



Independent LifeStyle Assistant™ (I.L.S.A.)

A NIST ATP Program

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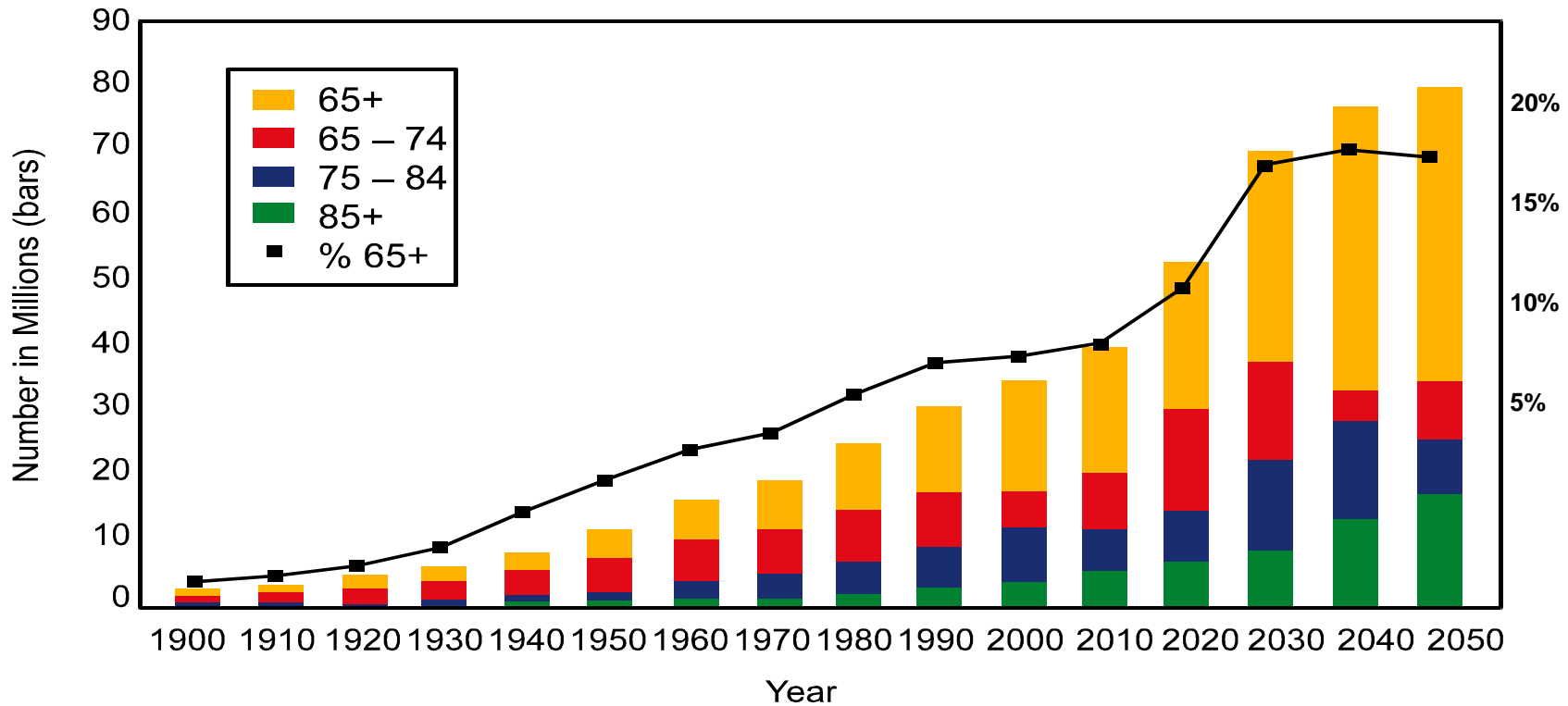
University of MN School of Nursing

United Health Group EverCare





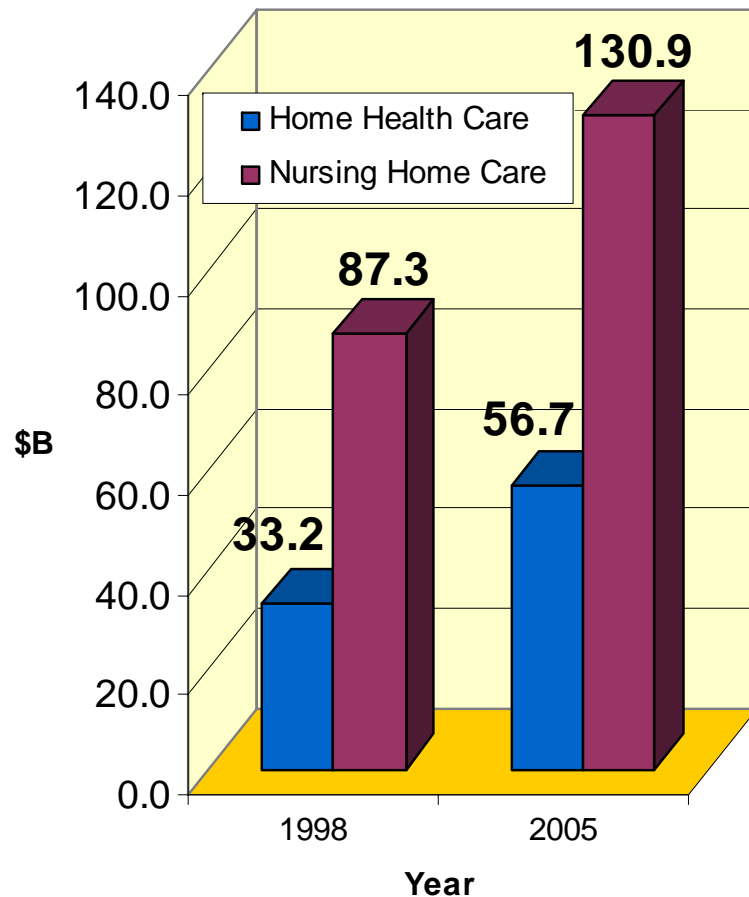
The Elder Boom



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



U.S. Financial Statistics



- Federal government pays 57% of nursing home and home health care costs (primarily Medicaid)
- 43% of those over 65 will enter a nursing home at some point
- 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)



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Quality of life

- Desire to maintain independence
- Limitations
 - ◆ Arthritis (49%)
 - ◆ Hypertension (35%)
 - ◆ Heart Disease (31%)
 - ◆ Hearing (31%)
 - ◆ Activities of daily living
 - ◆ Falling
 - ◆ Fraud



Support systems (Caregivers)

- Institutions are costly
- Remote families
- Decreased availability (aging population)

Technology developments

- Widespread, diverse products and services
- Lack overall, integrated infrastructure
- Resistance to new technology



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Thursday
APRIL 8, 1999

Woman, 89, says relocation violates her rights

She sues her nephew and Hennepin County in an effort to remain in her home in Minneapolis rather than be moved to a nursing home in Wisconsin.

By Warren Wolfe
Star Tribune Staff Writer

Emotionally-laden issue
for both the elder and
the family



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November 2002



The Vision

- **Gather** information about elder, activity, and home status by 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 inside the home
- **Respond** to a given situation by providing assistance to the elder and getting help when necessary
- **Share** health and status information with authorized family/caregivers to help improve the quality and timely delivery of care



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In a Nutshell

Program Objective

Develop an intelligent home automation system with situation awareness and decision-making capability based on integration of diverse sensors, devices, and appliances to support caregivers and enable elderly users to live independently at home.

Programmatics:

- Co-sponsored by the National Institute of Standards and Technology Advanced Technology Program

Benefits:

- Support elder independent living
- Provide peace of mind to caregivers
- Support efficient quality care for caregiving organizations
- Cost savings for government and industry

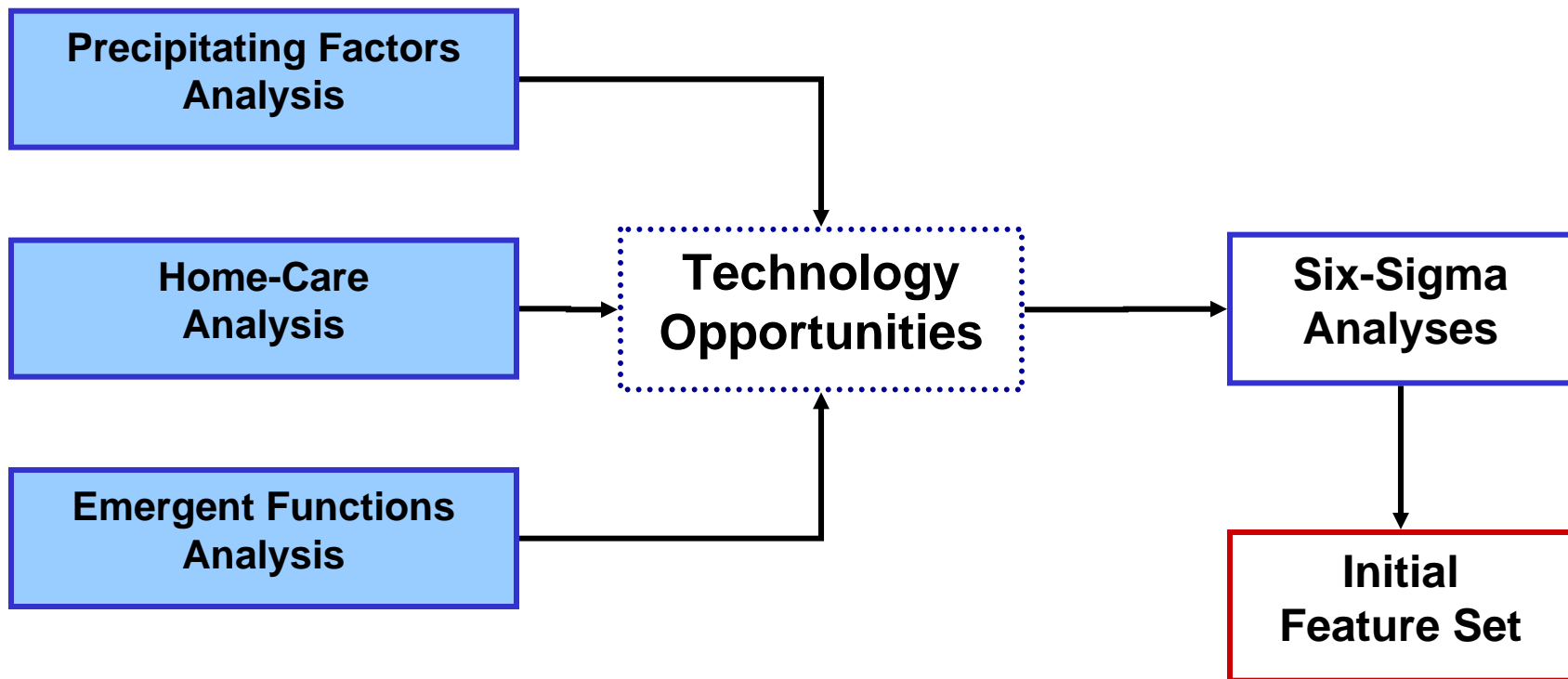


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Research Summary

Focusing on Features





Factors Precipitating Institutionalization

Literature reviews, interviews with adult children caregivers, and discussions with geriatric experts identified the most significant factors that pose a threat to the independence of elders.

- Safety
- Medical Monitoring
- Mobility
- Caregiver Burnout
- Medication Management
- Dementia
- Eating
- Isolation
- Toileting
- Equipment Use (usability)
- Wandering





Factors that Precipitate Institutionalization

Higher Significance

- Safety
- Medical Monitoring
- Mobility
- Caregiver Burnout
- Medication Management
- Dementia
- Eating
- Transportation
- Isolation
- Managing Money
- Toileting

Lower Significance

Housework
Shopping
Pressure Sores
Equipment Use
Alcohol Abuse
Wandering
Hallucinations & Delusions



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Home-Care Analysis and Opportunities

- **Functional Assessment and Monitoring**
 - Medical, as well as physical / mental function
- **Managing Information**
 - Medical history accessible to all caregivers and medical professionals
- **Coordinating Care**
 - Address the disconnect between the medical community, professional caregivers, family caregivers, and elders
- **Educating the Care Community**
 - train informal caregivers to recognize signs of dementia
 - train geriatricians to better recognize environmental factors contributing to dementia, especially in behavior outside the home
 - train physicians to better communicate medication strategies



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Emergent Functions Analysis

Potentially valuable features can be overlooked because they are not represented by specific interactions between the user and the system.

- Interactions between the client and the environment
 - Example: Using temperature data and door sensors to alert if an elder leaves the home without adequate clothing for the weather.
- Interactions between different aspects of the environment
 - Example: Locking windows in the home in response to the front door being locked.

This analysis produced 85 potential functions, either to generate alerts to caregivers, or provide direct assistance to the client. No emergent functions are in the initial features because environmental factors were rated low in priority.





What I.L.S.A. Looks Like

Control Boxes

- **Home & Away** - Hidden in closet, talks to sensors and devices

Devices to communicate with I.L.S.A.

- **Telephone** - I.L.S.A can call you with a message
- **WebPad** - You can get information from I.L.S.A.

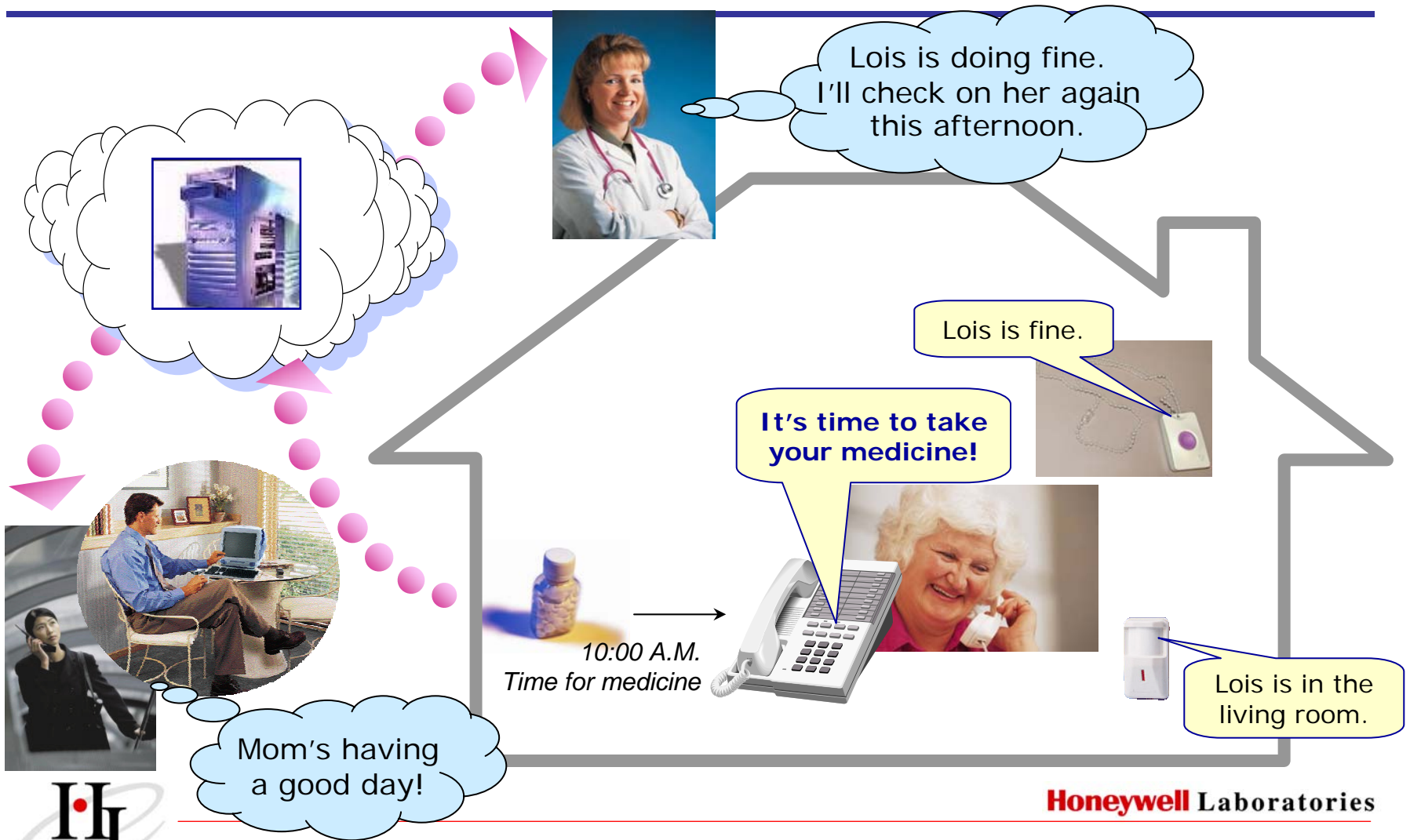
Sensors

- **Motion Sensors** - Sense motion in a room
- **Call Button** - Same as your current call button
- **Medicine Caddy** - To tell I.L.S.A. when you take your medications





A Day In Your Life With I.L.S.A...



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What I.L.S.A. Will Do

Functions¹

- **Reminders:** Notes to help you remember what you should do today
- **Mobility²:** Summary of your activity level for each time period of the day
- **Medicine²:** List of the medications you should take and whether you opened the caddy at the correct time
- **Controls:** The status of I.L.S.A. for your home
- **Help:** What to do in an emergency and who to call if you require assistance

Support

- **Caregiver/family member, user guides, and technical support**

¹*Critical to have accurate information*

²*Thresholds have been established to issue alerts for these functions*



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The Study

The study will last 4–6 months. Expectations of participants include:

- Completion of consent forms
- Provide start-up information
- Participation in focus groups

Honeywell Laboratories and its partners will support participants with:

- The I.L.S.A. system at no charge
- On-going support



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Field Test Scope

Evaluation Scope

- **Interface & Interaction design**
 - Ease of use, access to information, intuitiveness, match with expectations
- **Attitudes and perceptions**
 - Trust, levels of monitoring, privacy
- **Patterns of behavior**
 - Accuracy of identification, inferences, and learning
- **System operation**
 - Quality of data from devices, appropriateness of behavior
- **Affect of system on...**
 - Caregiver effectiveness and burden, quality of care, elder sense of independence
- **4-6 month duration**





Field Test Plans

Evaluation Sites

- **Two locations**
 - 20 homes in Minnesota & Florida
 - Assisted, community, independent
- **Elder Criteria**
 - Needs assistance with IADLs
 - Takes 1 or more medications
 - Has family or formal caregiver who provides regular assistance
 - Caregiver willing to participate in study

Evaluation Methods

- **Usability evaluations**
- **Interviews & Surveys**
- **User & System Logs**
- **Focus Groups**





Independent LifeStyle Assistant



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Independent LifeStyle Assistant



The Stove's been left on for 46.3 minutes!



Stove - turn yourself off.

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



**[via speaker]
Lois, are you all right?**

It's time to take your medicine!

You need more milk.

Fridge - we'll take care of the milk later.



Reminders - be quiet for now.



Linda's calling.

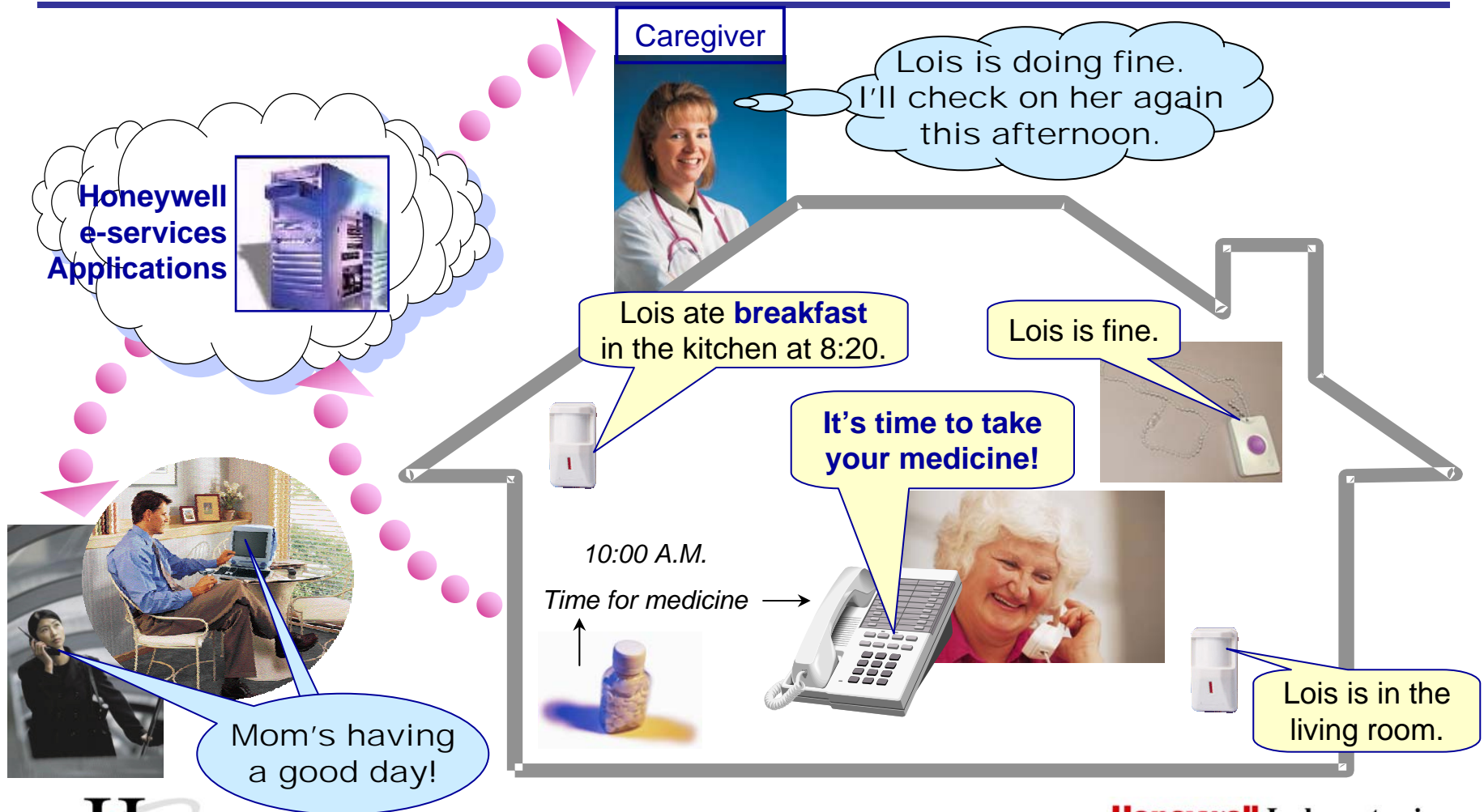
**Phone - disconnect Linda and call caregiver!!
I'll talk when you connect.**



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Example Integrated Assistive System

I.L.S.A.



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