Spurring Innovation in Senior Independent Living: Engineering a New Research Infrastructure

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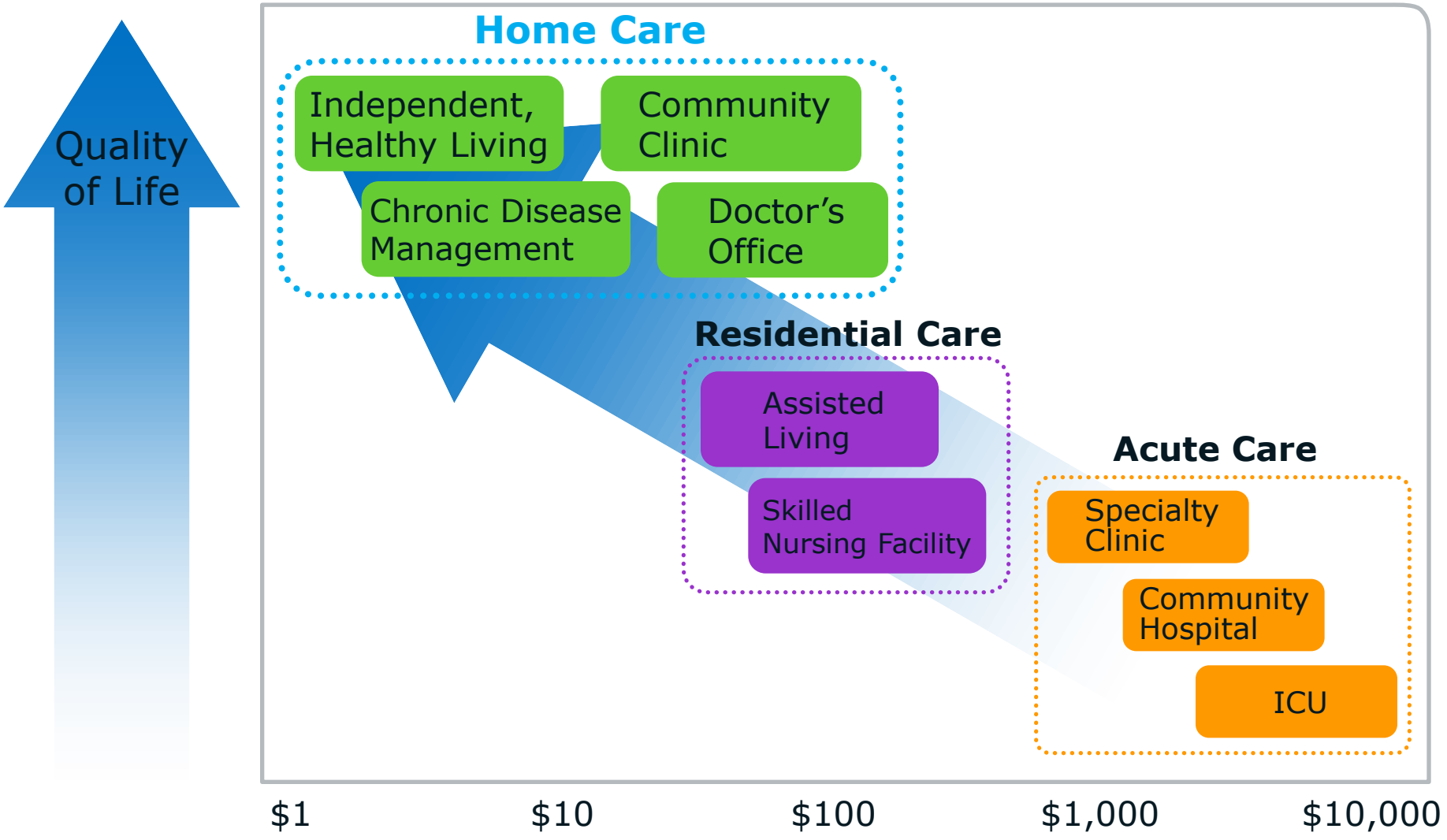
Intel + aging/independent living + research?

- Intel ethnographic research & evidence-based home pilots began in 1999
- Deep studies of 1000 elder households, 250 healthcare facilities, 20 countries
- More than a dozen innovative in-home pilots of personal health technologies
- Funded 120+ university researchers with seed $ and ETAC, TRIL, ORCATECH
- "Living Lab" cohorts of 100s of senior households in Oregon & Ireland
- Advocating public policy change in this area via CAST, Continua, Intel policy, etc
- Joint venture: Intel's Digital Health Group + GE Healthcare's Home Health => Care Innovations (2011)
- Remain invested in the success of the Senior Independent Living Research (SILvR) Network Initiative

Content Areas Studied

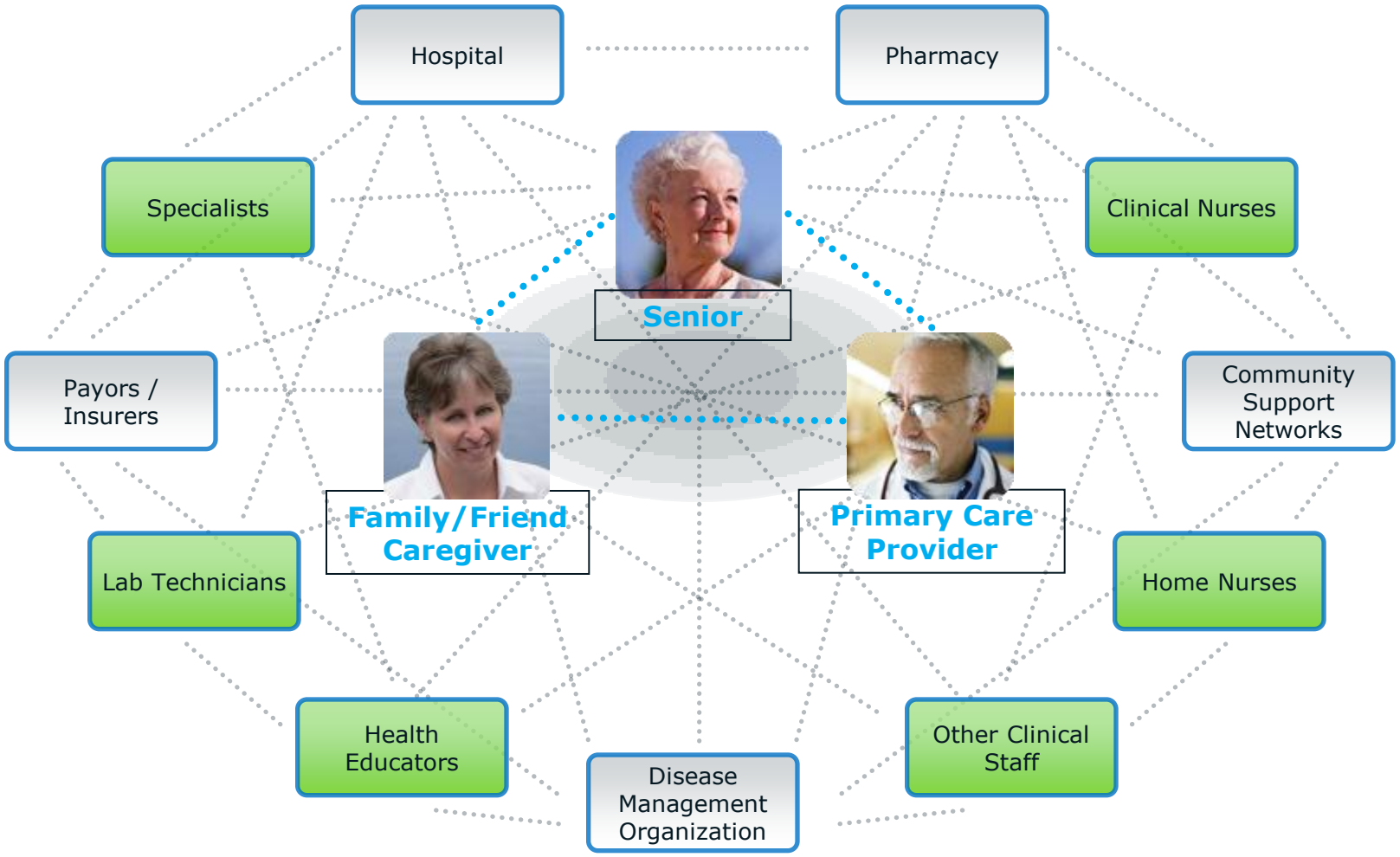
- Alzheimer's
- Cancer
- Cardiovascular Disease
- COPD
- Depression/ Mental Health
- Diabetes
- Falls
- Hypertension
- Medication
- Obesity
- Parkinson's
- Psychosocial health
- Stress
- Stroke
- Transportation

Perspective #1: Use Technology to "Shift Left"



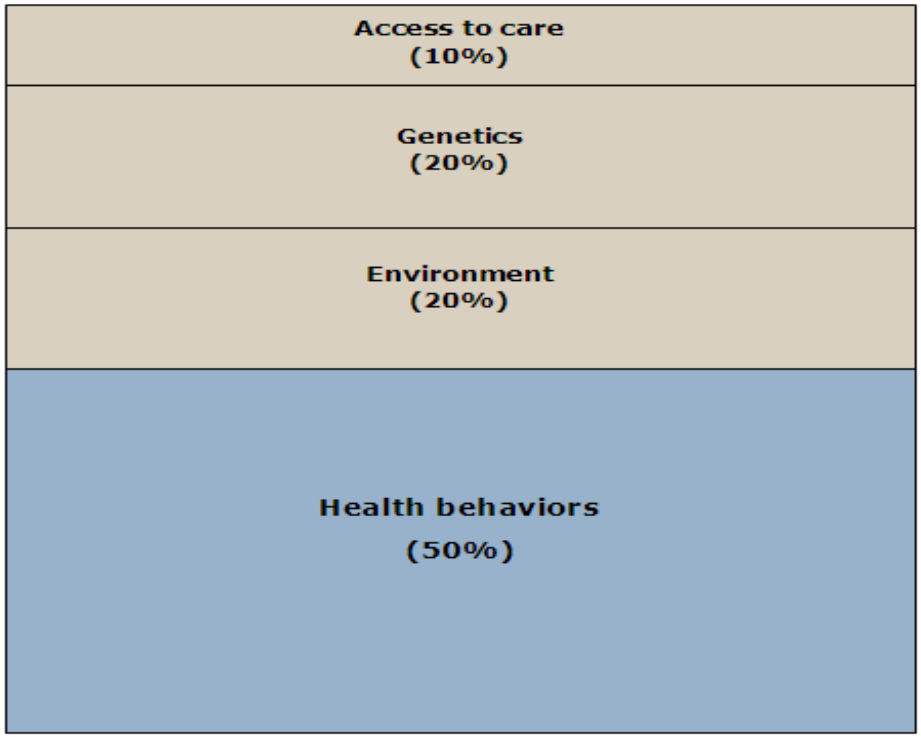
Implication: changes to care models, resources, workforce

Perspective #2: Enable the caregiver networks



Implication: mixing social, consumer, and enterprise interests

Perspective #3: Find behavioral markers



Source: Institute for the Future; Centers for Disease Control and Prevention.

"Behavior, not just Biology."
Implications: Need new diagnostic tools

Perspective #4: Grow the R&D Ecosystem

Research intent	Intel investments	Partner(s)	Good	Learnings
• Spark the research interests and activities	• "Seedling" research grants (2000-2007)	• Academia	• Started some early careers • Created an initial network	• Collection of 1-offs reduced the impact • Limited interdisciplinary work
• Sharpen the focus • Build interdisciplinary approaches	• Everyday Technology for Alzheimer's Care (ETAC) (2003-)	• Alzheimer's Association • Academia	• Created a stronger career and network foundation • Started interdisciplinary work	• Not a lot of commonality to the approaches • Needed more outcome studies
• Establish collaborative research tools and environment • Create evidence	• Oregon Center for Aging Technology (ORCATECH) (2004-) • Technology Research for Independent Living (TRIL) (2007-)	• OHSU • NIH • IDA	• Common research platforms created • Sustainable "living labs" start generating data • Started building evidence	• Not sufficiently scaled or scalable • Need sustainable infrastructure • Must accelerate output delivery
• Sustainable, scalable research infrastructure for independent living • Build critical mass • Accelerate discovery, innovation, evidence	• Senior Independent Living Research (SILvR) Network Initiative (2010-)	• FNIH • OHSU • RWJF • NSF • Et al.	• Incentives for all SILvR stakeholders to participate • Leverages existing aging/SILvR investments • Simultaneously advancing discovery, innovation, and evidence-building	• Interdisciplinary research demands a lot of discussion and translation work • Doing science differently is hard

Implications: a progression; lots of players

Example from ORCATECH Living Labs in Homes

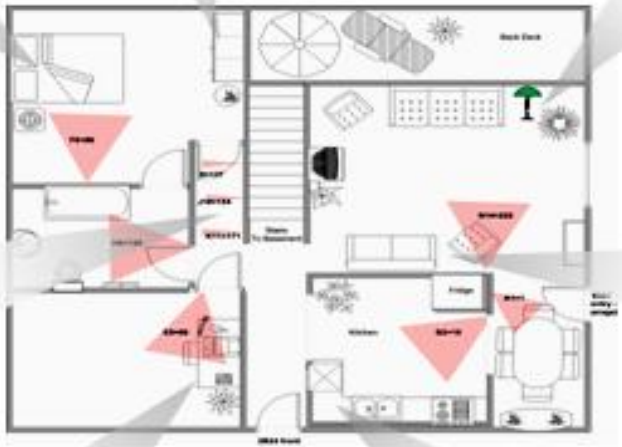
* Actigraphy devices

Bed mats

* Physiological sensors

* Localization sensors

Walking speed sensors

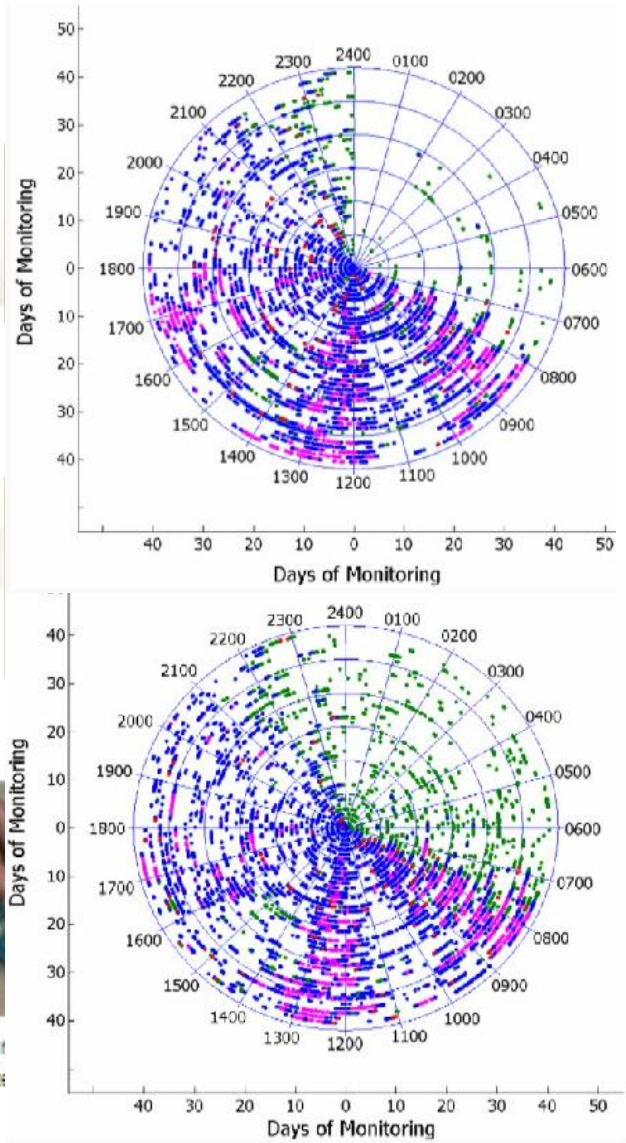


*Cell phone as prompting device and for location tracking

Home computer for coaching, personal use, and cognitive testing

Door sensors

Medication t… devic…







A Day in the Life of Gladys

Real Time, Real World, Real Trend data
Biological, Behavioral, Psychosocial data
Embedded and ongoing assessment
Multiple touchpoints for intervention
Comfortable settings and devices
Personalized, just-in-time care

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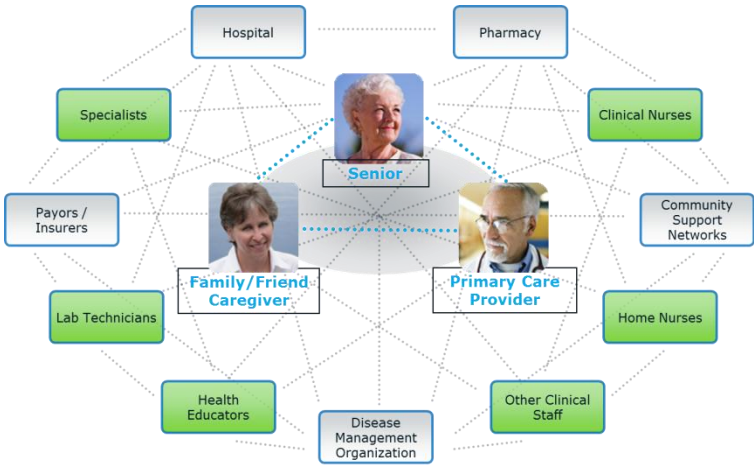
R&D Models of Interests

R&D model	Notable facts (U.S.)	Attractive ingredients
Pharmaceutical R&D	Rev=$160B+/yr industry	• Market and industry "lead with science"
Women's Health Initiative (WHI)	$625 million / 15 year study RCT - 68,132 women at 40 clinical centers OS– 93, 676 women	• "Sustainable" and "flexible" research infrastructure for hypothesis/non-hypothesis, observation/intervention longitudinal studies
Alzheimer's Disease Neuroimaging Initiative (ADNI)	I. $67M, 5 years, 800 adults at 50 sites across U.S.	• "Precompetitive environment" • Structured to be "scalable" • Data "open" to the public • "Broad stakeholder" enrollment

Necessary (but not sufficient) ingredients for SNI success

Other Prescribed Ingredients for SNI Success

Ingredient	Meaning…
“Holistic”	Must involve the caregiving network
“Accelerated science”	Discovery + Innovation + Evidence
“Cost effective”	Leverage other longitudinal aging studies in getting started
“Technology and solution agnostic”	Different technologies/solutions coexist

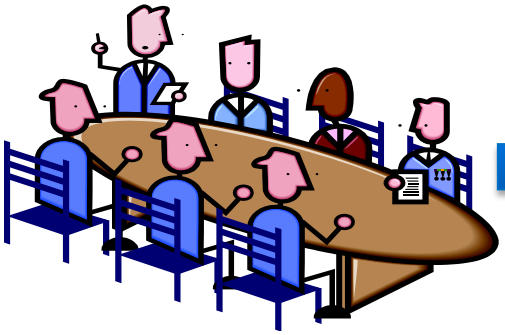


"Technology and Solution Agnostic": Activity Example

Discovery Engine: How do people move about in a house; how does that change with age?

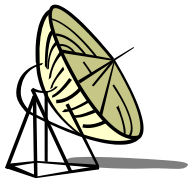
Evidence Engine: Can changes in movement patterns effectively signal changes in falls risk?

Innovation Engine: What are the system requirements for capturing movement?



Requirement: System shall be able to identify and record the location of a specified participant within the house under conditions X, Y, Z, etc….
Minimum specification: Room-level resolution with 95% reliability sampled every 60 seconds.
Optional specification: 1 m resolution with 95% reliability every 10 seconds

Example candidates: IR sensor system, radar system, acoustic system, beacon system



Verification work would done by Technology core to "QUALIFY" candidate systems

SILvR Network Initiative

- Phase 0: Proof of concept: Enroll 30-50 subjects at 3-5 study sites and test the operational machinery.
- Phase I: Basic Development. "High touch" pilots to understand and work out initial study and cohort issues.
- Phase II: Scaled Deployment. Industrialization of research effort into senior housing and communities.
- Phase III: Turnkey deployment: Simplified enrollment and installation to broaden geographic and demographic populations of study.

Summary

Key takeaways

- Challenge: Crossing business lines
- Don't forget: the caregiving network
- Need: new behavioral "diagnostic" tools
- Enablement: Build a national research infrastructure for senior independent living research – the SILvR Network Initiative (SNI)

Ingredients for successful SNI

- Lead with science
- Sustainable and flexible infrastructure
- Open
- Precompetitive environment
- Scalable
- Holistic
- Cost effective
- Accelerated science
- Technology and solution agnostic
- Broad stakeholder enrollment

Goal: 10,000 homes in SNI by 2020!

Thank You

Who's been involved?

Academia
- Carnegie Mellon
- Georgia Tech
- Mayo Clinic
- Oregon Health and Sciences University
- Rush University Medical Center
- University of Miami
- University of Missouri
- University of Pittsburgh
- University of Virginia
- University of Wisconsin
- Washington State

Advocacy/NFP
- AAHSA/LeadingAge
- Alzheimer's Association
- Home Care Technology Association of America
- National Caregivers Alliance

Foundations
- FNIH
- Robert Wood Johnson Foundation
- SCAN Foundation

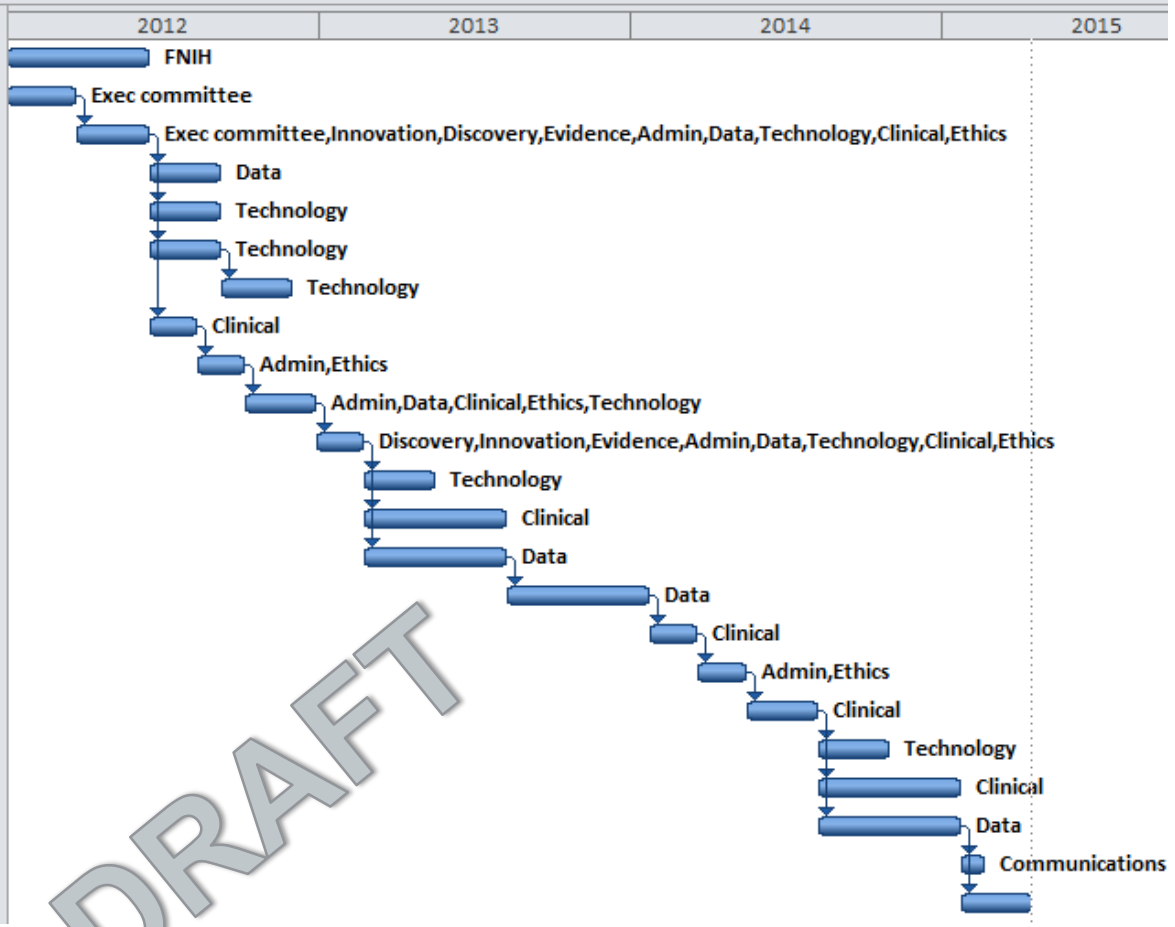
Providers
- Cathedral Square
- Kaiser Permanente
- VA

Government
- AHRQ
- CDC
- FDA
- NIH: NIA, NIBIB, OBSSR
- NHS Innovations
- NIST
- NSF
- OSTP
- State Department
- VA

Industry
- AT&T
- GE Global Research Center
- GrandCare
- HealthSense
- Intel
- Johnson and Johnson
- Philips
- Qualcomm
- Sanofis-aventis
- Verizon

Research Institutes
- Group Health Research Institute
- Research Triangle Institute

Task Name
Recruit and enroll SNI partners/sponsors
Recruit and staff SNI governing bodies
Build and coordinate policies/requirements/procedures
Construct data standards, specifications, and resources
Identify and qualify existing equipment, platform, software
Build new equipment, platform, software
Qualify new equipment, platform, software
Design SNI study protocol
Submit study protocol to IRB
Train operations staff
Update policies/requirements/procedures
Deploy techologies
Execute study protocols
Collect and monitor study data
Compile pilot study results
Review results/refine study design
Refine IRB
Recruit and consent SNI participants
Deploy technologies
Execute study protocols
Collect and monitor study data
Publish results
Propose and build new study arms (ad hoc)



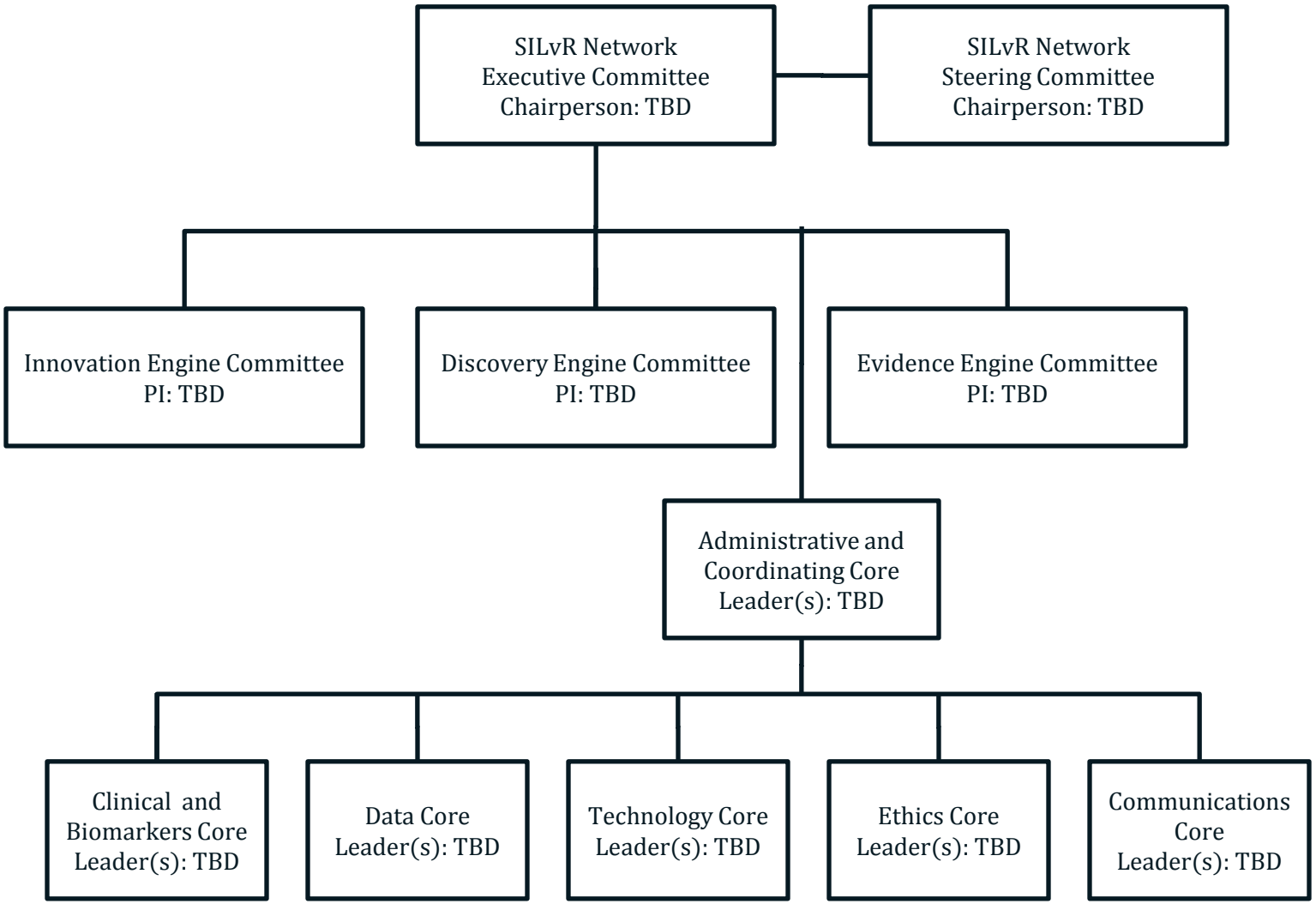
Year 1 results
- SNI funded
- SNI governing bodies constituted
- Data standards and resources established
- Study requirements specified
- >1 complete system solution qualified
- Study protocols designed
- Study submitted to IRB

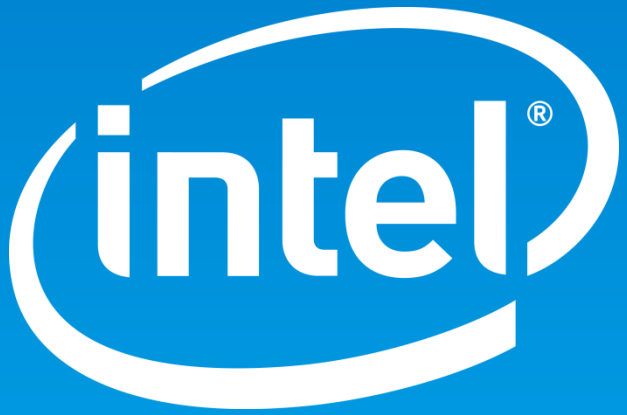
Year 2 results
- Study approved by IRB
- Staff on-board and trained
- 50-200 Pilot study participants recruited and consented; >3 sites
- Technologies deployed in pilot study homes
- Pilot study started
- Study protocols published

Year 3 results
- Pilot study completed
- Study modifications completed
- Study approved by IRB
- 500-2000 study participants recruited and consented
- Technologies deployed in study homes
- Study started
- Pilot study results published

Year 4 results
- 2000-4000 new study participants recruited and consented
- Technologies deployed in new study homes
- Study started in new homes
- Early study results published

SNI Organization and Governance

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