

In-Home Health Care: research and practice

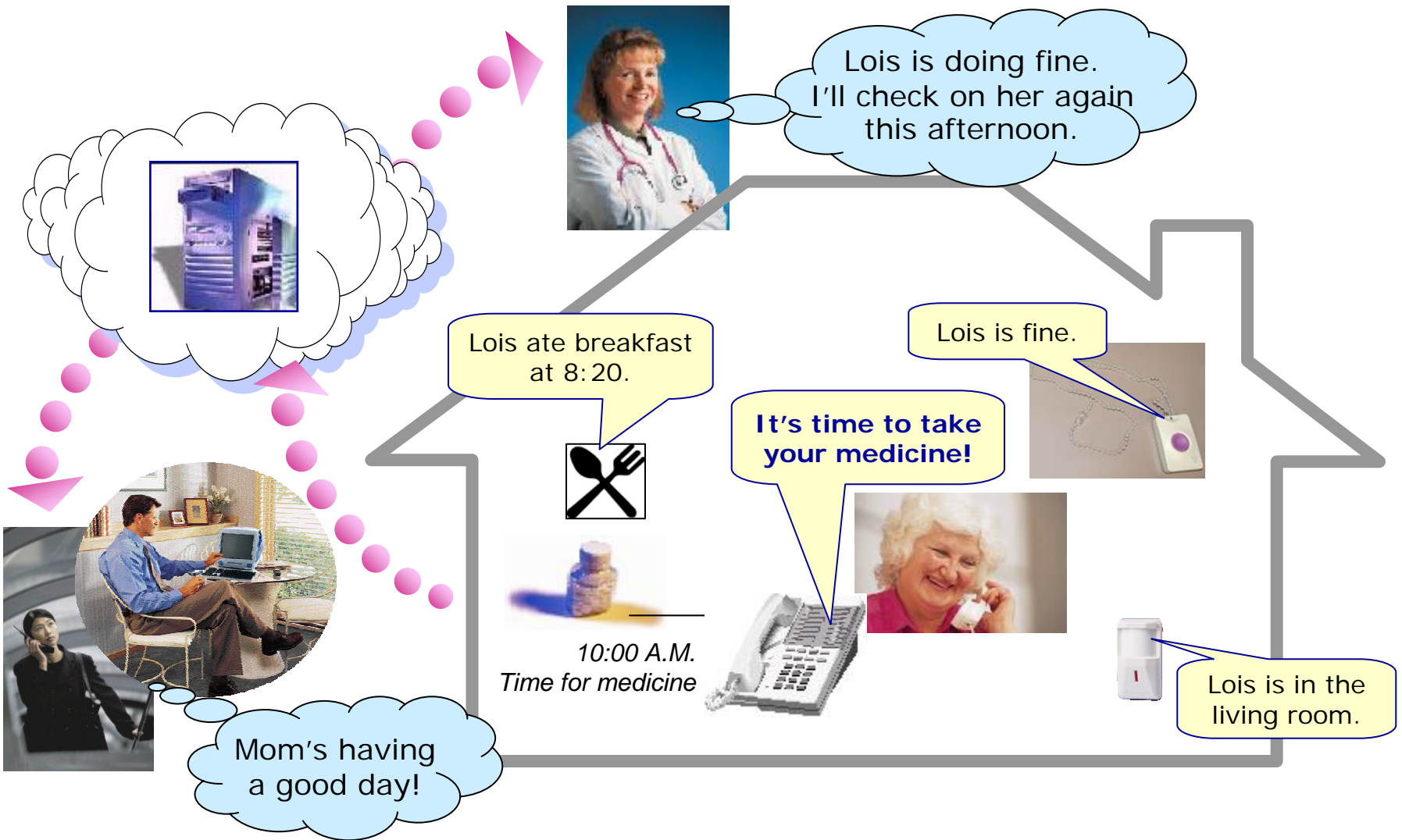
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Honeywell

Outline

- **Research project: NIST ATP Independent Lifestyle Assistant (ILSA)**
- **Commercial business: Honeywell HomMed**

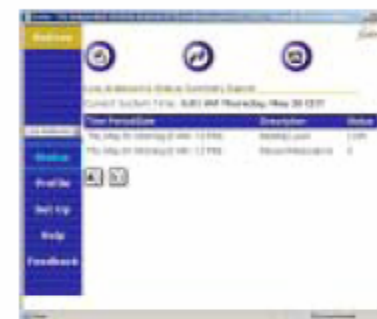
The Vision



I.L.S.A. System



Client Interface
Honeywell Webpad™
anywhere in client's home



Caregiver Browser
From any internet connection

Wireless Sensors
monitor general or
specific activities



Hidden **control and communication** components

Broadband internet



I.L.S.A. Server
Modular agent-based System



Installation

Example apartment layout with sensor locations

- Zones 11-16
IR motion detectors

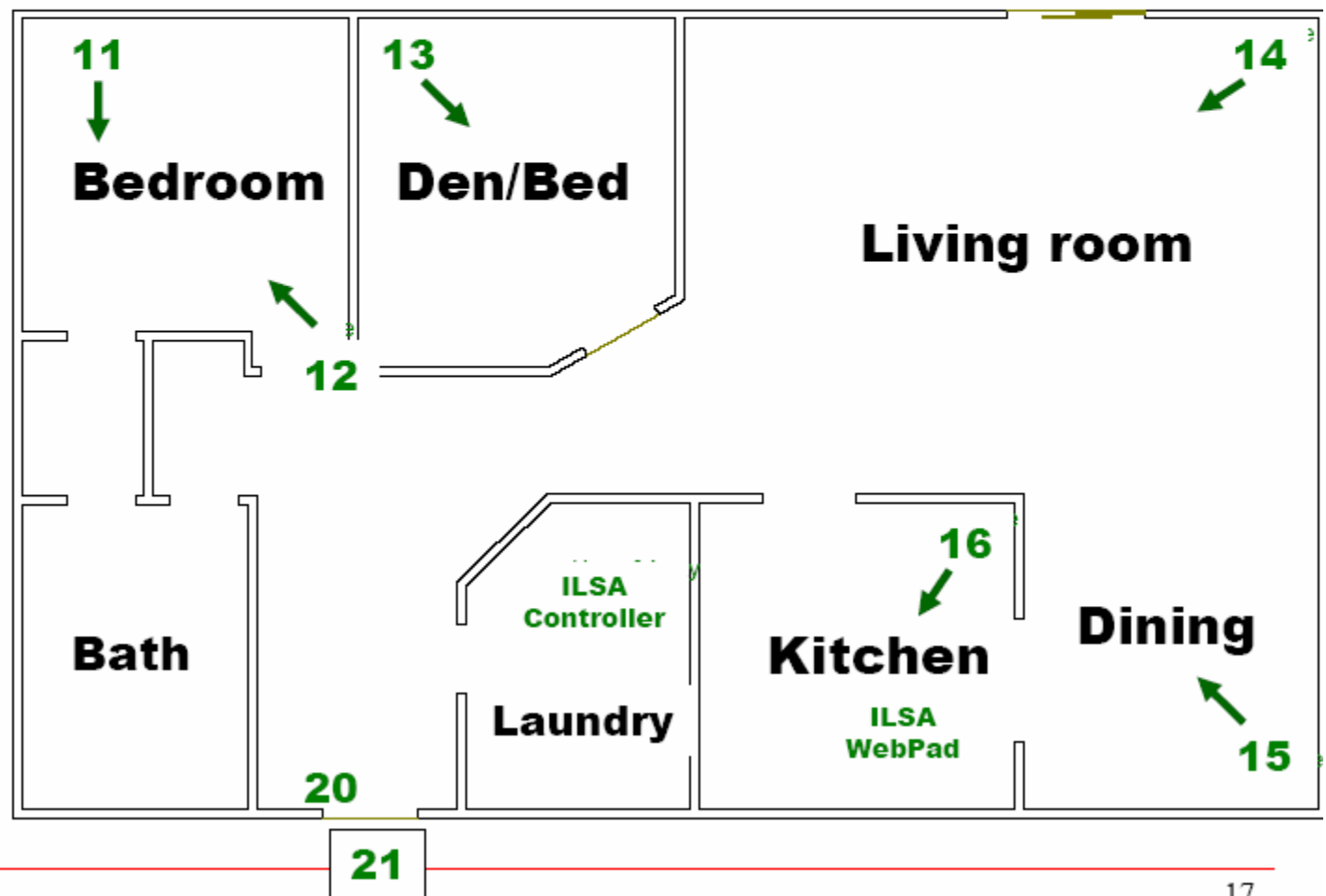


- Zone 20
Entry Door contact switch

- Zone 21
Hallway Pressure Mat



- Zone 10
med caddy contact switch





Test Subject Demographics

Location	N	Situation	Gender	Age
Minnesota	7	1 assisted apartment 6 independent apartment	1 male, 6 female	Ave: 83.42 Range 76-96
Florida	4	All in own homes	1 male 3 female	Ave: 70 Range (56-76)

- Relatively high education, High School to PhD
- Relatively high acceptance of technology
- “Early Adoptors” who want to influence technology

Identifying willing elder/caregiver teams was more difficult than anticipated

Some Conclusions from Field Trials

- **Sensor placement concerns necessitate an experienced installer**
 - installation and configuration of activity sensors is a significant barrier to cost-effective application
- **False alerts are a major problem**
 - machine learning appears to hold promise for alleviating it
- **Most clients showed a reduction in missed medications while using ILSA**
 - disliked telephone reminders; worked to avoid them
- **Elders more interested in an interactive system than expected**
 - but subjects were more computer-literate than general elder population
- **Initial concerns about privacy were forgotten within a day or so of installation**
 - but privacy was number one barrier to finding willing participants
- **Family/caregiver participation very important**

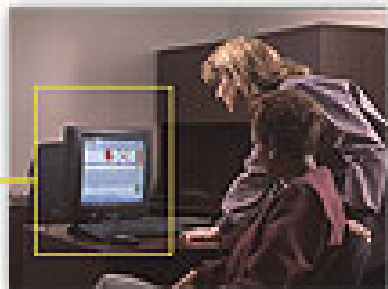
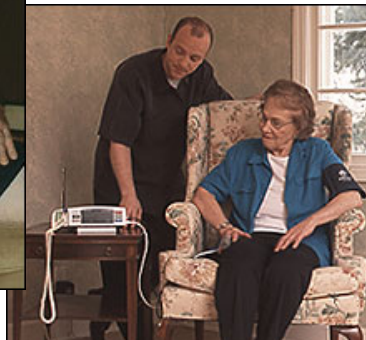
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Honeywell HomMed

Honeywell



- Telemonitoring systems for healthcare
- Over 15,000 systems currently in use; over 300,000 patients monitored—more than all other providers of home telemonitoring combined
- Customers include managed care organizations, disease management organizations, hospital specialty clinics, home healthcare agencies, senior and assisted living facilities
 - ROI within 6 months typically
- 40-67% reduction in hospitalizations and 40-65% decrease in ER visits for patients with CHF, diabetes, COPD, CAD
 - HomMed monitored patients versus matched nonmonitored cohort
- Other benefits: patients can live in their homes, clinical personnel can make in-home visits only when required, greater nursing efficiencies

Telemonitoring Unit and Parameters

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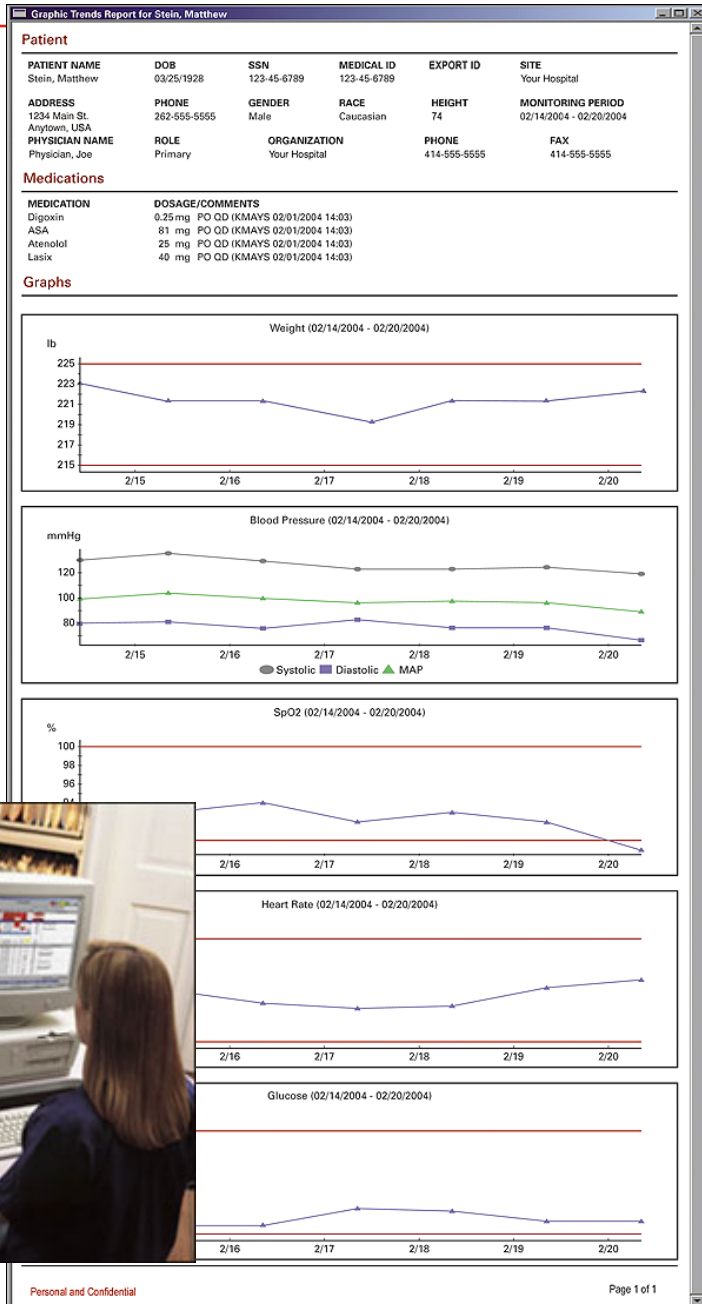


- The Honeywell HomMed Health Monitoring System has two main components.
 - telemonitoring unit: in home or clinical environment; collects and transmits health status information
 - central station: receives data and presents it to clinical personnel for monitoring and tracking
 - both FDA Class II medical devices (hospital grade)

- Five key parameters monitored
 - blood pressure
 - heart rate
 - weight
 - oxygen saturation
 - temperature
- Additional medical peripheral devices can be added
 - glucose meter
 - pocket size ECG device
 - spirometer
 - peak flow meter/FEV1
 - PT/INR device
- Plus yes/no questions
 - “Are you feeling any dizziness?”
- 3-5 mins, once or twice a day



Clinical Oversight



- Nationwide network of selected home healthcare agencies and skilled clinicians**
 - covers 95% of the US population
 - agencies undergo extensive training
- Several reports and applications available at central station**
- Capabilities to track and trend data, record and view nursing / physician notes, generate printed or faxed reports, etc.**



“Health and Wellness Kiosk”

Honeywell



- Targeted to corporations, health clubs, senior living communities, etc.
- Allows multiple users to securely monitor their health in less than three minutes.
- HIPAA compliant. Information sent securely over telephone lines. No user identifiers attached to data.
- Local healthcare agency reviews the healthcare data and communicates any changes to pre-set levels to the individual and their physician.

Conclusions

- **Healthcare monitoring: exciting area for research ... with the promise of societal impact in both the near and long term**
- **Government, academe, industry cooperation required**
 - several universities leading the charge: UC Berkeley, Penn, Carnegie Mellon, ...
- **Industry involvement beyond R&D labs possible**
 - potential for pilot applications and test beds
 - commercial offerings can provide foundation for applications of new research
- **Today's commercial systems are not highly sophisticated**
 - innovations in business model and delivery, not principally in technology ... many opportunities for R&D
- **Multihorizon roadmaps and funding initiatives needed**
 - industry should be better engaged in longer-term research
 - academe can help by understanding market economics and related issues