2004
TOKYO

Internet and Pervasive Technologies for Successful Aging

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Aging

The gradual changes in the structure and function of humans and animals that occur with the passage of time, and that eventually lead to the increased probability of death as the person or animal grows older.

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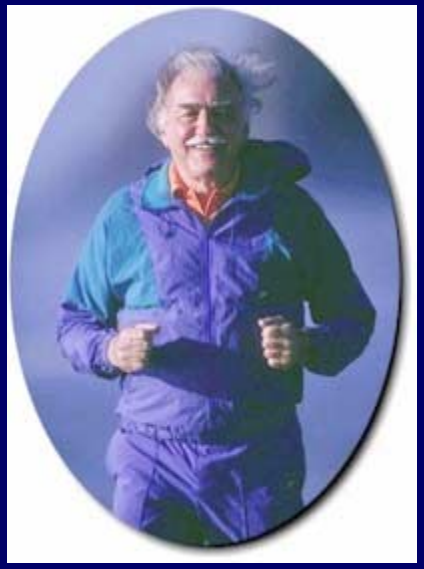
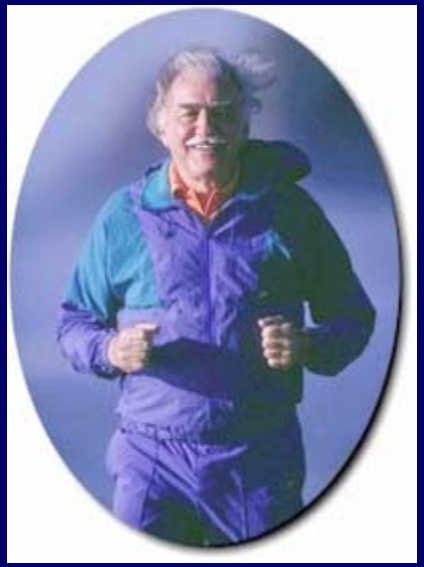


Aging

The gradual changes in the structure and function of humans and animals that occur with the passage of time, and that eventually lead to the increased probability of death as the person or animal grows older.

Age Related Diseases

Those diseases that appear late in life, such as Alzheimer's, osteo-arthritis, stroke, diabetes, cardiovascular disease, Parkinsons Disease.

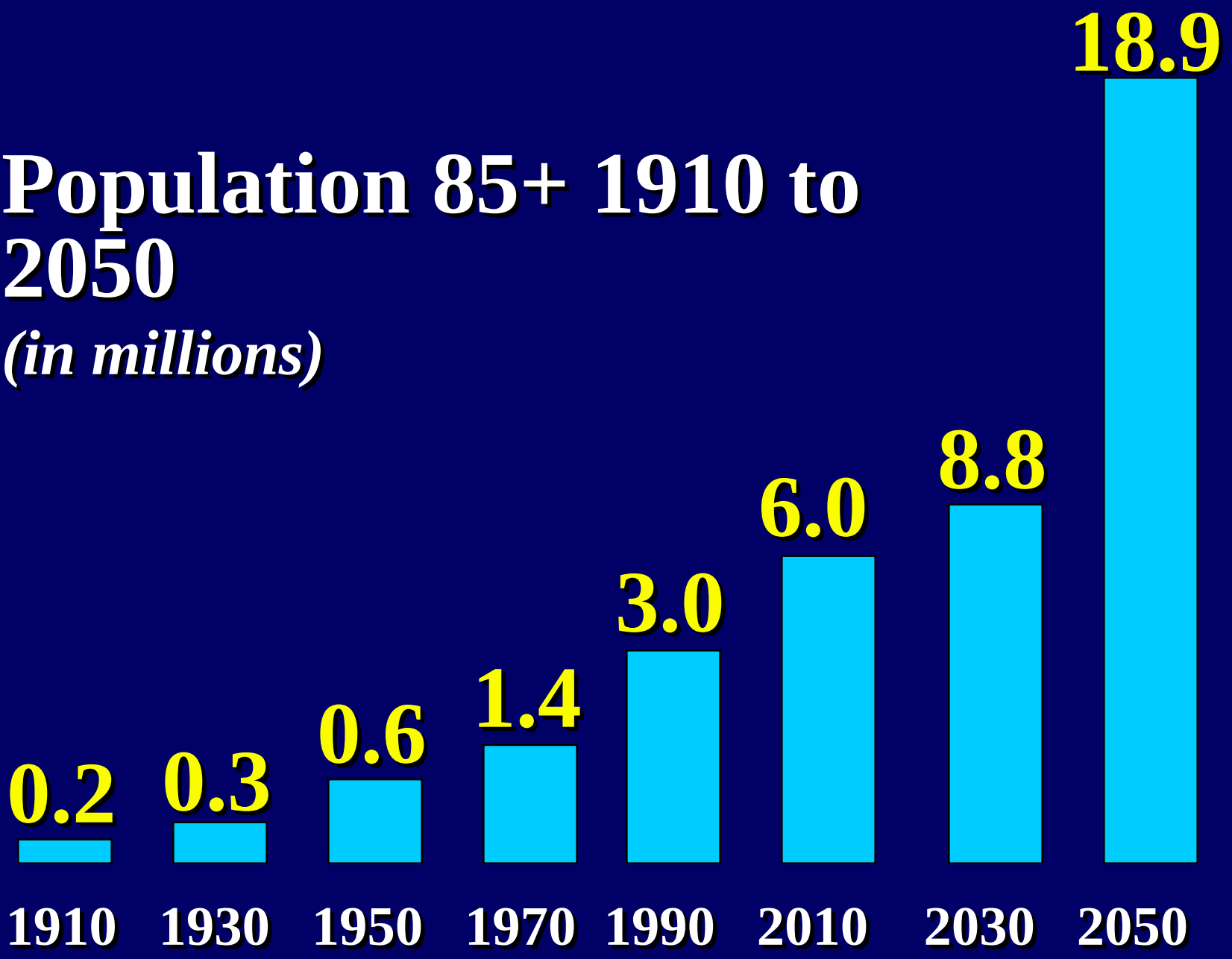


Model for Viewing R & D and Clinical Interventions

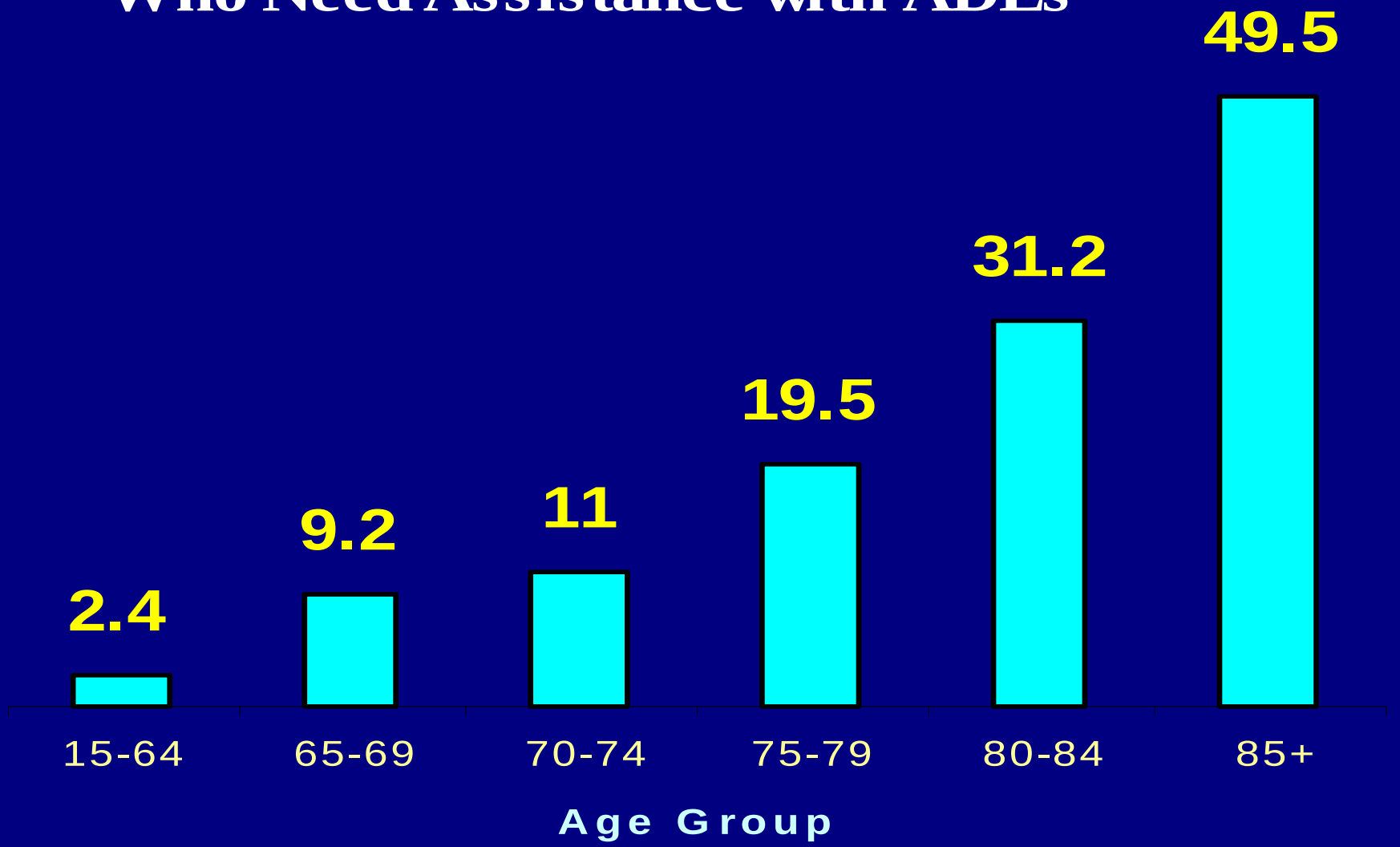
Why support research and development in technology and aging?

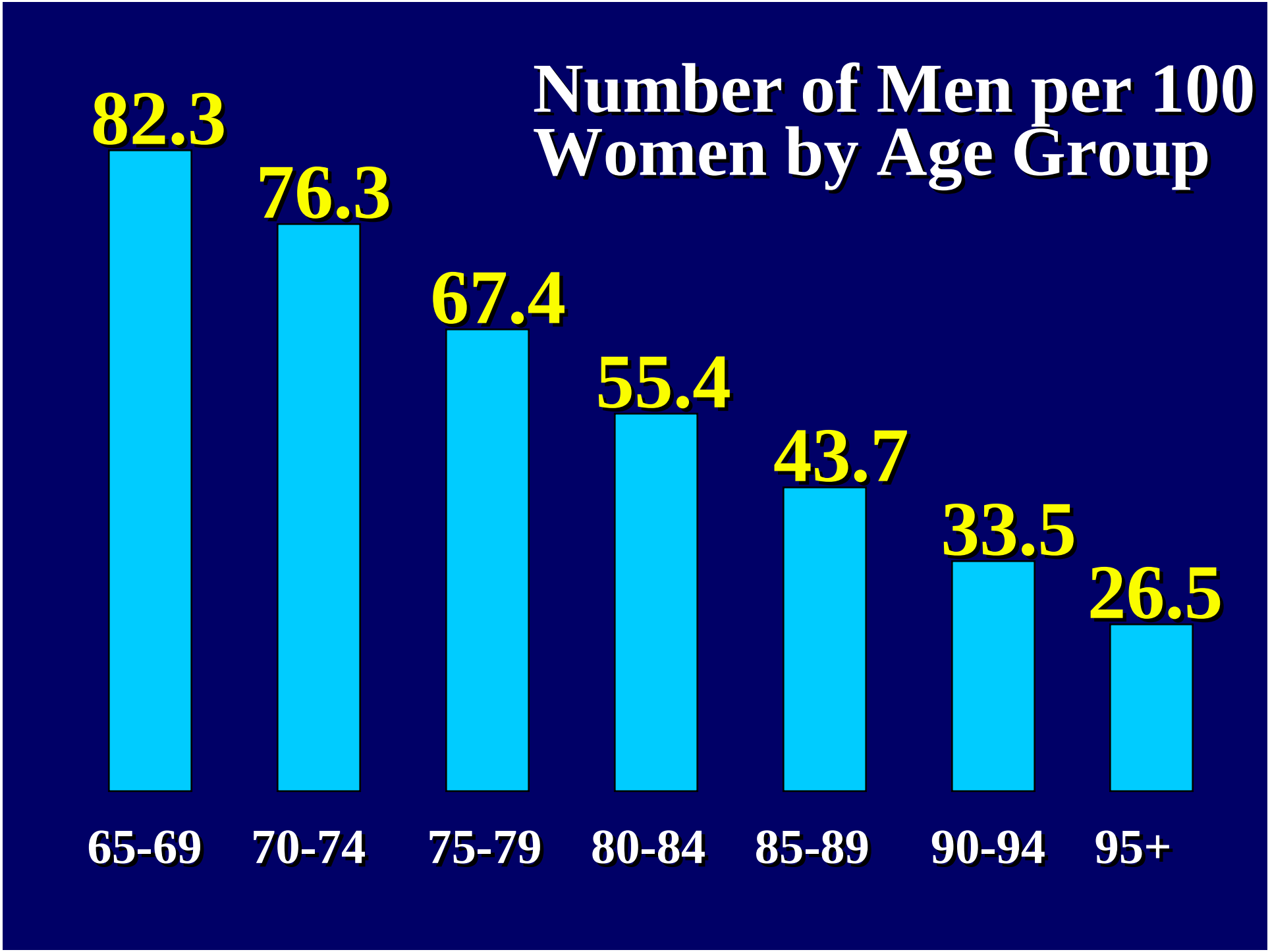
Population 85+ 1910 to 2050

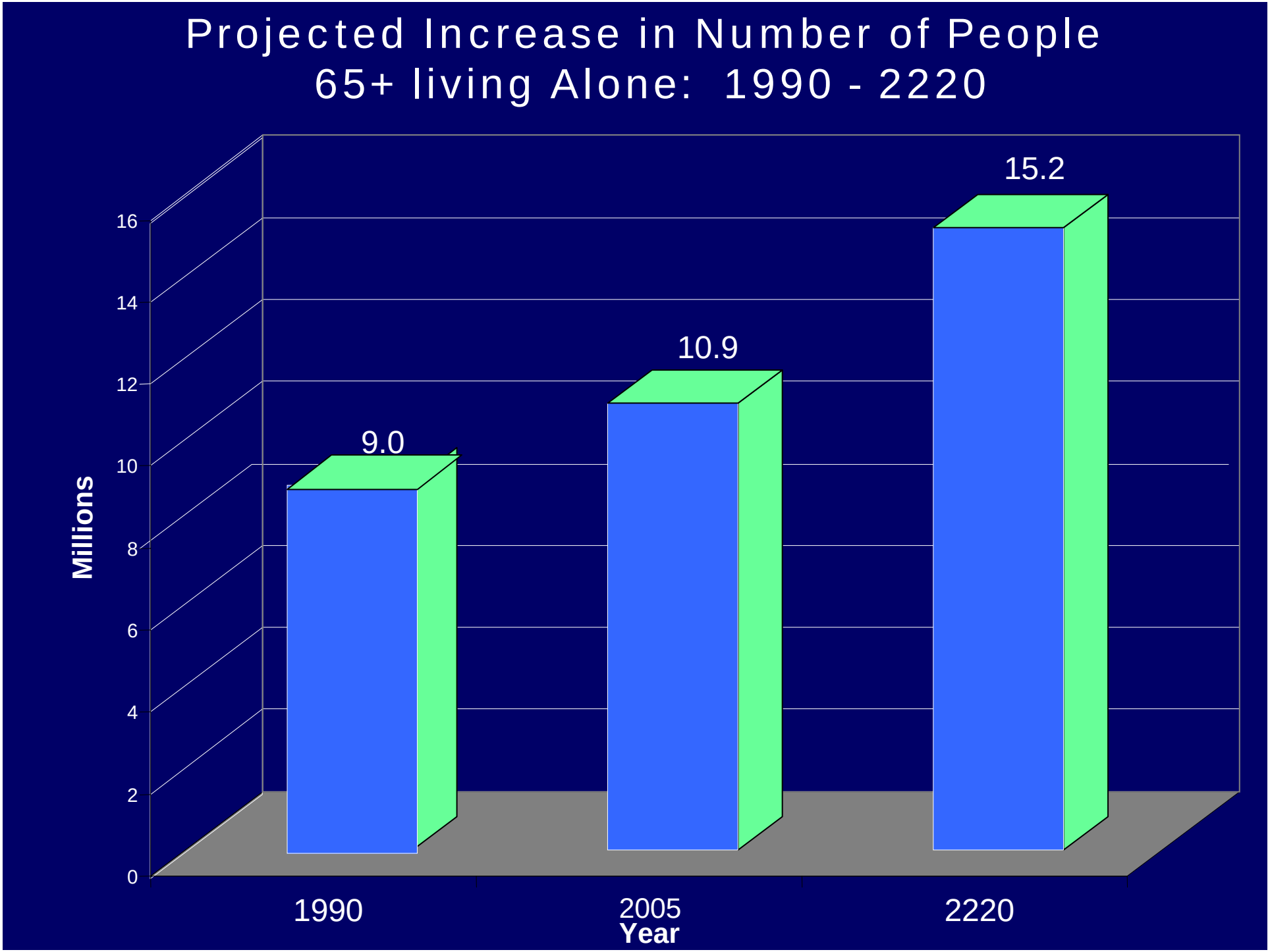
(in millions)



Percent of Population by Age Group Who Need Assistance with ADLs




Number of Men per 100 Women by Age Group
82.3
76.3
67.4
55.4
43.7
33.5
26.5
65-69
70-74
75-79
80-84
85-89
90-94
95+

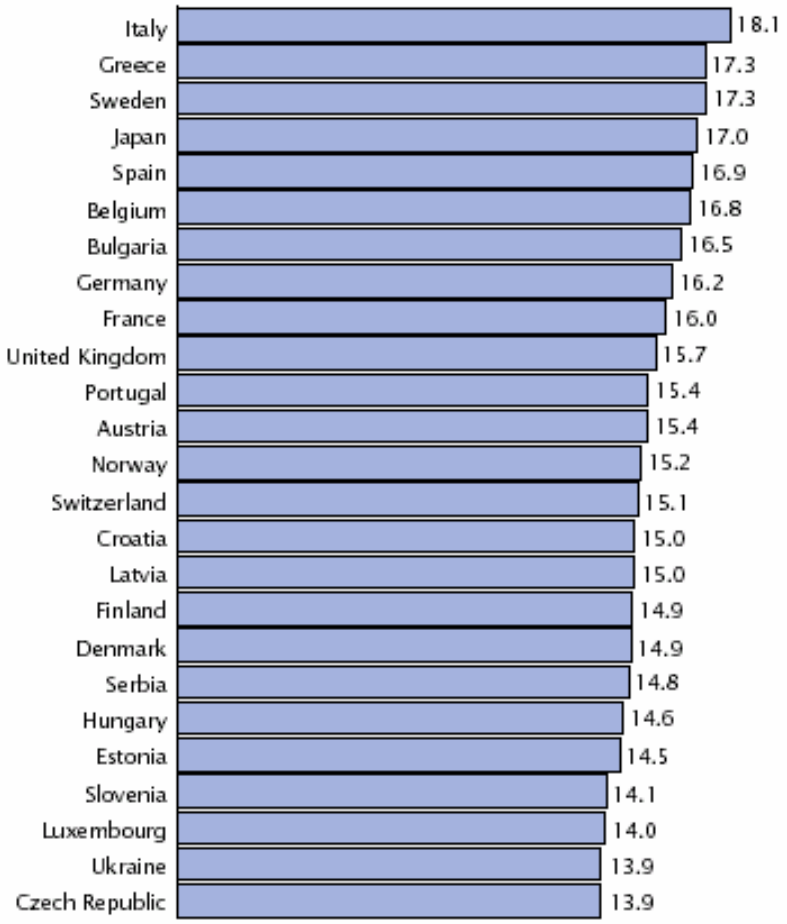

Projected Increase in Number of People
65+ living Alone: 1990 - 2220
Millions
16
14
12
10
8
6
4
2
0
9.0
10.9
15.2
1990
2005
2220
Year

Aging Population is a world concern

Figure 2-3.

The World's 25 Oldest Countries: 2000

(Percent of population 65 years and over)



Source: U.S. Census Bureau, 2000a.

Addressing Functional Limitations of Aging Population

Applying Technology

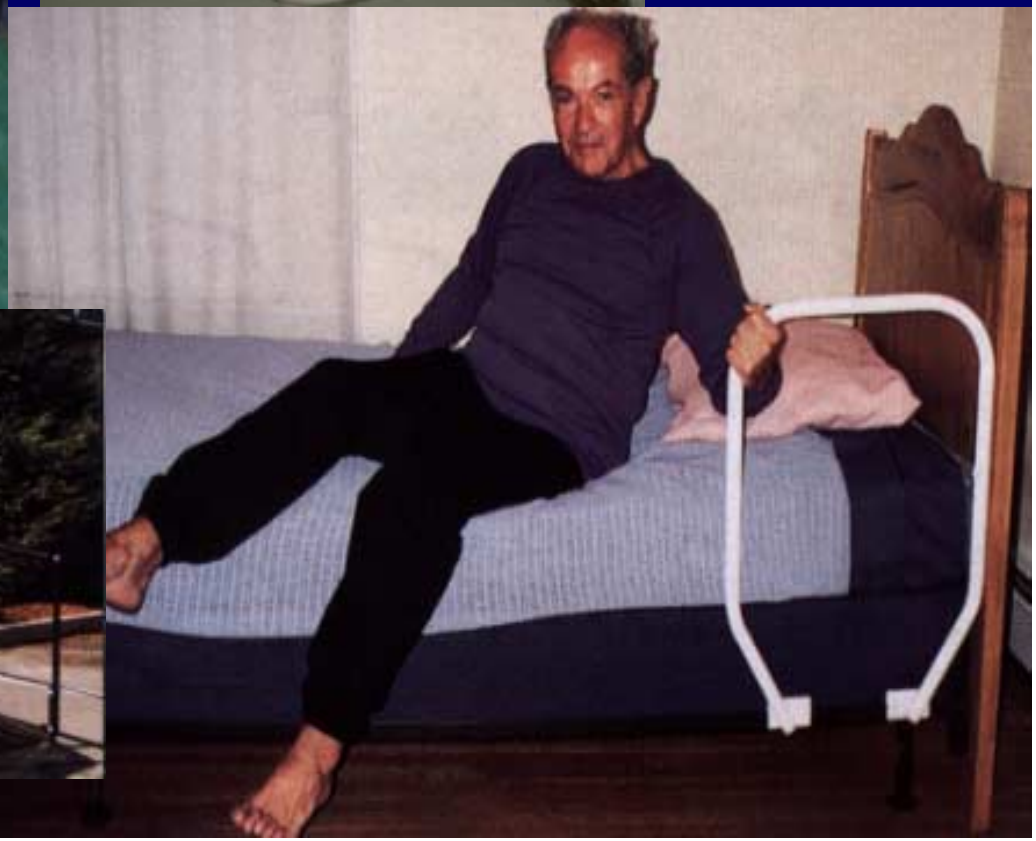
“Low” and “high”

Examples of “Low Technology” - Assitive Devices

Cognitive Device

Hearing Device

Mobility Devices



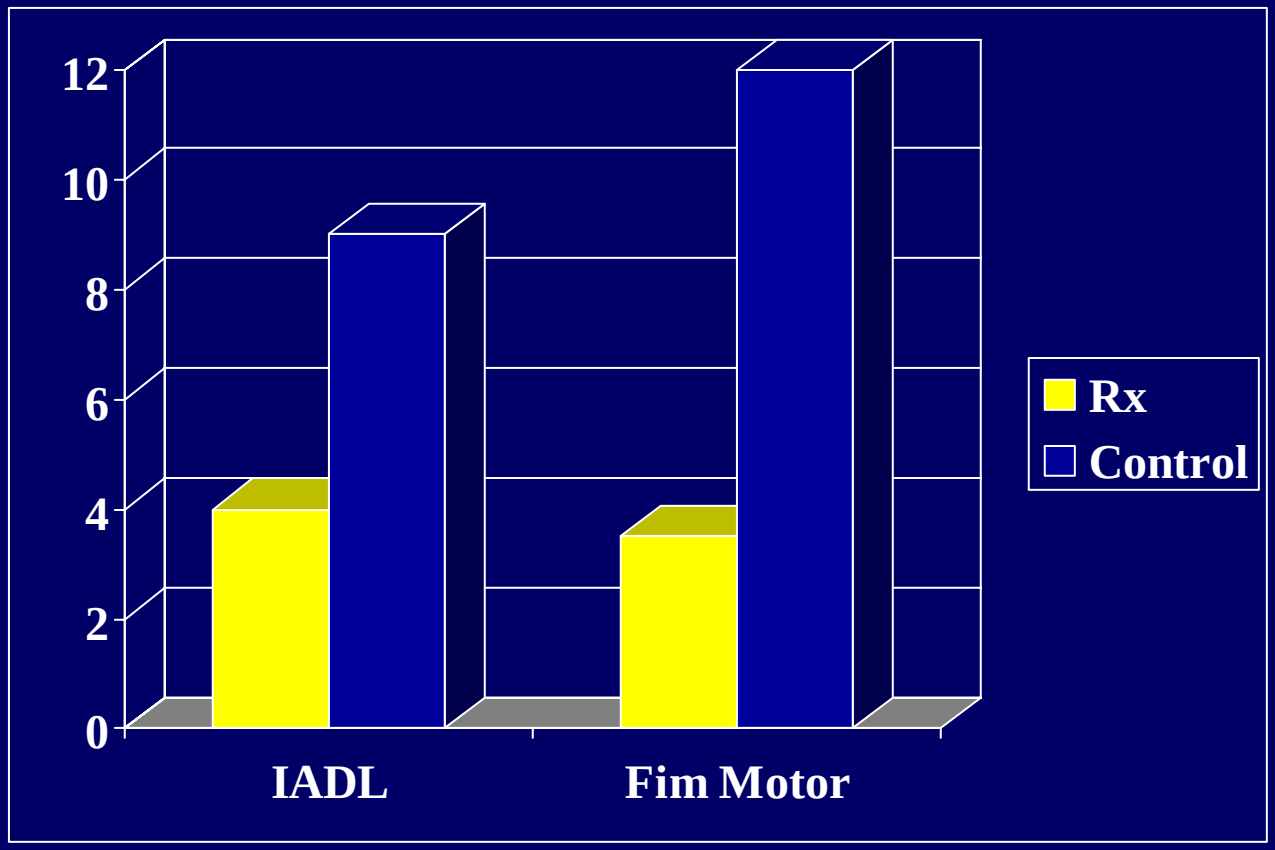
Powered Window Opener

Button hook / Zipper Pull

Can you support elders with technology?

A Randomized Controlled Trial of Assistive Technology / Home Modification Service Delivery

Mean Percent Decline on Measures of Functional Status by Group In Standard Scores



At 18 Months Post Initial Intervention

Treatment	Control
$2620	$443

Mean Intervention Cost/ Participant over 18 Months

Mean Total Institutional Cost/ Participant for 18 Months

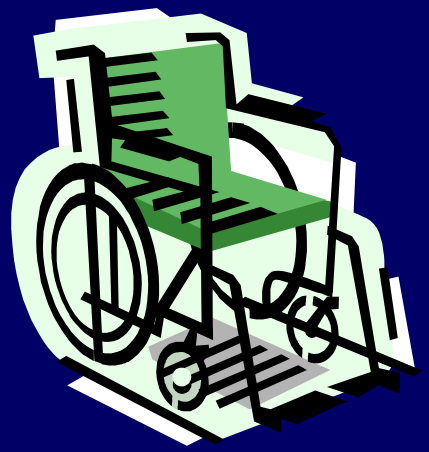
Treatment	Control
$5,630	$21,847

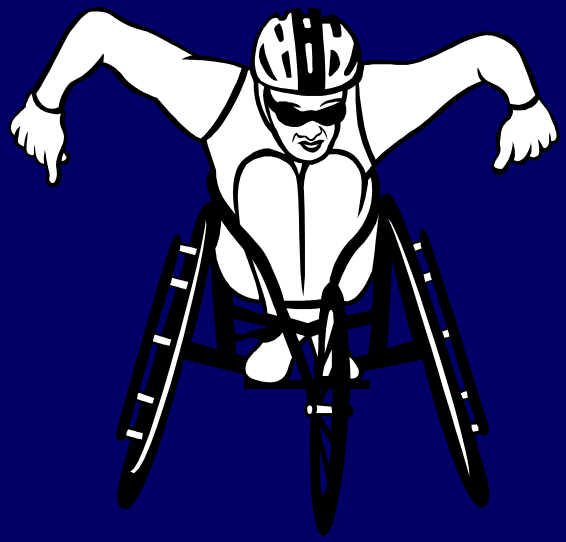
Mann, W.C., Ottenbacher, K.J., Fraas, L., Tomita, M., & Granger, C.V. (1999) *Effectiveness of Assistive Technology and Environmental Interventions in Maintaining Independence and Reducing Home Care Costs for the Frail Elderly: A Randomized Trial*; *Archives of Family Medicine*; May/June, 8(3):210-217

With Advances in Technology –
Can we do even better?

Technology – Advances:

Wheelchairs





1300 B.C.

- Oldest evidence of a wheeled chair – spoked wheels on chairs.

1595

- King of Spain had his own rolling chair with foot rest.

1655

- Self-propelled chair built by a watchmaker with paraplegia.

1933

- First folding wheelchair, manufactured with metal.

Today

- "High Tech," light-weight materials
- Improved design
- Wheelchairs used for sports

Advances

- Power Assisted Wheelchairs
- Stair climbing wheelchairs
- Smart Wheelchairs with Internet connections, wireless local connectivity and adaptive user interfaces


Hearing Aids

Early 1700's

An ear trumpet. Similar devices were used for thousands of years.

1850's

Acoustic table urn.

Meant to capture sound from any angle in the room.

1930’s

First electrical hearing aid.

1930's

Wearable multiple part hearing aid.

1940’s

Vacuum tube model.

1953

Oticon Pocket model.

1957

Ear aid that could hang over the ear from the wearer's eyeglasses.

1950’s – 1960’s

Combination of a microphone with a battery and transistor in one unit.

1970’s

"In-the-Canal," or ITC, aids - fill the ear canal without anything worn outside the ear.”

1980’s

This unit could be concealed completely in the ear canal.

1990’s

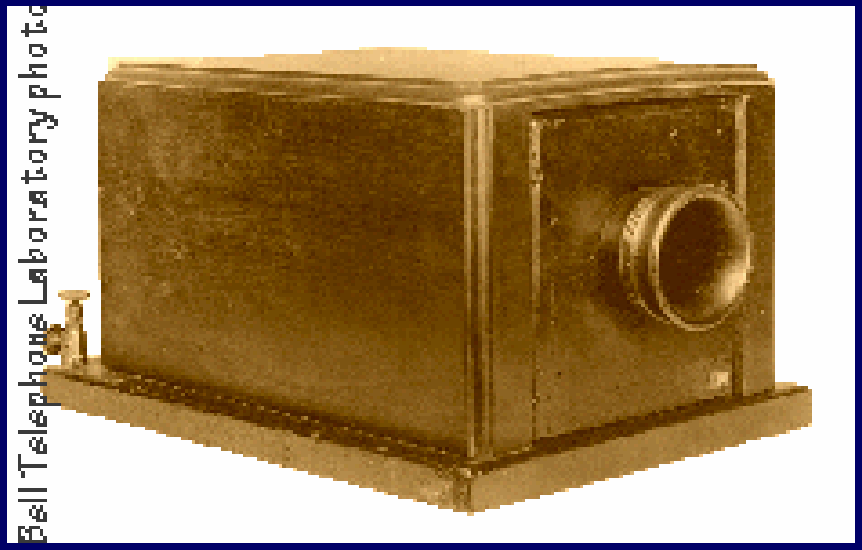
Hearing aids with digital processing

The future

- Web based programming updates for digital hearing aids
- Pervasive computing for better hearing aid performance
- Integration and embedding with mobile phones and other consumer electronics
- Additional forms of hearing devices: mobile digital assistants for real-time speech to text translation

The Telephone

1877



- First commercial telephone used by Alexander Graham Bell, based on his patent of January 1877.
- This telephone consisted of a single transmitter/receiver placed within a rectangular wooden box.
- You spoke into the opening in the box and listened through the same opening.

1882

Early Bell System telephone.

1904

1927

First phone with single handset.

1964

First “touch-tone” phone

1946

First commercial mobile phone

1973 - First cell phone call in USA

- Martin Cooper, an electrical engineer and a former general manager for the systems division at Motorola, is credited with making the first cell phone call, in 1973

The Incredible Shrinking Cell Phone

Year	1987	1989	1991	1993	1995
System	Large city system (April 1989) High-capacity system			Digital system (800MHz)	
Configuration of mobile station and antenna					
	802B:500cc 750g	803B:400cc 640g	Mova:150cc 230g	Digital 150cc Mova : 240g	Ultra-compact 100cc mobile station:150g

Dumb Terminal

Intelligence

Smart Phone

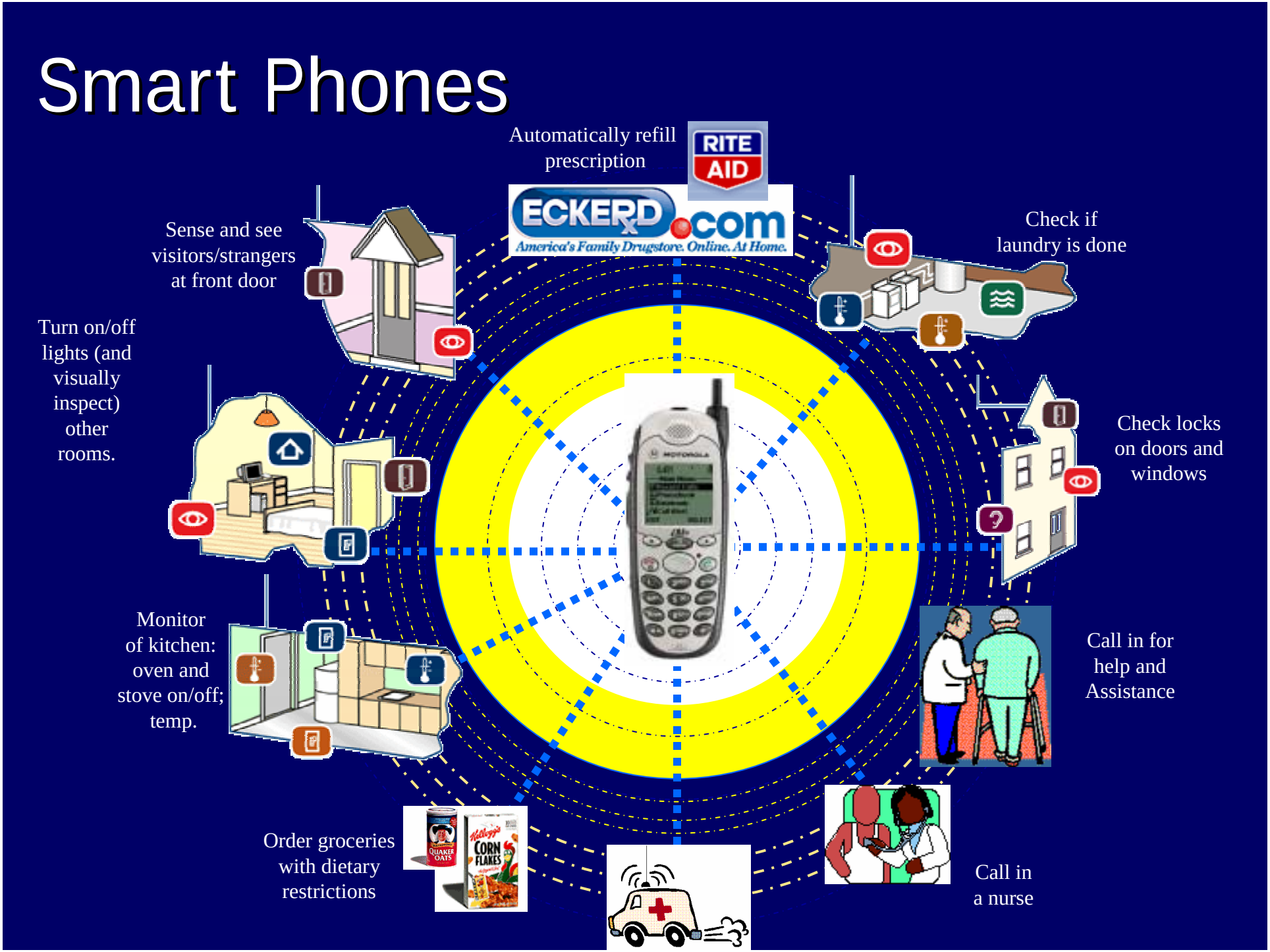
The Wearable & Pervasive Phone

2000

Smart Phone

Wireless and Internet connectivity

Smart Phones



Current Smart Phones: Are they Designed for older people?

Telehealth
&
Smart Homes

Computer-based Monitoring of Self-Care Needs of Physically Frail Elders

Malcolm M, Mann WC, Tomita M, Fraas LF, Stanton KM, Gitlan L (2001) *Computer and Internet Use Among Physically Frail Elders*, Physical and Occupational Therapy in Geriatrics, 19(3) pp15-32

Randomized Controlled Trial
Computer-based Monitoring of
Self-care Needs of Physically
Frail Elders 1999-2002

A comment from one participant in the intervention group:

I used to wake up in the morning, pray to God to take me, because I was ready. Now I wake up every morning and pray God will give me more time to use this computer. Thank you, thank you, thank you. When I think of all you have done to make my life easier….

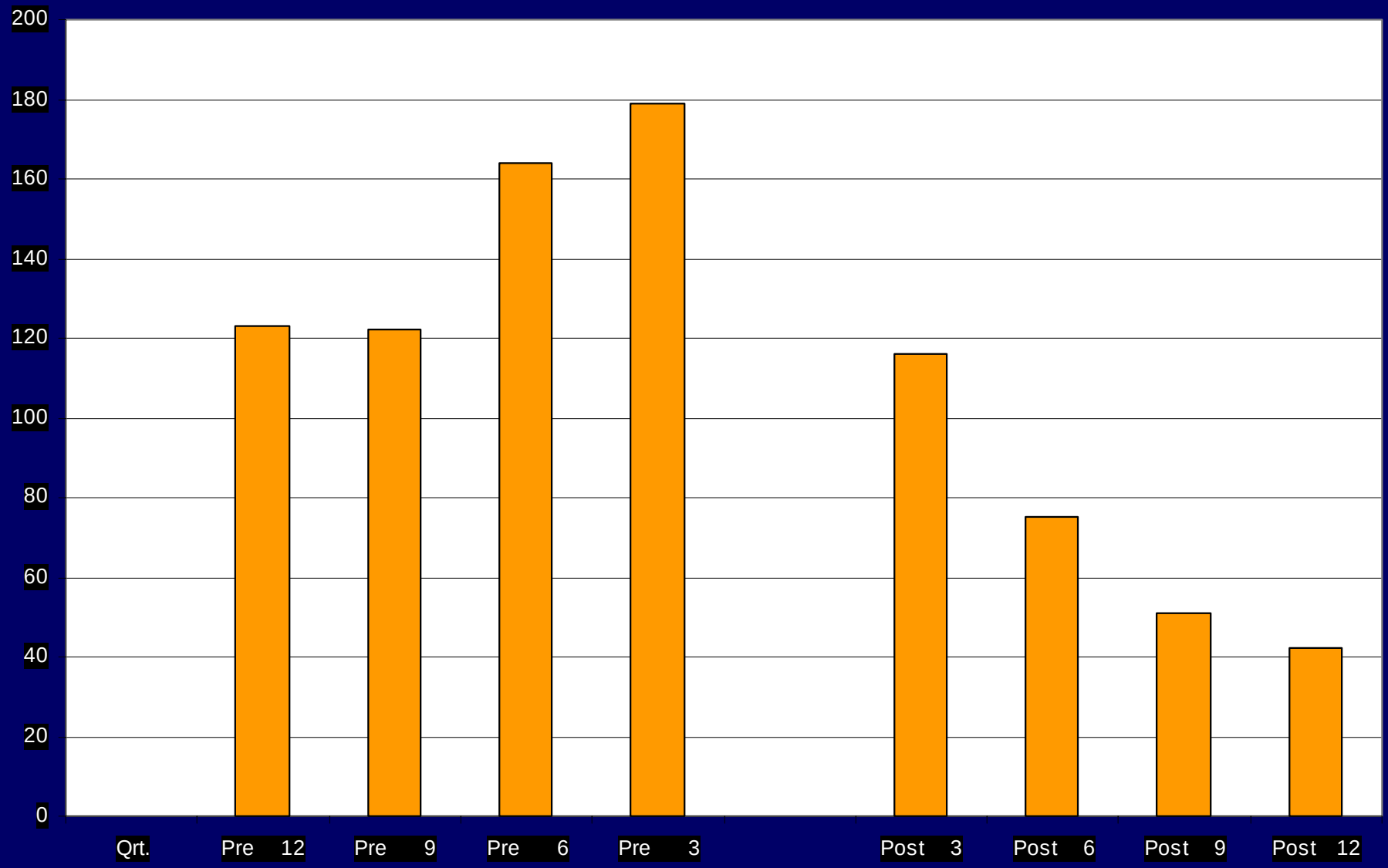

RHCP
DLP
VVN
Bay Pines
West Palm Beach
Miami
Ft. Myers
San Juan
VHA –VISN-8
Community Care
Coordination
Telehealth
Service Sites

Telehomecare Technology Results

- Improved Compliance
- Reduced resource utilization
- Improved patient education
- Improved functional Status

Hospital Admissions

N=791



The Health Buddy

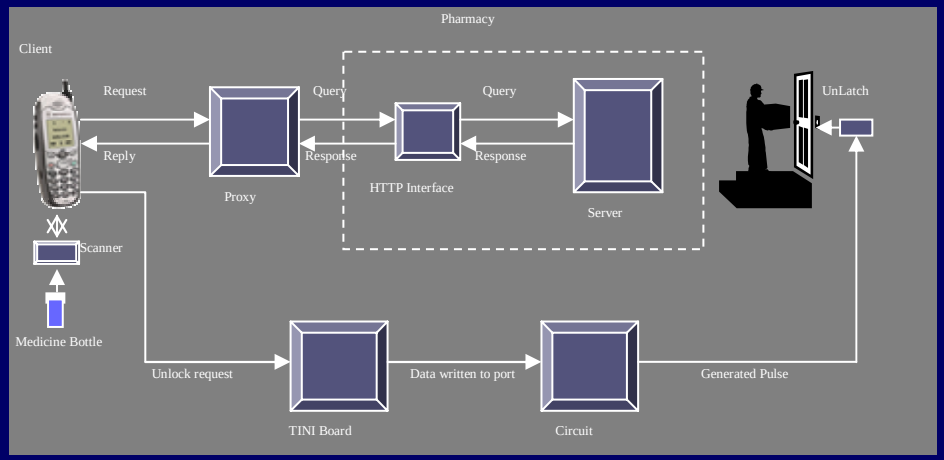
Smart Homes

- Monitor the elder's health
- Monitor the elder's self-care related needs
- Monitor the house
- Monitor the elder's activities, movement, and behavior in the house

Our University of Florida Smart House Initiative

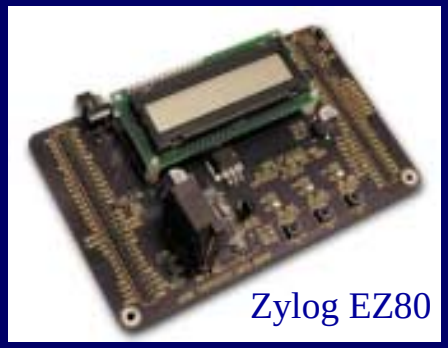
Snapshots of the Smart House

Early Prototyping



Pervasive Technology for Smart House

Technology for Pervasive Computing

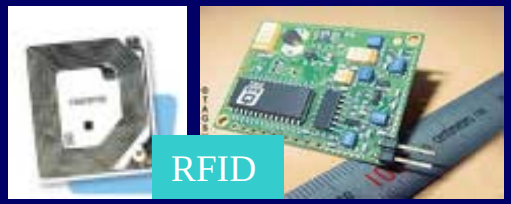

Zylog EZ80


SNAP


Ultrasonic Pilot


Ultrasonic Beacon


Systronix STEP Board


RFID


iButton

Wireless Sensors

Fig. 36. weC Mote.

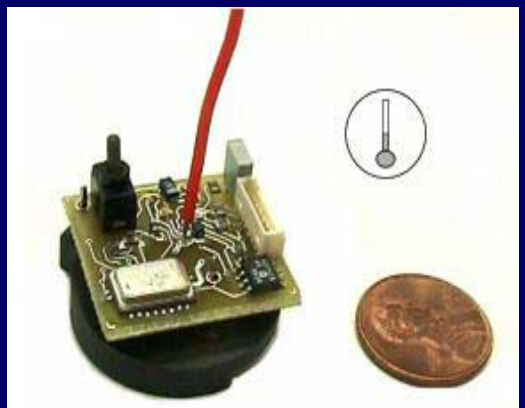


Fig. 35. First Mini RF Mote.

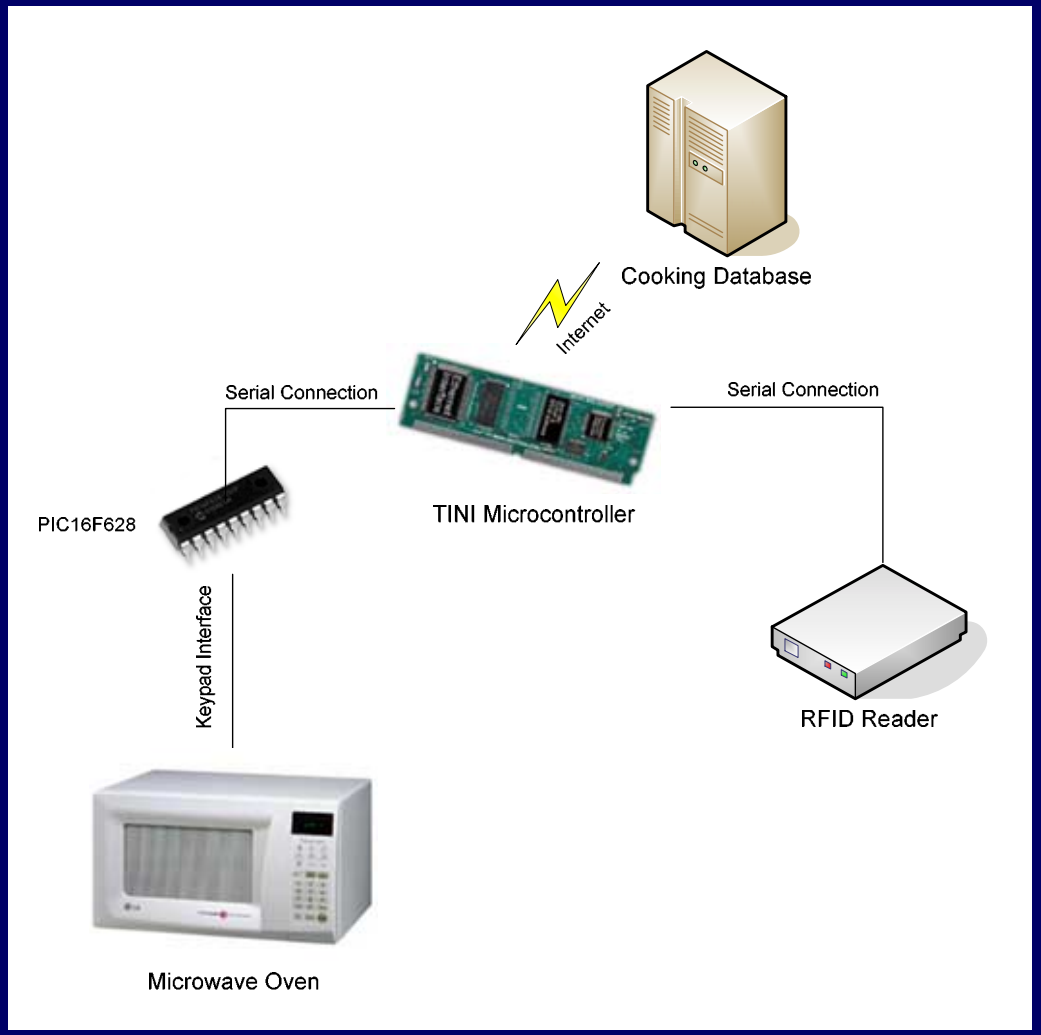
Applications

- Locating elders & objects (e.g. Car in parking garage, TV remote)
- Home appliances and device control (e.g. switching functions & A/C control)
- Smart Microwave Ovens, Talking Food, etc
- Alerts and alarms (e.g., medicine reminders & postal mail notification)
- Grocery shopping assistant
- Weather Awareness

Applications

- Integrated indoor/outdoor location tracking
- Map maker and navigation
- Security Alerts (doors, windows, water leaks)
- Access Control (lock/unlock doors, windows)
- Next generation Lifeline
- Home Entertainment
- Push to Eat (and other automated services)
- Dictation
- Others...

The SmartWave Project

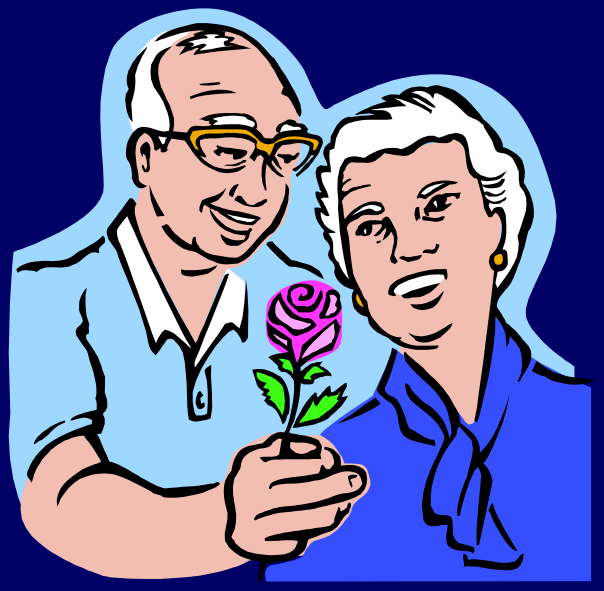


Gator-Tech Smart House
June, 2004

Technology and Aging

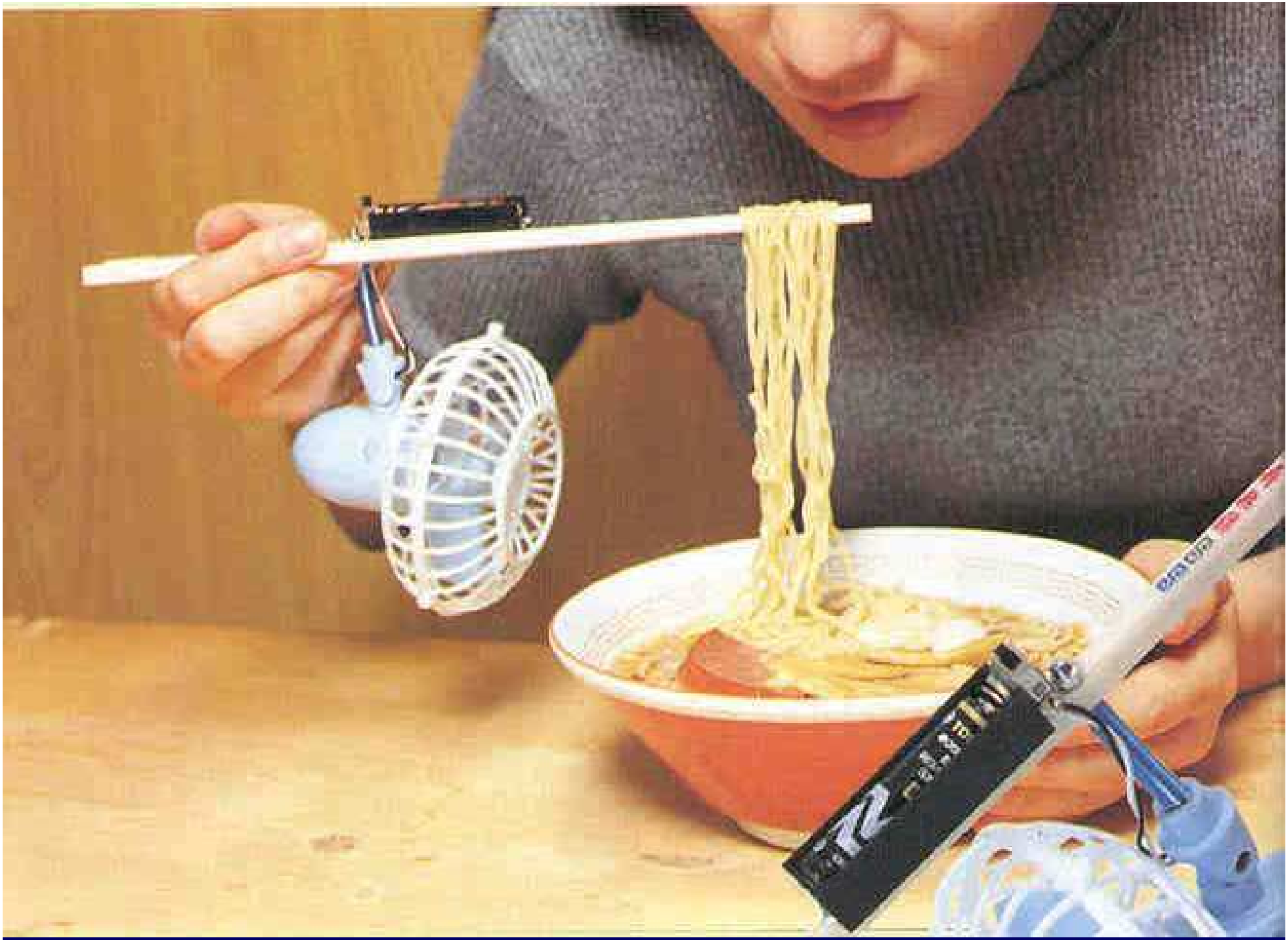
The Importance of People

Formal Service Providers



Family – Informal Providers


Just for Smiles




International Conference on Aging, Disability, and Independence
January 2006
Florida USA
www.asa.org/icadi

THE END

http://www.rerc.ufl.edu/

THank You