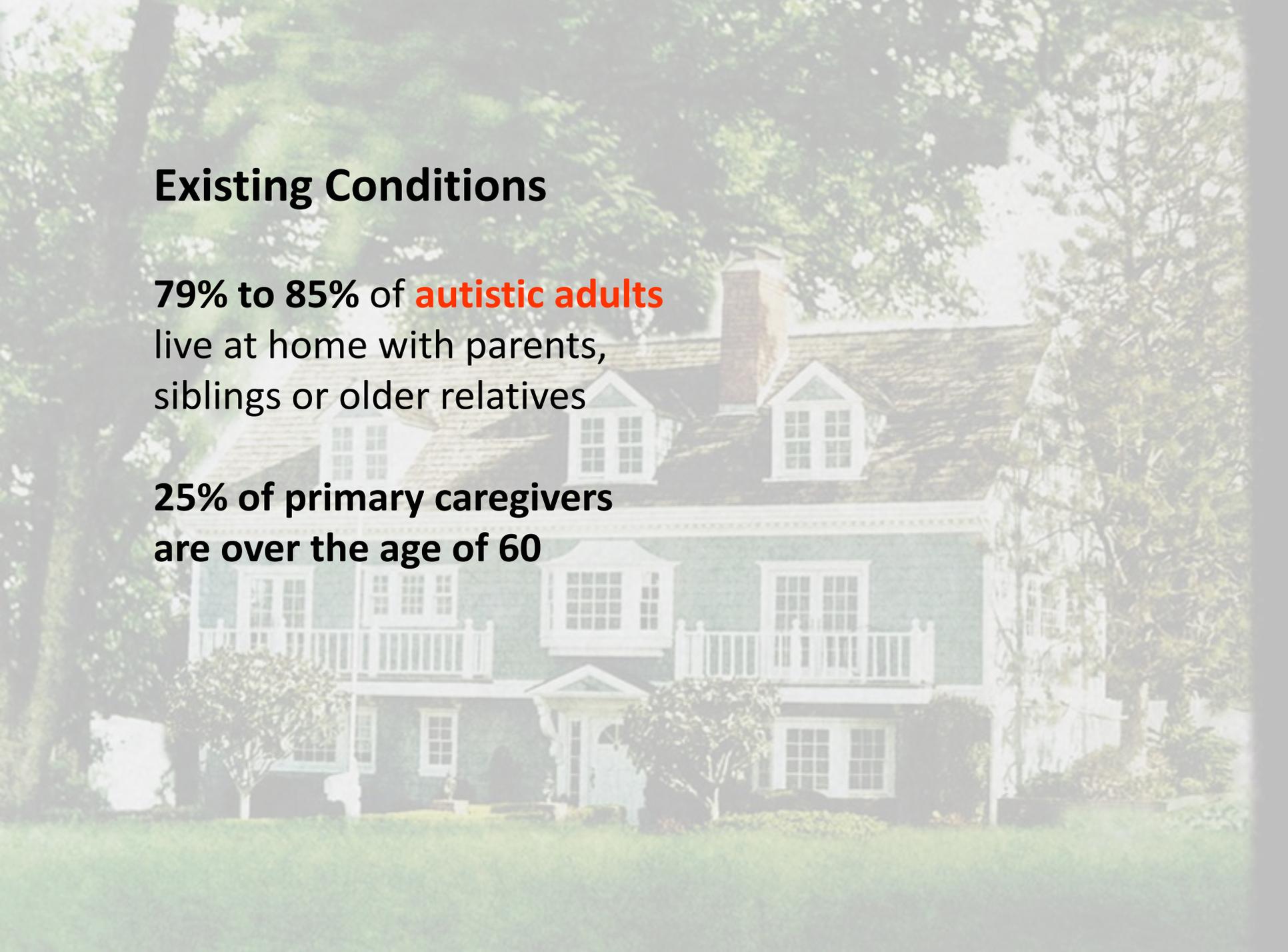
**ADULTS (19–30) WITH ASD**  
(n = 1,652)



## Existing Conditions

**79% to 85% of autistic adults**  
live at home with parents,  
siblings or older relatives

**25% of primary caregivers**  
are over the age of 60



## Costs to Individuals & Families

**Quality of life** issues

**Inadequate & poor  
quality** housing that  
does not meet needs  
of resident

**Increased stress** for  
family members

+

## Costs to Society

**\$126 billion per year \***  
(based on prevalence rate of 1:110)

Greatest costs incurred  
from **residential  
placements** and **care  
provision**

What do **autism** and **design** have to do with each other?

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If the world seems **fragmented** and **unpredictable** then functioning independently in it may seem impossible.

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If there is an environment that **mitigates unpredictability** and **fragmentation** then living independently may become possible.

What do **autism** and **design** have to do with each other?

If the world seems **fragmented** and **unpredictable** then functioning independently in it may seem impossible.

If there is an environment that **mitigates unpredictability** and **fragmentation** then living independently may become possible.

Appropriate **design** supports people in their daily lives and enhances their **quality of life**.

This goes for **people with autism** too.

# Design Challenges

**Sensory:** up to **95%** of people with ASCs have “unusual sensory experiences”

**Hyper**sensitivity: avoid input; lead to avoidance of social situations & isolation

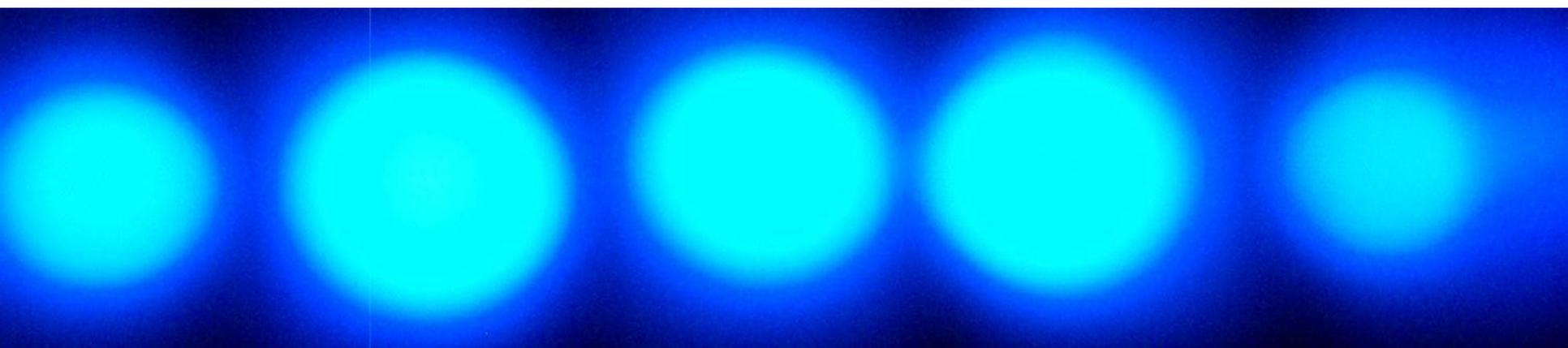
**sound:** vacuums, car horns, hum of appliances, human voices

**visual:** bright colors, patterns on surfaces, intense artificial light

**smell:** perfumes, food, off-gassing odors from furniture & carpet

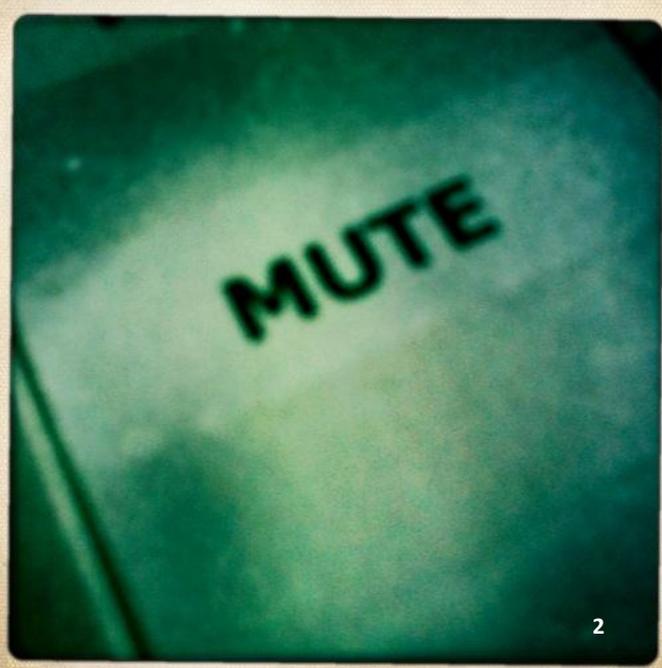
engage no more than 1 or 2 senses at a time

**avoid**





desired ⇨



⇨ avoid



# Design Challenges

## Sensory

**Hypo**sensitivity: seek more input; lack of discrimination among stimuli

**sound:** loud music, banging on surfaces

**visual:** gravitate toward disorder or clutter

**smell:** strong smells or flavors, unaware of personal odor

desired





1



2

desired



3



4

# Multi-sensory environments (MSE)

Dedicated room where **sensory input** is **controlled**; auditory, tactile, vestibular, visual, and olfactory senses can be stimulated individually or in combination

MSEs allow individuals to exert **personal choice** and work to **reduce** stress and anxiety and **increase** focus and adaptability of people using them – recognized **therapeutic benefits** among people with **autism**

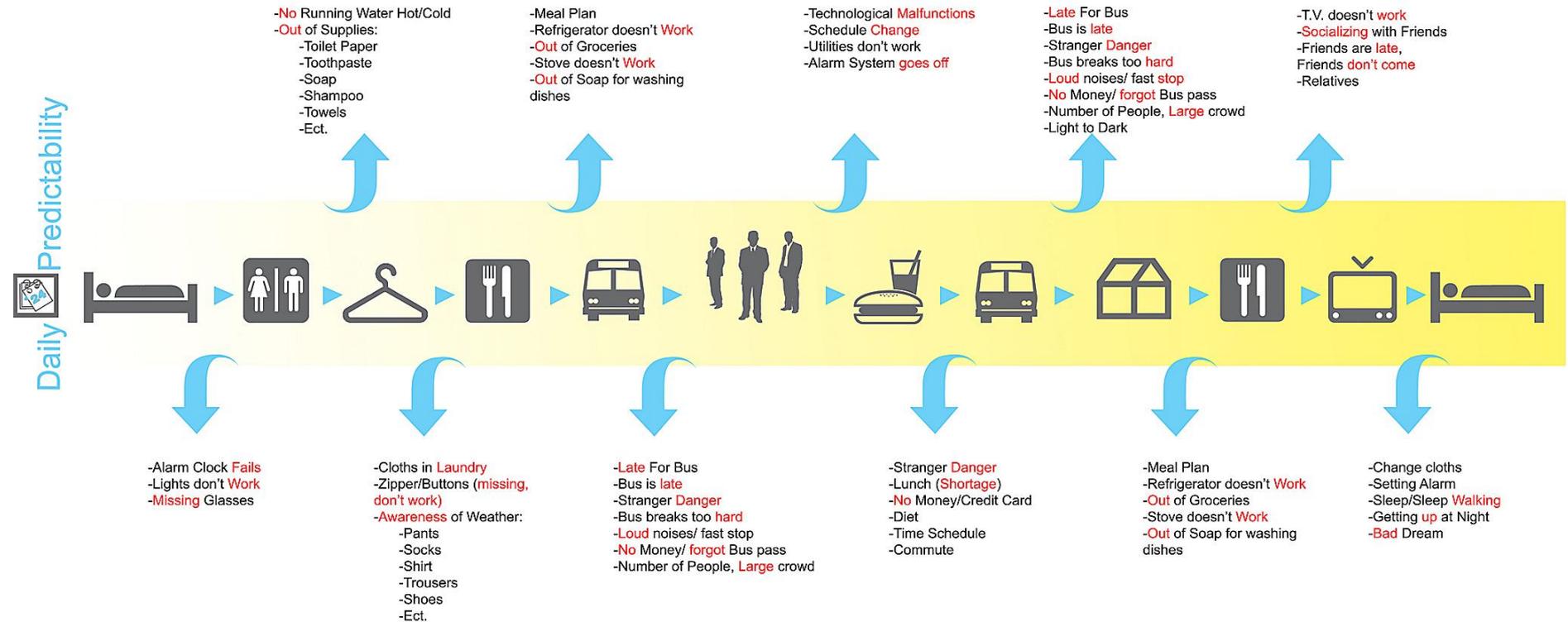


Snoezelen Rooms



# Independent Living Challenges – Predictability (desired)

## What can go wrong?



# Assistive & Ubiquitous Technologies

**Social Mirror:** Georgia Tech

**Ambient Kitchen:** Newcastle University

**Caregiver Autism Residential E-health (CARE) system:** Burleson, Newman, Brotman

**Infrastructure-Mediated Sensing (IMS):** Georgia Tech

Other Smart Home technologies

As there is **no single housing prototype** that works best for the vast spectrum of **adults with autism**, the optimal approach is to have a **range of residential options** available **within communities** and to work with individuals to find which best suits them.

## Our Intent:

Craft **evidence-based design goals and guidelines** to direct housing design and development

Create a **system for identifying** what may work best for whom

Promote a **range and diversity** of residential accommodations, features, and amenities that collectively respond to **spectrum of individuals and situations**

## Method: Craft an Evidence-Based Process

- Review + assess available empirical research
- Inventory/profile 100+ recommended residential settings for adults with cognitive/developmental disabilities (C/DD)
- Site visits to some residential developments
- Assess *expert* recommendations + experiences



# Types of residential and care support

## Supported Living

client directed program and instruction  
leased or self-owned homes  
caregivers living off-site

## Supervised Living

1 or 2 individuals with autism per unit  
leased or self-owned homes  
caregivers living on-site/24-hour staffing

## Group Home

Supervised living for 6 or fewer residents  
caregivers living on-site/24-hour staffing

## Family Teaching Model

## Transitional Living

intensive life skills training  
college support programs  
2-3 year duration

# 10 Resident-Based Design Goals



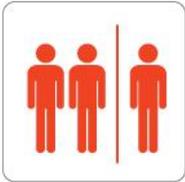
**Ensure Safety & Security:** Ensuring a safe living environment is the top priority. Issues range from providing appropriate security systems to selecting non-toxic products and materials.



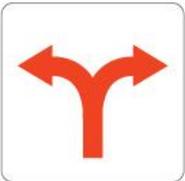
**Maximize Familiarity, Stability & Clarity:** Changes and transitions can be problematic for adults with ASDs so creating continuity and connection with the past is important. Design strategies include logical spatial layout and use of familiar materials.



**Minimize Sensory Overload:** Simplify the sensory environment by designing spaces to be quiet, visually calm, well ventilated and to have appropriate lighting.



**Allow Opportunities for Controlling Social Interaction & Privacy:** To accommodate personal preferences, the design of any home should provide residents with a variety of social opportunities including within a singular space.



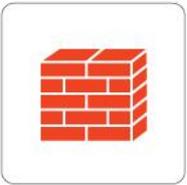
**Provide Adequate Choice & Independence:** The physical environment should be designed so that options are available but few and flexible so that it can be adapted to changes in residents' needs over time.



**Foster Health & Wellness:** To address any ongoing health vulnerabilities, the physical design should promote healthy living through the use non-toxic materials, the availability of natural light, good ventilation and incorporation of universal design strategies.



**Enhance One's Dignity:** Everything from selecting a neighborhood that accepts diversity and supports its residents to designing a home that allows residents to personalize their spaces and define their living arrangements serves to enhance one's dignity.



**Ensure Durability:** Investing in high quality materials, fixtures and appliances at the outset will result in lower maintenance/ replacement costs and will optimize resident safety.



**Achieve Affordability:** Designing for longevity and incorporating green building practices can lower costs over the lifetime of the home.



**Ensure Accessibility & Support in the Surrounding Neighborhood:** Site selection is critical to the overall success of any residential development. Access to transportation, community services, entertainment and shopping coupled with a supportive neighborhood community will create the best possible situation for the residents.

# Ensure Safety & Security

Ensure residents **sustain no harm** while not infringing on individual **independence, choice, and control**.

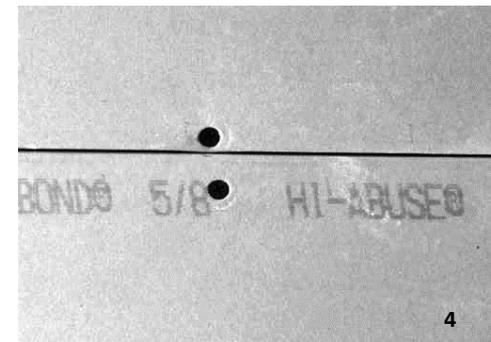
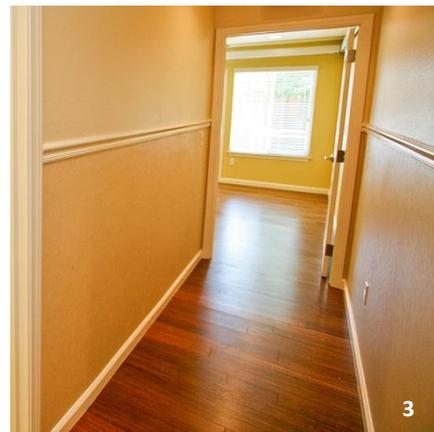


**Neighborhood** scale      **Individual** scale

**Select the right site**



**Robust NOT institutional**



# Foster Health & Wellness



Address core issues of health and wellness as well as those that **enhance quality of life**; avoid lowest-common denominator solutions.

**Health** factors →

**Quality of Life** factors

**Co-occurring conditions**

**Visual permeability**



# Design Guidelines

**Neighborhood**

**Floor plan strategies**

**Technology**

**Visual cues**

**Ventilation**

**Lighting**

**Materials**

**Acoustics**

**Appliances & fixtures**



# NEIGHBORHOOD

Selecting the right neighborhood and site is a critical first step in developing housing for people with ASDs. Issues to consider include access to amenities and transportation and the potential for residents to be integrated into existing community.



## NEIGHBORHOOD ACCESSIBILITY & SUPPORT

- Select a site that provides the most opportunities for residents such as proximity to the following:
  - family, support groups, and service agencies
  - public transportation (many residents do not drive)
  - grocery stores and pharmacies
  - employment opportunities
  - day programs
  - medical facilities
  - entertainment and social options
  - open space, parks, and other recreational opportunities
- Selecting a site that has the appropriate zoning at the outset will diminish the possibility for neighborhood opposition: NIMBYism or the tendency among some to assert “Not in My Backyard.”



Neighborhood amenities

- Neighborhoods that are established and stable suggest the best outcomes for new residents: less confusion, stress, and disruption.
- The scale of the proposed housing should be appropriate to the context: potential for acceptability increases

# KITCHENS

Providing ample counter space to accommodate multiple users and independent living aides (e.g. computers) facilitates residents success and satisfaction.



## SAFETY & SECURITY

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- Food storage areas should be placed away from the cooking surface to reduce accidents related to reaching and crowding.



## DURABILITY

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- Kitchen countertops need to be extremely durable, fire and heat resistant, and easily cleaned and disinfected.
- Solid surface countertops with an integral backsplash such as Silestone, Corian, granite, or concrete are durable choices for kitchen and bath.
- Butcher block is a good surface for cutting but must be disinfected properly.
- Avoid tiled countertops because of dirt buildup in the grout and because they are easily broken
- Avoid laminate countertops as they are easily scratched and burned and pooling water causes delamination.
- Mix countertop materials according to use (e.g. surfaces dedicated to cutting).
- Select solid wood cabinets over veneers as veneers delaminate and do not wear as well. Avoid particle board substrates because of susceptibility to water damage.



Kitchen with multiple work areas



## CHOICE & INDEPENDENCE

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- Kitchens should have adequate space including multiple stations and ample counter space for several people to work simultaneously.
- Sufficient storage should be provided such that individuals may have their own cupboards.

# BATHROOMS

At least one bathroom per unit should be fully accessible to accommodate residents with varying levels of mobility.



## SAFETY & SECURITY

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- Install nonslip tile flooring.



## HEALTH & WELLNESS

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- In units with multiple residents, there should be one or more bathrooms for general use.
- In multistory units include a main floor bathroom for accessibility.
- Bathrooms should have ample room for staff to assist residents.
- Sinks should be wall hung for accessibility.
- Grab bars should be installed by the toilet and in the shower and bath.



## DURABILITY

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- Toilets should have concealed cisterns and use a push panel flush system for durability and ease of use.
- Install tile or waterproof panels on all walls to minimize possible water damage.



Wall-mounted sink

# VISUAL CUES

Individuals with ASDs often experience attention difficulties and stimulus overselectivity. Ameliorate this by keeping visually distracting elements to a minimum. Opt instead to employ appropriate visual cues that assist residents with daily activities.



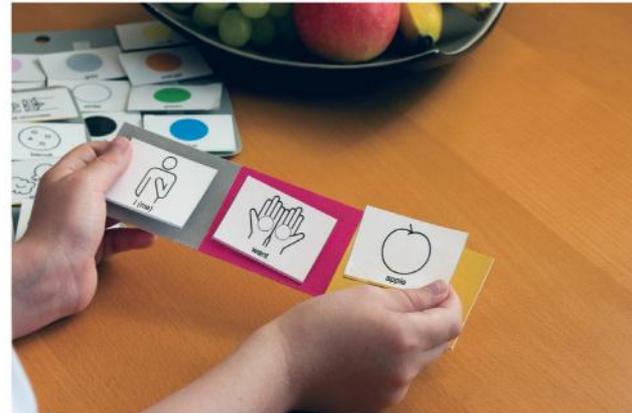
## SAFETY & SECURITY

- Incorporate visual signs into the home environment to assist with safe use of features such as appliances, electrical outlets, windows, doors, and on the like. These may be in the form of pictures, words, or warning colors that are understood by all residents.



## FAMILIARITY & CLARITY

- Picture schedules can assist residents with daily activities.
- Use color coding to indicate location, room function, activity area.
- Color palettes should avoid using bright, primary colors in favor of softer tones. Bright hues may cause agitation in certain individuals with autism.
- Written or pictorial signage also may be used to denote functions within the home such as an individual's bedroom, bathroom, storage areas, and so on.



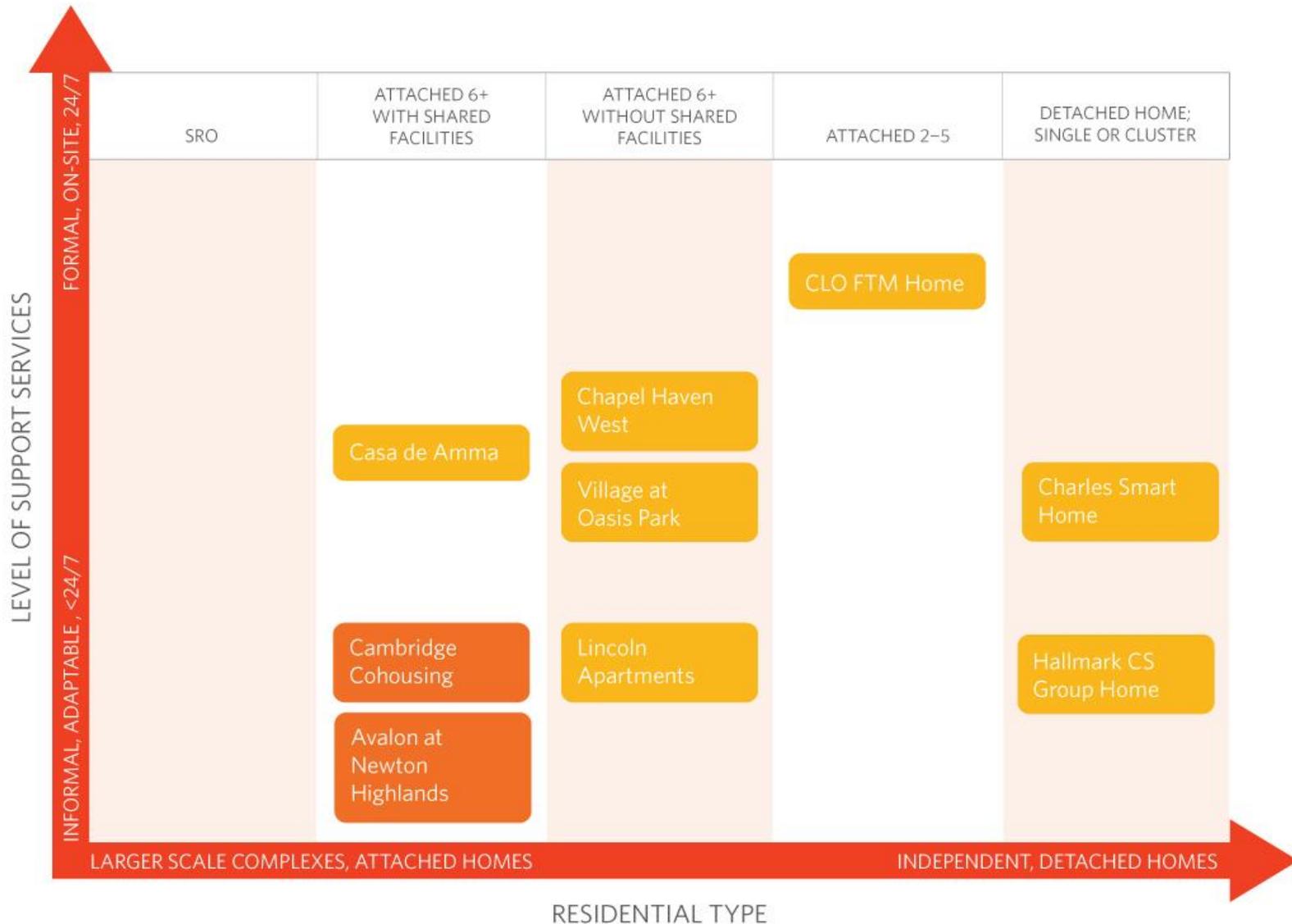
Picture exchange communication system



## SENSORY SENSITIVITY

- Minimize detail since visual clutter may lead to stimulus overselectivity causing an individual to fixate on a particular object or aspect in the environment.

# Residential Type and Support Services for Case Studies



- ONLY RESIDENTS W/DISABILITIES
- MIXED OCCUPANCY

# Community Living Options (CLO) Lawrence, KS

## Family Teaching model

Shared **group-home** duplexes  
Connecting door between homes

## 3 residents with CD

### 1 Teaching Family

30 hour work week per adult  
annual salary  
room + board  
health + retirement benefits  
respite for teaching family  
paid vacation  
vehicle + gas allowance  
training and support



# Respite Center

Nottingham Regional Society for Adults and Children with Autism, UK

New group home for  
**6 young adults** with **autism**

**6 BR** with en suite  
**bathrooms**

**Sensory Room**

**Shared living,**  
**kitchen, dining**

**Staff facilities**

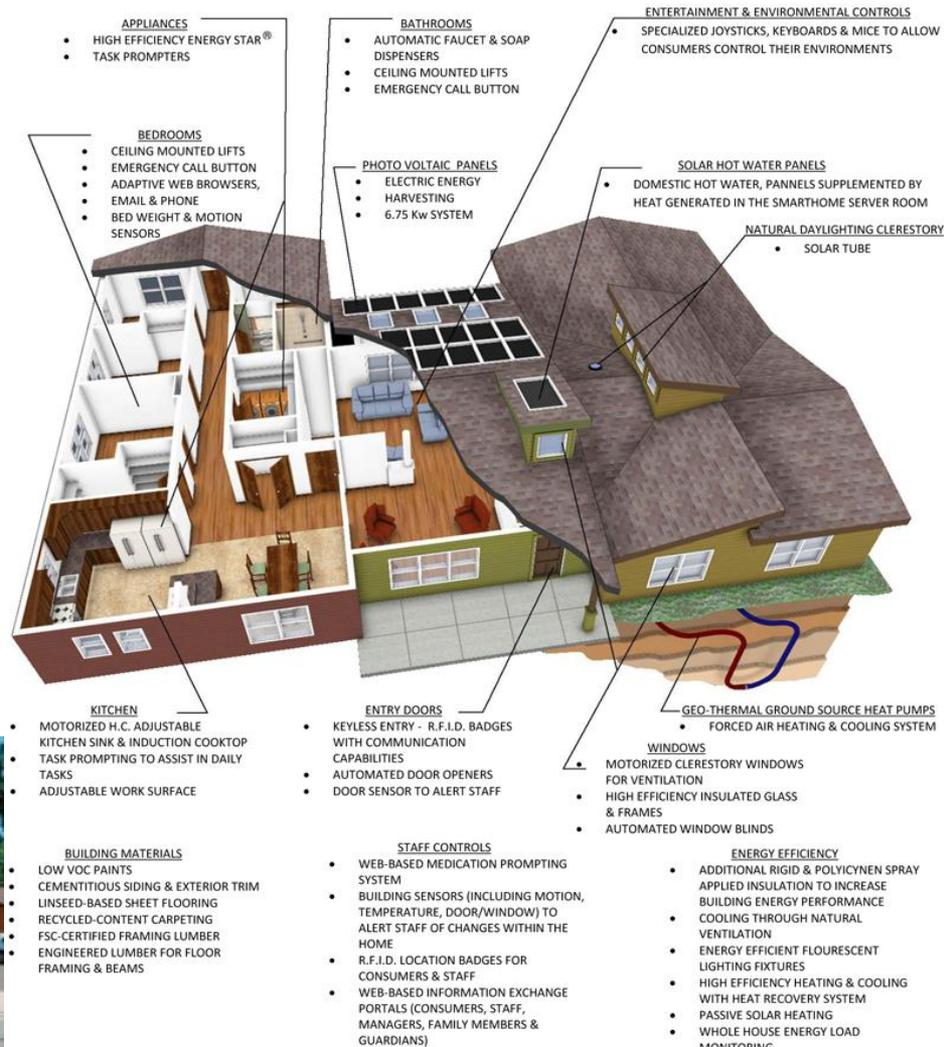


# Imagine! Smart Home Boulder & Longmont, CO

Group homes for 6-8 residents w/ CD  
**Integrated technology**

task prompting systems  
 individual computers & mobile  
 computing systems  
 individual environmental control  
 systems  
 sensors, call buttons, door openers  
 keyless entry

**Low-toxicity construction & finishes**  
**Renewable energy systems**



# New residential developments for **adults with autism**

3 new communities:

**Sweetwater Spectrum**, Sonoma, CA – opened 2012

**Airmount Woods**, Ramsey, NJ – opening fall 2013

**Mt. Bethel Village**, Warren, NJ – opened 2013

Design of each community informed by guidelines + goals articulated in ***Advancing Full Spectrum Housing: Designing for Adults with Autism Spectrum Disorders***

# Sweetwater Spectrum Supported Living Sonoma, CA

**Community** for 16 adults with **autism**

**Four** 3250 square-foot homes each with **4 BR** and **en-suite baths**, shared kitchen, dining, & living

On-site **land steward** and **staff-in-residence**

**Activity center** with **teaching kitchen**, **arts & music room**, **exercise studio**, **therapy pool**

1.25 acre orchards, organic gardens & greenhouses – **bring together residents + local volunteers**

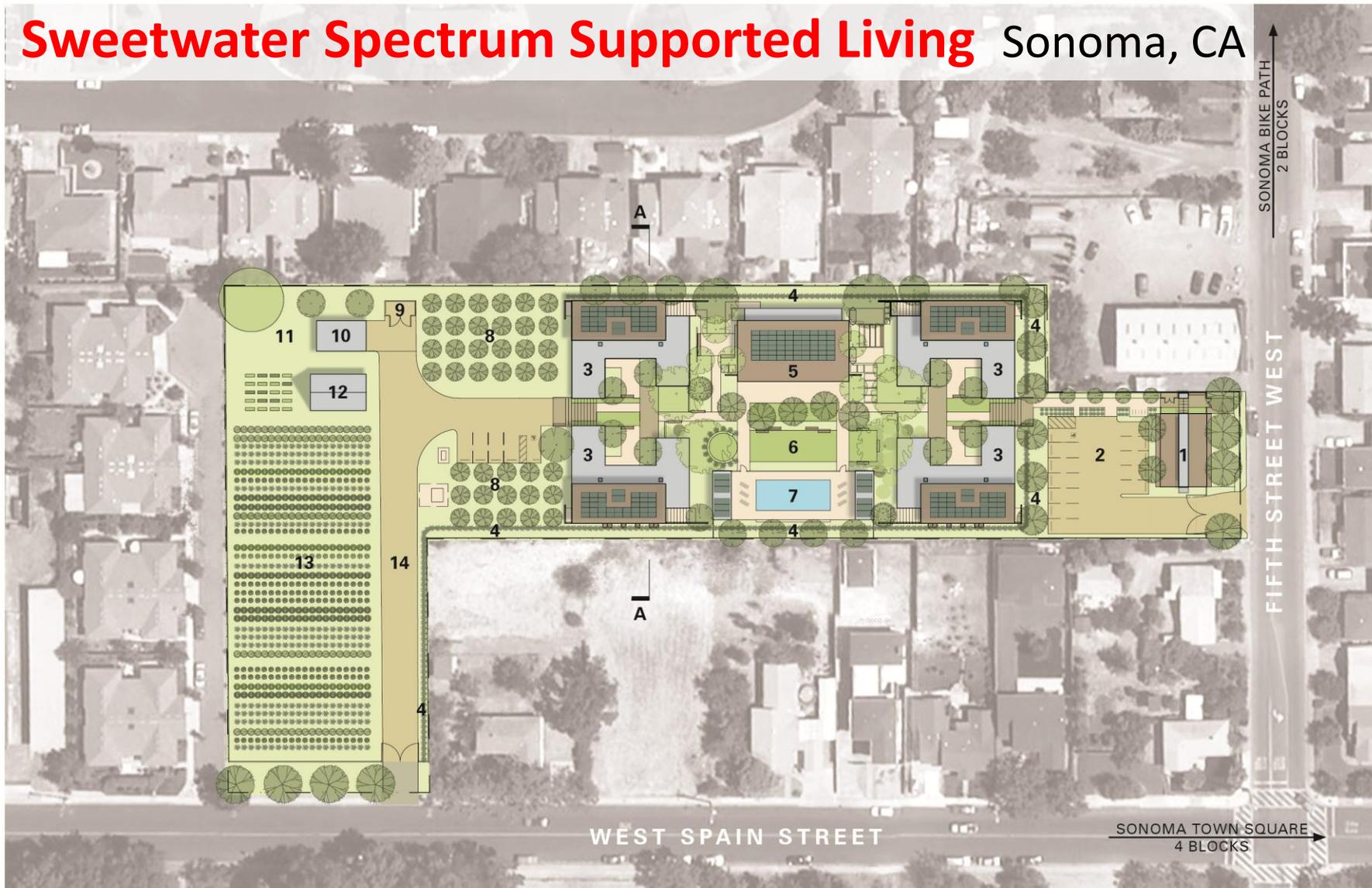
Design maximizes **choice**

**Access** to Sonoma town center



By **Leddy Maytum Stacy Architects**, [www.lmsarch.com](http://www.lmsarch.com)  
All photographs of Sweetwater Spectrum by **Tim Griffith**

# Sweetwater Spectrum Supported Living Sonoma, CA

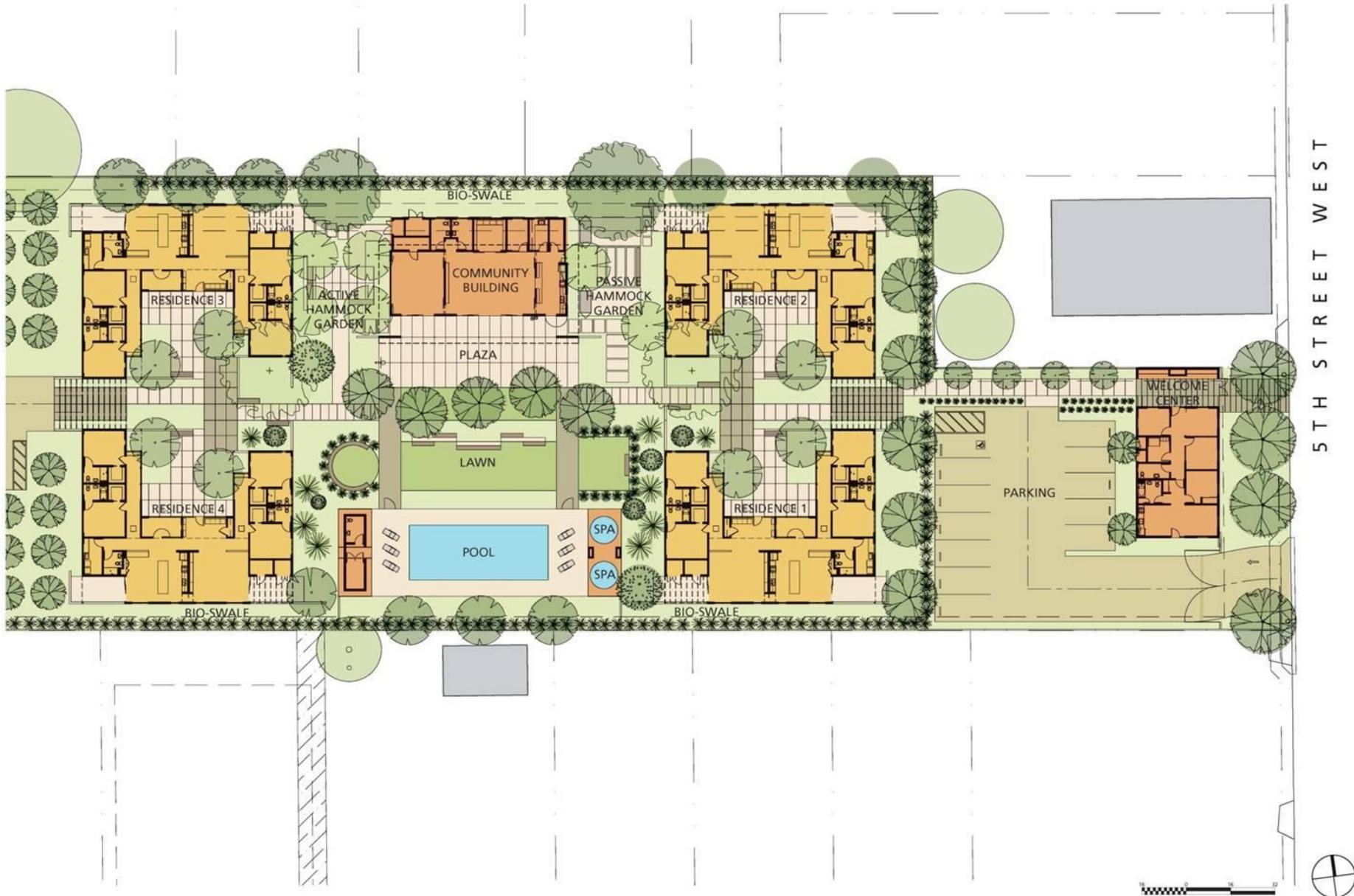


## SITE PLAN

1 WELCOME BUILDING 2 PARKING 3 HOUSE 4 STORMWATER TREATMENT BIO-SWALE 5 COMMUNITY CENTER 6 THE COMMONS: PLAZA & LAWN  
 7 THERAPY POOL & SPAS 8 ORCHARD 9 TRASH 10 STORAGE BUILDING 11 IRRIGATION WELL 12 GREENHOUSE 13 ORGANIC FARM 14 FIRE ACCESS ROAD



# Sweetwater Spectrum Supported Living Sonoma, CA



# Sweetwater Spectrum Supported Living Sonoma, CA



# Sweetwater Spectrum Supported Living Sonoma, CA



# Sweetwater Spectrum Supported Living Sonoma, CA



# Mt Bethel Village Warren, NJ

Housing for Adults with Autism, Developmental Disabilities and Traumatic Brain Injuries

41 Residents

35 one-BR apartments

3 two-BR apartments

Communal dining rooms

Digital video monitoring system (except in apartments)

Clear layout to **maximize familiarity**

**Clean, simple lines**

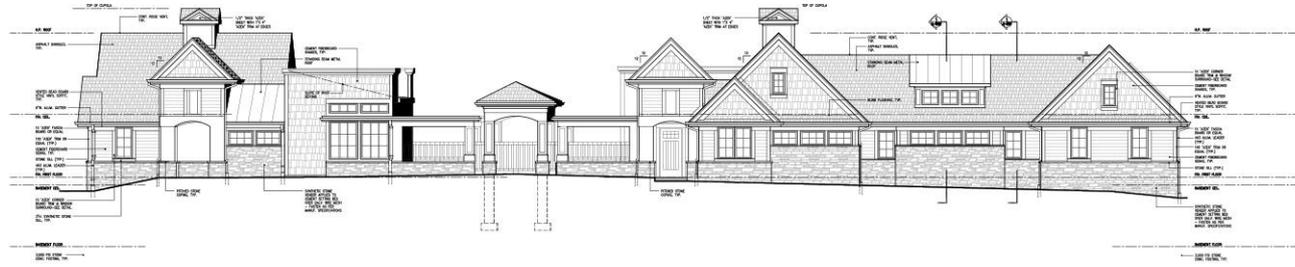
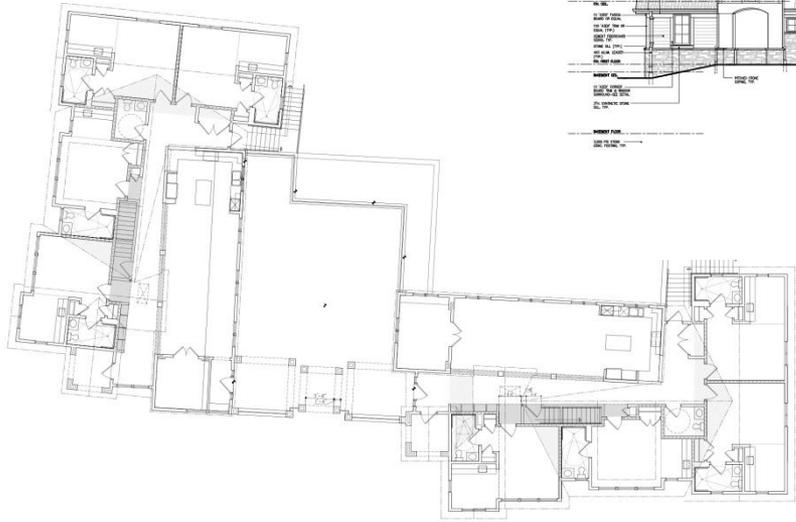
**Minimize sensory overload**

Reduce ambient noise – attention to **acoustics**

**Appropriate lighting**

By Douglas J. Coleman AIA PP, Architect & Associates LLC





WEST ELEVATION  
BUILDING WINGS 1 & 2

AIRMOUNT  
WOODS  
SPECIAL NEEDS HOUSING



VIRGONA + VIRGONA  
ARCHITECTS | PLANNERS



CONCEPTUAL RENDERING

VIEW FROM AIRMOUNT AVE

# Airmount Woods Ramsey, NJ

2 four-bedroom homes for **8 adults with autism**

Each with **en-suite bathrooms**

**Green technologies**

Passive outdoor recreational space

Bergen County United Way: developer & property manager

**Pre- & post-occupancy study**

by **Virgona + Virgona Architects | Planners**  
<http://virgonaarchitects.com/>

# Individuals with Autism Spectrum Condition: a Population Positively Affected by Sustainable Practices

THE CENTER  FOR DISCOVERY

<https://www.thecenterfordiscovery.org/>

**Michael Singer Studio** <http://www.michaelsinger.com/>

**Sherry Ahrentzen + Kim Steele**

- **architecture** and **interior design** that focuses on the specific needs of a population with **autism**
- **material** and **product** specification and assembly, and **long-term maintenance** and care that is relevant to spaces that serve **individuals with autism**
- education of and care for individuals with **autism**, including **assistive technologies** and **ubiquitous technology**
- **site specific** and **environmentally driven planning and design**.

Funded by the Jeffrey Cook Charitable Trust



# AT HOME WITH AUTISM

DESIGNING HOUSING FOR THE SPECTRUM

Kim Steele & Sherry Ahrentzen



The  
**POLICY PRESS**  
Publishing with a Purpose

**Forthcoming July 2014**



## ADVANCING FULL SPECTRUM HOUSING

Designing for Adults with Autism Spectrum

Sherry Ahrentzen & Kim Steele

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For a pdf copy of ***Advancing Full Spectrum Housing*** report, please contact one of us and we will be happy to forward you a copy of the report.

# References

Slide 5: <http://www.flickr.com/photos/44124348109@N01/4389134342/> Rain Man's Rainbow (creative commons)

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Speaker



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