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Harnessing the Internet of Things for Elder Care

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Introduction

It was once said that the moral test of government is how that government treats those who are in the dawn of life, the children; those who are in the twilight of life, the elderly; and those who are in the shadows of life, the sick, the needy, and the handicapped.

--Hubert Humphrey

The United States' rapidly aging population has strained traditional healthcare and long-term care and support systems for the elderly almost to the breaking point. As a result, informal caregivers -- usually adult children -- are stepping in to fill the services gap to provide care to older Americans. Informal caregiving presents unique burdens for members of this generation, who are "sandwiched" between raising their children and caring for their aging parents.

As part of an independent study course, students in the Communication Leadership (Comm Lead) graduate program at the University of Washington (U.W.) analyzed this social and technical caregiving challenge and have proposed a potential reference solution that leverages the emerging Internet of Things (IoT) [1]. Their research analyzed whether a wearable technology combined with a social communication strategy could provide a comprehensive, meaningful caregiving solution for elder care recipients, their extended family and friends and their medical providers. The working title for this reference solution[2] is "Careables."

This research paper describes the communication challenges and opportunities specific to connected healthcare solutions as they apply to the Careables concept. The students analyzed how social communication strategies could integrate continuous health monitoring in a way that resonated across different audiences with different needs but who were connected to the same goal -- the health and dignity of the elder care recipient.

The paper starts with a use case that depicts the motivations and communication challenges surrounding the care of an elderly parent with chronic health conditions. The research team modeled a user story derived from composites of demographic research, described in Appendix I. This research shows that chronic healthcare demands across generations affect significant segments of the U.S. population. The individuals impacted by chronic healthcare demands are often ill-equipped to handle such demands.

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[1] The Careables reference solution is rooted in the IoT, which may loosely be defined as a system in which the Internet is connected to the physical world through sensors. Examples of current IoT experiences that include wearable devices with sensors and apps include the Fitbit, the Nivea Protection ad and 94Fifty.

[2] By reference solution, we mean that Careables' physical technology is a modeled example, not to be confused with any of the emerging commercial offerings for healthcare monitoring through the IoT.

From this starting point, the paper describes the value proposition and key components of a Careables type solution from the points-of-view of the patient, her adult child caregiver and a medical professional. Communication within the health care organization is not covered. Instead, the research focuses on the communication environment that exists largely outside of the clinic or hospital.

Meet Reuben Rye and his Mother, Caprese

Reuben Rye is a 50-year-old man who lives with his wife and two teenage children. He is a college graduate with a management-level job at a regional general contractor. Ruben's wife, Irene, holds a similar position at a major insurance organization. The couple is saving for retirement and for college for their teenagers.

Ruben has an 80-year-old mother, Caprese, who lives three hours away by car. She has chronic obstructive pulmonary disease (COPD), which makes it difficult for her to perform everyday tasks such as opening windows, grocery shopping and taking her trash to the curb. She also has high blood pressure and circulatory issues, and takes several medications as well as daily oxygen. She has recently started repeating herself frequently and becoming forgetful.

Last week Caprese slipped on the ice and spent nearly 20 minutes trying to get to her feet, since she frequently had to rest and catch her breath. Eventually, she was able to crawl over to a grassy spot in the snow and push herself upright. She suffered bruises and sprained her knee, so now must use a cane. Caprese's health issues are increasingly worrying Reuben. Caprese wants to continue living in her own house, but Reuben is terrified that she will fall again or collapse from lack of oxygen. When he speaks with his mother about her health, the conversation turns into an unpleasant checklist of doctor's appointments, medications, suggested activities and many other tasks that are necessary for Caprese to perform if she is to stay independent. Because Caprese does not perform these tasks on a regular basis, they pile up until Reuben makes the three-hour trip to complete as many tasks as possible in the shortest amount of time. Increasingly, Reuben feels the crush of competing obligations between the well being of his mother and the well being of Irene and the kids. Additionally, Reuben's work schedule makes it difficult for him to travel back and forth to help his mother.

The research team modeled three core constituencies (recipient, caregiver and medical professional) to understand their greatest motivations and fears in Reuben's situation and how a Careables-type solution can address these fears:

- **Care recipients.** Care recipients want to age in place with dignity and not be a burden to their families. Careables addresses this audience through an attractive and easy to use interface, the ability to designate those who receive their healthcare information, proactive reminders and recommendations for maximizing health and built-in social networking capabilities to enhance connections.

- **Caregivers.** Caregivers want to do everything they can to take care of and not neglect their aging loved ones (often the aging loved ones are parents, so the emotional drivers for caring are especially strong). Careables addresses caregivers by providing regular updates on the health status of care recipients and new ways to easily communicate with care recipients.

- **Medical professionals.** Medical professionals want to provide the highest standard of medical care for their patients (care recipients) as efficiently as possible. Careables addresses this audience by providing data about care recipients' vital signs and other key health indicators and by allowing medical professionals to customize the type, scope and cadence of data that they receive and review.

Although each audience has specific and unique needs, all three have one common goal: Enhancing Caprese's quality of life, so that she can live with maximum independence and dignity as she ages. For Reuben, greater independence for Caprese is valuable not only for its own sake, but also for Reuben's ability to do the right thing for his family. For the medical staff who are responsible for her health, Caprese's greater independence means that she'll need fewer clinic visits and it shifts the core activity from containing health crises to monitoring and intervening only when absolutely necessary.

The Careables Value Proposition: Holistic, Proactive Health Care Management

Careables is the focal point of a combined technology and communication solution that addresses the emotional challenges inherent in a chronic healthcare monitoring situation. Careables targets the complex communication landscape that caregivers, patients and medical professionals must navigate from different angles with different needs but toward a similar, shared, social goal: The health and well-being of an older person who requires continuous monitoring of chronic health issues.

By enhancing quality of life and extending care recipients' independence, Careables reduces older adults' fear of being a burden to their children. For adult child caregivers, the same capabilities reduce their fear of not doing enough for their parents who are in declining health. Seamlessly bridging the physical and digital worlds through the IoT, Careables provides family members and professional caregivers with a communication architecture for proactively managing chronic healthcare conditions. This management is performed from a quality of life and continuous optimization viewpoint, rather than from a crisis and intervention viewpoint.

The Careables Product Line: Key Components

Careables incorporates ease of use and a non-threatening, fun form factor, making it possible for families such as the Ryes who have a loved one with health concerns to readily adopt and consistently use Careables products. Following are the key components of the Careables product line:

- A wearable device with a sensor. The device, worn by the care recipient, includes a sensor that tracks vital signs such as heart rate, respiration, activity, sleep and temperature and it relays this information to the Careables smartphone app and dashboard.

- A smartphone app. The app can be configured to send care recipients customized reminders about meals, exercise and medication.

- A dashboard. The dashboard can be configured to display customized, detailed views of care recipients' health data and provide recommendations to guide care recipients toward improving their health.

Additionally, care recipients can choose to share their health details with designated family members and medical professionals. When family members can easily access their loved one's health details through a dashboard, it reduces the need to consistently question that person about his or her health status -- questions that a care recipient may not be able to readily answer. Instead, families can spend more time conversing about other aspects of life. When medical professionals can also access the data, they can spend more time quality time with the care recipient, instead of running routine tests to obtain data that can be provided by Careables.

Careables and IoT Communication Strategies

Caregivers, care recipients and medical professionals are often confronted with too much information when it comes to healthcare. The challenge is to build an infrastructure that can interpret the raw data and provide meaningful feedback and information. The definition of meaningful, of course, will depend on the audience (whether the audience member is a caregiver, care recipient or medical professional).

For example, in the case of a healthcare wearable, if a care recipient's blood pressure is high, caregivers should be able to view information that explains what the care recipient should do about it. Additionally, providing blood pressure data without context is not helpful to a layperson who cannot interpret it easily. To make the data meaningful, the device would need to tap into the care recipient's medical history and determine what the reading means for that person.

It is crucial, though, that no one be inundated with exhaustive information. Push notifications should only be for critical information or as determined by the wearer (for example, a care recipient may choose to be notified when she forgets to take medication). Records shared with medical professionals should be filtered so that only the critical or specific information that the doctor needs to know is shared. For example, trend or progression information could be shared at a scheduled appointment to help the doctor target his or her focus.

Tailoring Communication: From Dashboard to Doctor

Healthcare professionals will likely welcome opportunities for healthcare improvement in an IoT environment. In a Pew Research Center survey, Daniel Castro, director of the Center for Data Innovation, wrote:

The biggest impact from the Internet of Things will probably be in healthcare, where more data can enable better diagnostics and treatment. This will likely lead to better health care services that allow individuals to manage their own care, often with less direct intervention by doctors. Predictive analytics will help provide users the right information at the right time. This will involve interpreting lots of data including body movements, location, and voice commands. (Anderson & Rainie, 2014)

Castro also astutely mentions the ability for technology to serve users not massive amounts of data, but the right bit of information at the right time to the right audience.

"Because there is already an issue with patients not being healthcare literate" says Meena Chelvakumar, a second-year resident in Family Medicine at U.W. Medicine, "You wouldn't want something on top of that that would make things more complicated." (M. Chelvakumar, personal communication, November 15, 2014) For patients who are having problems with existing healthcare information, to receive a flood of un-translated data (especially for a non-digital native segment of the population) would be counterproductive.

For Careables, this means that a solution must harness physical-world devices with a dashboard that can make sense of the stream of data being collected -- not just for the user, but also for those to whom the user chooses to grant privileges to view this information. These privileges would most likely be granted to a trusted family member who would see that everything is alright, or be served alerts if there are situations where they'll want to follow up with their loved one.

Having a trusted family member as the first contact for health care issues is crucial. "From a hospital point of view, where doctors, nurses, medical assistants are already overworked, you need to figure out how to reduce their workload," says Chelvakumar. A Careables dashboard with a concierge service or coaching service would help add a human voice, and most importantly, context, to cold data. The dashboard would also help inform users about the severity of the situation. These capabilities would not only make the information easier to understand, but potentially catch healthcare issues before they become crises and help reduce unnecessary hospital and clinic visits.

A Suggested Framework for Future IoT Communication Efforts

Given that the IoT is moving at warp speed into society, the research team suggests higher-level architectural guidelines rather than making very specific technology-dependent recommendations:

- **Connect: How do people access the experience?**

    As its name implies, the IoT comprises *things* (such as sensors that harvest data generated by people, places and things). It also requires network *connections* to transmit the data that is harvested. Beyond these elements are human considerations. The IoT is an environment, not just an assemblage of sensors and networks collecting and sending random data.

To design a compelling IoT experience, it's critical to understand how people access this environment from both a technology and a user experience point of view: What connections does the IoT experience need to provide for the people for whom it is intended? For example, Careables can provide users with a connection to information about their personal health status or the health status of their loved one, or an upcoming appointment or medication reminder. These individuals can also use Careables to connect to other people, including caregivers, extended family members, friends and their doctors.

- **Detect: How are changes in status communicated across audiences correctly?**

    In an IoT environment, sensors detect changes in status and other information, and then harvest data accordingly. For example, for a Careables device, a sensor can detect changes in a care recipient's blood pressure and heart rate, or a fall, and then transmit that information to the care recipient and any individuals that he or she designates. To ensure *relevance*, IoT experiences need to detect a combination of contextual elements, namely a user's location and ID, the time of day and activity/state. This combination will provide a much richer dataset than collecting any one element alone. A richer dataset, in turn, provides a stronger starting point for creating a meaningful IoT experience.

- **Select: How is information displayed to different audiences?**

    Arguably the greatest challenge in designing a compelling IoT experience is aggregating and presenting the data that is harvested in ways that are meaningful to users. Don't let users drown in a flood of data. Instead, act as a gatekeeper and filter. Provide reasonable options for users to select the frequency and type of data that is harvested, how the data is presented to them and with whom the data is shared. If the IoT experience is intended to benefit multiple user types, customize and create variations of the experience to suit different types of users. Perhaps a useful corollary or alternate title for this third consideration is "Respect." Respect your users by providing them with maximum choice. Let them customize their experience in ways that are most meaningful to them.

- **Protect: How is information secured but still usable?**

    With the wealth of connected devices and data that can be harvested through IoT experiences, privacy and security are obvious concerns. To paraphrase the proverb, "*Qui custodiet custodes ipsos?*" who's minding the store? The answer is, those who create IoT experiences must mind the store by designing experiences that achieve the proper balance of data harvesting with privacy and security.

Harvest only that data which are critical to providing the desired IoT experience. Don't harvest data just because it's there and because you can. Be transparent with users about what data are being harvested. Transparency and a proper balance of data harvesting will help you earn the user trust that is integral for widespread product adoption and longevity.

Note: An in-depth discussion of security issues is beyond the scope of this paper, which instead focuses on the demographic and economic landscape for caregivers and care recipients and the value proposition of the Careables ecosystem.

Conclusion: What Students Learned from the Prototyping Process

During the independent study course, the eight-student team brainstormed the problem and opportunity space for IoT-based solutions and decided to concentrate their efforts in the healthcare vertical. They then conducted landscape research and developed prototype ideas and a contextual storytelling plan for their proposed IoT reference solution, Careables.

These experiences have taught the students that given the rapid pace of change in the IoT space, it's challenging to create a contextual storytelling plan, to say the least. How does one develop a compelling storytelling solution around something that is going to be different tomorrow?

If the students were to recommend a best practice for research and prototype teams engaged in similar efforts, it would be this: In addition to having a baseline understanding of the marketplace, team members should make sure that they also have an agreed upon idea of the value of their experience (not the product, because the technology will change). If everyone on the team is focused on the unique experience, that is what will drive cohesive results.

Appendix I - Demographic Overview: An Aging America

The scenario of the Rye family, described earlier in this paper, is unfortunately increasingly common. The United States is looking at an unprecedented shift in population, in which 10,000 Baby Boomers will become retirement age every day from now until 2030 (Taylor, 2014).

Historically, population distribution by age groups has always looked like a pyramid, with the youngest people making up the base and the oldest age groups making up the tip. This once-stable demographic model is shifting dramatically.

> [F]rom 1960 to 2060, our pyramid will turn into a rectangle. We'll have almost as many Americans over age 85 as under age 5. This is the result of longer life spans and lower birth rates. It's uncharted territory, not just for us, but for all of humanity. And while it's certainly good news over the long haul for the sustainability of the earth's resources, it will create political and economic stress in the shorter term, as smaller cohorts of working age adults will be hard-pressed to finance the retirements of larger cohorts of older ones (Taylor, 2014).

This demographic flux puts a significant strain on the traditional model of caring for the expanding population of older Americans.

Americans Are Not Only Getting Older, More Are Aging in Place

Of the Americans who are age 65 and older, only 3.6% live in an institutional setting (such as a nursing home). The numbers logically increase as age increases, with 2011 numbers at "1% for persons 65 - 74 years to 3% for persons 75 - 84 years and 11% for persons 85+." (U.S. Department of Health and Human Services, 2012).

This model predicts that the majority of elderly Americans will remain in home environments as they age. A 2007 report by the Atlanta Regional Commission found that older Americans in their area have been "aging in place" and hoping to continue to live in their current homes as long as they could (Lawler, 2007). This specific trend indicates that a key target demographic for Careables, older individuals who are care recipients, is growing. The fact that Careables can help members of this demographic meet a primary need -- to remain in their home as long as possible -- is a strong argument for investment and adoption.

Appendix II - The Perfect Storm: The Economic and Emotional Impacts of Caregiving

While more seniors are aging at home or in multigenerational homes, the senior's adult children, often raising children of their own, often take on the role of caregiver. This sandwich generation feels stretched thin, not only economically, but also emotionally, with 68% of respondents in a Pew Research study reporting that their parents rely on them for emotional support (Pew Research Center, 2013).

Members of the sandwich generation face what Dr. Edward Creagan of the Mayo Clinic calls "the perfect storm" (Creagan, 2007). Struggling to prioritize the competing challenges of growing children and aging parents, they weather a host of stresses. They're raising their children and saving for their children's college expenses, saving for their own retirement, and financially supporting and providing basic personal caregiving for their aging parents -- all while still working.

Economic Costs of Caregiving

More than one in six Americans (~50 million people) who work a full- or part-time job are also caregivers, according to a Gallup poll (Cynkar & Mendes, 2011). Caregiving in particular results in negative economic impacts, due to the need for caregivers to miss work days annually (an average of 6.6 days according to Do, Cohen, & Brown, 2014), adjust work schedules, work fewer hours overall, take leaves of absence, turn down promotions, choose lower-paying jobs with flexible schedules and leave the workforce early.

According to one study by the MetLife Mature Market Institute (2011), the average total wage, Social Security, and private pension losses due to caregiving run approximately $304,000 per caregiver. Multiplied by the 9.7 million Americans who are more than 50 years old and caring for their parents, the amount totals nearly $3 trillion.

In addition to lost wages, caregivers also incur out-of-pocket expenses associated with caregiving. A Caring.com survey (2011) found that 42% of the survey respondents who were caregivers spent more than $5,000 annually on caregiving. Of these respondents, approximately 27% were members of the sandwich generation.

In light of these numbers, it's no surprise that caregivers find it harder to invest and save than do non-caregivers. According to Vicki Bogan of Cornell University, "Having any elderly dependents decreases the probability of both stockholding and college savings by twice as much as poor personal health." (Bogan, 2014).

Economic Savings of Caregiving

While at-home caregiving results in economic costs for caregivers, it generates significant economic value and savings for healthcare and long-term care services and support systems in the United States.

The AARP Public Policy Institute estimate of the economic value of caregiving in 2009 was $450 billion. This estimate is based on 42.1 million family caregivers providing an average of 18.4 hours of care per week to care for an adult with limitations at any given point of time, at an average value of $11.16/hour (Feinberg et al, 2011).

Although this data includes younger caregivers of adults, not just members of the sandwich generation, according to data from the National Alliance for Caregiving (NAC), the greatest proportion of caregivers is between 50 and 64 years of age. Between 2004 and 2009, the date of the most recent survey, the proportion of caregivers in this age group increased from 30 to 38% (NAC & AARP, 2009).

The second greatest cohort of caregivers was between 35 to 49 years of age (27% as of 2009). Given these numbers, it's clear that the greatest percentage of caregivers falls within the prime age range of the sandwich generation, an indication of this group's greater proportional contribution to the economic value and savings generated by caregiving.

Health Impacts of Caregiving

In addition to the financial stresses it imposes, caregiving can exact a heavy toll on caregivers' health, according to a national caregiver survey of adult caregivers in the United States in 2004. In general, the survey found that most caregivers' health became at least moderately worse due to caregiving (44%). About 15% of caregivers report that their health became a lot worse (Evercare & NAC, 2006).

Negative health impacts that caregivers experience due to caregiving include:

- Increased stress (90% of respondents)
- Disrupted sleep (82%)
- Decline in eating and exercise habits (63% and 58% respectively)
- Decreased frequency of preventative care practices (52%)
- Increase in personal medication use (51%)
- Abuse of alcohol or prescription drugs (10%)

Given the stresses of caregiving, many caregivers are also depressed, with Family Caregiver Alliance estimates showing that between 40% to 70% of caregivers of older adults have clinically significant symptoms of depression, and that 25% to 50% of these caregivers meet the diagnostic criteria for major depression (Family Caregiver Alliance, 2006).

The Careables Opportunity: Reducing Information Overload

Clearly, caregivers are experiencing significant burdens while also generating economic value to the larger economy at their own personal expense.

To alleviate their burdens, Careables must help solve a key problem: How can the surfeit of redundant and often unnecessary medical information about care recipients be streamlined, to simplify life for caregivers, care recipients and medical professionals? Technology alone won't solve this problem. Instead, broader innovation at the communications level is needed.

As Carol Levin states (Family Caregiver Alliance, 2006), describing the challenge in which she found herself after her husband was grievously injured in a car accident:

> Finding ways to relieve a caregiver of aspects of caregiving he or she finds most onerous would go a long way toward preventing exhaustion and burnout and delaying nursing home placement.

Appendix III: Why Choose the IoT for Healthcare Monitoring?

The IoT provides a rich environment and starting point for creating compelling user experiences that make data useful. Sensors can harvest data and intelligently designed applications and other interfaces can then filter the data to help mitigate information overload. The Careables product line leverages IoT capabilities to perform the following functions:

- Harvest key care recipient health-related data, such as vital signs and other health indicators.
- Provide designated individuals with easy access to the data that is harvested.
- Provide the ability for different categories of users to filter and customize views of the data so that the data is suited to their level of interest and expertise and their role (caregivers, care recipients and medical professionals).
- Interpret the data to provide proactive healthcare recommendations for care recipients.

In these ways, the Careables product line not only provides exemplary functionality -- it helps solve a major problem that plagues caregivers, care recipients and medical professionals alike by streamlining healthcare-related communications.

The Broader IoT Market

The entry of several strong competitors into the IoT space for devices targeted to older adults reflects a broader and growing trend of market awareness and adoption. IoT market space comprises five key verticals of adoption: Wearables, connected cars, connected homes, connected cities and the industrial Internet. Of these major verticals, healthcare is a subset of the industrial Internet (Jankowski et al, 2014). As an example of how fast the IoT is expected to grow in the connected homes vertical, a *Business Insider* Intelligence report estimated that connected-home device shipments would grow at a compound rate of 67% over the next five years.

By 2019, the market is predicted to hit 1.8 billion units shipped annually (Danova, 2014). The wearables vertical is also rapidly growing, with the "smart wearables" category forecasted to generate a cost adjusted growth rate of 171% between 2013 and 2018, according to a market analysis by IDC (Llamas, 2014).

Driving Adoption and Long-Term Engagement

Although the IoT market is growing quickly, particularly in the area of smart wearables, getting individuals to adopt and then continue to use smart wearables is a major challenge. Studies over the past year show that while 10% of adults in the United States own an activity tracker, about one-third abandon their device after about six months (Ledger & McCaffrey, 2014).

Ledger and McCaffrey have identified the following nine baseline criteria to drive initial adoption and use of a smart device:

- **Selectability/adoptability.** The device must solve a problem for the consumer.

- **Design/aesthetics.** Any visible device must be visually appealing to consumers.

- **Out-of-box/setup experience.** Customers must have initial ease-of use.

- **Fit/comfort/form factor.** The device must be comfortable.

- **Quality/durability.** The device must be able to withstand daily use.

- **User experience.** The device must be intuitive and easy to use.

- **Application programming interfaces (APIs)/Integration capabilities.** The device must support APIs that will be used by other services that will integrate with it.

- **Lifestyle compatibility.** The device should require minimal behavior change from consumers.

- **Overall utility.** The data that the device provides to consumers should have a clear purpose.

The goal of architecting IoT-based communication solutions such as Careables is *not* to generate more data and communication. Rather, the communication design goal is to integrate continual healthcare monitoring and suggestion into daily life across different audiences. These audiences have different needs, but share a similar, socially relevant goal. In the case of Careables, that goal is to optimize the health and well being of elder care recipients.

Ledger and McCaffrey identify several behavioral patterns that affect long-term engagement: Habit formation, social motivation and goal reinforcement (2014). These behavior patterns and other elements, such as appearance, will play a role in making Careables fun and enjoyable to wear, thus helping to drive adoption and longevity.

- **Design as engagement**

    On her web page, medical jewelry designer Abbe Sennett stated that she "saw too many people refusing to wear a life-saving medical ID bracelet because it was considered ugly, and draws too much attention their medical condition" (Sennett, n.d.). This inspired her to create aesthetically pleasing and trendy medical bracelets.

    In fact, a Nielsen *Connected Life Report* (2014) shows that 62% of those with a high interest in connected wearable technology said that they wanted alternative form factors to wristbands and watches; 52% wanted devices that look more like jewelry. The report said "consumers are already looking for new form factors in wearable designs, including smart glasses and textiles, for their future purchases." Current wearable-tech companies are also incorporating style with function, from fashion designer Tory Burch's collaboration with Fitbit to tony department store Barneys' work with Intel division Basis Science.

    Making the Careables device fun to use will also make wearers more apt to keep using it. For example, if a care recipient needed encouragement to do simple exercise, the Careables device could incorporate gameplay, such as moving one's arms to the beat of music, or earning badges or even financial incentives for sticking to a program.

- **Careables as an experience for creating, maintaining and strengthening connections**

    For care recipients, high-quality social networking and communications experiences can provide valuable opportunities for connecting and socializing, helping to mitigate mobility limitations and/or geographic distance from family members. These experiences can also reinforce positive behaviors that extend beyond social networking (Pew Research Center, 2014).

    Accordingly, a number of social networking sites geared toward older adults now populate the online landscape (examples include GenKvetch, AARP Online Community and The Cool Grandma). Careables has an opportunity to improve on and extend the social networking elements provided by these sites, in addition to providing a rich health data harvesting and sharing ecosystem.

Critical to Careables' success as a tool for facilitating connections will be its ability to bridge generational communication differences. A 2012 study by Microsoft and AARP found that among older adults ages 59-75, only 16% prefer to communicate with family members through social media, but 52% of teens prefer to communicate with family in this way (AARP & Microsoft, 2012). To help bridge these differences, Careables could provide social games that peers and family can play. A game that incorporates communication between older adults and their grandchildren would be a great incentive for older adults to use it. This functionality also might make grandchildren more apt to communicate with their grandparents.

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About the University of Washington Communication Leadership Graduate Program

Based in Seattle, the University of Washington (U.W.) Communication Leadership (Comm Lead) graduate program offers unparalleled instruction to those who seek to connect persuasively with audiences, customers, constituents and communities.

The program houses two degree emphases in digital media and creative engagement. The program guides professionals into transformative roles through the design of networking strategies, anchored in compelling storytelling and insightful analytics. Professionals build the necessary communication knowledge, strategies, and skills to manage content, information, systems, people and change.

Industry leaders and Department of Communication faculty direct the program and teach its courses. Both the Master of Communication in Digital Media (MCDM) and Master of Communication in Communities and Networks (MCCN) degrees maintain the rigorous academic standards of the University of Washington Graduate School. Courses are based on the theory and practice of the communication discipline and are taught in a highly collaborative environment.

About the Research Team

Connie Rock
Connie is an MCDM candidate in the U.W. Comm Lead graduate program. Trained as a journalist, she holds a master's degree from Northwestern University's Medill School of Journalism.

Connie's experience spans the for-profit and nonprofit sectors and client-side and agency environments, with roles in research, content strategy, content creation and digital analytics. Her work has been published in the *Chicago Sun-Times*, *Aviation* magazine and *Seattle Business* magazine. She is a creative copywriter based in Seattle.

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Joe Howell
Joe is Senior Director of Global Employer Brand & Engagement at EMC Corporation. Joe drives communication strategies that touch 60,000+ EMC employees around the globe and more than 7,000 new hires each year. He has a strong background in advertising and communications, particularly in working for market leaders such as TMP Worldwide and J. Walter Thompson.

Joe holds an MBA degree in International Management from Thunderbird. He has lived and worked extensively across Asia and currently lives on Orcas Island in Washington State.

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Kathy Matosich
Kathy holds an MCDM degree from the U.W. Comm Lead graduate program. She received her undergraduate in Media and Theater Arts: Motion Picture, Video and Television from Montana State University.

Kathy has presented papers at the Pop Culture Association/American Culture Association conferences, as well as the Film and History Conferences, usually on critical television and radio studies. She worked as a commercial producer for more than 10 years, receiving more than a dozen national and state advertising awards for her work. She currently works as a content strategist.

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Carrie Shepherd
Carrie is a communications professional based in Seattle, specializing in tailoring voice and story to reach target audiences. Her published work ranges from a dialogue-intensive fashion video game for tweens to market analyses for executives; she has managed content for more than a dozen national magazines and hundreds of comic books.

Carrie earned a bachelor's degree in journalism from Northeastern University, is an MCDM candidate in the U.W. Comm Lead graduate program, and she produces and edits content for Rick Steves' Europe.