Interdisciplinary Collaborations from a Health Informatics Prospective
Katie A. Sick and Kay Connelly

1 Introduction

Can we prevent young adults from developing chronic illness, such as diabetes, by motivating them to exercise [1]? Can we empower people with diabetes to understand how their past choices affect their current health state [2]? Can we provide people with advanced diabetes a means to strictly monitor their nutritional intake [3]? The answer to all of these questions is a resounding, “Yes!” But we, as informaticians, cannot create the systems to address these problems in isolation. These health-specific problems require researchers to attack them from multiple angles, thus creating a need for interdisciplinary research [4].

Unfortunately, there is not a specific conceptual framework for how to conduct interdisciplinary research [5-7]. Steward T.A. Pickett and colleagues argue that without a conceptual framework identifying how hypotheses correspond to expectations, “it is difficult to unify a field of study, expose inconsistencies, and prioritize research agendas” [7]. In addition, without a framework, researchers have difficulty justifying the costs associated with developing an interdisciplinary team and balancing the social and political insights needed to sustain a research career [4, 6]. Indeed, researchers note a lack of institutional infrastructure and funding support for interdisciplinary research endeavors [6, 8, 9].

Despite the lack of support, if a researcher decides to continue pursuing interdisciplinary research, she may find internal research group dynamic barriers such as a limited common lexicon [6, 8, 10-12], conflicting work styles [4, 6, 10], disagreements over idea ownership [6, 8, 10], and publication issues [5-7]. Many researchers overcome these barriers to continue to conduct interdisciplinary research by improving communication with their collaborators, departments, and research communities and thus reap the benefits of their cutting-edge research. In this section, we discuss some of the research that discusses the barriers and motivations of interdisciplinary research.

One of the most common issues that arise in interdisciplinary discourse is the limited common vocabulary that exists between disciplines [6, 8, 10-13]. Even within some disciplines, there are specific dialects that can change the interpretation of terminology [12]. Researchers’ experience in interdisciplinary research estimate that it takes at least a year to develop a common lexicon [10]. Some researchers believe that interdisciplinary research problems go beyond terminology –
collaborators must work together to seek a common meaning for work [11]. Common meanings are especially important when the group is using the many technological communication mediums available, because physical meaning is lost with most forms of virtual communication. Collaborators must also take into consideration that some terms carry metaphorical baggage in a collaborator’s own discipline and thus even if the meaning of a term is understood by everyone in the research group, it may effect the thoughts and ideas of the eventual audience and group members [12].

Another natural issue that comes up in some interdisciplinary collaborations is the varying work cultures between disciplines. The work styles of collaborators may be incompatible and effect the group’s ability to efficiently produce results in an already complicated project [10]. In addition, group members varying strengths may be perceived as a difference in “intellectual caliber,” thus making discussions on work styles uncomfortable when some group members are perceived as weaker [6]. Collaborators may assume that the work style of the group will be similar to their work culture in their discipline and become frustrated with the collaboration [10].

Interdisciplinary researchers try to openly communicate their ideas and problems with their group to help mitigate the issues discussed here. Sometimes when communicating ideas, it is difficult to discern who came up with the idea when everyone is building on each others ideas. Disagreements over ownership of ideas could cripple a team and effect careers [6, 8], thus it is an important issue that all interdisciplinary research groups discuss how ideas will be identified and credited before collaborations begin.

Researchers are divided if team dynamics [6] or a lack of appropriate venues [5, 7] adversely affects publishing on interdisciplinary research. Robert J. Naiman postulates that collaborators who have a lack of trust, understanding, patience, and respect can hinder a group’s ability to publish scholarly works. However, Monica G. Turner and Stephen R. Carpenter argue that writing and reviewing is difficult because people are not sure about appropriate venues for interdisciplinary research [5]; Picket and colleagues agree with the latter argument because venues are typically discipline specific and thus, the reviewers are discipline specific as well [7].

The best way to overcome the obstacles described here is to effectively communicate with collaborators [6]. When interdisciplinary teams are developing a common lexicon, collaborators should provide clear descriptions when using terminology from their discipline so others learn the meaning behind the term [12]. Communication can provide group members with an understanding of their roles within the team and how their roles can influence the group work style. Carol Palmer notes that researchers commonly vary their approach, information practices,
knowledge strategies, scope, and outcome depending on their role in the project [4]. In addition, collaborators should communicate how information will be shared and when results should be exchanged to help organize work styles. Group members should educate others about ownership of the project to avoid potential problems with idea ownership. If publication problems are because of internal group hostilities, communication can help build trust, respect, understanding, and cooperation [6, 13]. Alternatively, researchers must support interdisciplinary publication venues and train interdisciplinary researchers to review publications. If people from different disciplines have dissenting opinions on some articles, they should be able to communicate their ideas in the journal [12].

Many researchers have overcome these obstacles and benefit from their interdisciplinary research by becoming more broadly educated researchers [4, 6]. Their collaborations provide them with the ability to visualize more complex problems [8] and attack the problems from multiple angles [4]. In the process of their research, they also develop well-focused problems and produce “good science” results [6, 8]. The obstacles discussed here were presented with examples from the authors’ experiences in many fields such as environmental science, ecology, and economics. In this chapter, we discuss these obstacles and others we encountered from a health informatics standpoint and abstract them into a core set of four themes:

- Understanding work styles and discipline culture
- Developing a shared lexicon and common meaning for terminology
- Interpreting communication styles
- Learning about the target population

Our aim is to discuss these themes with examples from our own experiences so researchers interested in health informatics can learn about possible challenges and solutions.

2 Our Collaborative Experiences

The themes we extract in this chapter are based on our experiences with three different health and technology collaborations occurring over a span of five years. While our views are necessarily biased by our own training and experience, we have spent substantial time learning from our colleagues and have a great deal of respect for them all. We are both trained as computer scientists, and our research emphasizes design and evaluation of technology for non-expert users, including, but not limited to the projects we briefly describe in this section. We employ a user-centered design approach where we use ethnographic methods (e.g., interviews and observations)
as well as more traditional human-computer interaction (HCI) methods (e.g., usability studies, experience sampling, cognitive walkthrough) to arrive at a holistic view of how our user population may or may not incorporate technology into their lives. We have had other interactions with health-related professionals, but use the following three from which to draw our examples.

Finally, we are compelled to offer a caveat at the beginning of this chapter. Throughout the remainder of this chapter we will make generalizations about computer scientists and healthcare professionals. We are fully cognizant that these do not apply to everyone who fit those descriptions. Rather than qualify those generalizations throughout the paper, we provide one blanket qualification here. These are simply generalizations based on our experiences and our hope is that our experiences can help others approaching a collaboration in this area to identify (and protect against) possible problems early on.

2.1 DIMA

The Dietary Intake Monitoring Application (DIMA) is an NIH-funded project first conceptualized by a nurse researcher and health informatics professor in order to help an inner-city, low-literacy population with Chronic Kidney Disease (CKD) monitor and manage their diet. Patients with CKD have lost most, if not all, kidney function, requiring them to undergo dialysis three times per week in order to remove fluid and toxins from their blood. Too much fluid or certain kinds of nutrients (e.g., sodium and potassium) can cause life-threatening complications, requiring patients to adhere to a rigid diet. Unfortunately, many patients lack the cognitive processes (literacy, memory and/or computational skills) to monitor their diet. The DIMA project uses mobile technology (i.e., a PDA) to assist patients in computing their nutrient consumption and provides feedback about their consumption as relates to their proscribed diets.

We were brought into the project as technology experts in 2003, near the beginning of the grant-writing phase. The nurse researcher was the PI of the project, had been working with renal care patients for many years, and provided the theoretical underpinnings for the intervention. The health informatics professor was interested in how delivering electronic information to different patient populations affects their health outcomes, but was new to this particular patient population. We were interested in designing and evaluating mobile applications for non-technical users; however, this was our first health-related collaboration. Over the years, the team has evolved to include two biostatisticians, a research dietitian, a unit dietitian, and a nephrologist.
2.2 Feeding Tube

The Feeding Tube application is an NIH-funded project designed by a nurse researcher to assist unit nurses in calculating feeding tube insertion-length estimators in pre-term infants. The application calculated an experimental insertion-length estimator that the nurse researcher created and compared it with two standard insertion-length estimators (NEX and NEMU). Researchers have estimated that between 21% and 44% of all feeding tubes are incorrectly placed [14, 15]. When feeding tubes are not placed correctly, babies can be seriously injured and perhaps even die. Despite the need for accurate insertion-length calculations, it is sometimes difficult to quickly calculate insertion-length. Nurses sometimes must use complicated formulas that require them to calculate the exact number of days a baby has been alive, a baby’s length in centimeters, and multiply and add these numbers with appropriate fractions. The Feeding Tube application uses mobile technology (i.e., a PDA, Java enabled mobile phone) to assist nurses in calculating a feeding tube insertion-length estimator. In addition, it assists researchers in learning about how calculations vary between two standard insertion-length estimators and an experimental estimator.

We were brought into the project as technology experts in 2005 when the grant was already funded. The nurse researcher was the PI of the project and had significant experience with feeding tube placement research with people of all ages. The biostatistician was interested in being able to quickly get feedback about the three measuring methods used in the study by getting logging data from the Feeding Tube application. We were interested in designing, implementing, and evaluating a performance support system used by health professionals in their work setting.

2.3 Colorado Care Tablet

The Colorado Care Tablet (CO Care Tablet) is a Robert Wood Johnson Foundation funded project lead by a research doctor specializing in medical informatics and chronic disease management. CO Care Tablet is a Personal Health Record (PHR) Tablet PC application that helps older adults, during transitions of care, coordinate their care among multiple providers and caregivers and learn about the medication they are consuming. Medication errors are prevalent among older adults who are in transition between the hospital, home, or assisted living community [16]. CO Care Tablet empowers older adults to learn about what medications to take when, and update caregivers and medical professionals about the medications they take.

We were brought into the project as usability and technology experts in 2006, near the end of the grant-writing phase. The research doctor was the PI of the project, had significant experience
with older adults and was able to assemble a team of nationally recognized experts in transition of care, health information system, PHR, medical informatics, and behavioral science. The overall aim of the research was to design and develop a prototype PHR to assist older adults during transitions of care using participatory design and iterative development.

3 Major Themes

The major challenges we have encountered while developing productive interdisciplinary research relationships are:

- Educating collaborators about the research agendas and work styles of technologists/informaticians
- Developing a shared vocabulary and carefully defining terminology that researchers in different disciplines may interpret differently
- Learning how to effectively communicate with collaborators with various technological communication mediums
- Understanding our target population with information from collaborators and participants

In this section, we discuss each theme more in-depth.

3.1 Differences in Research Culture

One of the major roadblocks in developing a productive, interdisciplinary, research relationship is understanding the different research cultures. Technology projects are particularly susceptible to this problem, as people in other fields often view computer scientists as “implementers” or “programmers,” and have difficulty understanding their research contribution. Even with the best of intentions, we have found that researchers in health fields often forget that we have our own research questions to answer, and if solving their problem was a simple matter or implementation, we would have no interest in the project. Because the technology aspect of the project is also research, it is not always possible to implement a solution on a specific timescale. This required flexibility of the entire team, which can be difficult if the health research questions cannot be answered without the technical implementation.

Likewise, the technologists need to be sensitive to the needs of their collaborators. Computer science has a rich tradition of independent work. Just as one of our major programming paradigms is modularization, where programs are divided into different components to be implemented and tested separately, and composed together at a later point, technologists often
view collaborative projects as a simple division of work, getting together once every few months for status updates. In our experience, this divide and conquer technique that allows us to work independently even in a collaborative project, simply does not work with a health and technology project. Even though our collaborators are not involved in the details of an implementation, it is critical that we inform them frequently about our progress so they experience less anxiety and have a better understanding of our final design, as well as our successes and failures along the way. Ultimately, the project is not there simply to give the technologists a justification for building a particular system, but to solve a real medical problem.

In addition to understanding each other’s contributions and needs, there are significant cultural differences in how research is actually performed. One important distinction between the fields of nursing and computer science is who actually does the work on the project. In computer science, there is often an apprentice model with Ph.D. students, such that the student performs a good portion of the research with guidance from the faculty member. The more junior students tend to need more guidance, and as the students progress, they become more independent. In this way, students are an integral part of the research process. Our collaborators in health sciences have found this an unfamiliar model. In the nursing community, students work on their projects, but they are seen more as labor, than as collaborators. When we work with doctors, they hire professional research assistants who have a masters degree in a related area to assist with research work. While at first glance this may appear to be a minor difference, we have found that there are serious repercussions throughout the project. For budgets, for example, there may be conflicts over paying an hourly student or a percentage of salary for a professional research assistant to perform data collection, versus paying a student research assistant for the duration of the project. For authorship, issues may arise over if a student is allowed to be a first author on a paper addressing a specific aim of the research proposal. And for data ownership, there may be contention over if a student should have access to the data to answer their own research questions for an independent publication.

In addition, the apprentice model can leave others on the team confused as to the role of the advisor, as the research contribution of advisor and student is nearly impossible to separate. The students almost always perform the visible work (e.g., conducting user studies, coding the application), while the advisor provides training and guidance as needed depending on the rank and experience of the student. There may be difficulty in understanding why a budget should include funding for the advisor and funding for the student. In our case, this tension was eased by including summer funding for the advisor in the budget, but not a course buyout. This was
feasible in part by the lower standard course loads in computer science (3 courses per year), as compared to those in nursing (6 courses per year), where they depend on course buyouts in order to have time to do their research.

One final major difference in research culture that warrants attention is the avenues for dissemination of results. Nursing and medical fields follow the standards similar to those in the other sciences, such as biology and chemistry. Their major publication venues consist of peer-reviewed journals, which may take several months to over a year from submission to publication. Less prestigious, but still of value, are conference presentations. These presentations are accepted on the basis of short abstracts. Computer science has a very different dissemination model. Because of the fast-paced nature of research results in technology, there is a tradition of highly competitive, peer-reviewed papers in conferences, and less of an emphasis on journal publications. Conference papers are anywhere from 8 to 20 pages long, depending on the venue, and take only three to six months from submission to publication. Computer science journal papers often consist of aggregating the results of several conference papers into one, and usually have a smaller impact on the field than their corresponding conference papers.

In addition, health fields often have large teams in which everyone on the team co-authors the papers on the project. This is not completely unfamiliar in some sub-disciplines of computer science, such as the computer systems area, which requires large teams to build large-scale systems. However, many subfields of computer science, and in particular, the area of human-computer interaction in which we work, have an expectation of a small number of authors (1-4). A newly graduated Ph.D., or an assistant professor coming up for tenure, must have a number of high-quality papers in which they are the first author on a short list of authors in order to be competitive with their peers. Similarly, author order guidelines vary widely within subfields of computer science, and can be very different than those expectations in nursing and medicine.

Deciding what publications will be submitted, to what kind of venues, how many authors, and how much work each author must contribute can be a delicate negotiation in order to satisfy the career needs of everyone. We found that committing an agreement to how publication decisions will be made to paper at the beginning of a project has served as a focal point for discussing the different discipline traditions and helped avoid misunderstandings that foster distrust within the team.
3.2 The Tower of Babel

A pervasive issue in interdisciplinary collaboration is language and terminology differences between the parties involved. Researchers are used to discussing ideas with people from their own field and thus use field related terminology indiscriminately. However, for interdisciplinary researchers, they must be able to identify key terminology from their field and be prepared to describe the term and its importance. Indeed, because of our interdisciplinary collaborations, we have become so comfortable with defining every field related term we use, we sometimes continue defining terms when we talk to peers in our own field. Or worse, we do not use the term and only the description of the term and are quickly reminded who we are speaking to when they start volunteering the correct terms.

We have found that it is better to err on the side of verbose descriptions of terms than to continue discussions with the assumption that everyone in the interdisciplinary group understands the terminology used. Indeed, when we began working with health professionals, we spent many meetings writing notes in ledger margins alerting us to look up a specific term later on so we could better understand what was being discussed at the meeting. For example, the terms Bandura and Hawthorn were used many times during some of our interdisciplinary meetings without a full explanation of the term – it was assumed everyone knew Bandura’s social cognitive theory on self-efficacy [17] and how it could frame our research projects. When we admitted we did not know Bandura’s theory on self-efficacy or the Hawthorn effect, our colleagues gave us a quick summary of the terms and some references.

Of course, technologists must also be careful when using technical terms and processes when discussing design, implementation, and evaluation details for projects. Three letter acronyms that are fairly mainstream now, such as Personal Digital Assistant (PDA), were sometimes confusing for our collaborators. Undeniably, all professionals have their own acronyms – such as MCOs for Multiple Chronic Conditions. However, we have found that just because health professionals use technology and see technology advertisements everyday, does not mean they necessarily understand the terminology such as the benefits of more RAM instead of a larger disk drive.

We also have to carefully describe our processes so everyone has similar expectations during the design, implementation, and evaluation process. We find that our collaborators are sometimes surprised when we want to meet with the target population. Indeed, our collaborators have an idea of the problem we can address with technology, but we must design the application to address the needs of the target population or it may not be usable by them. Thus, we spend a considerable amount of the early design period conducting a needs assessment by interviewing, shadowing,
and conducting focus groups with the target population. During the later part of the design process, we have described to our collaborators that we were designing low fidelity prototypes to quickly get user feedback – our deliverable would be pictures of the interface or probable icons - only to find our collaborators were concerned with the lack of technology in our design process. We also have had to describe the iterative implementation process to our collaborators so they would understand the benefits of testing each part of the application before putting the entire application together and testing it at once.

One of the most costly terminology problems we have encountered is when we use the same terms, but each discipline assumes they mean different things. In two of our collaborations, we have worked with older adults. We assumed older adults would be defined as 65 and older as it is defined by the United States Health and Human Services [18]. However, we have found our collaborators differ on the definition depending on their specialty. For one of our collaborations, we assumed we knew the age range of older adults and spent six months conducting comparative user studies with older adults only to find the age ranges were quite different between the target user group and the baseline group we recruited.

We have found that the easiest way to ease terminology issues is to have everyone define terminology and give references for further reading. We work with incredible interdisciplinary health researchers who go out of their way to learn about our work and in return, we make efforts to learn about their research area. Sometimes our collaborators are so excited about our area that they assume proficient knowledge in an area after only an overview. This can make some collaboration relationships difficult because although the textbook advises one way, our training and experience may warrant a deviation from the standard way to gain a deeper understanding from a design and evaluation perspective. Fortunately, after some discussion, it becomes clear what avenue should be taken and there is a renewed respect of everyone’s specialty.

Interdisciplinary research teams imply that people from different fields are going to discuss their research contributions with their own terminology. We found that the easiest way to work through these differences of terminology and processes is to have each researcher define research associated terminology as they speak or have collaborators speak-up when they are unfamiliar with a term. When there is a term that is not usually used in the researcher’s field, but the definition is assumed, we typically preface it with, “In our field, we mean this…” In addition, we recommend carefully laying out a schedule with detailed deliverables so everyone knows what is happening with appropriate expectations. The language issues among different fields takes a lot
of time to overcome – there is no quick fix – but the benefits of learning another field’s language provides researchers with an opportunity to become more well-rounded scholars.

### 3.3 Disciplinary Etiquette

There is a significant difference in the communication styles of nurses, doctors and technologists. We discovered the hard way that the style of one can be found immensely rude by another. While we have our suspicions about the root causes, we are not experts in this area and cannot say for sure. Suffice to say that computer science is a male-dominated field (second only to engineering in the dirth of women in its ranks) [19]. In our experience, women who are successful in this field tend to have a fairly straight-forward, no-nonsense approach to communication. Whether this is a matter of survival, or simply the kind of women attracted to the field is debatable.

In addition, as technologists, we use email as our normal medium for communication, often writing a single line without so much as a hello or signature. Email lacks the social cues of in-person, or even phone, conversations. We have discontinued using email for any substantive conversation with our nursing collaborators because of the tendency to cause offense. The doctors we have worked with, on the other hand, are very matter-of-fact in their communication, both in person and via email. However, they are also incredibly verbose. It is not unusual to receive over 10 emails a day discussing different part of the research in long paragraphs. Technologists are more likely to use bullet points; the shorter and easier to read, the better.

In nursing, perhaps because it is a female-dominated field, or a field of people devoted to the care of others, there is an emphasis on respectful listening, caring and democracy. Whereas interruptions are the norm with computer scientists and doctors as part of a healthy debate, interruptions are a sign of disrespect in nursing. In our meetings with nurses, the first 10 to 20 minutes are spent inquiring about each other’s personal lives, a practice not as common or as ritualized in computer science or medicine. Nurses work through the agenda slowly, making sure everyone at the table has the opportunity to contribute. Technologists and doctors are more apt to rush through the agenda, attending to the most critical items before they go to their next meeting. Criticisms are carefully crouched in positive language by nurses, whereas the male dominated

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1 We are extremely fortunate that our collaborators told us how they found our communication style offensive at times, and were patient with us while we attempted to change.
fields are more to the point and less concerned with offending other or being offended themselves.

3.4 Conflicting Messages

When we started our interdisciplinary projects, we knew our collaborators were experts in their field and could provide us invaluable information about current health-specific findings and broad user profile information about the target population. We quickly learned that, unlike programming, there is a lot of “grey area” depending on our collaborators specialty. This was somewhat problematic from a design and programming point of view because our programs had to be accurate and the design had to present the information to the participants who would be using the systems to help them monitor and maintain their health or the health of someone else.

When we were developing DIMA, we found the nurse researchers, unit dietitians and patients all had different ideas on how important different nutrients were to a CKD patient; how accurate feedback must be on nutrient consumption values; and details of a typical patient’s diet (e.g., what; how often; how much). Originally, we were only going to focus on monitoring fluid and sodium consumption for nutrients. But after talking with dietitians, we realized we would also have to monitor phosphorus, potassium, protein, and calories. When we talked to the patients, they said that although they did not monitor any of their nutrients [20], they had received warnings to monitor fluid, sodium, and potassium intake. At first, these differences in messages from the three groups were daunting, until we realized we could integrate all three suggestions by monitoring all the nutrients proposed, but use the patient feedback for ordering of the nutrients.

We also found that the research nurses and dietitians were more likely to want the application to record every detail of a patient’s diet. For example, they would want every detail of a sandwich down to the serving size of the condiments used. This information was vital for them to have to for their research. Whereas the unit dietitian wanted more general information (e.g., a turkey sandwich), because she currently had difficulty receiving any dietary information from patients. Thus, any information was a large improvement for her to provide feedback to patients’ on their respective diets. The patients were not interested in an application that would require a lot of time by having to input many items at each meal [20]. We had to openly discuss these differences with our collaborators to create a common middle ground that would provide enough data for our collaborative research, but not overburden the patients so they would not use the application.

Early on in our design of the Co Care Tablet, we defined our target population as older adults who had seen health professionals in more than one doctor’s office, took more than two
prescription medications, and had at least one diagnosis that would lead to a future transition of care. After our initial needs analysis, we found that people in this group did not have the problems with transitions of care that we thought they would have. We had to add to the target population criteria that patients had to have been in the hospital in the last few years.

We also found some conflicting messages in designing for the personal health record. Our collaborators were sure patients would be interested in medication reconciliation – the ability to look at the medication lists all of a patient’s doctors had for them and make notes on differences between their medication list and the doctors’ medication lists. We conducted two rounds of low fidelity prototyping studies and found most patients were not interested in medication reconciliation. After the first round, our collaborators reasoned that perhaps the interface was too complicated. We held a design workshop with the research team to brainstorm alternative medication reconciliation interfaces. After the second round, our collaborators realized this was not the correct direction and were struck that the patients were not interested in medication reconciliation – a task that is critical for doctors to know for patient health. We were able to work together to rework the idea of medication reconciliation into a task of more value to the patients – medication list management.

4 Overcoming the Challenges

We have found some ways to overcome the obstacles described in our four major themes. Before we first meet with potential collaborators, we always research them to gain a better understanding of their interests. We read their latest papers, identify their past and present research interests, and see what funding they have been awarded. When we later meet our potential collaborators they are impressed with our initiative to read their papers. We have also had the experience of emailing potential collaborators before the initial meeting and swapping two or three relevant research articles and our curriculum vitae. Learning about potential collaborators helps to jump start ideas on the project, learn about potential terminology issues, and discover the research methods the collaborators are accustomed to. It also gives us more time during the meeting to discuss research models, publication expectations, terminology, and etiquette.

We always attend initial meetings with potential collaborators with copies of our portfolio. Our portfolios are simple PowerPoint presentations that contains our research agenda, examples of our previous work, publications associated with each project, a list of the collaborators on each project, and a description of our role in the project (e.g., I designed, implemented, and evaluated this system). We find that the portfolios are great ways to generate ideas with our colleagues and
meet new potential collaborators because someone at the meeting may know the perfect person to meet after the meeting for a potential project.

Before we settle on collaborating with a colleague, we discuss funding budgets and publication expectations. Occasionally, these discussions have broken a potential collaboration. But, most of the time things can be worked out. A full-time graduate research assistant can be worked into the budget because the graduate student is less expensive than hiring an hourly programmer and can provide must better user-centered, iterative design methods. Publications can be negotiated so that collaborators from all fields could be on most of the publications.

A common theme for overcoming the challenges of interdisciplinary collaborations is educating – educating colleagues about what we do; our research methods; our odd publication cycle; and our terminology. As technologists, we must continue to educate our colleagues in other fields about our field because no one quite understand what we do or are capable of accomplishing through interdisciplinary research. Mass media portrays technologists as socially challenged nerds who do boring, highly technical work [21]. We must get out of our technical comfort zone and let colleagues know we are motivated and able to help each other move our research agendas forward. The more we educate our colleagues about the possibilities of technology integration, the easier future collaborations will be.

5 Conclusion

Interdisciplinary research is a challenging and rewarding endeavor. In this chapter, we have discussed some of the challenges associated with interdisciplinary research and ways to overcome these challenges. We would like to emphasize that the benefits of interdisciplinary research far outweigh the challenges and associated risks. Researchers get to share and learn about other fields from experts. We, as technologists, get to work with target user groups we ordinarily would not have access to and our collaborators get a customized, user-centered design experience to ensure the application will meet the intended users’ needs. Collaborators get to see research processes from another perspective. Most importantly, researchers get to develop innovative technology interventions that could not be developed without the passion, knowledge, and abilities collaborators contribute.
18. *Health Information for Older Adults*. 2007, Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion: Atlanta, GA.

