

Honeywell



Independent LifeStyle Assistant

Transforms the home into a supportive environment.

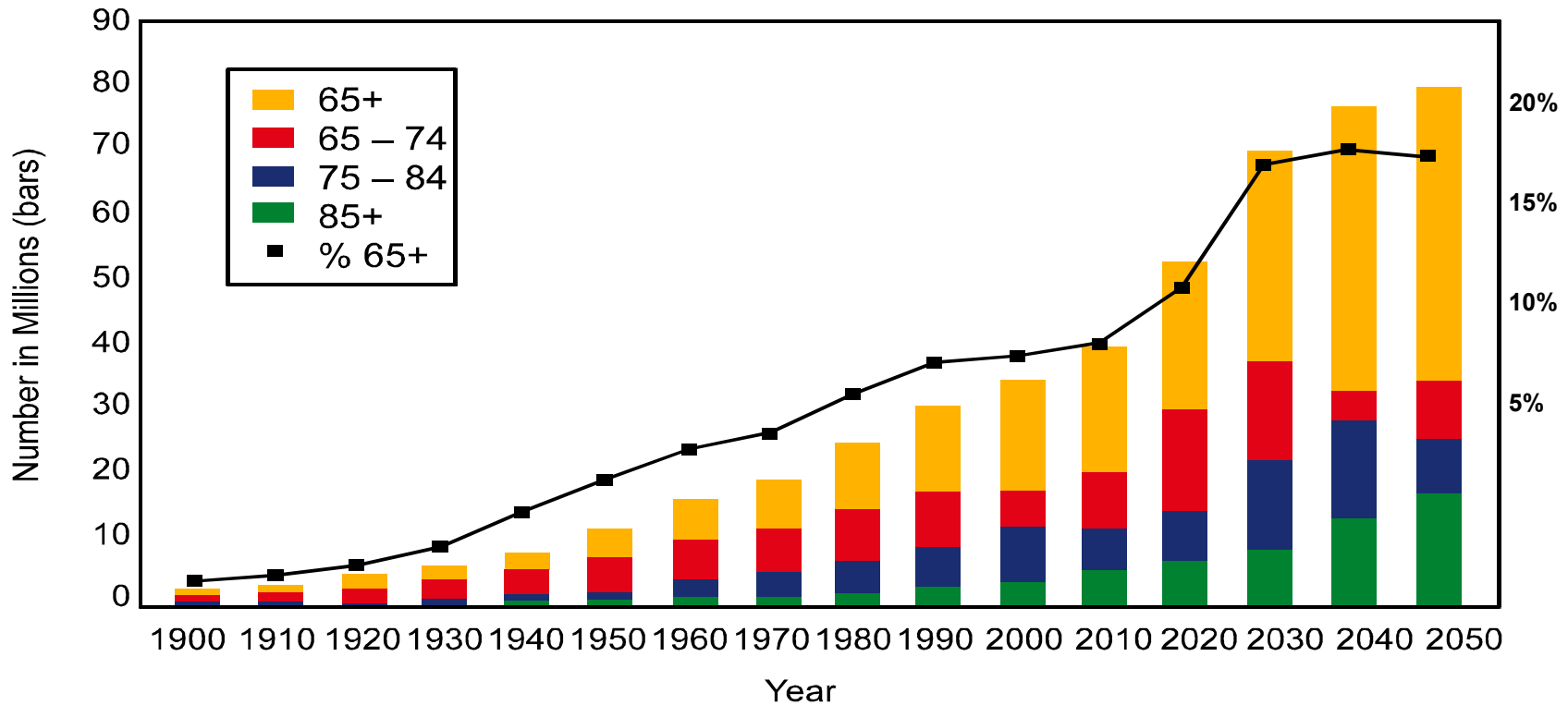


Independent LifeStyle Assistant (ILSA)

A NIST Advanced Technology Program



Why ILSA?

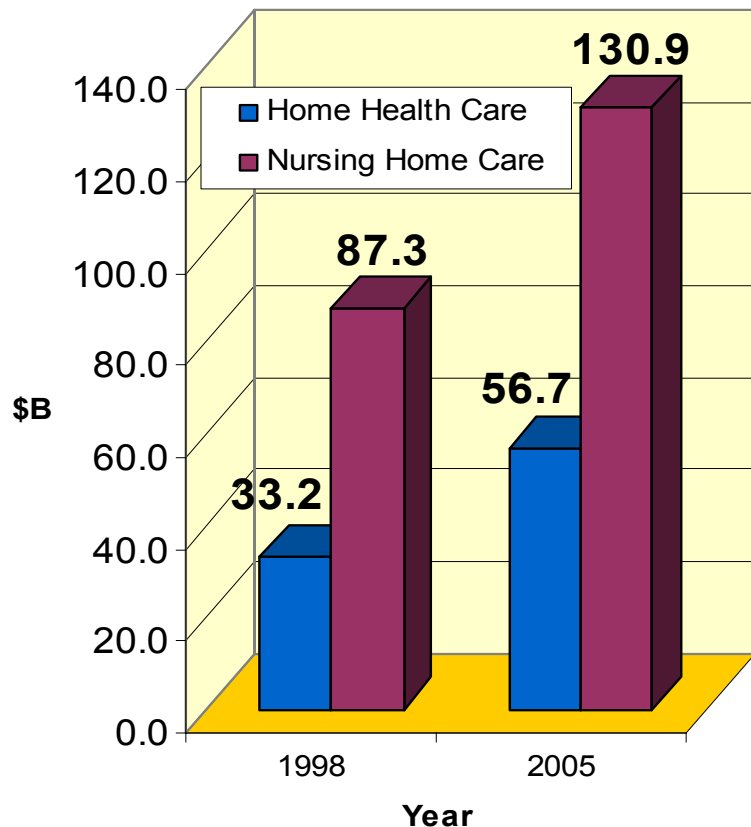


Growth of the 65+ Population by Age Group: 1900 to 2050





Why ILSA?



- Federal government pays 57% of nursing home and home health care costs (primarily Medicaid)

- 43% of those over 65 will enter a nursing home

- Average nursing home cost per patient is \$47K

- 1.6 million home care patients in 1996 will increase to 2.0 million in 2005

- 7 million Americans provide remote care to an elder (12 hours per week or more)





Why ILSA?

- 23% of U.S. households are involved in caregiving to persons 50 or older
- An estimated 14.4 million full- and part-time workers are balancing caregiving and job responsibilities
- 33% of full time and 37% of part-time employees have lost time due to care giving responsibilities
- 15% of previously employed caregivers chose early retirement
- 7 million Americans are long distance caregivers for older relatives; the average travel time to reach their relatives is four hours
- annual costs due to family caregiving was \$11.2B
- best case estimate \$287 M revenue from ILSA product between now and 2012
- currently holding discussions with major assisted living facility developers who are very interested in ILSA technology





Why Honeywell?

Leverage Honeywell Connected Home and home automation products for a growing market to meet real needs.





A J Sixsmith: An Evaluation of an Intelligent Home Monitoring System (Journal of Telemedicine and Telecare, 2000) (UK)

22 elderly subjects in assisted living facilities

Motion detectors, switches on doors and refrigerators,
room temperature: 9 - 12 sensors per home

Home unit records sensor activity, dials up control
center every 60 minutes

Control center analyzes data, calls client, caregivers if
data are way outside normal ranges

Each client has activity profile, updated every time new
data are recorded





Sixsmith (continued)

Alerts generated if:

- no activity over period of time
- client asleep longer than usual
- lack of refrigerator use
- low room temperature
- unusual activity pattern (client in one room for much longer than usual)

Three month trial

61 alerts: 46 FA, 15 genuine

80% rated fairly or very satisfied, 20% fairly or very dissatisfied





Objectives

- Intelligent home automation system with situation awareness and decision-making capabilities
- Integrated with a diverse set of sensors, medical devices, and "smart" appliances
- Enable elderly users to live and function safely at home.





Benefits

- Elder independent living
- Peace-of-mind to caregivers
- Efficient quality care
- Cost savings
- Market growth for in-home product manufacturers





Programmatics

- A NIST advanced Technology Program
 - High risk research program
 - 2.5 years (Nov 00 - Apr 03)
 - \$5 million (HW 60%, NIST 40%)

- Led by Honeywell
 - University of MN School of Nursing
 - United Health Group EverCare
 - Behavioral Informatics (soon)





ILSA Vision

- An invisible **Network** of integrated sensors, devices, and “smart” appliances
 - Sensors - motion, contact, pressure, etc.
 - Devices - thermostat, speaker, microphone, etc.
 - Smart Appliances - communicating refrigerators, stoves, etc.
- **No computer** needed.
 - Telephone
 - TV-like Remote control
 - Simple, dedicated browser devices





Honeywell Web Pad



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Gerontological Society of America Workshop 11-15-01



What ILSA Will Do

- **Gather** information about elder, activity, and home status by watching and listening to the home and communicating with devices
- **Assess** the need for assistance based on the system's understanding the elder's condition and what activities are going on
- **Respond** to a given situation by providing assistance to the elder or calling for assistance
- **Share** health and status information with authorized caregivers to help improve the quality and timely delivery of care





Possible Caregiver Screen

Home Activities **Safety** Messages To-Do List

status mobility **eating** toileting

- ✓ Breakfast 8:21 am
- ✓ Lunch 12:10 pm
- Snack
- ✓ Dinner 5:49 pm
- Snack





Activity Screen

Home Activities Safety Messages To-Do List

status mobility eating toileting

Everything looks good today:

- mobility is a little low
- eating is normal
- toileting is normal
- activity goals are normal





Possible Client Screen

Activities

Safety

Messages

To-Do List

Lois,

It's time to take your coumidin.

Remember to use the bathroom before lunch.





To-do List

Home Activities Safety Messages To-Do List

today tomorrow this week

You have **6** things to do today:

- Call Brenda
- Change furnace filter
- Take out trash
- Get groceries
- Refill coumidin

New...





Home Control Screen

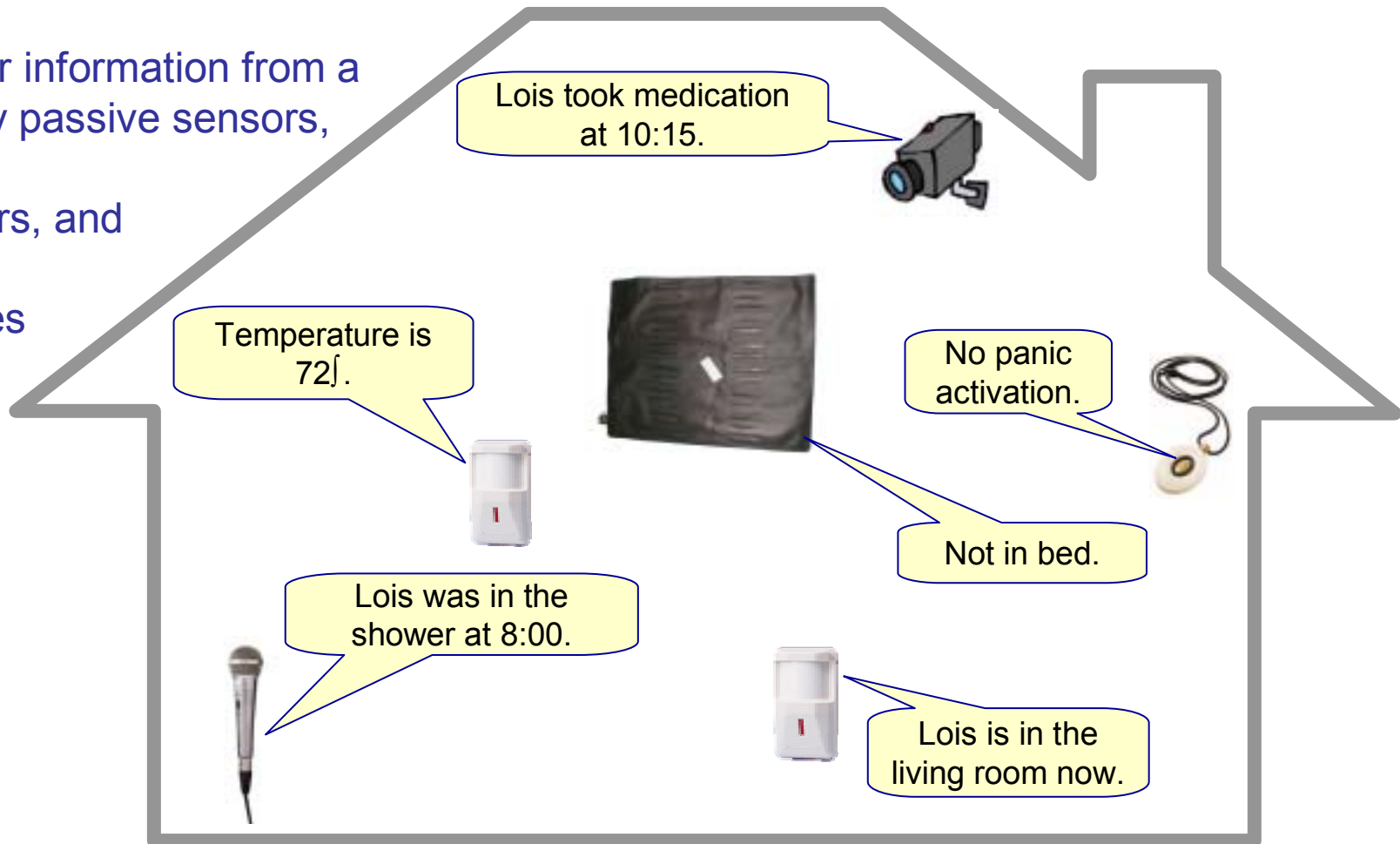
The interface consists of a top navigation bar with five tabs: Home (grey), Activities (yellow), Safety (purple), Messages (light green), and To-Do List (green). Below the navigation bar is a purple bar containing four buttons: status, comfort (highlighted with a white border), security, and safety. The main content area is a white rounded rectangle with a grey border. It displays the text "Inside temperature is 72°" and "Thermostat settings:". Below this are three control panels. The first panel, labeled "Setting 72°", has two buttons: "warmer" and "cooler". The second panel, labeled "Mode Heat", has four buttons: "heat", "auto", "cool", and "off". The third panel, labeled "Fan Auto", has two buttons: "auto" and "off".





ILSA Vision - Gather

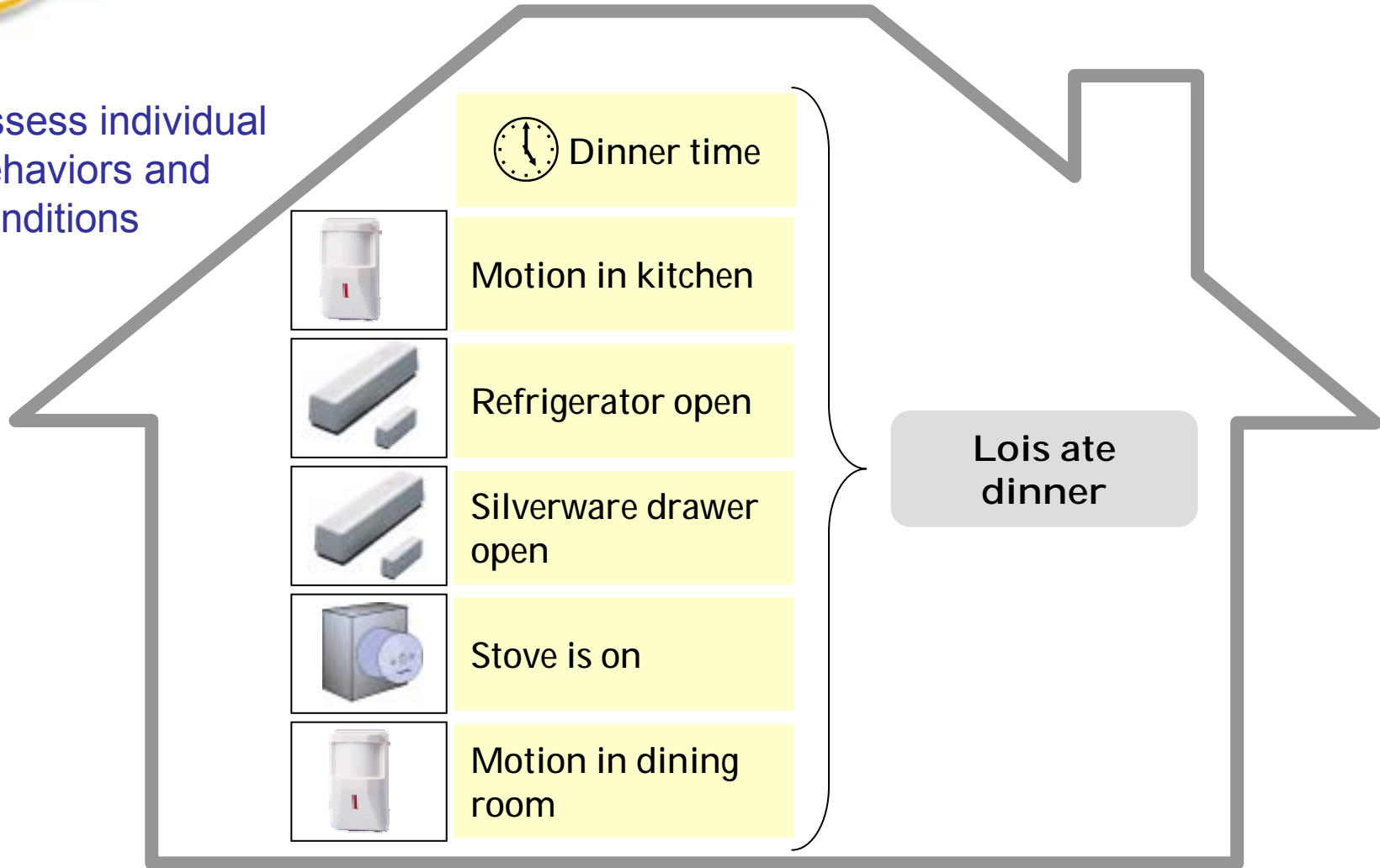
Gather information from a variety passive sensors, active sensors, and smart devices





ILSA Vision - Assess

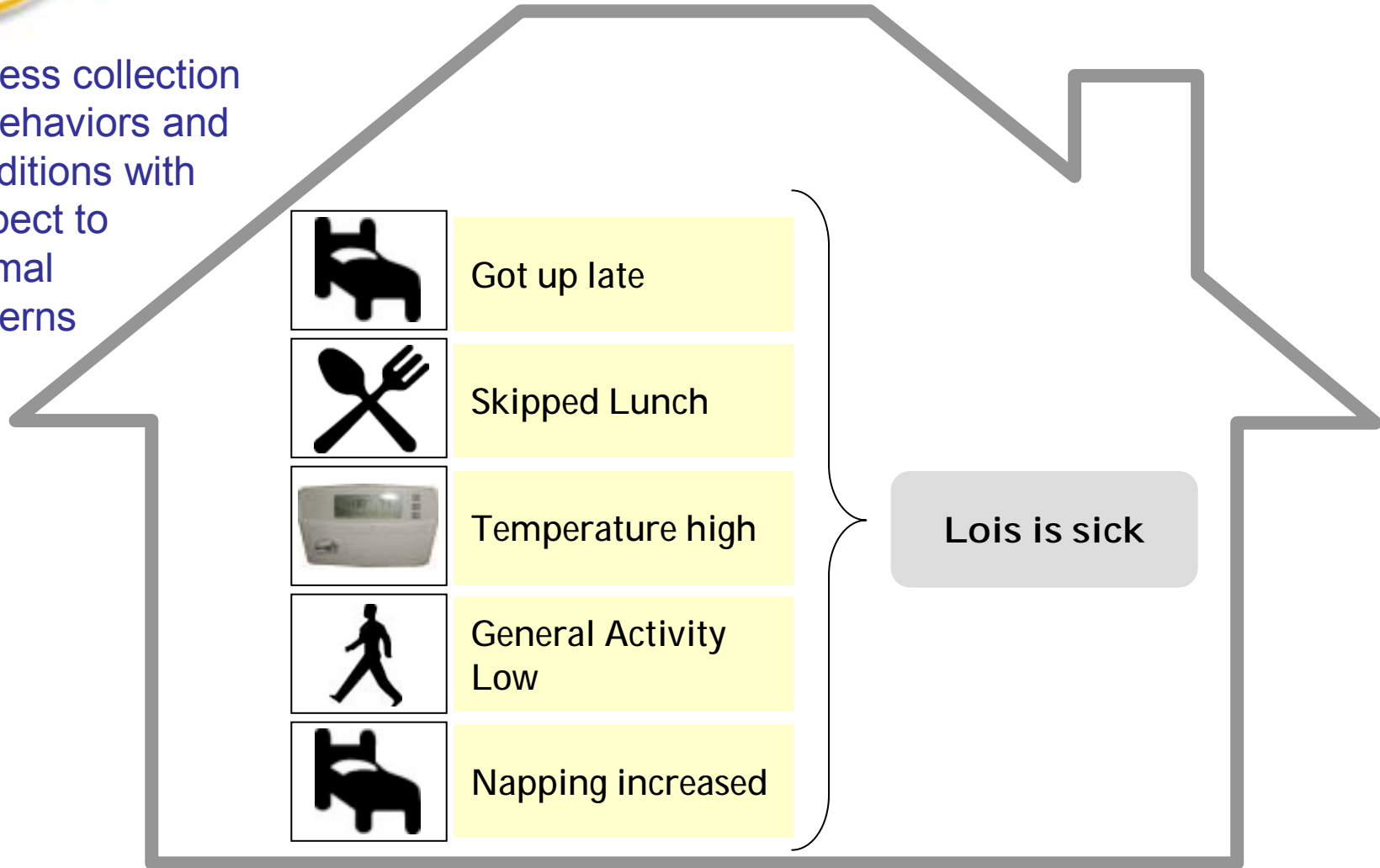
Assess individual behaviors and conditions





ILSA Vision - Assess

Assess collection of behaviors and conditions with respect to normal patterns





ILSA Vision - Respond

Prioritize conditions and formulate an appropriate response plan

The Stove's been left on for 46.3 minutes!

It's time to take your medicine!



I've fallen, and I can't get up!

Linda's calling.





ILSA Vision - Respond

Control situation so Loisí immediate needs are met

The Stove's been left on for 46.3 minutes!

 **Stove - turn yourself off.**

It's time to take your medicine!

 **Reminders - be quiet for now.**



I've fallen, and I can't get up!

Lois, are you all right?



Linda's calling.

Phone - disconnect Linda and call caregiver. I'll talk when you connect.

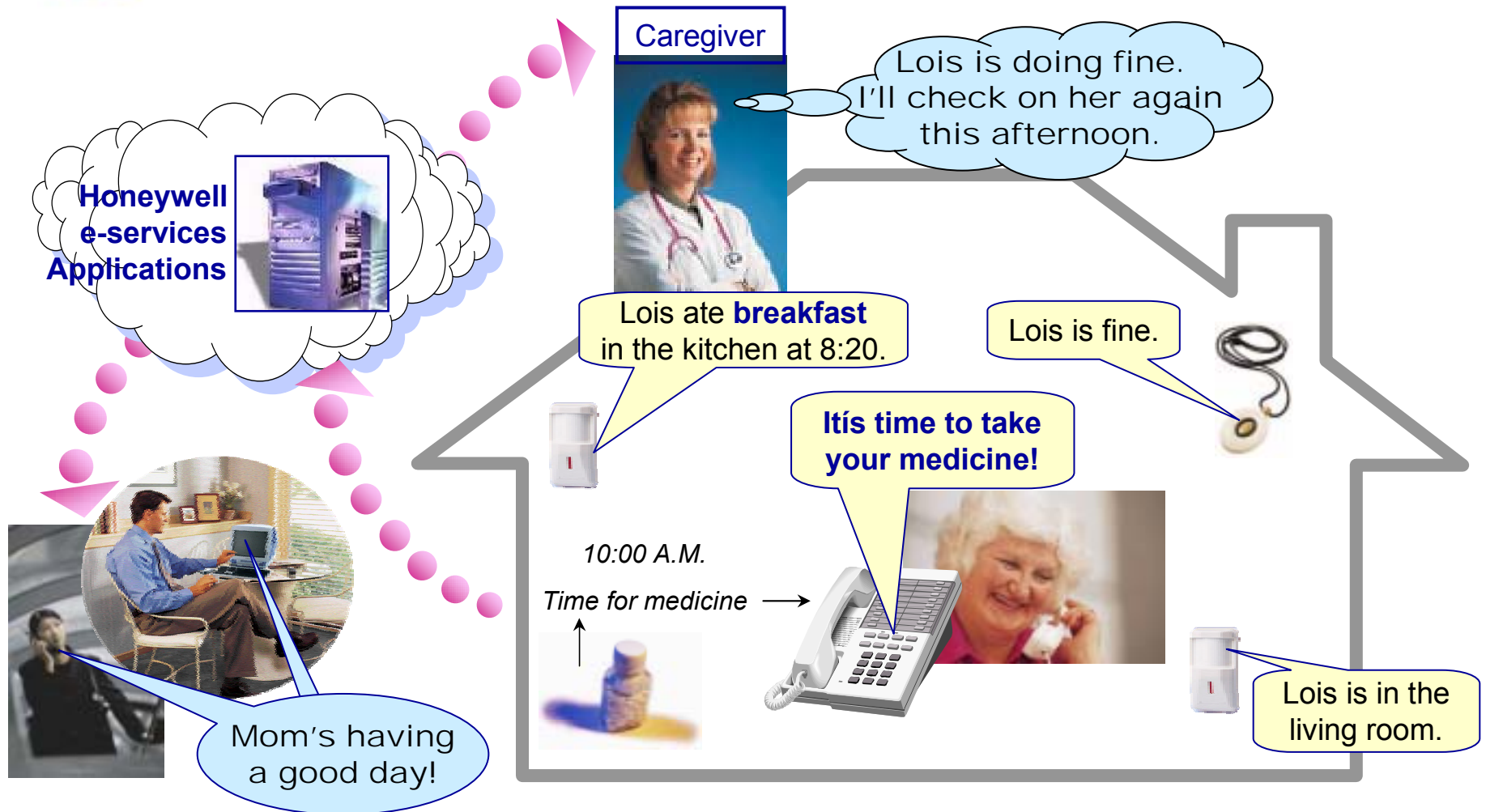


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ILSA Vision - Share



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Initial Functions and Features

Monitoring

- Intrusion detection
- Mobility (general activity level)
- Toileting
- Falls
- Verify medication taken
- Home and away
- Panic button activation
- Environmental conditions

Response

- Alarms, alerts, notifications, reports
- Auto-contact help
- Path lighting

Services

- Reminders
- To-Do lists
- Remote access to information
- Coordinate multiple caregivers
- Reduce false alarms

Usability Features

- Acknowledge with exceptions
- Operational modes (vacation, guests, sick...)
- Muting (cameras, reminders...)
- Password-free elder interactions





Technology Innovations

- Home automation
- Situation Assessment
- Machine Learning
- Adaptive Interaction Design
- Human-Centered System Design





Progress

2001 Accomplishments

- Studied users to identify what leads to institutionalization and what are the greatest monitoring & assistance needs
- Developed infrastructure to support hardware-software communications and speech recognition capabilities
- Developed system architecture, situation assessment capabilities, and began learning capabilities
- Implemented and test a prototype system in laboratory setting





Plans

2002 Activities

- Address configuration and set-up issues
- Refine and enhance machine learning capabilities
- Expand system's ability to communicate with various types of sensors and devices
- Evaluate user interfaces and user interaction issues

2003 Activities

- Evaluate overall system in field settings over extended period of time

