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The TRIL Centre is an active research collaboration between industry and academic partners including Intel, Trinity College Dublin, University College Dublin and the National University of Ireland, Galway. The Centre is driving bi-directional knowledge and technology transfer through the collective work of a multidisciplinary team.

PARTNERS

FUNDERS
“Last time, I got up in the middle of the night to go to the bathroom and the floor came up to meet me, I don’t know what happened”

Caitlin

“When my family visit I take them out for a meal. They’ll not be giving alms to me. But I do enjoy the craic.”

John

“Life long learning is important. I passed my driving test at 60. Important when my husband had his heart attack.”

Mary
One of the greatest challenges of the Twenty First century will be demographic ageing. The global population of older people will almost quadruple to over 2 billion within the next fifty years. By 2050, half the population of the EU will be over 50, while the death rate will exceed the birth rate from 2015 onwards.

What does this mean in practical terms? The impact on healthcare systems will be enormous. As older people live longer, the cost of caring for their health dramatically rises. According to the World Health Organisation, current global healthcare costs are estimated at $4 trillion and are projected to double by 2050 to become 20-30% of the world’s GDP. The huge increase in those who need care is coupled with a decrease in the number of carers. Fewer young people mean shortages in the workforce. More and more women are working outside the home, placing ever greater pressures on traditional family-based models of care. Older people who would prefer to live at home are finding themselves forced into expensive institutional care due to lack of alternatives. This puts pressure on hospitals and long-stay facilities which are already fully utilised.

We have to invent new ways to care for our ageing populations. Current health and social care systems are not equipped to face the epidemic of age-related illnesses and injuries. Information and communication technologies offer us a means to prevent disease and injury, to detect problems earlier, to help older people better manage their own health conditions at home, and to personalise care to their unique needs and preferences. All of us will benefit from these kinds of technologies, first as caregivers for our own ageing parents and, if we’re lucky, for ourselves some day.

In 2007, the TRIL Centre was established to help tackle this challenge. Its approach is to combine high quality clinical investigation with intensive qualitative research to iteratively develop culturally appropriate technologies that enable older people to live independently at home, whilst feeling comfortable and well connected in their communities. Our multidisciplinary teams of clinicians, scientists, technologists, designers and anthropologists work with older people to invent and test in real world contexts some of the new care paradigms of the future.

Demographic ageing is one of our planet’s most pressing social and economic issues; it deserves and demands our attention, our investment, and all of the technology innovation that we can imagine.
Independent living means something different to each individual. An important factor, however, is *choice* — to live in your own house, to be as active as you choose in the community, to be mobile, to enjoy your privacy and to meet whom you choose, when you choose. Independence also means not being over-reliant on family or friends, being able to care for yourself, being confident that you can remain independent.

The Technology Research for Independent Living (TRIL) Centre is dedicated to enabling older people to live their lives as they choose. TRIL is researching a technology safety net which provides *unobtrusive care in the home*, whilst helping older people remain connected to their communities. Collections of non-intrusive devices and sensors will collect and analyse data about the older person’s health on an ongoing basis as well as encouraging healthy behaviour through feedback mechanisms. Communications links will alert family, friends or doctors should the need arise.

**TRIL’s Mission:**

The TRIL Centre’s mission is to discover and deliver technology solutions which support independent living, ideally in a home environment. This will improve the quality of life of older citizens while reducing the burden on carers and on the healthcare system. The project is an active collaboration bringing together industry and academic researchers in multidisciplinary teams.

**What does this mean to John?**

“I love the idea of sensor technologies and would welcome the chance to try them out in my house. I’ve heard of video links and it would be wonderful to see my son in Australia. People like me will use technology as long as they think it will be good for them.”

The TRIL Centre aims to provide the older person with the strategies and tools to help them pursue a healthy, independent life. This will be achieved by providing the older person with new technologies that will work together with their carers, clinicians, and therapists to provide them with a network of support to help sustain and even improve their physical, cognitive and social wellbeing.
Caitlin is 87 years old and has been widowed for nine years. She lives in her own home in north Dublin. For the past eight years she has suffered a series of falls. Caitlin says she can ‘blackout’ and may only regain consciousness some hours later. She can’t remember many details of these falls events: “Last time, I got up in the middle of the night to go to the bathroom and the floor came up to meet me, I don’t know what happened.”

Caitlin learned about the TRIL clinic when she attended the Falls and Black Out Unit at St James’s Hospital and volunteered as a research participant. Several weeks later, Caitlin attended a TRIL clinic session where she underwent a series of examinations to evaluate her cognitive, social and physical health. One immediate result of this assessment was that Caitlin was referred to a rehabilitation programme that provides a comprehensive Falls appraisal with physiotherapy and strength development exercises.

Caitlin has three adult children. Her only son lives abroad, whilst her two married daughters live in and around Dublin and visit regularly with the grandchildren. When her husband died, Caitlin found it hard to adjust and although her family rallied, she wished to assert her independence: “It was hard in the beginning but I was determined I didn’t want to worry the family because they all have their own lives and responsibilities.”

Despite having two hip replacements, Caitlin says that up until a year ago, she enjoyed her independence:

“I loved going out to the shops, I’d try to walk every day, but you know the weather.” More recently Caitlin has got used to having a stair lift, walking with a stick and ‘taking her time’—slowing down. Caitlin feels restricted by poor mobility and finds it difficult to adjust. However she suggests that life is about adapting and she now seeks more activities within her home. She ‘potters’ most of the day doing ‘bits of house work’ and watches TV.

Caitlin says she can be forgetful at times and tries not to worry about losing her memory. She has some longstanding neighbours who ‘pop in’ to visit her and a home-help one morning a week. Her niece takes her shopping – and although Caitlin appreciates this she feels she can no longer do things in her own time.
TRIL is unique. TRIL grounds its research in ethnography and clinical efficacy, builds on a common set of research tools, and takes the research out of the lab into homes of older people. TRIL has proven the efficiency of this model and demonstrated its potential.

TRIL research innovates upon clinical knowledge, by using that knowledge to inform and direct technology developments, how technology is used in the home, and the benefit it can bring to the lives of older people.

TRIL believes in multi-disciplinary research. Each team includes a range of skills and disciplines, from scientists and technologists, ethnographers and clinicians, to economists and designers, enabling TRIL to look at the bigger picture.

TRIL looks at the social and economic viability of new technologies. This is an important criterion for success or failure of technology. TRIL believes that research prototypes must have a good chance of being mainstreamed by healthcare systems and deployed on a large scale if they are to be considered successful.

TRIL research benefits are long-term. Our home deployments will involve hundreds of end users, over a period of several years. This lets us track the success of our research prototypes and assess their long-term impact on older people’s lives.

TRIL is efficient and takes an industrial approach to research and prototype development. We focus on flexible technologies which can be repurposed to embrace new opportunities. TRIL has pioneered the use of a common technology platform, which has been shared with the wider research community.

THE OLDER PERSON AT THE HEART OF EVERYTHING TRIL DOES

THE OLDER PERSON IS AT THE HEART OF TRIL’S RESEARCH. TECHNOLOGY FOR ITS OWN SAKE IS OF LIMITED VALUE IF IT DOES NOT MEET THE REAL NEEDS OR IF THE OLDER PERSON FINDS IT DIFFICULT TO USE.
Overview of TRIL strands

Overview
The aim of the TRIL Centre is to accelerate research and development of independent living technologies that help older people to live in their homes of choice, even in the midst of age-related illnesses and injuries that are becoming so commonplace. The Centre brings together Intel researchers with clinicians, ethnographers, designers, technologists and scientists from University College Dublin, Trinity College Dublin and National University of Ireland, Galway.

Falls Prevention
The challenge for the falls strand is to apply a truly integrated multi-system approach to early detection of postural and neurocardiovascular instability. The key objective is to enable prediction and prevention of falls and blackouts through measurement of neurophysiological, behavioural and cardiac responses in the real-world environment. This TRIL Centre research programme examines the key characteristics of fallers and identifies new multifactorial algorithms for fall prediction and new technologies for monitoring, feedback and intervention.

Cognitive Function
The biggest limiting factor to independence in older people is impaired cognitive function and its consequences. Such consequences include: accident proneness, self-neglect, loss of initiative, diminished repertoire of activities and low mood. The goal of this research is first to identify behavioural markers which lead to the decline of cognitive function in older people. Second, to develop ways to improve cognitive function which allow older people to live independently.

Social Connection
For many people in modern society old age is a time of great change and transition. As the later life course unfolds mobility may become restricted through illness, disability or care obligations. This can inhibit social activities outside of the home. The result for many older people is loneliness, depression, isolation and an overall decline in quality of life. Maintaining social interaction contributes to social, physical and mental health. The social connection strand develops and evaluates technologies that can improve social engagement and measure differences on a range of mental and physical health outcomes.

Ethnography
The work of the ethnographic team based at NUI Galway informs the design, implementation and usability of new technologies developed for older people. Ethnographic information provides guidance and user feedback to the engineers and scientists who design and produce the new technologies.

Technology Platform
TRIL Centre research themes reveal a series of basic, common technological needs including the software and hardware for devices such as home sensors, mobile physiological status monitors, or communication assistants. The Technology Platform is a multi-disciplinary team of technologists and interaction design experts who create open architecture, common platforms which serve as a technological foundation across the strands.
The Clinic is operated by TRIL in St. James’ Hospital, Dublin, to address the physical, cognitive and social consequences of ageing. The ultimate goal of the research is to develop new technologies to help older people maintain their independence and to age in place from wherever they call home.

As a key component of the research programme, the TRIL Clinic performs comprehensive health assessments of people over 60 years old. The Clinic has assessed 600 older people in total, including 400 who have experienced falls and 200 who have not. The entire process takes three to four hours to complete, with breaks and complimentary catering provided along the way.

The assessments performed at the TRIL Clinic have uncovered a number of health conditions that otherwise might have gone undetected, from heart disease to early cognitive decline and hidden depression. The clinical assessment is comprehensive and is performed by clinical staff and researchers who have experience working with older people.

After the clinical assessment is completed, a TRIL clinician reviews the findings with the participant and together they discuss the appropriate treatment and follow-up, which may include a referral to a specialist. The participant’s general practitioner and (if applicable) the referring health professional are also informed of the results of the assessment, and participants receive written feedback if they request it.

Data from the 600 in-depth clinical assessments are stored in a growing database that researchers can mine to identify trends and discover correlations between health conditions and symptoms. ‘The beauty of TRIL is that we’re not only focused on specific areas’ says Dr. Mimi Fan. ‘We’re taking a multidisciplinary, holistic look at the person. Because we’re collecting so many different parameters, across disciplines, we can mine the data to find new correlations that lead to new insights and research directions.’

**AIDAN’S JOURNEY THROUGH THE TRIL CLINIC**

**10:00 AM**

**Hip Pain**

At age 78, Aidan lived alone and had been self-sufficient until a recent fall brought him to the hospital. When he arrived at the Emergency Department (ED) in St James’s Hospital, he had severe hip pain from the fall. Aidan was happy that nothing was broken and he was discharged with a prescription for pain killers. As there was a direct referral system between ED in St James’s Hospital and TRIL Clinic, Aidan was assessed very quickly for risk factors that contributed to his fall.

**10:30 AM**

**TRIL Assessment**

The TRIL Clinic performs comprehensive assessments that examines participants physical and cognitive functioning as well as their level of social engagement—a key contributor to overall health and well-being. Participants are given a series of cognitive exams that test skills such as word recall and attention levels.

**11:15 AM**

**Cognitive Exams**

They are also given a standardised cognitive test which assesses memory, orientation, and the ability to do simple arithmetic, among other cognitive functions. Finally, the voice of each participant is recorded, in order to detect speech characteristics that suggest cognitive decline.
“Our goal is to take a 360-degree look at the older person from a variety of perspectives. With that goal in mind, the programme encompasses ethnographic research, which explores the lives and needs of older people, as well as research into falls prevention, cognitive function, and social connection—factors that are crucial to maintaining independence, and areas where researchers believe that technology could make a positive impact.

Older people come to the TRIL Clinic through a variety of channels, including general practitioners and public health workers as well as other units within St. James’s Hospital. More than half of participants are self-referred, often encouraged by neighbours, friends or family members who have been to the Clinic or have heard about it in the media. ‘Many older people are eager to take part in our research,’ says Fan. ‘They are curious and interested in how technology can help them live an independent life.’”

In order to assess the person’s risk of falling a clinician takes a medical history, screens for orthostatic hypotension, bedside spirometry, tests vision and hearing. Participants are then fitted with SHIMMER™ sensors that capture heart rate and motions and are asked to walk across a ‘gait mat’ that detects their gait, stride and sway. Additional data is captured by a video camera.

Participants are also interviewed by a qualified psychologist, to assess their level of social connectedness. The interviewer explores the details of participants’ connections in the community, how often they are visited by family and friends, and their level of social engagement.

In the case of Aidan, the clinical assessment determined that his balance difficulties had resulted in his falls. The pain in his hip had stopped him from going out to do shopping and out to the local pub for regular meals. He is at risk of becoming malnourished. By coming into contact with the staff at TRIL clinic, he was referred on to social services and meals on wheels. His balance has also improved after outpatient rehabilitation. Aidan feels more confident and independent now.
Ethnography at TRIL

Ethnography, the primary methodology of anthropologists, is about understanding people and their lives in context. Ethnographic studies strive to create understandings of cultures, (or religions, social contexts or phenomena such as technology use) as people themselves see or construct them. To achieve this researchers spend long periods of time immersed with people, participating in their lives and social contexts.

Ethnographers try to grasp how people understand the world: what categories do they use to describe or apprehend the world (what does old mean to people) and how do these ideas shape what people do?

Within TRIL, ethnographic methods – participant observation, semi-structured interviews, cultural probes, photo diaries – are used to create empathetic views of older people and their lives. We use these accounts to help shape the research and design agenda of TRIL Centre teams by identifying appropriate areas for intervention.

Ethnography is good at reaching beyond what people say (“I have a really busy social life”), to what they do (e.g., little evidence of face to face contact but lots of phone based communication). Critically engaging with people’s practices, ethnographers draw on a wide body of literature, concepts and intellectual traditions that allow them to make sense of their research experiences. The promise of ethnography is that it can manage the intricacies, contradictions and subjectivity that are central to social life and create models or frameworks which have explanatory power.

To date, the ethnographic team have engaged with older people, the research strands and clinicians across a range of settings. They worked in the establishment of the clinic to optimise the experience of older people. The clinic becomes one location from which to begin their journey with older people, into their homes and communities. As well as conducting ethnography with the intention of grounding the TRIL Centre team in a sympathetic appreciation of the ageing experience in Ireland they have also conducted numerous more targeted projects with specific strands.

Technology Platform

One of the most significant challenges in health care research is the amount of time that must be devoted to technology development. TRIL has based its technology development around a common research platform called BioMOBIUS™. It is based on a philosophy which focuses on reusing existing components for each new project where feasible and abstracting away low level hardware and software details from researchers. This platform is a combination of hardware, sensors, software and a graphical development environment that enables engineers...
Ethnographers within TRIL are conducting a ‘long conversation’ with older people in Ireland – by conducting fieldwork with them over long periods of time, slowly appreciating the subtleties of personal character, biographical details and the day to day challenges and issues they face.

The TRIL ethnographers work closely with the research strands and the technologists and designers within the TRIL Technology Platform (TTP). The designers assist the researchers in their studies. For example, in the Falls strand, by making plans of homes which were used to analyse sensor data and people’s own reports of their in-home movements.

When the first rounds of fieldwork are completed, ethnographic researchers engage in the design process. Here the issues and findings from their explorations are combined with clinical (and survey or desk research) data to start to identify possible interventions. For example, in the Social Connection strand, insight from the AGECAT survey, analysis of research exploring existing ‘social connection’ devices, and feedback from interviews and early pilots of ‘off the shelf’ technologies formed the basis for an ideation process which created a host of possible technology solutions.

Focus group discussions with older people allowed them to comment upon the ideas and to provide input into how they might be developed. Further refinement of the ideas was then possible and a decision was made about which idea to develop further. However, potential users of the prototype technology stayed close to the process as co-designers – with regular testing of ideas and early stage technologies giving them the opportunity to express their preferences.

Small scale early trials of the technology allowed technologists to refine the systems prior to the first deployment of the prototype. Such a process of iterative and user-centred design is not rapid. But it does ensure that a consistency between the early identified needs and issues and the proposed solutions is maintained. It allows the TRIL centre teams to work with older people from their first visit to the clinic in St James’s Hospital through to the deployment of systems for piloting in their own homes.
FROM THE CLINIC...
...to the Home.
The Staff of the TRIL Clinic have now completed 600 assessments of older Irish adults. The assessment received in the clinic provides clinicians and patients with significant insight into the health profile of the older population. However, "the clinical assessment is only a snapshot, whereas the in-home trials of technology prototypes is more like a video," says Dr Mimi Fan, TRIL Clinic Director.

The vision of TRIL has always been to move beyond the clinic to the home and to prove out the efficacy of technologies for delivering a reconfigured form of care and support. The move from lab or clinic to home represents a challenging journey: from a controlled and familiar environment in which experiments and data capture can be planned and conducted, to one where the unexpected and unplanned events of everyday life can intervene at any moment. For example, while it is relatively simple to capture voice recordings in the lab to enable the identification of markers for cognitive decline, it is not so straightforward to replicate this data capture in significant numbers of homes. The journey from the clinic to the home represents a significant design challenge.

To date the TRIL activity in-home has ranged from learning more about collecting biomedical data in an uncontrolled environment (an example would be 24 hour blood pressure monitoring), to better understanding the nature of data capture from sensors, as well as more fully developed prototype deployment. All come with their own challenges and the opportunity to learn more about how people, homes, everyday life and new technologies react. Such learning is vital as the TRIL Centre widens the scope, length and complexity of its home deployments in 2009. Already researchers are sharing best practices within the Centre and outside, to the broader community of practitioners inventing and deploying home health technologies. In the future, delivering care and support into the home, and enabling independent living for ageing populations, will require technologies to operate at significant scale to deliver efficiencies. What we learn as we move from the lab and clinic to the home will be invaluable in meeting that pressing challenge.
Building Bridges
Social Connection Home Deployment

What is Building Bridges?
The Building Bridges project explores how technology can help older people remain connected with family, friends and people in their community. Social connections might be lost due to retirement, relocation or widowhood. Engagement in social activity is also restricted by poor health, lack of mobility and demand to care for a significant other. Modern technology and the internet offer new ways to help remain connected. However, it is often inaccessible to older people due to decline in cognitive, sensory and physical abilities. Furthermore, the majority of older adults are inexperienced computer users.

Research Objective
The aim of the project is to develop a system that reduces loneliness and social isolation. The study explores how the technology should be designed to provide opportunities for social interaction with peers, and help sustain existing social connections. The technology must be usable for older adults with little or no computer experience.

The Prototype
The concept and interface has been developed through a user-centered design process. The hardware is comprised of a 12” touchscreen, a phone handset, and speakers. The interface is built on top of and is interoperable with Skype. Daily broadcasts are played through the speakers and may include news, documentaries, stories or music. During the broadcast the user can see who else is listening. When the broadcast is over the user can lift the phone receiver to join a ‘group chat’ with the other listeners. The onscreen display provides visual cues to support group interaction on the phone (e.g. who is on the call, who is speaking, who wants to speak). In addition, users can initiate group calls and send messages.

Home Trials
A series of trials are being conducted in seniors’ homes to evaluate the usability of the interface, usage and experience of the system, and impact on loneliness and social isolation. Data is collected through remote logging of system use, semi-structured interviews, and a social connection questionnaire.
Dear Diary
Cognitive Function Home Deployment

What is Dear Diary?
Dear Diary investigates the way technology can help to detect significant changes in cognition and mood for older people in their home. This technology will help older people to live independently in their homes longer and not only improve their quality of life, but also help to reduce health care costs. Depression, dementia, and mild cognitive impairments are the most common pathologies that may prevent older people from remaining in their homes. These diseases gradually impair the executive functions of the older people and are often difficult to detect quickly without thorough testing. In addition, due to the gradual nature of this decline, even relatives living with the concerned ageing individuals may not notice the early changes. Finding a non-invasive way of regularly monitoring cognitive functions, as well as mood, without face-to-face testing will be invaluable.

Research Objective
The objective of this study is to develop technologies and methods that will allow for remote monitoring of cognitive and mood changes in older people. An interesting possibility is the use of speech. Indeed, speech is easy to collect using technologies widely used by the older adults such as the telephone system. Moreover, it has been used with some success with classifying normal and cognitively impaired populations (e.g. depression, schizophrenia) in the past.

The Prototype
The prototype device and interface are built around the interaction between the interviewee and the interviewer. The hardware can be seen as a three part system. For the older person (i.e. the interviewee) the prototype device is simply the phone handset. On the interviewer’s side, the prototype device consists of a computer and a USB device that records the phone interview digitally. The interviewer also benefits from a graphical user interface that guides the interview and allows for online data input. Finally, the last part of the system is a computer server that hosts the analysis software. This software contains an algorithm developed by TRIL researchers. It extracts speech features from the recordings.

Home Trials
We are conducting remote interviews with older people in their homes. A subset of these individuals are participating in a longitudinal version of this study in which the interviews are repeated once a month for six months. We are recording the participants’ speech as well as their answers to multiple neuropsychological tests. The speech recordings are then processed by the speech feature extractor.
**Engineering Alertness**

**Cognitive Function Home Deployment**

**What is Engineering Alertness?**
Absentminded episodes and lapses in alertness can become more problematic as we get older. Indeed, failures in attention can lead to memory problems and increase the risk of accidents including falls. We are exploring the effectiveness of home based training to enable older adults to gain control over their alertness levels in the service of individually-tailored goals.

**Research Objective**
The Engineering Alertness study aims to develop technologies that would monitor alertness levels in older adults and support independent or remotely facilitated self-alert training. The aim of the training is to increase alertness via self-induced periodic increases in locus coeruleus activity in the brain, leading to raised levels of noradrenaline (NA), a key chemical messenger in the brain linked to alertness and important for maintaining well-organised behaviour and good memory.

**Laboratory and Home based trials**
The training uses biofeedback of electro-dermal activity (EDA), a useful real-time, non-invasive measure of alertness. We have shown in the first series of studies that older people are capable of learning to increase their EDA using these biofeedback methods, both in the laboratory and at home. Initial findings suggest that the periodic increases of alertness may improve some cognitive functions (e.g., memory, attention and speed of processing) and have a positive impact on everyday functioning.

**Ongoing work**
We are continuing to work in collaboration with our engineering, design and ethnographic colleagues to improve the usability of the system and the training experience for our participants. The image in the bottom right hand corner is a prototype of a mobile EDA research device developed by TRIL designers for use by TRIL researchers for in-home self-alertness training.
**MuSensor**

**Falls Prevention Home Deployment**

**What is MuSensor?**
The MuSensor project investigates if older adults dwell longer in doorways and walk slower in hallways when they are feeling unwell or unsteady. This study was informed by clinical and ethnographic findings, which indicate that velocity is a statistically significant differentiator between fallers and non-fallers; and that falls occur at thresholds, such as doorways, and when walking. The unobtrusive MuSensor system can capture natural velocity patterns over long periods of time; thus providing a fuller picture of an older person’s functional health than a single velocity measurement recorded in a clinic, which could be subject to the “white coat effect”.

**Research Objective**
The aim of the project is to develop a system which unobtrusively measures velocity and dwell time of older people in their own homes for several weeks; and to investigate correlations between this objective data and self-reported measures of wellness/unsteadiness.

**The Prototype**
The MuSensor system integrates several elements: wireless sensors to measure dwell-time and velocity; an in-home data aggregator to acquire and upload sensor data; and a central server to store and process data from the participant’s homes. SHIMMER™ based dwell sensors were developed to measure the time from when a person enters a doorway to when they exit the doorway. A SHIMMER™ based velocity sensor was also developed to record the time taken to walk along the hallway. Data from these wireless sensors was transmitted to the TRIL Data server, via in-home data aggregators using wireless broadband technology.

**Home Trials**
MuSensor systems were installed in the homes of eight TRIL participants for eight weeks. House plans of each home were drawn to identify suitable doorways and hallways for sensor installation. Detailed ethnographic entry and exit interviews were administered. During the trial, each participant recorded their wellness and steadiness in a diary.
What is Falls BioRhythms?
The Falls BioRhythms study investigates the circadian variability of known falls risk factors, at time-points during a day which epidemiological research indicates an increased risk of falling. This study measured these risk factors in fallers and non-fallers in their own homes at four time-points during a single day. The risk factors were measured within one hour of waking, after lunch, mid afternoon and in the evening. This novel repeated measurement method provides a more complete view of the participant's falls risk factor and their interactions than single measurements in a clinical setting, and may inform future clinical diagnosis and treatment strategies.

Research Objective
The aim of this project is to investigate if older people who are prone to falls are more likely to demonstrate abnormalities in cardiovascular, attention, and gait and postural stability, as compared to healthy older controls; and if these abnormalities are more pronounced in fallers at distinct time-points during the day.

The Prototype
This study was designed to investigate four common risk factors for falls in a home setting – orthostatic hypotension, static balance, dynamic balance, and attention. A clinical tool, the Finometer, was used to record beat-to-beat blood pressure before, during and following an active stand. BioMOBIUS™ software and SHIMMER™ hardware, initially developed to assess gait in a clinical setting, were adapted to record motion during the sit-to-stand, static balance and dynamic balance trials. Static balance was assessed with eyes open and eyes closed, when the participant stood on firm ground and when they stood on a foam mat. Dynamic balance was assessed during a sit-to-stand, and gait tests. An existing computer-based attention test, the Sustained Attention Reaction Time test (SART) was used to measure attention.

Home Trials
Forty TRIL participants (20 fallers and 20 non-fallers) were recruited for this study. A clinical team visited each TRIL participant’s home for a full day. Measurement of all four risk factors (orthostatic hypotension, dynamic stability static stability, and attention) was repeated at four time-points during that day.
The TRIL Centre was officially launched by Minister Micheál Martin, Minister for Enterprise Trade and Employment in January 2007.

The TRIL team was assembled with over 70 leading researchers from Intel, UCD, TCD and NUI Galway.

The governance team and structure were put in place to facilitate multi-organisation multi-disciplinary collaboration.

Dedicated laboratories were set up at Intel, UCD, TCD and NUI Galway.

The TRIL Clinic was officially launched at St James’s Hospital by Ms Máire HECTOR TD, Minister of State at the Department of Health and Children with responsibility for Older People, on 26th February, 2008, and has assessed over 600 people over the age of 60.

TRIL’s BioMOBIUS™ research platform was developed, and officially launched on 22 April 2008. A research community based around BioMOBIUS™ has been established to ensure this common shareable platform is advanced and re-used by other researchers in the biomedical and independent living domains.

Three international workshops were held in Ireland, the US and Canada, on the BioMOBIUS™ platform, to further develop and inform research communities on BioMOBIUS™.

The SHIMMER™ wireless sensor platform was licensed to Irish SME Realtime Technologies Ltd.

The TRIL home deployment programme has overseen the piloting of TRIL technologies into the homes of older people. TRIL researchers are validating and gathering feedback from users that will enable TRIL to develop the next revision of the technologies.

Intel and IRCSET (the Irish Research Council for Science, Engineering and Technology) developed the TRIL Scholars programme. To-date six PhD students have been accepted as TRIL Scholars in the area of technology for independent living. This represents co-funding of over €400,000 over three years. More students are expected to join the programme in the coming years.

The TRIL Clinic won the category “Best use of Information Technology” at the Irish Healthcare Awards 2008.
Today, one in fourteen people are aged 65 or older. Increased longevity is a wonderful benefit of modern science and healthcare, but it also has as economic and resource cost. Older people are likely to have at least one chronic illness, and 50% suffer from more than one. Already our health and social care systems are creaking. In 2006 the World Health Organisation reported a shortage of four million nurses worldwide. Imagine then the picture in just fifteen years time when one in seven people globally will be over the age of 65. This will be more pronounced in developed countries, but the most profound change will be the rise in the numbers of those over 80. It is unlikely that many nations will be able to afford to maintain existing levels of hospital and welfare provision in the light of such demographic change. Furthermore, many older people wish to maintain their independence and remain in their own homes for as long as possible. With the right medical, social and technological supports, this can become a reality.

Ageing also offers many opportunities. We just need to find the right tools to successfully detect and treat physical and mental illness as early as possible, to minimise the risk of having a serious fall, or prevent a bereavement or caring role from leading into social isolation. It is important to help our older people feel secure without feeling restricted, providing appropriate mechanisms by which they can productively link into their communities.

It was in this context that Intel and the Industrial Development Agency (IDA) joined forces with several leading Irish universities to form a research centre focused on technology research for independent living. Launched in January 2007, TRIL was built upon the philosophy that building technologies sensitive to the needs of older people requires the combined knowledge, insight and perspectives of many disciplines including medicine, engineering, design, economics, psychology and the social sciences. To be suitable and effective, the products and services of the future need to be based upon a foundation of solid scientific research, co-designed with older people and extensively tested, evaluated and improved within their households. To date, TRIL has focused on the domains of falls prevention, cognitive function and social connection. We have made substantial strides forward but a great deal more work needs to done to realise the vision of independent living.

No research centre, university, company nor even country can do this alone. The TRIL Centre has the ambition to extend its research agenda and would like to invite a broad consortium of partners from academia and industry from around the world to join us in this grand challenge. We need to create the ability to conduct trials on the scale of hundreds of households whilst collaborating holistically with all stakeholders of the communities involved —whether that is social, economic, policy or healthcare.

As Eric Dishman, Global Director of Research for Intel’s Digital Health Group puts it, “This is not a technology problem nor a standards or policy problem. It is an imagination problem. What we need is for everybody to re-imagine how we ‘do healthcare’ as we move forward into the future.”
TRIL and You

The future success of TRIL depends on the contributions of everyone concerned. This means not just the consortium members, but also older people and their representative groups, government agencies, new industrial and research partners, funding bodies and healthcare providers. The TRIL team will be delighted to engage with you, whether your interest is using TRIL technology for your own research, piloting new models of healthcare, joining the TRIL consortium, improving the lives of older people, or supporting research into independent living technology.

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