

FROM PEOPLE TO PROTOTYPES AND PRODUCTS: ETHNOGRAPHIC LIQUIDITY AND THE INTEL GLOBAL AGING EXPERIENCE STUDY

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Index Words

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Abstract

This article documents how a large-scale, multi-site, ethnographic research project into aging populations, the Global Aging Experience Study, led to the development of concepts, product prototypes, and products for the independent living market. Successfully leveraging the output of ethnographic research within large organizations and product groups is often fraught with challenges. Ethnographic research produced within an industry context can be difficult for an organization to thoroughly capitalize on. However, careful research design and sound knowledge transfer activities can produce highly successful outcomes that can be thoroughly absorbed into an organization, and the data can lend itself to re-analysis. Our research was conducted by the Product Research and Innovation Team in the Intel Digital Health Group, and the work was done in Europe and East Asia, eight countries in all. Using a mixed methodology, our research examined health and healthcare systems in order to chart the macro landscape of care provision and delivery. However, the core of our study was ethnographic research with older people, and their formal (clinical) and informal (family and friends) caregivers in their own homes and communities. Data from this study were organized and analyzed to produce a variety of tools that provide insight into the market for consumption by teams within the Digital Health Group. As the results of the research were driven into the Digital Health Group and other groups within Intel, it became clear that the Global Aging Experience Study possessed what we term ethnographic liquidity, meaning that the data, tools, and insights developed in the study have layers of utility, a long shelf life, and lend themselves to repeated and consistent use within and beyond the Digital Health Group.

Introduction

In 2006, researchers within the product research and innovation team within the Digital Health Group launched the Global Aging Experience Study. This is a multi-year, multi-site, ethnographic, research project designed to develop a global, comparative understanding of the practices and meanings associated with growing older. To date, we have conducted intensive, qualitative research into older people, living in eighty-five households in eight countries. These data, supplemented by additional interviews with dozens of informal caregivers and healthcare professionals, resulted in a detailed database comprising field and analytic notes, thousands of photographs, and five hundred hours of video. Long-range research design, innovative reporting, and knowledge transfer activities by the team have resulted in the data and analysis providing ongoing value. In this article, we explore how this research has affected how we imagine the new independent living technologies of the future.

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Demography: the Age Wave and its Implications

The world's population is growing older. According to the latest United Nations biennial population forecasts, 11 percent of the world's current population of 6.9 billion are over 60 years old. By 2050, this will be 22 percent of a total population of 9 billion people. However, the developed world will be older, with 33 percent of its population over the age of sixty [1]. There are two key demographic drivers of this change: longer life expectancy and lower fertility rates.

“The developed world will be older, with 33 percent of its population over the age of sixty.”

People are now living longer lives and, in general, are healthier and more active. During the course of the twentieth century, average life expectancy within the developed world rose from 50 to 78 years [2]. Populations have benefited from better basic healthcare and from the decline in infectious diseases. However, fertility rates have continued to fall in the developed world. The rate is now 1.6, which is below the 2.1 rate, regarded by demographers as the requirement for a population to replace itself. This low fertility rate will mean that global population growth will level out during the middle of the century. However, it also means that the ratio of people who work versus those who do not work, the dependency ratio, will continue to fall. For example, in Britain in the early 1900s when old-age pensions were introduced, there were 22 people of working age for every retired person. In 2024, there will be less than three [3]. Such a ratio has fiscal implications: governments will get less revenue to support the health and social care needs of their aging populations, and they will be less able to meet the pension entitlements and expectations of retired people. Political and policy discourse around the inevitable bankruptcy of the social security system in the United States is perhaps the most familiar manifestation of the impending problem to U.S. residents.

“Governments will get less revenue to support the health and social care needs of their aging populations.”

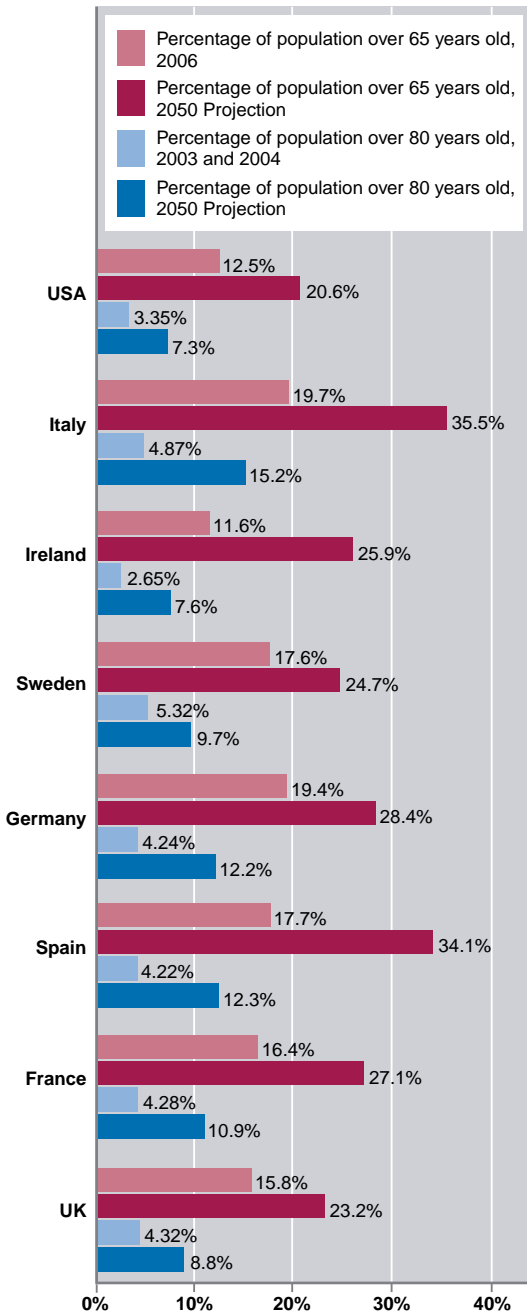


Figure 1: Percentage of Population Over 65, and Over 80, and Projections

Source: Intel Corporation, 2009

The ways in which different countries' populations will age in light of the demographic shifts just described are likely to differ widely, both from a sociocultural and a material perspective. For example, in the United States, the shift will be amplified by the aging and retirement of the so-called *baby boomer* generation; i.e., the 80 million people born between 1945 and 1965. In Italy, Spain, and Germany, the continued decline of fertility rates is resulting in smaller families, which itself results in these countries' populations growing older, faster. But whatever the structural constraints (i.e., social, demographic, cultural, or economic) on the aging experience, the anticipated challenges presented by aging, both to the individual and societies, will be profound. See Figure 1 for the percentage of populations in the developed world who are over 65 and 80, respectively, and also projections of aging as a percentage for those populations.

Looking at the 27 member states of the European Union alone, the rate at which Europe's population is aging relative to the number of younger people available to provide support for elders is predicted to diverge. While the falling dependency ratio is also due to falling fertility rates, the net outcome is that a shrinking workforce threatens the fiscal base of numerous healthcare systems.

As the broad demographic picture changes globally, the health landscape is being transformed. The decline of deaths due to infectious disease is accompanied by the rise in the number of people with chronic diseases, conditions increasingly associated with affluent and sedentary lifestyles. Among these chronic diseases are, for example, Type 2 diabetes, chronic obstructive pulmonary disease (COPD), and congestive heart failure (CHF). These diseases are expensive to manage and represent a significant strain on the healthcare systems of the developed world. Annual U.S. costs of COPD were \$37.2 billion in 2004, which included \$20.9 billion in direct healthcare costs, \$7.4 billion in indirect morbidity costs, and \$8.9 billion in indirect mortality costs (from the American Lung Association). However, many of the developing nations are experiencing significant increases in the incidences of such diseases also. It is also important to note that individuals with these conditions are not the only impacted parties: caregivers, public health systems, payers, and employers are also negatively affected by the rise in the incidences of these diseases.

Health and Welfare Systems

While differences exist in the ways that countries will age, there are also significant variations in the ways that countries are organized to respond to the challenges and opportunities that an aging population present. Of critical interest to our research team was the ways such systems have evolved — how they are funded and structured — and how people comprehend, experience, and behave in relationship to these systems. A base assumption of the project was that there is a dynamic relationship between health and care systems and the ways people think about, and respond to, health challenges and the process of aging in general.

Spain, Sweden, and Italy appear to receive comparatively high dividends for their levels of investment in healthcare; i.e., the overall measures of national health relative to the percentage of GDP spent suggests that those euros are well spent. This suggests that cultural, environmental, and other factors are at least as important as formal healthcare systems in shaping health outcomes. However, it is worth remembering also that a high proportion of healthcare expenditure is directed towards treating ill-health, particularly for those over the age of 75 [4].

For example, in Europe there is considerable diversity in the ways that welfare states are organized and how health and social care for older people are delivered. A range of factors underpin this variety: the historical development of welfare states; local, regional, and national ideas about the role of the state versus the individual, family or third-sector (voluntary) in providing care; and the fiscal and economic frameworks in which development has occurred within these countries. The interplay between people, practices, policy and politics, and economics has created a complex and mutable health and healthcare landscape.

Analysts have created a series of models that seek to describe and categorize the different welfare systems of Europe. These models provide a good guide to understanding the fundamental principles or structure of how care is organized and financed. Notably, Esping-Anderson's [5] work identified three distinct social welfare regimes. These are the social democratic model (Nordic countries), conservative or state corporatist model (Germany or the Netherlands), and the liberal welfare or Anglo-Saxon model (United Kingdom). Ferrera [6] subsequently added a fourth category — the Southern European model including Italy, Greece, Spain, and Portugal. In the United States, the system can best be characterized as a liberal, capitalist model that “endorses equality of opportunity but not of outcomes” and is arguably outperformed by the state corporatist model in terms of social and economic objectives [7].

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These models represent high-level views of systems and so fail to capture the regional and local variations in delivery that often makes care provision deviate from these ideal, typical models. In short, these models render human and economic activity in brush strokes too broad to support nuanced insights into phenomena such as the relationship between policy and the experience of aging in a given socio-economic structure. Over recent years and in anticipation of dramatic transitions within the demographic landscapes of Europe, there have been significant changes in policy planning and rhetoric surrounding how welfare and care systems operate. European long-term care systems demonstrate that different attitudes and expectations exist about the relative roles of family, state, and volunteers.

To answer the questions of shifting demographics and varying approaches to healthcare, many countries are moving away from hegemonic, expensive, institutional, and medicalized responses towards a more community- and home-centered approach to care. The propensity of bio-medicine to extend its domain over a range of real and perceived maladies, despite any empirical basis for doing so, has been well documented within the social science literature. Scheper-Hughes and Lock [8] argue that “the funnelling of diffuse but real complaints into the idiom of sickness has led to the problem of *medicalization* and to the overproduction of illness in contemporary advanced industrial societies.” In addition to the gradual bankrupting of healthcare systems, owing to shifting workforce ratios, medicalization has also contributed to healthcare systems being overburdened and dysfunctional, as well as to inadequate institutional and social responses to the challenge of aging. This shift towards a more community- and home-centered approach to care is being forged, with varying degrees of success, through attempts to create the optimal mix of funding and provision of care by citizens, family, state, and private and voluntary sectors of society. This multi-faceted approach frequently entails a repositioning of the state as a financier, rather than as a direct provider of care to individuals, through the amplified use of market mechanisms, the growth of the private and commercial care industries, and increased regulation and funding of the not-for-profit and voluntary sector [9]. Additionally, a central component of the rethinking that is underway in the way that care for older people is organized is a commitment to home-based models of care in which technology plays an enabling role.

The Intel Global Aging Experience Study

The need for innovation today in order to prepare for tomorrow's demographic change was the primary context in which the Global Aging Experience Study was conceived and conducted. The work was designed to support the Digital Health Group's commitment to affecting a paradigm shift within the independent living market. Our research built on a foundation of earlier work conducted in the United States, and we sought to extend that work into Europe and East Asia thereby providing concrete local detail, while simultaneously developing a more thorough global perspective on the experience of aging. In addition to deepening our understanding of the myriad social and cultural differences in people's subjective experiences of aging and health, our other research objectives were to challenge prevailing assumptions about what it means to grow old and to identify strategic opportunities for appropriate technologies and services for older people. Grounded in a thorough review of the gerontological literature, and utilizing ethnographic techniques such as open-ended interviews, observations, and multi-day visits at multiple households in each country, our team gathered thousands of images, stories, and insights about what it means to grow old from the perspective of older people themselves. This was the first step in a long process of understanding the needs over time for real people. Local researchers and healthcare professionals helped us recruit older people from diverse socio-economic backgrounds and with a wide range of health conditions. Efforts were also made to ensure a reasonable distribution of ages was represented, ranging from 60 to 100 years old. Researchers would typically spend two days per household. The first day was usually spent getting to know the occupants and exploring their life and health histories, while the second visit involved an exploration of the home and the meaning and use of material objects within it. The ethnographic interview ended with a mapping exercise and frequently, it ended with trips around the neighborhood with the senior to meet their friends, families, and community members. Our style of questioning was purposively fluid and relaxed, providing encouragement and time for participants to think through and formulate their responses, often revisiting sensitive or painful memories. Over the course of the ethnographic encounter the following domains, among others, were gradually probed and explored:

- Older people's relatives, acquaintances, and care networks.
- Life review and biography.
- Experiences and expectations of aging.
- Health and housing histories.
- Older people's relationships with their built, material, and social environments.

“The work was designed to support the Digital Health Group's commitment to affecting a paradigm shift within the independent living market.”

“Our team gathered thousands of images, stories, and insights about what it means to grow old from the perspective of older people themselves.”

- Perceived and actual availability of formal and informal support networks following critical health events or along chronic disease pathways.
- Health information sources used by older people and their carers in different parts of the world to make informed decisions about both their treatment and their future.
- Everyday life, technology, and home.

We provide a vignette to demonstrate the wealth of material and insights that can be gained from just one of these case studies.

“Anna brought up her own children to work hard and be financially independent.”

Widowhood and Aging in an Italian Village

Anna (85) shares a house with her unmarried oldest son Dario in a village about an hour from Milan. She has lived in this area all her life and soberly recalls the poverty of her youth. “I remember a widow came to my mother and told her that her children didn’t want to sleep because they were hungry. And my mother gave her some flour...” Anna developed an abhorrence of debt after seeing her father, a seed tradesman, in difficulties, and she brought up her own children to work hard and be financially independent. Life wasn’t easy. To make a profit from the small café bar she and her husband ran demanded their attention eighteen hours a day. When her husband suddenly died from acute kidney failure in 1973, she managed to close their business for eight days and then the family had to go on working. Times were hard, but they were able to survive, as her three children were already working. Now well into her eighties, Anna reflects how she feels differently inside in comparison to how she felt in her youth, “I am different in the way life is different now. In the past I had to sacrifice a lot. I managed to get a house to pass onto my children. I worked hard for it. My husband liked to have a motorcycle but work was secondary for him. It was always first with me.”

As she ages, Anna feels she has a safety net in her children and especially her oldest son who has taken on the role of family caregiver. Italian law stipulates that an elderly parent in need has the legal right to demand either accommodation or financial help from children with resources. Many would not press this right however. Anna’s daughter now lives in another part of Italy and so can only visit for holidays, but they talk a great deal on the telephone.

Anna believes older Italians, though still reliant on the family, live better today than in the past due to the basic state pension — a welfare benefit the country may have trouble supporting for future generations. As things stand today, young Italians entering the workforce will have to pay contributions equivalent to 127 percent cumulatively of their salaries over the next fifteen years to guarantee the same level of benefit support received by the current older generation. Anna is able to subsidise her income a little with a small pension from the days when her husband worked in a factory, but aside from this, like many women and small business owners, she regrets they were not able to contribute to personal pensions.

“As things stand today, young Italians entering the workforce will have to pay contributions equivalent to 127 percent cumulatively of their salaries over the next fifteen years to guarantee the same level of benefit.”

Anna feels her health has seriously started to decline over the last year with recurrent problems with her knees causing her the greatest concern. In 2002, her arthritis was causing her so much pain she opted for a knee prosthesis operation against her doctor's advice. She was in hospital for three weeks and then had to spend six weeks at home in bed being cared for by her son and sister. Her treatment included an hour of physiotherapy per day and a passive exercise machine to prevent her muscles from atrophying. Her rehabilitation was paid for by the healthcare system for two months and she feels this was not long enough. She neglected her exercises, and now problems have begun to emerge with her other knee due to long periods of over compensation. This is partly because she felt it demeaning to use a walker in public and preferred a single walking stick.

Anna suggests the chronic pain in her legs is helped by massage and creams. Unfortunately she is unable to get massages on the public health service and private practitioners charge €40 an hour, a sum she feels guilty about spending. Anna feels alienated from her doctor so she avoids visiting her local clinic. Her shoulder has been troubling her recently and when she asked for more of the cream that works on her knee to fix the problem, he refused on grounds of expense. Nowadays, Anna just phones in when she needs her prescription and her son picks it up. She finds it very irritating that she has to do this every six to twelve days, as she is only allowed one box of twelve blood pressure pills at a time and would like more pills in each box to save her the trip.

Decreasing mobility is having a significant effect on her quality of life. "I feel old because I am dependent on other people. The problems with my legs make me feel old. I don't have any plans for the future now. I don't want to go out dancing but I would love to visit a specialist to be able to move around better." For the last eight weeks, Anna has not left her apartment. Instead she spends her days watching the world go by from her balcony and trying to do the little she can in terms of housework: her family decided to pay for a home help worker to visit four hours a week to clean. Her son has taken over the shopping duties. Anna is not able to conceive of using an electric buggy to get around as she no longer believes she is safe going out by herself. Having given up on travel, she now regrets not seeing more of the world during her life. The main variation in routine occurs when her daughter or sister comes to help look after her once a year when Dario takes a respite break from his care-giving duties and visits a health spa. "I would consider a nursing home during these times, but only for a month, for a change, never for good."

Anna uses sticks to get around and has a stick located in every strategic position in the household. She sometimes tests and pushes herself by attempting to walk between resting points. The main obstacle for her in the house is the slippery marble staircase from her apartment down to the ground floor.

"She felt it demeaning to use a walker in public and preferred a single walking stick."

"Anna feels alienated from her doctor so she avoids visiting her local clinic."

"For the last eight weeks, Anna has not left her apartment. Instead she spends her days watching the world go by from her balcony."

“As Anna’s mobility has declined and her social circle has narrowed, her phone has become an increasingly important lifeline.”

Anna has heard of alarm pendants but does not have one. She carries a mobile phone with her in case of emergencies but never takes it into the bathroom with her, one of the most dangerous rooms in the house. Last year, Anna had a fall in her bedroom and could not get up. Her son was not able to hear her cries over the living room TV and her mobile phone battery was flat. She managed to crawl to her charger but didn’t realize that she could use the phone while it was plugged in. It was two hours before she was discovered.

As Anna’s mobility has declined and her social circle has narrowed, her phone has become an increasingly important lifeline. Her son works long hours, and she receives few visitors: she, therefore, calls her sister as often as she can afford it. She can still cook a little and loves to sew. She used to make clothes for her family, but she has stopped as nobody wears what she makes. Reading is another hobby, as is listening to the radio. The real highlight of her month is a visit from her grandchild. This occurs only rarely, however, as she dislikes her second son’s wife and they do not feel she is capable of taking care of the child on her own. “I don’t think I would want to spend another twenty years living like this, though I would love to see my grandchild married. Although I am alone a lot, I am not lonely. I can always watch the street from my balcony.”

“The real highlight of her month is a visit from her grandchild.”

Developing Insights and Tools for Knowledge Transfer

As the selected field notes of the interview with Anna demonstrate, ethnographic fieldwork requires a balance between having an appropriate focus, but not being so focused on one topic that you lose sight of what is important to the participants themselves. Ethnography, in this respect, is not like requirements gathering, usage model development, or design research, where the goal is to determine the boundary conditions for a particular product. Instead, we are trying to understand what it is that people want and need through a holistic exploration of their subjective experience, and the associated meanings and behaviors that interpellate [10] with wider socio-economic structures. The requirements come later.

When ethnographers return to the office, they bring with them images, audio recordings, video recordings, and hundreds of pages of field and analytic notes to both review and log for later analysis. As depicted in Figure 2, transcribed voice recordings and field notes are then entered into qualitative data analysis software to be coded into themed categories that allow for a horizontal view across the data set to be developed.

“We are trying to understand what it is that people want and need through a holistic exploration of their subjective experience.”

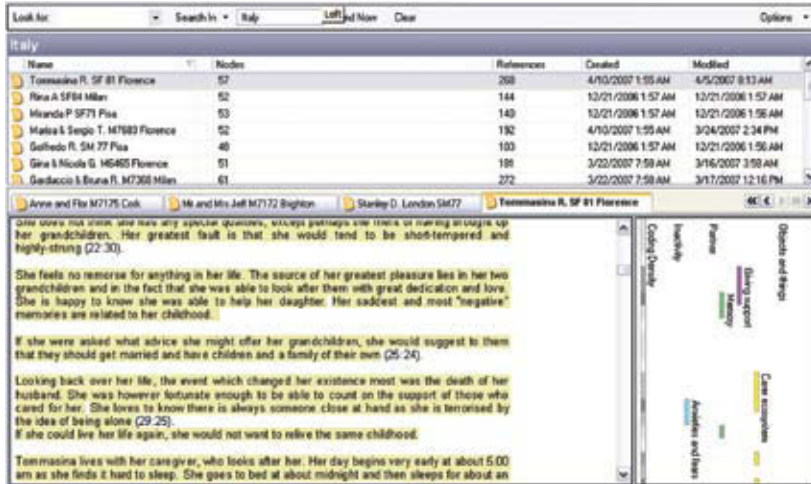


Figure 2: Qualitative Software for Coding Raw and Analytic Field Notes

Source: Intel Corporation, 2009

As important as systematic coding of interviews are, group analytic working sessions, or *harvest sessions*, are equally important. Harvest sessions are where data from the field, the photos, and other collateral are shared, in an attempt to inductively identify patterns in the data, as well as to note the important dimensions of variability within and between countries. These tasks are accomplished by working through the data and actively listening for recurring insights, themes, and other aspects of the data. This kind of analysis requires very active participation and constant critical engagement. Post-it notes are used to capture ideas as they emerge. After hours, sometimes days, of sharing stories from the field, the team begins to organize what might be hundreds of post-it notes into clusters, and robust patterns begin to appear. Identification of the patterns in the data leads to *grounded theory* insights about what is most important to people. For instance, one persistent idea that came up in story after story in our Global Aging project was simply this: people don't want to be treated as if they are no longer competent or valued members of society. They are human beings, with aspirations, goals, and a sense of identity and self-worth. And yet, so many healthcare devices and services treat older people as if they were children, or worse.

“This kind of analysis requires very active participation and constant critical engagement.”

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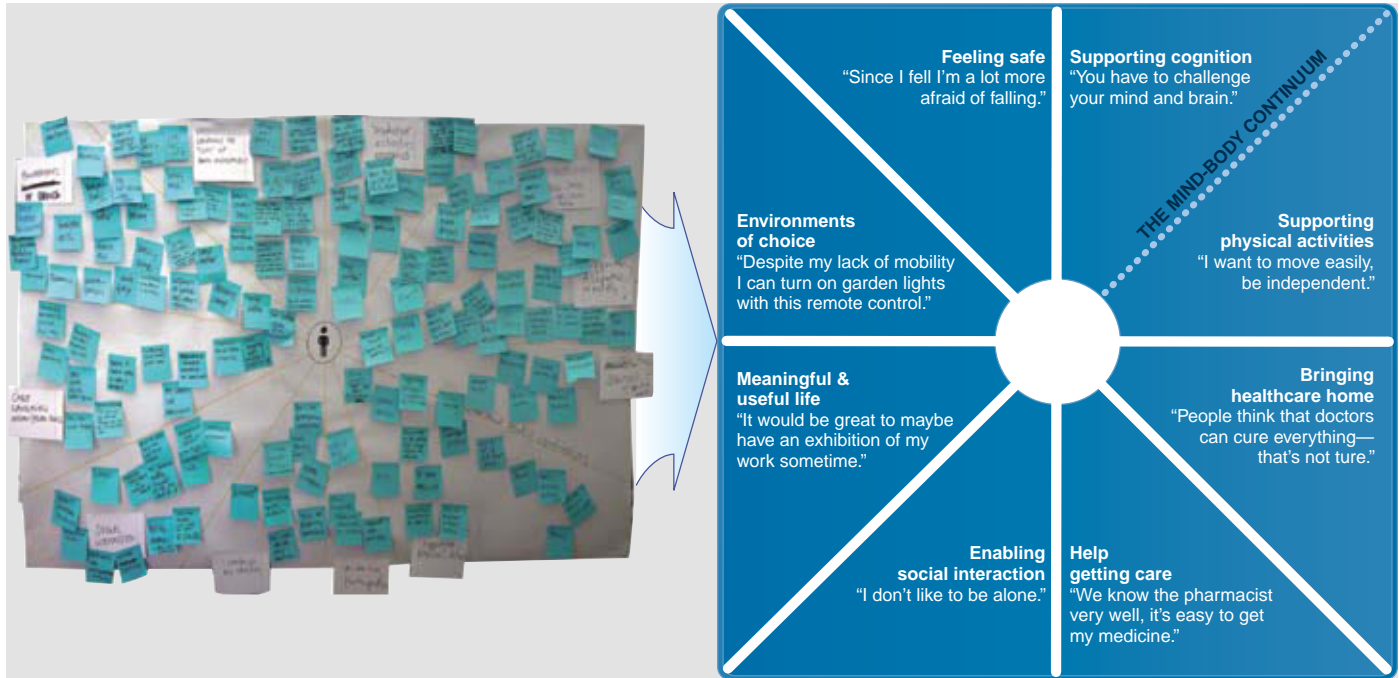


Figure 3: Initial and Final Versions of an Opportunity Map

Source: Intel Corporation, 2009

As more and more of these needs are noted, the team begins to cluster them into what we call the *opportunity map*. The map, featured in Figure 3, helps us organize many of the possible ideas about needs and technology ideas that come up during sharing of field stories, or ideas about services or other interventions. We repeatedly refer to this map when thinking about products already on the market, or products in development within the Digital Health Group. By doing this we can identify gaps or places that need more attention.



Figure 4: Design Principles Derived During the Analytic Process

Source: Intel Corporation, 2009

Beyond the identification of needs and opportunities, when thinking through the ethnographic data, the study team identifies insights that are neither ideas for new products nor areas of explicit need; rather, they are insights into the required characteristics of any device or solution we might develop. We capture these as *design principles* (see Figure 4).

With all these materials and insights in hand, we finally have a basis for actually thinking about products, services, or other interventions. We follow up harvest sessions with design brainstorms. During these work sessions (see Figure 5), we use the opportunity maps to identify which *slice* of the map we want to address. Keeping in mind the values and design principles from our data, we begin to explore ways of addressing particular needs. Here is where mapping other products, technologies, or research onto the map ahead of time really helps inform our thinking.

Key Aging Experience Themes

A range of important themes emerged from the analysis of the Global Aging Experience data set. Seven of these are outlined next.

People want to focus on what they CAN do, not what they CAN'T do

As one woman told us, succinctly and unambiguously, “You are sick when you are lying in bed.” That is why so few people self-identify as either ill or old. Many people chose not to use canes or assistive devices in the home. This is not just because these devices are socially stigmatizing in appearance, but because these devices reinforce a personal identity as someone who is *sick*. Many people sought out challenges as ways of keeping themselves sharp: in fact it seemed that it was people’s energy level, their will to pursue such challenges, that most correlated with self-identification as ill or old. Still, we cannot avoid the fact that many people will and do need assistance. The key is to provide this assistance in ways that people recognize “as helping me do what I want to do,” not as a constant reminder that I am no longer capable.

We identified a sort of *denial* that is a healthy part of the natural aging process that makes some interventions very difficult. We call this *adaptive optimism*. Often, people will regard most interventions as *not necessary* until it is too late, unless we can find a way to introduce these interventions into their lives earlier. The clear implication of this is that we need to be thinking about technologies that adapt and age with a person, changing the mix of offerings as the person ages.



Figure 5: GAE Brainstorming Session
Source: Intel Corporation, 2009

“Many people chose not to use canes or assistive devices in the home.”

“Often, people will regard most interventions as not necessary until it is too late.”

“These factors can seriously impact a person’s ability to live the life they desire in later years.”

Healthy aging and independent living mean far more than health

There are many factors that enable a person to remain at home and relatively *independent*. These include a wide variety of capabilities, not just health-related ones. The ability to take care of one’s own home maintenance or gardening, the ability to get groceries, prepare meals, and clean up afterwards, the ability to get around the neighborhood or town, are among some of the most important ones. All of these factors can seriously impact a person’s ability to live the life they desire in later years. We need to be thinking about all of these factors when we design interventions. A few of the key areas for enabling services are these:

- Mobility and transportation in the community are crucial. Community-based transportation initiatives are catching fire both in the United States and in Europe. Different attitudes towards private transportation and different availability of public transportation will mean very different systems in different places.
- Services for the home are becoming increasingly important. This is particularly true for widowed husbands or wives: the loss of a spouse can mean a serious adjustment of lifestyle, at a time when the ability to adapt is not what it once was. Cooking, cleaning, home maintenance, and other forms of routine care will become increasingly needed. An opportunity exists to provide an infrastructure to enable a broader, less centralized marketplace for trusted providers.
- The need for finding trustworthy providers is going to increase. Technology can play a major role in helping communities identify and enable trusted providers. This may be particularly important considering that some forms of care that one would expect to come from family members will come from *strangers*.

Health is not an objective quality; it is defined collaboratively and culturally

Health is defined through interactions and negotiations among various people, including informal caregivers, family members, hired in-home caregivers, and medical caregivers. We saw many differences within and between these networks in our assessments of an elder’s health.

- Assessments of health can vary from person to person. In Germany, for instance, an elderly husband insisted that his wife (who had suffered a mild stroke) needed much more help with driving, shopping, and taking her medications than the woman herself felt she needed. Both she and her daughter felt that the husband was being overly protective. In multiple cases, children had put their parents in nursing homes even though those parents did not feel they needed to be there. And yet, the parents acquiesced, mostly because they “did not want to be a burden.”

- Notions of health vary from place to place in both major and minor ways. The cultural, social, and political systems in which we are embedded shape our attitudes and behaviors with regards to health. In England, people behave in particular ways as a result of the presence of the National Health System's guarantee of life-long, free healthcare. In Mediterranean countries, people do not recognize eating as a health-related practice. They simply eat what people outside the region recognize to be very healthy foods.

People mark the progression of aging by watershed events

People do not experience aging as a gradual loss of capability, but rather as a series of threshold events. It is most obvious in the case of falls, where a combination of physical or cognitive decline might go unacknowledged for a long time before the precipitating event, namely, the fall, makes it official. While the obvious solution might seem to be monitoring and intervening earlier, we suggest it is not that simple: people who are in this state of adaptive optimism or denial might not willingly submit themselves to this kind of intervention.

- Some watershed events initiate decline. Non-health-related events can have a serious health impact. For example, the loss of a loved one or a child, resulting in grief and depression, may have measurable, negative health consequences.
- Sometimes external events leave deficits that expose health decline. The loss of a spouse may entail the loss of a person who has for years helped one cope with other deficits. A wife who has prepared her husband's meals, done his laundry, and helped with other daily life needs over a period of forty or fifty years will, upon death or disability, leave a huge gap deficit that the husband or other informal caregivers will need to overcome.

Healthy aging is inextricably linked to social participation

People of all ages aspire to have a sense of belonging, a legitimate role in the life of their family and community. We are meaning makers all through life: meaning is made through social interaction and that does not cease in older age. At the same time, people become more acutely aware that ongoing engagement with the community or their family might actually increase their sense of being a burden, not a contributor. Thus, enabling social participation means lowering the costs associated with social engagement in at least three ways:

- Feeling useful or productive, or at least having something to offer and the sense of identity that comes with that. This could be either in the form of caring for grandkids or being able to tell one's story, to put one's life's history in context.
- Enabling emotionally satisfying contact with the people the elderly care about, people they share relations or a history with. At the same time, note that there are costs associated with such social contact, and those costs seem to rise with age (for example, as you lose your ability to drive, or when cognitive impairments affect your ability to remember names on the telephone).

“Meaning is made through social interaction and that does not cease in older age.”

“One interesting theme to emerge from our work was a deeper discussion of why nursing homes or institutional residences were generally regarded as bad, while staying at home is generally regarded as good.”

- Enabling *recognition* and lightweight engagement with a broader community. As one of our participants told us, “Sometimes you just want to look out your window and see what’s happening in your neighborhood.” In many European communities people placed a lot of value on being *known* in a place, of interacting with people with whom they share some history or interests. This could come from such activities as going regularly to the local market, or participating in a club.

The lived-in space is crucial to the experience of aging

People’s choice of objects to inhabit their homes, as well as less malleable aspects of architecture, location, and other aspects of the physical environment were important in how people experienced aging and health. One interesting theme to emerge from our work was a deeper discussion of why nursing homes or institutional residences were generally regarded as *bad*, while staying at home is generally regarded as *good*. As we teased the attributes apart we realized that these elements characterize differences across many kinds of environments, including movement from one private residence to another. These elements suggest interesting possibilities for technology:

- Houses reflect cultural norms around physical privacy. There is a reason why bathrooms are hidden in European and American homes. There are cultural notions of privacy and intimacy associated with care and nurturing of the body, particularly hygiene. We need to be cognizant of how different cultural values around bodily intimacy may shape acceptance or resistance to technologies.
- Houses are the sites of spiritual and personal expression. Expressions of spirituality and the emplacement of memories (for example, in shrines to lost loved-ones) abounded in the houses we visited.
- Enacting of *micro-routines*. Simple daily activities, from checking the barometer, to drinking a glass of juice at bedtime (and using the empty glass as a medication reminder in the morning) to gardening, were crucial for people for multiple reasons simultaneously: as a way for people to fill little slots of time, as a way of grounding behaviors in some structure that aids memory, to provide some lightweight ways of finding meaning and having something to talk about, get a little bit of physical exertion, keep one’s mind sharp, and generally have some sense of small purpose to focus on each day.
- The *home* is not just the four walls. It is the physical situation of the house in the neighborhood, proximity to other services and opportunities for social engagement. One woman we visited in a nursing facility in Spain was quite happy there, partly because the home was in her old neighborhood, near the same market, the same services, and the same social network that she had always had.

Healthcare networks are large and increasingly complex just about everywhere

People in virtually every country we visited struggled to get the best value out of their healthcare systems. People struggled with healthcare bureaucracy and sought to bring alternative approaches to care into alignment:

- *Help people figure out their options.* In places where coverage is *universal*, people still seek out alternatives. In the United Kingdom, despite universal coverage, people find it necessary to pursue alternative (private) healthcare systems to speed up access. In some cases, people had to leave their country to gain access to treatments that were unavailable because of resources or regulations.
- *Help people help each other.* Several people we visited had been forced to learn a lot about the healthcare system, because of a chronic condition or the need to care for someone who is ill. More than one noted that it was unfortunate that, when their situation changed (a patient died or got better) they had no place to share this hard-won knowledge. Simple tools might make a collaborative user-based system to help people share that knowledge and help each other.

The identification of key themes such as these provides broad insight into the issues, problems, and desires of participants to help guide the development of effective, culturally sensitive, and age-appropriate technologies. We now outline some examples of how the global aging experience research program has stimulated more in-depth studies and has contributed to the cycle of product incubation and development, constantly ongoing within the Intel Digital Health Group.

Ethnographic Liquidity

Since the beginning of the twentieth century, the vast majority of ethnographic research has been conceived and consumed within an academic context. The structure of ethnographies as academic texts, and the tools and techniques used to produce them, are well fitted to an audience of scholars that, to a greater or lesser degree, sees ethnographic research as cumulative and contributing to anthropological and other related fields of inquiry. Over the past decade, a somewhat different style of ethnographic research has been developed in the context of industry and commerce. This work differs in scope and duration. It does not bear the same implied scholarly and cumulative relationship to academic ethnographic research.

Within the context of industry, ethnographic research has different demands placed on it and different gauges are used to assess the relative success or failure of an ethnographic project. A key demand placed on ethnographic research in this new context is that of immediate relevance. Equally, multiple stakeholders expect the research to be *actionable*. The term actionable refers to the requirement that the research must be problem-directed and result in an analysis that produces results that are easily consumed, understood, and acted upon by other stakeholders in an enterprise (for example, research that produces engineering requirements leading to product specifications).

“Over the past decade, a somewhat different style of ethnographic research has been developed in the context of industry and commerce.”

“A key demand placed on ethnographic research in this new context is that of immediate relevance.”

“If research activity and its output is liquid, it is readily exchangeable.”

For research to have an impact in any organization it needs to circulate so that the findings can be understood, conclusions discussed, and the implications fleshed out by relevant stakeholders. It could be argued that research that does not travel through an organization can only ever have limited impact, since it is on this journey that audiences can create for themselves a meaning for the research. However, the impact of ethnographic research in the context of large organizations, and beyond, can often be impaired by issues of circulation. Creating outputs that travel well is all important to developing what we call *ethnographic liquidity*, that is, the ability of research to be converted into something of value by its audiences.

Therefore, another way of thinking about the actionability of ethnographic research is through the lens of liquidity. If research activity and its output is liquid, it is readily exchangeable. The research creates debate, is able to inform existing activities, and creates the basis for new endeavors. Liquid research will perform different functions for different members of an organization, because it is multivalent and contains different layers of utility. For example, engineers and designers might focus more on design principles as a means of guiding their work. Marketing may take more note of needs and compelling ways of telling their business story.

In short, the best ethnographic research in an industrial context is research that has continued resonance and meaning. In essence, there are two competing demands placed on ethnographic liquidity. First, the research must be conceived and conducted to meet current organizational objectives. Second, the research must have prolonged and ongoing relevance for the organization.

When we commenced the design of the Global Aging Experience Study, the team was new to a recently created business division. The organization to some degree was still, to borrow the concepts of Tuckman [11], storming and forming. As a result, the research was conducted as much to shape the activities of a business division as it was to meet a pre-defined set of research needs. An explicit goal was to create a piece of liquid research that would endure and have long-term value.

“The research was conducted as much to shape the activities of a business division as it was to meet a pre-defined set of research needs.”

The Global Aging Experience Study was designed accordingly. A foundation of the research was an extensive review of gerontological literature and its dominant theories of aging. This review led to the creation of *domains of experience* that were used to create the interview guides and the coding system later applied to our data. While this *grounded theory* research approach is commonplace in the academy, it is less so in industry. (Researchers and management in industry generally perceive this approach as too academic and too resource intensive. The members of the Digital Health Group, however, viewed this approach as a wise, long-term investment). The domains we created remain relevant to the aging experience and have enabled other researchers to access and mine the original data we collected for other projects within the Digital Health Group, a practice that will continue for the foreseeable future.

Another aspect of the ethnographic liquidity of our research is the multiple artifacts we have created to disseminate the research. These include video, PowerPoint* presentations, academic papers, printed internal and external reports, press releases, conference talks, posters, and an opportunity map. Key to this strategy of dissemination has been the production of materials in an *analog* format.

We have focused on the production of high-quality, printed material in the form of booklets. Booklets are used to draw together large projects presenting ethnographic profiles, country overviews, and illumination of the analysis of the material. The booklets aim to provide content that will become on-going resources that diverse readers find useful (for example, by including relevant statistics and demographic and market data). Our experience has been that focusing on materializing research in this way has allowed us to increase the liquidity of our work. Perhaps counter-intuitively, moving ethnographic material out of digital formats into paper formats can make it easier to circulate. Further, its existence in an organization becomes more durable. Materials in this format have been crucial to supporting the persistence of our research in the geographically dispersed, digital workplace. Furthermore, we have found that producing versions of our documents [12, 13] for external audiences further enhances the liquidity and durability of the original research.

Because of the ethnographic liquidity characterizing our work, the organization has made repeated use of it. The following represents a sample of activities to which the Global Aging Experience Study has contributed, either in part or in whole:

- Deeply informed the initial conceptualization and subsequent development of two major product incubation efforts, one of which has developed into a key program within the Digital Health Group.
- Defined a further research agenda examining social health and social participation in more detail within the context of the European Union and the United States.
- Resulted in the submission of 60 or more invention disclosures for the Digital Health Group.
- Informed major research efforts in the Technology Research for Independent Living (TRIL) research partnership between Intel and the Irish government within the areas of social connection, cognitive decline, and falls. One specific example is how older people negotiate movement through their homes and develop pathways in the household. This insight informed the development of a sensor strategy.
- Developed an operational blueprint for ethnographic research of this scale and complexity and identified best practices for knowledge transfer.
- Launched deeper research efforts in the areas of sleep and sociality, transportation and mobility, social care, active retirement groups, and the reinvention of retirement.

“Booklets are used to draw together large projects presenting ethnographic profiles, country overviews, and illumination of the analysis of the material.”



Figure 6: Front Covers of Two External-facing Documents

Source: Intel Corporation, 2009

Conclusion

In this article, we have discussed the Global Aging Experience Study in the context of ethnographic liquidity and knowledge transfer. The project afforded our team an opportunity to develop tools and artifacts that have led to the continued relevance of our research to the Digital Health Group. One can argue that conducting fieldwork and analyzing data represents the comparatively easy parts of any research project. The real challenge when conducting ethnographic research in the context of industry, comes in the practice of *sustained* knowledge transfer and in the ability to drive the insights gained and communicated through research into a program for development.

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