Samples in this file are solely for the purpose of guidance in the quality of content and writing when preparing URG submissions.

SAMPLE ABSTRACTS

Section II. ABSTRACT (approximately 300 words in length)

Researchers in sport have suggested social media can be used to build relationships between teams and consumers, thus making these channels effective marketing tools. While engagement has been touted as the ultimate outcome of the content posted on social media networks, very little is understood about what actually motivates engagement and why fans engage with sport teams on social media. Additionally, to date, no experimental research has been conducted on social media content in sport, and very little has been conducted in other industries. This study will extend research on social media marketing in sport through a mixed methods research design, which will include experimental and qualitative phases. First, a series of mock Facebook posts will be created. Three element categories will be varied separately to determine how different content elements impact intentions to interact with that piece of content (like, comment, share, read, and view). The categories include type of media element, content of the post, and call to action. Post-experiment, participants will be invited to complete a semi-structured interview, where they will be asked why they chose to interact with content and why they chose the level of interaction they did (read, like, share, etc.). Data will be analyzed using descriptive statistics, regression analysis, and thematic analysis. The results of this study will be presented at national conferences and published in a peer-reviewed journal to provide a practical basis for social media content strategy for sport marketers.

Section II. ABSTRACT (approximately 300 words in length)

Ultra-small wearable devices, e.g., smartwatches, are becoming popular quickly. However, due to the limited screen size and the "fat-finger" problem, text entry on devices with tiny screens is challenge although desired. FingerStroke is proposed in this research to support text entry on smartwatches. It allows users to use a finger to enter text by making strokes at any place on a touch screen without the need of pressing any keys accurately. It is a round keyboard with eight small areas surrounding its center. The direction of a finger stroke on the screen is calculated to select one small area and then a character in it. The objective of this study is to propose and implement the FingerStroke keyboard to support text entry on smartwatches, and to evaluate it in terms of typing speed, accuracy, and users' perceptions by comparing it to two existing keyboards on smartwatches, i.e., DriftBoard and ZoomBoard. A longitudinal experiment with 10 sessions will be conducted to evaluate users' progress with practice using the three keyboards, due to the learning curve of new keyboards. Repeated measures ANOVA will be used to compare the typing speed, accuracy, and users' perceptions of the three typing techniques. The findings of this research will provide new technical and practical insights for designing interactive systems, especially text entry techniques, for touch-screen ultra-small wearable devices.

Section II. ABSTRACT (approximately 300 words in length)

Although mobile technologies provide individuals with a range of attractive features, the proliferation of mobile devices in individuals' daily lives has led to a growing attachment to devices. Problematic habits with technology as well as the general, everyday use of technology can cause interruptions and intrusions in face-to-face interactions and relationships—which has been termed "technoference" by previous work. Technoference has been associated with poorer individual and couple relationship well-being in cross-sectional studies. In the current project, I expand upon previous work by examining partners' use of technology during daily leisure time and the potential influence of this use on satisfaction with daily couple leisure time and feelings of daily relationship satisfaction. Potential differences between partners within couples in these processes will also be explored. This will be accomplished through a longitudinal study, which also includes 10 days of consecutive daily surveys, assessing such things as technology use, perceptions of partner's use, leisure time with partner, and relationship quality. Technology use likely varies on a daily basis and differences in the amount of use and the opportunities for interruptions in daily face-to-face interactions likely hold meaning for changes in the functioning of couple relationships. Besides further

illuminating our understanding of daily processes, this knowledge can be used to inform the future work and interventions of scientists and practitioners with couples. For example, if relationship satisfaction is shown to be reactive to particular types of technological interruptions (e.g., phones, tablets, computers, etc.) on a day-to-day basis, we can refine our interventions to target these specific mechanisms and improve the quality and daily stability of couple and family relationships.

Section II. ABSTRACT (limited to 300 words in length)

Having precise understanding of the strength development progress of concrete in natural environment helps to save project time and cost. However, the current construction management of concrete tasks depends on published laboratory test charts and curves, which would not show the frequently changing environmental conditions. The research objective of this project is to provide a reliable and accurate method to validate the test data of the strength developments of concrete specimens in early ages. The approach includes the following tasks: (1) arrange sensors to monitor the temperature and moisture data of in-place concrete; (3) record the sensor data automatically; and (3) design the temperature and moisture controls on a concrete-curing device to keep the curing conditions of the specimens the same as what the in-place concrete has. The expected findings will be the modified measurement method of concrete strength and an efficient and reliable management and control system for sample testing and data collection. The expected implementation outcomes will be used for the application of the research grants of Illinois Department of Transportation (IDOT). This entire research design is applicable to various concrete construction projects.

The practical implications will be the efficiency improvement in work schedules when engineers can verify the gained strengths of early-age concrete samples and cost savings that construction companies can achieve in the assessment of on-going performance of early-age concrete. The social implications are the possible construction code and policy advances in the concrete construction of transportation infrastructure. The research results will provide decision support for transportation planning and budget justification. The project proposal for the first time brings forward the study on the precise monitoring and control of the strength and quality of early-age concrete. The concept and the design will contribute to the technology improvement of the construction industry.

Section II. ABSTRACT (limited to 300 words in length)

This project aims at creating and implementing a hybrid course (50% face-to-face (F2F)+ 50% online delivery) for a lab-based construction management class to seek answers for the following two questions: 1) Are there differences in students' performance in understanding the subject matters when taught in a hybrid format vs. a traditional format (100% face-to-face delivery)?; and 2) How do the perceptions of construction students exposed to the hybrid course delivery differ from those students enrolled in the conventional classes? This study utilizes a quasi-experimental research design. Target subjects are enrolled in two sections of a lab-based Construction Management course. The experimental or treatment group is comprised of 25 students who take the course in a hybrid format (50% F2F and 50% online). The control group is also comprised of 25 students who take the course in a 100% F2F conventional format. The hybrid course will be developed using the same contents of the existing conventional course; only the delivery methods will differ between these two courses. For research question #1, two different data sources will be collected. One is formal assessment instrument (quizzes and exams) consistent with the construction management concepts covered in the learning activity and additional data will be gathered from a performance-based assessment on the construction project management skill sets. The assessment materials developed by the American Institute of Constructors will be utilized to increase the assessment credibility. The same content will be assessed for both the treatment and control groups. A t-test will be conducted to assess differences in learning outcomes. For research question #2, the study will utilize a Course Delivery Format Survey to assess students' perceptions on the course delivery method they experienced. Data will be analyzed using a t-test to determine if there are differences between the two groups of students.

Section II. ABSTRACT (approximately 300 words in length)

Studies have shown that nonviolent youths are less likely to reoffend if they receive appropriate services in the community instead of being incarcerated. These community-based options cost less than institutional care in correctional facilities. In fiscal year 2005, the cost of incarcerating a juvenile offender in Illinois was $70,827, compared to less than $15,000 per youth for community-based services. Of released juveniles, 48% return to a juvenile institution within three years. To address these issues, the Redeploy Illinois (RI) pilot program was created to give counties financial support to provide community-based services for nonviolent youths (age 13– 18 years) who would otherwise be committed to the Illinois Department of Juvenile Justice (IDJJ), which oversees juvenile correctional institutions. Mclean County received a planning grant and an 18-month RI pilot grant ($280,000). The PI received a $38,000 contract from the county to develop data collection tools, analyze data, and write the reports. The RI planning study showed that the county commits an average of 24 youths to IDJJ per year. The proposed URG grant is an extension of the current project and addresses the following objectives, through in-depth interviews, to: 1) assess the attitudes and perceptions of the youths (approximately 10–15) participating in the program; 2) examine the views of family members of RI youth; 3) assess the views of victims of youth; and 4) analyze the views of the probation officers, attorneys, and service providers. This qualitative data will provide a comprehensive understanding of the impact of the RI program on youths, families, victims, and the justice system, and will serve as a model for other counties and states. The results will be published in scholarly journals and could lead to additional funding from the Illinois Department of Human Services.

NARRATIVE SECTIONS

Section III. NARRATIVE (not to exceed six single-spaced pages)

Introduction:

The promotion of physical activity (PA) and physical fitness are important public health goals in the United States and abroad. Numerous cross-sectional and prospective studies have outlined the protective effect of cardiorespiratory fitness (CRF) against various cardiometabolic conditions. For example, in adults, CRF is associated with a lower prevalence and incidence of hypertension (1,2), type II diabetes/insulin resistance (3–5), dyslipidemia (6,7), and metabolic syndrome (8,9). Beneficial relationships between CRF and kidney (10,11) and liver function (12–14) have also been documented in the literature. It should also be noted that while all of the aforementioned conditions are also associated with obesity (15,16), CRF remains predictive of metabolic function regardless of weight status (17,18). Recent public health work has focused on evaluating and promoting PA, however, assessments of CRF provide a more stable and objectively evaluated indicator of cardiovascular and metabolic function (19,20). Further, low CRF may be a stronger disease risk factor than inadequate PA because CRF maintains a strong relationship with cardiometabolic health and mortality after adjustment for activity level (12,21–24). Clearly, CRF is a critical component of health and a robust predictor of some of the most pressing public health issues facing the nation today.

Considering the strength of evidence linking CRF and metabolic disease, it is astounding that there are not definitive criterion-referenced standards available to guide research and clinical practice. Current approaches are based on comparisons with normative data (25). Professional organizations, such as the American Heart Association (26,27) and the American College of Sports Medicine (28), have typically guided clinicians and researchers to use percentile values developed from the Aerobics Center Longitudinal Study (ACLS) population. These sex- and age-specific normative standards (based on decade of life; e.g. 20-29 years, 30-39 years, etc.) have been widely used and adopted but are based somewhat arbitrarily on the 20^{th} percentile since the original ACLS defined low fitness as the bottom quintile of CRF. In their landmark study, Blair and colleagues (29) found men in the lowest quintile ($<20^{th}$ percentile) and women in the two lowest quintiles ($<40^{th}$ percentile) of CRF had a greater risk of all-cause mortality than those in the highest CRF quintile. The use of quintiles was selected arbitrarily but the 20^{th} percentile values have been retained as the threshold to define "low fitness" in numerous ACLS studies (30–35), as well as other studies based on different samples (36–38). The adoption of these 20^{th} percentile values has standardized comparisons (and provided useful benchmarks) but it is important to acknowledge that the ACLS sample is 75% men, 99% white and almost exclusively middle to upper class socio-economically. The ACLS study (now called the Cooper Longitudinal Study – CLS) has dramatically advanced research on associations between CRF and health, but the proposed study will use empirically derived approaches based on large and more representative samples to provide more defensible values for clinical and public health research.

The lack of adult CRF standards in the field is particularly surprising since criterion-referenced standards have been used for evaluating youth health risks within the FITNESSGRAM program for many years. We directly contributed to establishing both the CRF standards (39) and the body composition standards (40), and have experience in the analytic methods used for this type of research. Our past studies capitalized on nationally representative data from the National Health and Nutrition Examination Survey (NHANES) and utilized receiver operating characteristic (ROC) curves to establish values defining both a Healthy Fitness Zone (HFZ) and Needs Improvement Zone. We designed the HFZ to be a range of healthy fitness values where youth testing into the zone have a low prevalence of poor cardiometabolic health (in these examples, this was operationalized as metabolic syndrome). Importantly, because of the methodology we used to create the standards, their clinical utility (sensitivity, specificity, odds ratios, etc.) are used to provide context to the standards. Instead of simply referring to fitness as adequate or inadequate, those using the health-referenced standards can be aware of the specific hazards that accompany low fitness and broader topics, such as the value of physical fitness and the link between physical fitness and health, can be conveyed and used to

educate those being evaluated. Designing strong, defensible health-referenced standards requires study designs that are specifically focused on creating and evaluating the performance of the thresholds, which has yet to be done for CRF in adults. Besides creating HFZ standards for FITNESSGRAM, we have also performed cross-validation testing and evaluation of normative standards to identify their utility as health-referenced standards. For example, more recently we conducted cross-validation testing in a sample of Hungarian youth (41). Although the Hungarian sample was considerably more fit that the original U.S. NHANES sample used to design the FITNESSGRAM standards, while also having a lower burden of metabolic dysfunction, the CRF and body composition standards maintained their utility to predict metabolic syndrome. Boys and girls in the needs improvement zones for CRF and body composition had an odds of metabolic syndrome that were 4 to 5 times and 2 to 3 times higher than those in the HFZ groups, respectively. Our group has also evaluated the normative standards for body mass index (BMI) from the Centers for Disease Control and Prevention (42). This work, conducted to standardize BMI values, was particularly important since it documented the clinical utility of the widely adopted 85th and 95th percentile values and re-framed them to more accurately reflect health-standards. These examples demonstrate how research on existing standards informed practice and helped to ensure consistent interpretation by practitioners.

One of the barriers to creating and using CRF standards for health evaluation is the difficulty in assessing CRF. We plan to overcome this obstacle by creating two sets of CRF standards. The first set of standards will be based on maximal oxygen consumption estimated from traditional exercise testing. However, the second set of standards will be based on a non-exercise test estimation of maximal oxygen consumption. Such estimations have existed for several decades (43) and are used in the absence of personnel, equipment and other resources needed for clinical exercise testing. Importantly, non-exercise predictive fitness maintains strong associations with cardiometabolic outcomes. For example, Artero et al. (44) found non-exercise estimated CRF was associated with a 15% and 13% lower risk of all-cause mortality and nonfatal CVD events per MET (1 MET = 3.5 ml.kg.min, in reference to maximal oxygen consumption) in men and 11% and 13% reductions in women, respectively. In the proposed work, by creating a second set of CRF standards using non-exercise derived fitness, we will extend the clinical usefulness and applicability of evaluating CRF in adults.

The shift from normative to health-referenced standards is important for clinical education and prevention since the use of the normative (percentile) values has led to considerable confusion in the public and in clinical settings. The present study will fill a similar gap in the scientific and professional literature by providing more defensible criterion-referenced CRF standards based on associations with metabolic disease in a diverse sample of U.S. adults. Developing these two sets of criterion standards will provide more precise screenings for deficiencies in CRF, lead to more efficient and effective prevention and treatment of metabolic diseases and, ultimately, better clinical outcomes.

Objectives:
The objective of this URG application is to request support in developing a competitive external grant proposal. The external grant, as detailed in this application, preliminarily includes the specific aims outlined below.

Specific Aim 1: To create age- and sex-specific percentiles for cardiorespiratory fitness from adolescence through adulthood. Cardiorespiratory fitness varies by sex and age due to natural phenomena (e.g., sexual dimorphism, puberty, and aging). We will characterize these normal variations by using LMS regression in a nationally representative sample of 12-49 year old children and adults from NHANES, 1999-2004. By combining the child and adult samples into one analysis, a harmonized set of standards will be created to ensure consistency throughout the transition from adolescence to young-adulthood and beyond. Percentile and z-score standards will be created and applied to the sample and used in Aims 2 and 3.

Specific Aim 2: To develop standards for cardiorespiratory fitness based on metabolic health using exercise testing maximal oxygen consumption. We will use receiver operating characteristic (ROC) curves to identify thresholds levels (i.e., cutpoints) for age- and sex-specific CRF that discriminate between the binary classification status of metabolic syndrome and the individual syndrome components. A three-tiered system (low-risk, moderate-risk, and high-risk) will be based on the interplay of sensitivity and specificity of the potential cutpoints. This novel approach will mirror the three-tiered system used screening for other conditions that clinicians and researchers are already familiar with, such as those for weight status (normal weight, overweight, and obese). Using three tiers of classification will also enhance the information gained by using the thresholds compared to a conventional two-tiered (low-risk, high-risk) index.

Specific Aim 3: To develop standards for cardiorespiratory fitness based on metabolic health using non-exercise estimated maximal oxygen consumption. To provide clinically relevant CRF standards in the absence of an exercise test we will repeat the methodology of Specific Aim 2, but with the non-exercise estimated CRF. The result will be two equivalent CRF standards that can be used in the presence or absence of clinical fitness testing, which will enhance the utility of the standards for all practitioners.

Methodology:
To evaluate and improve upon the most common threshold used to characterize unhealthy CRF, we propose developing CRF standards based on the presence of metabolic syndrome and its components. These standards can be used as a means to screen, evaluate, and set goals for CRF in a variety of individuals and settings, as well as inform public health messaging. All three specific aims of the proposed work will be accomplished via secondary data analysis with NHANES data. NHANES is the ideal dataset for the proposed work for several reasons. NHANES includes: 1) a large, diverse sample representative of the U.S. population; 2) an objective assessment of CRF, 3) extensive physical and medical testing, including fasting blood samples in youth and adults needed to evaluate metabolic health status and estimate CRF from non-exercise equations. Further, NHANES abides by strict quality control protocols and all testing is completed by trained technicians. All data, and detailed information on each measure, is available at: http://www.cdc.gov/nchs/nhanes.htm.

Participants:
The specific aims of the study will be accomplished by two overlapping samples from NHANES. To characterize normal variation in CRF due to aging and sexual dimorphism (Specific Aim 1) and develop CRF standards from traditional exercise testing (Specific Aim 2), we will utilize adolescents and adults ages 12 to 49 years from a combination of three (continuous) NHANES waves, spanning 1999-2004. Each of these waves of data include treadmill testing and CRF for approximately 2,800 participants, totaling over 8,000 successful tests. To create CRF standards using the non-exercise equations (Specific Aim 3) we will use additional waves of NHANES data (1999-2004 plus 2005-2010). In this case, each two-year wave of NHANES will contribute approximately 5,000 subjects, totaling around 30,000 participants. It is important to note that all samples will include a diverse range of subjects in regard to race/ethnicity, socioeconomic status and age. Each two-year wave is representative of the total U.S. non-institutionalized population, which is a novel aspect of these planned CRF standards compared to prior research.

Measurements and Key Variables:
Estimated maximal oxygen consumption (as VO_{2max}) was assessed via a submaximal treadmill test. Testing protocol selection was based on variables including sex, age, BMI, and self-reported physical activity, and designed to elicit an exercise heart rate that was approximately 75 percent of the age-predicted maximum heart rate by the end of the testing session. Each test included a 2-minute warm-up, two 3-minute exercise stages and a 2-minute cool-down. By assessing heart rate during the exercise stages, VO_{2max} was estimated based on the linear relationship between heart rate and oxygen consumption, which is a common approach to estimating CRF. Non-exercise CRF estimation typically involves the use of common demographic variables (such as age and sex) combined with resting physiologic assessments (such as resting heart rate, body mass

index, and physical activity questionnaire data). NHANES includes many of these common metrics and allows our research team to utilize many different prediction equations and select the best fitting method for the data we have access to.

The primary outcomes used to define risk groups in Specific Aims 2 and 3 will be metabolic syndrome and the individual components of the syndrome (waist circumference, HDL-cholesterol, triglycerides, fasting glucose, and blood pressure). Metabolic syndrome is a strong outcome for these analyses because it represents several aspects of metabolic and endocrine disorders (hypertension, dyslipidemia, and insulin resistance). Metabolic syndrome is predictive of more serious diseases, such as type II diabetes or chronic kidney disease (45,46). Though definitions of metabolic syndrome can be somewhat controversial, we plan to use the most widely accepted version, the National Cholesterol Education Program/Adult Treatment Panel III (ATP III) criteria (47).

Data Analysis:
LMS regression (48) will be used to derive the growth standards for CRF in Specific Aim 1. The LMS method summarizes a varying distribution, like CRF across the lifespan, with three curves representing the median (M), coefficient of variation (S) and skewness (L), with the latter expressed as a Box-Cox power. Using penalized likelihood the curves can be fit for CRF as cubic splines by non-linear regression. The extent of centile smoothing required is expressed in terms of equivalent degrees of freedom. Detrended Q-Q plots and Q-tests for fit will be used to optimize smoothing during model fitting. Our laboratory is experienced with using LMS regression in complex survey data like NHANES (49,50).

ROC curves will be used to determine optimal thresholds of CRF z-scores (both traditionally estimated and from non-exercise equations) to detect metabolic syndrome and the individual syndrome components in Specific Aims 2 and 3. ROC analyses evaluate the sensitivity and specificity of each possible threshold to detect an outcome. This is the ideal analysis to select thresholds since information on every potential threshold is evaluated and used in threshold decision-making. Besides sensitivity and specificity, sub-analyses will be used to estimate positive and negative predictive values, positive and negative likelihood ratios, diagnostic odds ratios, and area under the ROC curve. Usually sensitivity and specificity are maximized to select a single threshold. However, sensitivity and specificity are inversely related and one must be sacrificed for gain in the other. To take advantage of this we plan to use an innovative approach in selecting the optimal thresholds by creating a high sensitivity threshold (denoting low/moderate risk) and a high specificity threshold (denoting moderate/high risk). Our lab has previously created three-tiered thresholds linked to metabolic disease for BMI (42), percent body fat (40), and aerobic fitness (39). This novel analytic approach will result in superior information and estimation of risk. The three-tiered standards will be similar to those for BMI (normal weight, overweight, obese), which are widely recognized and accepted by clinicians and researchers already.

Complex Survey Data:
It should also be noted that the NHANES datasets represent complex sample survey data. This type of data is statistically weighted, based on sub-sampling and non-response rates, and subjects are also clustered within counties and cities across the nation. While this allows for nationally representative estimates, complex survey data must be analyzed differently than most other datasets. Statistical procedures that assume a simple random sample are inappropriate due to the survey weighting and design. The author has experience in such statistical methods, and will employ advanced survey methods in both SAS v 9.3 (SAS Institute, Cary, NC) and IBM SPSS v 22 (Chicago, IL), while controlling for the sample weighting, clustering, and stratification of the data.

Section III. NARRATIVE (not to exceed six single-spaced pages)

Introduction:

Technology use, especially cell/smartphone use, has grown in recent years. In 2015, 92% of U.S. adults owned a cell or smartphone (Anderson, 2015). Although mobile technologies provide individuals with a range of attractive features—such as texting/calling, instant internet connection, maps/directions, alarms/reminders, and more—the proliferation of mobile devices in individuals' daily lives has led to a growing attachment to devices (Konok et al., 2016).

Researchers have found that some develop problematic device habits, including using technology too much, sensing vibrations that never occurred, having trouble resisting the urge to check the device, feeling anxiety over messages one might receive or a fear of missing out, feeling anxiety when separated from their device, and more (Bianchi & Phillips, 2005; Chotpitayasunondh & Douglas, 2016; Drouin et al, 2012; Igarashi et al, 2008; Konok et al., 2016). These problematic habits as well as the everyday use of devices—with their usual beeps and buzzes—can lead to interruptions in face-to-face interactions; this has been termed "technoference" (McDaniel & Coyne, 2016). Indeed, researchers have examined how the everyday use of technology can sometimes interfere with face-to-face interactions (McDaniel, 2015; McDaniel & Coyne, 2016; Roberts & David, 2016). For example, in one study, 70% of women perceived phones as interfering in their interactions with their partner (McDaniel & Coyne, 2016).

According to the displacement hypothesis, this technology use replaces time that could be spent in other activities. Of key interest here are the ways in which technology use may displace time spent with one's romantic partner and family. Recent research has found that when partners feel that their interactions are being interrupted conflict may ensue (McDaniel & Coyne, 2016), and this conflict may be a result of feelings of jealousy (Krasnova et al., 2016) or feeling like the partner values the device more than their relationship (McDaniel & Coyne, 2016). Interestingly, individuals may not need to actually use the device for partners to feel that it has intruded into their relationship. For example, some researchers have found that the mere presence of a device, even when not in use, can degrade the quality of interactions between conversation partners (Misra et al., 2016; Przybylski & Weinstein, 2013). Overall, technological interruptions have been associated with greater conflict and worse relationship satisfaction in couple relationships (McDaniel & Coyne, 2016; Roberts & David, 2016).

Although this prior work suggests that technology—especially when use becomes problematic—can have potential negative effects on the quality of time and interactions spent together in couple relationships, this work has often been cross-sectional and exploratory in nature (e.g., McDaniel & Coyne, 2016). However, the use of technology during face-to-face interactions happens in often small and seemingly minor ways on a daily basis. Therefore, to understand the real-time relationship processes involved we must better approximate life as it is lived in our measurement (Bolger et al., 2003). Besides further illuminating our understanding of daily processes, this knowledge can be used to inform the future work and interventions of scientists and practitioners with couples. For example, if relationship satisfaction is shown to be reactive to particular types of technological interruptions (e.g., phones, tablets, computers, etc.) on a day-to-day basis, we can refine our interventions to target these specific mechanisms and improve the quality and daily stability of couple and family relationships.

Additionally, as mobile devices are now ever present in society and in many interactions (Anderson, 2015), differing views between partners on device use during leisure time or couple time likely hold meaning for the quality of the relationship. For example, Miller-Ott et al. (2012) found that when partners were dissatisfied with the way mobile phones were used in their relationship their relationship satisfaction suffered. Some studies have also suggested that individuals have begun to fill their free time with mobile device use (Dimmick et al., 2011; Oulasvirta et al., 2012), and these changes in how leisure time is spent—in a sense distracted time together or time spent multitasking instead of focused solely on the time spent with one's partner (e.g., Amichai-Hamburger & Etgar, 2016)—may alter what individuals desire out of leisure or time

spent together with one's partner. The proliferation of devices during time spent together may have also changed the synchrony or match between individuals' desired and actual experienced time with romantic partners. Furthermore, many individuals who are now in romantic relationships in the U.S. have grown up using and carrying mobile devices with them at all times; younger generations may have different and changing expectations within relationships concerning partners' use of devices during time spent together (Miller-Ott & Kelly, under review). In a sense, the landscape of typical and desired couple and leisure time has changed rapidly over recent years. A better understanding of partners' desires and views on their couple time with and without technology is necessary.

It is also crucial that we understand both partners' perspectives, as it is often the mismatch in behaviors and views between partners that produce conflict and relationship dissatisfaction. Yet, in the fields of cyberpsychology and human-computer interaction—where most of the research has taken place on technology use, technoference, problematic phone use, and similar processes in couple relationships—work examining data from both members of couple relationships is somewhat rare. This is an oversight as partners within relationships are interdependent (Cox & Paley, 1997; Rusbult & Van Lange, 2003) such that the perceptions of one partner are intricately connected to those of their partner. In general, partners who are more similar to one another in attitude and experience are often happier in their relationships (Gonzaga et al., 2010); however, some work suggests that women may use mobile phones more problematically (or at least perceive their use to be more problematic) than men (Chotpitayasunondh & Douglas, 2016), and these differences in use and perceptions of use likely hold meaning for the stability and quality of relationships. For example, some research has suggested that a mismatch in texting styles is linked to lower relationship satisfaction (Dietmar, 2005).

Therefore, I build on prior research—including my own (McDaniel, 2015; McDaniel & Coyne, 2016)—by examining the use (and misuse) of technology during leisure and couple time on a daily basis and the potential influence this use may have on relational well-being. This will be accomplished through a longitudinal study which also includes 10 days of consecutive daily surveys assessing such things as technology use, perceptions of partner's use, leisure time with partner, relationship quality, and personal well-being. Technology use likely varies on a daily basis and differences in the amount of use and the opportunities for interruptions in daily face-to-face interactions likely hold meaning for changes in the functioning of couple relationships. In this work, I extend previous cross-sectional findings to *daily* couple interactions. Determining these small fluctuations in use and their meaning for couple relationships and individuals can inform future work with couples on how to manage technology use in life as it is really lived.

Objectives:
In order to better understand couples' experiences of *daily* leisure time spent together with and without technology as well as the influence of this technology use on relationships, the current study will examine the following research questions utilizing 10 days of daily survey data:

RQ1: How frequently are various technology devices (e.g., phones, tablets, computers, TV, etc.) used on a *daily* basis during couple leisure time?

RQ2: Does an individual's satisfaction with *daily* leisure time spent with one's partner depend on (a) how frequently technology is used, (b) how often couple interactions are interrupted by technology, and (c) whether there is a mismatch between partners in terms of each partner's technology use (e.g., where one partner is using more than the other) during *daily* leisure time?

RQ3: Does an individual's *daily* relationship satisfaction depend on (a) how frequently technology is used, (b) how often couple interactions are interrupted by technology, and (c) whether there is a mismatch between partners in terms of each partner's technology use (e.g., where one partner is using more than the other) during *daily* leisure time?

RQ4: Are the potential effects of *daily* technology use and interruption on daily relationship satisfaction mediated by satisfaction with *daily* leisure time?

RQ5: Do differences appear between men and women as well as between younger and older individuals within RQs 1 through 4.

Methodology:
This study will consist of an intake survey, baseline survey, 10 days of daily surveys, and a brief follow-up survey. All surveys will be administered online via Qualtrics.com (I am part of the pilot program with Qualtrics here at ISU and will gain access to Qualtrics soon). The links to the surveys will be presented to participants via email. Participants will be compensated for their participation ($3,500 in funding from my New Faculty Startup Program grant) using the following amounts: Intake ($0.50), baseline ($1.25), daily surveys ($0.50 per day, plus $4 bonus for completing at least 7 days), and follow-up survey ($0.50).

Initially, a study announcement (also known as a HIT) will be placed on the Amazon Mechanical Turk (Mturk) website. Mturk has been successfully used in family and relationship research to gather ethnically and socioeconomically diverse samples (e.g., Buhrmester et al., 2011; Dworkin et al., 2016). This HIT will describe the study and its requirements. Potential participants will click on a link to an online survey. They will then complete informed consent and complete this intake survey including demographic information, study qualification screening questions (in line with what I outline below as inclusion criteria), and basic relationship quality and technology use questions. This recruitment (intake) survey will likely produce an initial sample of about 500 to 600 potential participants. Those who qualify for the larger study will be asked at the end of this survey if they are interested in participating in follow-up surveys including the daily surveys and so forth as described in this proposal. If they respond yes, they are prompted to enter their email address.

A member of the study team (e.g., research assistants, etc.) will then email these participants with information about the study and request their phone number. Once we obtain their phone number, a study team member will call and speak with the participant and his/her romantic partner in order to explain all of the study details. If both partners are interested in participating in the full study then they will be assigned unique ID numbers and sent an email with the survey link for the baseline survey, where participants will first enter their ID numbers and complete informed consent (i.e., click that they understand and give their consent to participate in the study) before they can proceed to complete the baseline online survey.

Participants for this daily survey study will include 200 couples (or 400 participants, as both partners will participate). In order to be eligible for participation, they must meet the following inclusion criteria: (1) be age 18 or older, (2) in a serious romantic relationship (defined as a relationship of 6 months or longer), (3) be living together and in the U.S., (4) have access to the internet, (5) speak English, and (6) both partners must agree to participate.

Both partners will complete a baseline survey, including measures of demographic information, couple relationship quality, individual well-being, technology use, and so forth. These measures will provide important controls and baseline amounts when analyzing the later daily diary data.

About two weeks after completing their baseline survey, participants will complete 10 days of nightly online surveys. These surveys will be kept brief (about 5 to 12 minutes per night), and the resulting data are the main focus of this research proposal. For example, participants will rate their leisure time spent with their partner, satisfaction with leisure, use of technology, interruptions and distraction due to technology, and so forth. Participants will be tracked by my team of research assistants and will receive daily text reminders to complete their surveys. I have managed a team of research assistants to carry out daily diary research on family relationships and used this method successfully in the past to increase participant compliance to study

procedures and to reduce participant attrition (e.g., McDaniel, 2016). I have also recruited and begun managing a team of research assistants here at ISU in preparation for this research study and am actively recruiting research assistants for the summer and fall.

Finally, about 1 month after completing the daily surveys, participants will complete a follow-up online survey (containing similar measures to the baseline survey). Although not the focus of the current proposal, data garnered from this follow-up time point can be used to examine potential outcomes of the daily processes identified during the current project from the daily data.

Data Analysis. Data from the daily survey portion of the study will be analyzed using the following methods in SPSS and SAS. As participants are measured across multiple days and are nested within couples, multilevel modeling (e.g., Singer & Willet, 2003) will be utilized in all models to properly and statistically account for the interdependencies in the data. Additionally, in all psychological and relationship processes there exists variability at the between-person and within-person level. In other words and as one example of this, individuals likely differ from one another in the frequency of their technology use (between-person variability), but also individuals likely have days on which they use technology more or less frequently than they typically do (within-person variability). Therefore, all daily variables will be split into their respective between-person and within-person portions (as recommended by Bolger & Laurenceau, 2013), and the focus of the current work will often be on the within-person associations among daily variables—as these associations come closer to causal, real-time processes.

RQ1: Frequency of daily technology use during leisure. Means will be computed from the 10 days of nightly surveys for each participant. The overall mean and standard deviation across all within-person means will provide estimates of the extent of technology use during couple leisure.

RQ2: Technology use, technological interruptions and distractions, and leisure satisfaction. Within a multilevel model, I will predict individuals' daily leisure satisfaction by (a) one's own and one's partner's frequency of technology use, (b) interruptions due to technology, and (c) the potential mismatch between partners in their technology use and interruptions due to technology. I will first enter predictors "a" and "b" into the model and will then later add in predictors "c" (the partner mismatch predictors). If the mismatch predictors are not significant, they will be removed from the model in order to produce the most parsimonious model. The mismatch variables will be created by subtracting partners' daily technology use or interruption variables and taking the absolute value; e.g., "tech use mismatch" = absolute value of ("partner 1 tech use" – "partner 2 tech use"), with higher scores representing greater mismatch between partners' technology use and distraction with technology during daily leisure together.

RQ3: Technology use, technological interruptions and distractions, and relationship satisfaction. The same multilevel model analyses as RQ2 will be used here in predicting individuals' reports of daily relationship satisfaction.

RQ4: Daily satisfaction with leisure time as a mediator between technology use, interruptions, and relationship satisfaction. In the model already created in RQ3, I would then enter daily leisure satisfaction as an additional predictor. If the size of the effects of daily technology use and interruptions (already in the model) are significantly reduced, this would provide evidence that satisfaction with daily leisure at least partially mediates the association between these technology variables and relationship satisfaction. This result would help to explain why technology use potentially influences couple relationship satisfaction or dissatisfaction. In other words, results from RQs 2, 3, and 4 could be combined (depending on the actual results) to show that daily technology use during leisure time can negatively impact perceptions of the quality of leisure time spent together which then leads to decreased feelings of connection and satisfaction with the relationship.

RQ5: Gender and age differences. Throughout all of the analyses, interaction terms will be included with gender and age in order to determine whether the strength of any of the effects differs by gender or age. Interaction terms will be created by multiplying gender or age by each of the predictors (e.g., Gender X Tech Use, Gender X Tech Interruptions, etc.). Non-significant interaction terms will be removed in order to produce the most parsimonious models.

Ultimately, the results will be disseminated through a submission of a manuscript to a peer-reviewed journal and submission for a national conference presentation.

Instrumentation:
Most relevant to the current proposal are the daily surveys. Survey measures for the daily surveys have been gathered from the existing literature or developed from a careful review of the literature. I describe the measures in general below, while the exact items and measures most relevant to this proposal can be found in the Appendix. In order to reduce participant fatigue due to repeated assessments over days, the daily survey has been kept brief—although enough items are included on each scale to assess reliability; Shrout and Lane (2012) recommend having at least three items per scale in daily survey research.

Frequency of technology use. Participants will rate the frequency with which they and their partner used four technology devices (e.g., phone, tablet, etc.) during their leisure time together. Items are on a 6-point scale ranging from 0 (*Never*) to 5 (*Almost all the time*). Separate scores will be calculated for one's own use and for perceptions of one's partner's use by averaging the 4 items for own use and for partner use on each day.

Interruptions due to technology. Similar to prior cross-sectional research (McDaniel & Coyne, 2016), participants will rate how frequently four technology devices (e.g., phone, tablet, etc.) got in the way of or interrupted interactions between romantic partners during leisure time. Items will be measured on a 6-point scale ranging from 0 (*Never*) to 5 (*Almost all the time*), and all items will be averaged to create an overall technology interference score on each day for each participant.

Satisfaction with leisure time. Participants will rate how much they agree with four items concerning how happy they were with their leisure time with their partner on a 5-point scale, ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Items were obtained from a validated measure in the field (Miller-Ott et al., 2012) and then adapted to deal with daily couple leisure time specifically. Negative items will be reverse scored and then all items will be averaged to produce an overall satisfaction with leisure score on each day for each participant.

Relationship satisfaction. Participants will rate their feelings concerning their relationship with their partner each day across five items (e.g., love, closeness, satisfaction, etc.) on a 7-point scale, ranging from 1 (*Not very much or just a little*) to 7 (*Very much or a lot*). This scale is commonly used in daily survey research on couple relationships to examine daily relationship satisfaction (e.g., Curran et al., 2015; Totenhagen et al., 2012;), and in this prior work the items have been shown to successfully measure daily variability in relationship feelings (Totenhagen et al., 2016). Negative items will be reverse scored and then all items will be averaged to produce an overall satisfaction score on each day for each participant.

Section III. NARRATIVE (not to exceed six single-spaced pages)

Introduction:
The concept of retirement is changing. Longer life spans, better health, and more active lives have influenced what it means to retire. In addition, a demographic shift in the workforce is occurring in the United States as baby boomers approach the normal retirement ages during the next 10-15 years (U.S. Bureau of Labor Statistics, 2015). For instance, the Bureau of Labor Statistics estimates that more than 40% of Americans over the age of 55 will be employed in 2020, making up more than 25% of the labor force in the U.S. Turning to the park and recreation profession, these aging workforce trends have appeared to impact the

professionals in a couple of ways. First, the field is witnessing a significant exodus of human resource talent through retirements. For example, the number of retirees in Illinois public park and recreation agencies nearly doubled from 6.6% of the workforce in 2006 to 12.8% in 2015 (Mulvaney, 2016). This growing number of retirees raises significant challenges (and potential opportunities) for these agencies as they manage this loss of institutional capital. A second issue facing the park and recreation profession as a result of this demographic shift centers on the career planning of these professionals. In particular, anecdotal evidence suggests that while some of professionals elect to pursue a traditional retirement route by transitioning from full-time employment to full-time retirement, a growing number of professionals are choosing to return to the workforce after they retire from their career jobs. Referred to as "bridge" employment experiences, these post-retirement jobs act as transitions between long-term career positions and total retirement. These bridge employment experiences have been found to range from part-time work, self-employment, and temporary employment (i.e., fewer hours, greater flexibility, less stress, etc.) to full-time employment experiences.

Despite these trends, little work has been done to explore the actual prevalence of bridge employment in the recreation profession and its impact on the professionals and their agencies. Responding to this void in the research, the purpose of this project is to explore possible predictors of professionals' bridge employment intentions in public parks and recreation. The intent of this research project would be to serve as a starting point for future bridge employment research within the setting of public parks and recreation. As the field of public parks and recreation experiences a growing number of its professionals at or near retirement, research investigating the links between these professionals and bridge employment intentions is needed. Furthermore, as a field predicated on enhancing the quality of life within communities, one might argue that the field of public parks and recreation should be a "front runner" in the promotion (and enhancement) of supportive work environments for their professionals.

The proposed research will be situated within Social Cognitive Theory's reciprocal determinism. Social Cognitive Theory has been broadly applied to workplace research and focuses on an individual's (career) life span, reflecting real-life situations and problems (Gibson, 2004; Mulvaney, 2014). Social Cognitive Theory's reciprocal determinism takes into account the behavior, the individual, and the environment in which the individual operates (Martin, 2004; Miller, Verbos, & Goswami, 2014). The reciprocal interaction of the work environment, behavior, and the person – with each influencing and being influenced by the other – provides a comprehensive explanation of the factors that influence adult behavior (Gibson, 2004). According to Bandura (1986), human functioning is comprised of a series of reciprocal interactions between behavioral, environmental, and personal variables. The series of interactions have been represented as a triangle with each factor (behavior, environment, and personal) bi-directionally influencing the others. Guided by Social Cognitive Theory and the existing bridge employment literature, this study sought to identify predominant influences (i.e., variables) within the three areas of Bandura's (1997) reciprocal determinism (behavior, environment, and individual). This review resulted in the identification of specific variables within each area. More specifically, it is hypothesized that behavior outcomes (i.e., bridge employment intentions) will be affected by an individual's attributions (i.e., job satisfaction, financial preparedness, social retirement anxieties, and life satisfaction) and environmental factors (i.e., career attachment, professional development opportunities, workplace role support, and work-family balance). A brief review of each of these variables and the study's hypotheses are provided in the following paragraphs.

Behavior Outcome – Bridge Employment Intentions: According to Freedman (2007), nearly half of workers in the 50s are interested in a second career. These workers are focusing on an early retirement and are proactively pursuing second careers that focus on work that matters most to them and to the larger society (Freedman, 2007). Referred to as bridge employment, these workers seek employment that acts as a "bridge" between their career jobs and full retirement (Doeringer, 1990; Weckerle & Shultz, 1999; Kendrick & Wollan, 2009). Researchers have conceptualized two types of bridge employment: career bridge employment and non-career bridge employment. Career bridge employment refers to older workers who

retire and draw a pension but remain a paid worker (part-time or full-time) in the same industry or field as their career job(s) (Hill et al., 2015). Non-career bridge employment is defined as an older worker who retires and accepts employment (part-time or full-time) in a different field (Gobeski & Beehr, 2013). While bridge employment is a relatively new trend, it has also become an increasingly important trend in the retirement landscape (Dingemans, Henkens, & Solinge, 2016). As scholars contend, retirement is no longer an abrupt and complete withdrawal from work but an opportunity for older workers to further develop in their given career or pursue a completely new area (Wang, 2013). Connecting bridge employment to Social Cognitive Theory, it is assumed that life transitions such as bridge employment intentions do not occur in isolation. Rather, Social Cognitive Theory suggests that bridge employment intentions are a result of a complex set of individual and environmental factors. Individual and environmental factors of interest to this project are discussed below.

Individual Factors – Job Satisfaction, Financial Motives, Retirement Anxiety, & Life Satisfaction: In terms of reciprocal determinism and bridge employment, job satisfaction, financial preparedness, social retirement anxiety, and life satisfaction appear to have merit as individual attributes worthy of investigation. According to Locke (1976), job satisfaction is a positive emotional state resulting from the appraisal of one's job or job experiences. Applying the job satisfaction concept to the current study, Social Cognitive Theory's reciprocal determinism would suggest that if one is satisfied with their job, he/she may be more likely to consider returning to work after retirement (Hanisch & Hulin, 1998). Thus,

> *Hypothesis 1a: Intentions to participate in career or non-career bridge employment will be higher for pre-retirees who display higher (perceived) levels of job satisfaction compared to pre-retirees who display lower (perceived) levels of job satisfaction.*

In a discussion of the career life of employees, Mariappanadar (2013) suggested that pre-retirees' preferences for bridge employment might also be based upon their overall financial preparedness. Support for Mariappanadar's (2013) assertion has been found in research that has identified links between the perceived retirement anxiety of workers and their level of financial preparedness (Dingemans & Henkens, 2014). In particular, individuals who perceived to be financially unprepared for retirement were more likely to display higher levels of retirement anxiety. Applying these findings to bridge employment intentions,park and recreation professionals who perceive to be financially unprepared for retirement would be more likely to consider bridge employment opportunities. Thus,

> *Hypothesis 1b: Intentions to participate in career or non-career bridge employment will be higher for pre-retirees who display lower (perceived) levels of financial preparedness compared to pre-retirees who display higher (perceived) levels of financial preparedness.*

In addition to job satisfaction and financial preparedness, employees' attitudes toward retirement also appear to have merit for inclusion in a study of bridge employment. In particular, the social component of employees' anxiety towards retirement is of interest. As the research has noted, work has the ability to provide individuals with a sense of purpose and provides opportunities for social relationships and the confirmation of one's social identity (Chou & Chow, 2005). Transitioning from work to retirement may cause some professionals to feel socially anxious and vulnerable as they anticipate the possibility of losing their social identity, social exclusion, and lost friendships in the workplace (Mariappanadar, 2013). In contrast to full retirement, bridge employment supports opportunities for professionals to maintain some of these social relationships and lifestyle patterns. Thus,

> *Hypothesis 1c: Intentions to participate in career or non-career bridge employment will be higher for pre-retirees who display higher (perceived) levels of social retirement anxiety compared to pre-retirees who display lower (perceived) levels of social retirement anxiety.*

Another individual factor potentially impacting bridge employment intentions is life satisfaction (Lucas et al., 2004). Life satisfaction has been defined as an overall assessment of feelings and attitudes about one's life at a particular point in time, consisting of desire to change one's life, satisfaction with the past, satisfaction with

the future, and significant others' views of one's life (Chen, 2016). Life satisfaction research has found individuals with greater life satisfaction feel better psychologically about their lives than other people do (Erdogan et al., 2012). Connecting this research to the workplace, scholars have found positive correlations between workplace experiences and life satisfaction (Lucas et al., 2004). Within the field of parks and recreation that is predicated on quality of life issues, a strong argument could be made for the connection between recreation professionals' workplace experiences and life satisfaction suggesting professionals who are more satisfied with their life may be more likely to continue employment after retirement. Thus,

Hypothesis 1d: Intentions to participate in career or non-career bridge employment will be higher for pre-retirees who display higher life satisfaction perceptions compared to pre-retirees who display lower life satisfaction perceptions.

Environmental Factors – Career Attachment, Professional Development, Role Support, & Work-Family: When considering the workplace environment, four factors appear relevant to bridge employment intentions: career attachment, professional development, role support, and work-family balance. Career attachment refers to the desire to remain employed in the same career and the positive affect related to employment in that specific career (Gobeski & Beehr, 2013). While research on career attachment and bridge employment intentions is limited, previous research has found links between career attachment and retirement planning (Adams, 1999). Connecting this previous research to the current study, Social Cognitive Theory would suggest that employees with higher career attachment would be more likely to engage in bridge employment opportunities. Thus,

Hypothesis 2a: Intentions to participate in career or non-career bridge employment will be higher for pre-retirees who display higher (perceived) levels of career attachment compared to pre-retirees who display lower (perceived) levels of career attachment.

Park and recreation professionals must rely heavily on continuing education workshops to keep them updated on ongoing trends in several job content domains including: finance, personnel management, programming, and marketing. Thus, professional development continues to remain a priority for all professionals, even those who are near retirement. Professionals whose jobs have enabled them to continue learning through professional development opportunities would have a stronger desire to remain connected to the workforce following retirement (Ulrich & Brott, 2005). In contrast, professionals who lack the appropriate skills as a result of limited professional development opportunities might be more likely to select full-time retirement. Thus,

Hypothesis 2b: Intentions to participate in career or non-career bridge employment will be higher for pre-retirees who are more satisfied with their professional development opportunities compared to pre-retirees who are less satisfied with their professional development opportunities.

In addition to career attachment and professional development opportunities, the role support of co-workers and supervisor has been identified in the bridge employment literature (Greller & Richtermeyer, 2006). Social Cognitive Theory would suggest that the support received from supervisors and co-workers would influence older professionals' bridge employment intentions. For instance, if the social support received from co-workers was stable, the professional would be more satisfied with their work experiences. In turn, the professional would become motivated to remain in the workforce after retirement. Thus,

Hypothesis 2c: Intentions to participate in career or non-career bridge employment will be higher for pre-retirees who display higher (perceived) levels of workplace role support compared to pre-retirees who display lower (perceived) levels of workplace role support.

It has been well documented that retirement decisions are often linked to the professional's spouse/partner's decision of when to retire (Smyer & Pitt-Catsouphes, 2007). For example, Henkens (1999) examined the extent to which partners influenced each other's retirement decisions and found that, to a certain extent, retirement was a household decision. Henkens' (1999) work indicated that spousal support impacted the retirement decision-making process and that these decisions were largely based on the couple's perceptions of

their balance of activities within their home and work life. Building upon Henkens (1999) work, additional research has suggested professionals who perceive more of a "balance" are more likely to participate in bridge employment opportunities (Kendrick & Wollan, 2009). Thus,

> *Hypothesis 2d: Intentions to participate in career or non-career bridge employment will be higher for pre-retirees who display higher perceptions of work-family balance compared to pre-retirees who display lower perceptions of work-family balance.*

Rationale for Conducting Bridge Employment Research in the Parks and Recreation Field: Advocating for bridge employment research that is specific to the park and recreation field may raise concerns. Specifically, why does research need to be conducted on bridge employment within public park and recreation agencies? Could findings from studies conducted within other disciplines, such as I/O psychology or human resource management, be generalized to park and recreation agencies? The response to these questions can be found in several unique issues facing the park and recreation profession. First, it appears an increasing number of public park and recreation professionals are pursuing bridge employment opportunities (Mulvaney, 2016). Despite this increase, there is little understanding of the effects bridge employment is having on employees or their agencies. Research investigating the links between bridge employment intentions and individual and environmental factors is needed to provide insight on the impact(s) of these trends. The overall mission of public recreation agencies also lends itself to advocating for bridge employment research. In particular, public park and recreation agencies are predicated on enhancing the quality of life within communities. Subscribing to this approach, one might argue that the field of public parks and recreation should be a "front runner" in the promotion (and enhancement) of bridge employment work environments for their professionals. Given the large number of part-time and seasonal positions within public park and recreation agencies, non-career bridge employment opportunities could also serve as recruitment tool for retired professionals who previously worked outside the field.

Objectives:

The objectives of the proposed research project are:

- Test the eight hypotheses outlined in the "Introduction" section.
- Initiate an exploratory research study on bridge employment that can pave the way for future research within this area.

Methodology:

Participants for the study will be selected from the complete membership database of the Illinois Park & Recreation Association (IPRA). The IPRA membership database contains 2,326 professionals from more than 340 park districts within the state of Illinois. An email invitation to participate in the study will be sent to each of the 2,326 recreation professionals within IPRA's membership database. Employing a technique utilized by Kendrick and Wollan (2009), the email will invite professionals who anticipate retiring within ten years or less and are currently employed on a full-time basis to participate in the study. Based on conversations with IPRA membership administration and reviews of recent retirement trend data (see Mulvaney, 2016), the anticipated number of professionals meeting this criteria is ~700. This group will be provided with a link to the online survey which will be created using a well-known online survey development tool, Qualtrics. All of the study's variables of interest will be measured using the online survey. Guided by Dillman's (2000) work with survey research, a series of reminders will be sent to the participants. First, a reminder e-mail with a link to the survey will be sent one week after the initial e-mail was submitted. Fourteen days after the initial invitation email, a second personalized reminder e-mail will be sent to participants who had not completed the survey. Finally, a third reminder email will be sent to all non-respondents five days before the deadline. With an anticipated population of 700 professionals, the study will aspire for at least 250 responses to produce a precision of at least +/-5% (e.g., the true population value is within +/-5% of the sample value). It is also expected that brief phone interviews will be conducted with 25 of the nonrespondents in an effort to address the potential for nonresponse bias.

Initial data analyses will include examining the data for (a) missing values, (b) multivariate outliers, (c) linearity, normality, and homoscedasticity, and (d) multicollinearity issues among the study's independent variables. Boxplots will be computed and reviewed to identify possible outliers within the dataset. Mahalanobis distance statistics will also be calculated in an effort to provide a more precise identification of outliers in the sample, particularly given that statisticians have suggested multiple regression's sensitivity to extreme cases. Linearity, normality, and homoscedasticity issues will also be assessed through the examination of the residuals scatterplots as well as measures of skewness and kurtosis statistics. Internal consistency measures will also be calculated for each of the scales. In addressing multicollinearity concerns, tolerance statistics and intercorrelations will be performed among the study's variables. The results of these analyses will be used to guide subsequent statistical analyses in determining the support (or lack of) for the study's hypotheses. Hierarchical regression analyses will be computed to test the study's hypotheses. Hierarchical regression analyses will be used in an effort to obtain a more precise estimate of the amount of variance accounted for by the various individual and environmental factors on bridge employment intentions after partialling out the demographic characteristics of the participants. The demographic characteristic variables (years to retirement, sex, age, tenure in organization, single vs. dual income, household income, and position type) will be specified as the first block of predictor variables in the regression analysis and the individual and environmental factors under consideration will be added to the second block. It is expected that categorical variables will be dummy-coded in all of the regression analyses.

Instrumentation:

The items included in the online survey are provided below:

Bridge Employment Intentions: 7-scale - Strongly Disagree to Strongly Agree (Kim & Feldman, 2000)

After I retire from my "career job", I would like to work in long-term employment.
After I retire from my "career job", I would like to work in part-time employment.
I do not want to work in any form of employment after I retire from my "career job".
If I were to work after retirement, I am likely to work in the same/similar industry.
After I retire from my "career job", I am likely to work for my current employer.
After I retire from my "career job", I am likely to work for a former employer.
After I retire from my "career job", I am likely to work for another agency that is outside my current field.
If I were to work after retirement, I am likely to work for money.
If I were to work after retirement, I am likely to do volunteer work.

Job Satisfaction: 5-scale – Very Dissatisfied to Very Satisfied Agree (Judge, et al., 1995)

How do you feel about your job overall?

Financial Preparedness: 5-scale – Strongly Disagree to Strongly Agree (Mariappanadar, 2013)

I will be financially prepared for retirement at my intended retirement age.
I will be financially prepared for retirement as a result of my retirement savings and/or investment plans.

Social Retirement Anxiety: 5-scale – Strongly Disagree to Strongly Agree (Fletcher & Harrison, 1991)

It is difficult to imagine not working.
I am afraid I will lose all my work friends as a retired person.
There really isn't much for a retired person to do.
I am afraid I will be a burden on my family as a retired person.
My job has always been a source of my identity. I hate to lose that.
Retirement will not bother me because I am sure I can make new friends no matter where I go.
After retirement, I am not sure I will know how to stay involved.
I don't know what I am going to do without my job.
I worry that my family will not support me after I retire.

Life Satisfaction: 7-scale - Strongly Disagree to Strongly Agree (Diener, et al., 1985)

In most ways my life is close to my ideal.
The conditions of my life are excellent.
I am satisfied with my life.
So far I have gotten the important things I want in life.
If I could live my life over, I would change almost nothing.

Career Attachment: 7-scale - Strongly Disagree to Strongly Agree (Ellemers et al., 1998)

May career is one of the most important things in my life.
I regularly consider what I could do to get ahead at work.
The ambitions in my life mainly have to do with my career.
My career plays a central role in my life.
I think that I should have a successful career.

Professional Development: 5-scale – Never to Always (Wayne et al., 1997)

Besides formal training and development opportunities, to what extent have your managers helped to develop your skills by providing you with challenging job assignments?
Regardless of your agency's policy on training and development, to what extent have your mangers made a substantial investment in you by providing formal training and development opportunities?

Role Support: 7-scale - Strongly Disagree to Strongly Agree (Caplan et al., 1980)

I find it difficult to allow myself to depend on others at work.
Top management is never there when you need them.
I can count on work colleagues to support me when I need them.
I find it difficult, in the workplace, to trust others completely.
I often feel that I am on my own in this company.
I do not often worry about being left in the lurch at work.

Work-Family Balance: 5-scale – Very Little to Very Much (Thomas & Ganster, 1995)

How much choice do you have over the amount and quality of daycare available for your child?
How much choice do you have over the amount and quality of care available for your sick child?
How much choice do you have in obtaining adult supervision for your child before or after school?
How much choice do you have over the amount and quality of daycare available for a dependent parent?
How much choice do you have over when you begin and end each workday or each workweek?
How much choice do you have in arranging part-time employment?

Demographic Items

Years to retirement
Respondent sex
Respondent age
Tenure in organization
Single vs. dual income
Household income
Position type

Section III. NARRATIVE (not to exceed six single-spaced pages)

Introduction:

Cumulative innovation is fundamental to creating new value in the economy. Few innovations are pioneering (Menell 1999); new innovations are often advanced generations of one or a set of previous innovative work products. Cumulative innovation is achieved through collaboration and sharing of research and work products within and among firms (Saxenian 1994). In this study I focus on cumulative innovation at the individual level which manifests itself in creative integration. Creative integration occurs when individuals synthesize shared artifacts into a new whole that is an advancement to the descendants. Creative integration, depending on the context, takes different forms. Thoemmes & Conway (2007), for instance, examined creative integration in politics by studying State of the Union speeches by 41 US presidents. Cheliotis & Yew (2009) examined creative integration in ccMixter which is a music remix community. Because creative integration and cumulative innovation depend on knowledge sharing and collaboration, therefore intellectual property protection mechanisms can stifle cumulative innovation.

While intellectual property rights are deemed to undermine cumulative innovation at the firm level (Barlow 1994), perceived difficulty of proper attribution to and loss of control over licensing of creative artifacts can hinder creative integration at the individual level. To advance cumulative innovation, flexible intellectual property frameworks are required. Intellectual property protection frameworks such as Creative Commons (CC) and Copyleft (Stallman 1997; Lessig 2004) and technological features that support implementation and support of open innovation (e.g., attribution trees) reduce the effort ant time that is required for attribution and licensing and thus foster creative integration. Because cumulative innovation produces synthetic artifacts, it is hard to identify a single entity as inventor (Aoki, 1993-1994). Therefore, when dimensions of several people's work are combined, attribution and licensing may become key factors in shaping the creative integration process. Individuals who engage in creative integration process by using other individuals' creative artifacts are required to keep track of and state a list of all previous artifacts upon which their creative product has been built. Individuals who produce cumulatively innovative artifacts may have concerns over how their creative works may be shared or used by others for commercial or non-commercial purposes.

Because electronic media and online communities are prevalent media and platforms for sharing and integration of creative works (e.g., engineering designs, music remixes, research reports), IT design helps alleviate intellectual property-related concerns. Electronic tools and platforms with their constantly increasing intelligence and processing power can remove impediments to cumulative innovation by implementing automatic smart attribution and licensing enforcement. In this research project I focus on how IT can reduce efforts and time that is required for proper attribution and licensing. I present a research model for advancing creative integration. I then plan to empirically test the proposed theoretical model that formulates impacts of ease of attribution and licensing on creative integration (Javadi *et al.* 2016). The conceptualized link between IT design and creative integration provides a foundation for tailoring IT design to the required level of creative integration in different settings and thus leads to the design of interfaces that better fit the task.

Research Model:

Task-Technology Fit literature have identified "fit" as a key predictor of system use and task performance (Goodhue 1995; Goodhue & Thompson 1995; Zigurs & Buckland 1998). Fit is defined as the extent to which the technology features support the underpinning processes that lead to high performance in a particular task. Goodhu & Thompson (1995) identified eight factors for characterizing fit including ease of use and authorization. In this study the task to be supported by technology is "creative integration". Previous research posits that creative integration is affected by *perceived integration efficacy* (Figure 1; Javadi *et al.* 2013). *Perceived integration efficacy* is defined by two formative sub-constructs. The first sub-construct is the belief of an individual regarding the value of the shared creative works, namely the shared works' *perceived value* (Dennis 1996; Zhang & Watts 2008). *Perceived value* represents a context-oriented quality measure for the value of share creative artifcats. Prior research has shown that valuing creative artifacts of others is a motivational factor in reusing those creative works. (Dennis 1996; Gruenfeld et al. 1996). The

second sub-construct is the *perceived value of integration*, i.e., an individual's belief regarding the extent to which integration contributes to the value of the "whole" creative work unit which they are constructing. It is posited that higher levels of perceived integration efficacy will lead to a higher levels of creative integration. The more an individual values other individuals' creative works, the more likely s/he is to use them in their creative integration process; the more an individual believes that integration is a beneficial activity, the more s/he is likely to engage in creative integration.

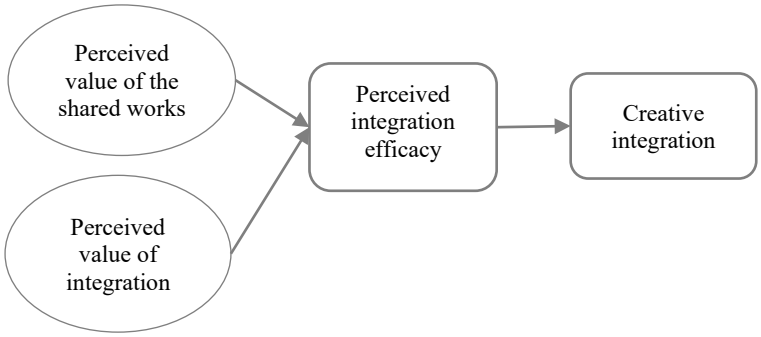


Figure 1: Perceived integration efficacy and creative integration (Javadi *et al.* 2013)

Taking an intellectual property rights approach, this study focuses on technology features that foster perceived integration efficacy (or its formative sub-constructs) through decreasing intellectual property rights related efforts that are required during the creative integration process. Monroy-Hernández (2011), a computer scientist who founded the Scratch online community in his extensive study of creative integration activities in the Scratch community identified a set of key determinant of creative integration. Those identified determinants include whether or not the computerized system structure and functionalities supports cumulative innovation through automatic attribution and remix-friendly licenses. This study, thus, focuses on IT-enabled licensing and attribution mechanisms (Figure 2). The two formative sub-constructs of perceived integration efficacy (from Figure 1) are separately represented in this study's proposed model because the IT design features have distinctive impact on each. Details of the research model is explained in the next section.

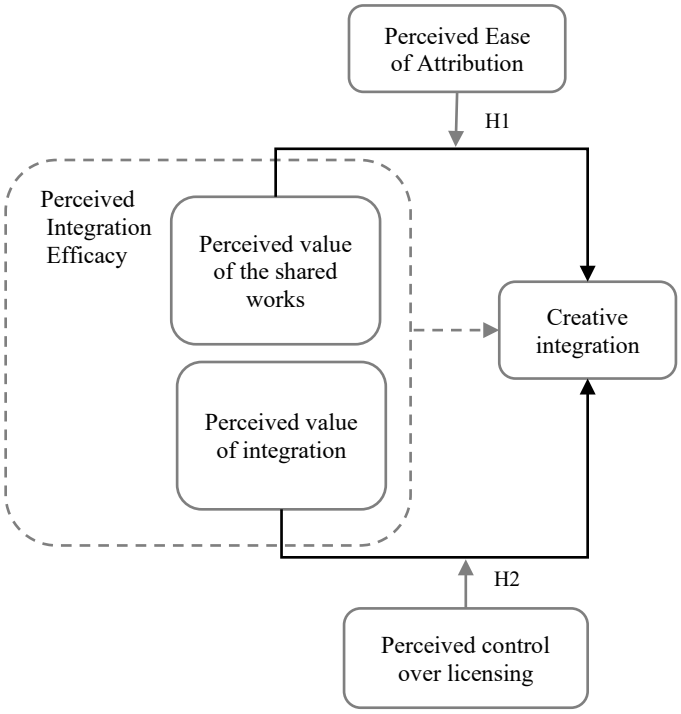


Figure 2: Research Model

Efforts required for appropriately attributing credit to creative artifacts which are used in creative integration process can be an inhibitor to the creative integration process. When an individual values a certain creative work and chooses the work as input to their creative integration process, providing attribution for the used artifact and its parent artifacts becomes a time-consuming side activity. Assuring that the attributions provided are adequate and appropriate may adversely affect an individual's tendency to act upon their desire to use prior works for producing an integrative creative outcome. This study's proposed model posits that "perceived ease of attribution" magnifies the effect of perceived integration efficacy on creative integration. When individuals value other individuals' creative products, perceived effort for tracing other individuals' work for proper attribution may decrease their tendency to engage in creative integration. "Perceived ease of attribution" provided by intelligent attribution technologies (e.g., attribution trees; plagiarism detection) will ease this concern:

Proposition 1: Perceived ease of attribution magnifies the relationship between perceived integration efficacy and creative integration by decreasing efforts required for tracking and providing adequate and proper attributions.

Ease of attribution increases the rate at which individuals act upon their desire to produce an integrative creative work after they perceive value in other individuals' creative works. Individual's concerns over how their creative works may be shared or used by others for commercial or non-commercial purposes can be alleviated by a licensing infrastructure which makes licensing easy and protective.

Proposition 2: Perceived control over licensing magnifies the relationship between perceived integration efficacy and creative integration by easing concerns over use of the outcome of the creative integration process.

To examine this study's proposed research model I have chosen ccMixter, a music remix platform (ccMixter.org) (Stone 2009) that has technology features for implementing creative commons copyright choices and automatic attribution. To corroborate this study's propositions I use survey method with stratified sampling. I will select individuals from different segments of the ccMixter community (more and less active members) to compare creative integration activities by users based on their attitude towards creative integration and their perception on how technology features help them during the integration process.

Objectives:

I plan to survey ccMixter users to understand whether users' creative integration activity levels are affected by their perspectives on technology features that ease attribution and enhance control over licensing of creative artifacts.

Methodology:

This research will use real data collected from the ccMixter website along with self-report measures collected by surveys to examine the relationships among the constructs in the proposed research model (Figrue 2). The real-data collection will be performed by a scraper script, and self-report measures will be collected by sending surveys to ccMixter users who will be chosen based on stratified sampling mechanism.

Stratified sampling mechanism:

To identify different segments of the ccMixter user community, I rely on the Bow-Tie analysis of the remixer and review networks (Cheliotis & Yew 2009). Bow-Tie analysis clusters the large population of users in a community into smaller segments. Those segments are labeled Core, In, Out, Tendril, Tubes, and Disconnect. Not all members of ccMixter create remixed samples, nor do all members review samples shared by fellow members; these community members fall into the Disconnect segment of the Bow-Tie clustering analysis. To more precisely identify highly active community members, one can look at the strongly connected component (SCC) segment in the Bow-Tie analysis report. These are remixers who frequently

remix each other's work. Similarly, SCC in the reviewer network represent community members who frequently review each other's works. The IN segment in Bow-Tie analysis is comprised of remixers/reviewers who only are subject to remix/review by remixers/reviewers in SCC. The OUT component is comprised of remixers/reviewers who only remix/review the work of remixers/reviewers present in SCC. Other remixers/reviewers are part of the Tendrils or Tubes. Those are community members who are connected to members in either IN or OUT segments, or both, but they are not connected to the members in the Core. Community members in Tendril and Tube usually only remix/review samples shared by members in IN or OUT; or whose music are only remixed/reviewed by OUT component remixers/reviewers. The complete Bow-Tie analysis report is included in Table 1. For surveying, I use stratified sampling to select ccMixter users from each segment of the Bow-Tie.

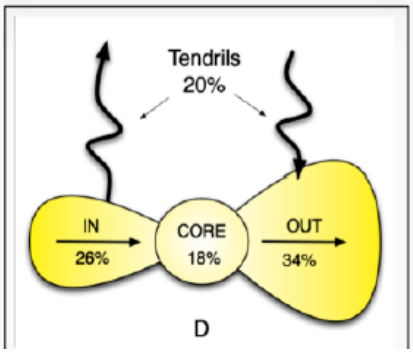


Figure 3: ccMixter Remix Network Bow-Tie (Cheliotis & Yew 2009)

Table 1: ccMixter Bow-Tie Analysis (Javadi *et al.* 2016)

	Core	In	Out	Tendril	Tubes	Disconnect
Web	27.7	21.2	21.2	21.5	0.4	8.0
Remixer	24.8	30.1	22.8	21.8	0.12	0.36
Reviewer	37.1	41.5	17.9	3.2	0.03	0.31

Measurements:

Table 2 summarized research constructs and a preliminary draft of their measurement items.

Table 2: Constructs and Measurement Items

construct	definition	Prior research	Measurement items
Perceived value of the shared [creative artifacts]	The degree to which a person believes that shared creative artifacts are worthy of consideration for use in making of new creative works.	Dennis (1996)	(1) *I am not sure that all the [creative artifacts]* that others contribute have much value.* (2*) Most people do not share valuable [creative artifacts].* (3) *I am not sure I attributed value to any of the [creative artifacts] that are shared by others.* (4) *I am convinced that most of the [creative artifacts] that other people share are valuable.*
Perceived Value of creative integration	The degree to which a person believes that integrating of her/his work with those of others creates a synthetic value.	Javadi *et al.* (2013)	(1) C*ombining my [creative artifacts] with those shared by others creates better [creative artifacts].* (2) *I am not sure if combining [creative artifacts] shared by others with mine will help me generate better ideas.* (3) *I am convinced if I use [creative artifacts] shared by other people, I can create better [creative artifacts].* (4) *Using other peoples' [creative*

			artifacts] will not helped me create better [creative artifacts].
Perceived ease of attribution	The degree to which the user perceives that it is easy to attribute credit to the shared artifacts that are used in producing new creative works.	Technology acceptance model Davis (1989)	*(1) I feel that [IT feature]** makes attributing credit to the shared [creative artifacts] easy.* *(2) It is easy for me to attribute credit to other peoples' [creative artifacts] because I can use [IT feature].* *(3) Learning to work with [IT feature] for keeping track of the [creative artifacts] that I use in my production is easy for me.* *(4) I find it easy to have [IT feature] do what I need to do for attributing credit to other's people [creative artifacts].*
Perceived control over licensing	The degree to which an individual feels control over licensing of her/his creative artifacts.	Theory of planned behavior Ajzen (1991)	*(1) I am confident that I can choose how I license the [creative artifacts] that I share with others.* *(2) Deciding how to share my [creative artifacts] is up to me.* *(3) I am not sure that I can control how my [creative artifacts] will be used by others.* *(4) I think others may use my [creative artifacts]in ways that are not authorized by me.*
Creative integration	Number of remixes in the past 6 month	Monroy-Hernández et al. (2011)	This information will be collected directly from the ccMixter by using data scraper scripts.
In ccMixter survey the two general terms above will be replaced by their contextual counterparts: **creative artifact: music remix* *** IT feature: attribution history theory – automatic licensing notification*			

Analysis:

For preliminary analysis I use multivariate analysis to compare creative integration in Core, IN, OUT, Tendril, Tubes, and Disconnect segments of the ccMixter network. To test the structural model along with the measurement model, I will use Partial Least Squares.

Section III. NARRATIVE (not to exceed six single-spaced pages)

Introduction:

In 2005, the Illinois Juvenile Division was separated from the Department of Corrections, which oversees both juvenile and adult correctional institutions, creating a new Illinois Department of Juvenile Justice (IDJJ). The IDJJ operates eight youth institutions or youth centers, ranging from minimum to maximum-security facilities. Since its inception, approximately 1,800 youths have been sent to IDJJ, costing the state over $100 million. The cost of incarcerating one juvenile offender in a state facility was $70,827 per year, compared to $15,000 for providing services in the community. The rate of recidivism (reoffending) among youths released from IDJJ and returned within three years was 48%. These numbers do not include those youths who later became

involved with the adult criminal justice system (Illinois Department of Human Services, 2008). Despite the proven ineffectiveness of incarceration on youths and the enormous financial burden to taxpayers, many nonviolent youths, especially minority youths, are committed to state correctional institutions. Two major factors seem to influence juvenile institutionalizations. First, lack of local services, and second, the cost of committing juveniles to state correctional institutions is paid by the state and not by the counties. The latter factor has historically influenced counties to unintentionally encourage incarceration of nonviolent juvenile offenders.

To address the issues, Illinois has taken significant steps toward reform of its juvenile justice system (Coldren, 2006). In the late 1990s and early 2000s, advocacy organizations and groups initiated several juvenile justice reforms in the Chicago area and statewide, culminating in the creation of the IDJJ, Redeploy Illinois (RI) programs, youth advocacy initiatives, and the Juvenile Detention Alternatives Initiative, all with the aim of reducing disproportionate minority confinements, and raising the age of majority to 18 (Coldren, 2006). The Redeploy Illinois law (2004) recognized the need to provide funding to counties so that the youths can receive services in the community rather than being committed to IDJJ. In turn, counties are obligated to reduce IDJJ commitments by 25%. Failure to reduce the commitments will result in financial penalties and the counties will have to pay the state the cost of incarceration in a state facility. The RI project excludes youths who have committed murder or Class X Forceful Felonies (e.g., aggravated sexual assault, aggravated assault with a weapon, or robbery).

In 2008, McLean County was awarded a planning grant to study the trends and types of commitments, services provided, gaps in services, and justice-system issues. Upon completion of the planning grant, the county received funding for a pilot grant ($280,000). The PI was awarded a contract ($38,000) by the county to work on both the planning and pilot grants. The grant required that the county assess the needs of youths and address their risk factors; develop and offer evidence-based programming (e.g., Multi-systemic Therapy, Functional Family Therapy); and reduce IDJJ commitments, including minority commitments. The pilot study does not include interviews of key players to assess their attitudes and perceptions of the program. The proposed URG project will address these issues and interview youths, families, victims, and key stakeholders.

Literature Review

Studies have shown that offenders sent to prison recidivate at a higher rate than those given probation (Spohn & Holleran, 2002). In addition, high levels of incarceration are often concentrated in impoverished communities, with devastating effects on families and communities (Mauer & Chesney-Lind, 2002). Advocates of incarceration theory argue that when incarcerations increase, crime rates decrease (Zedlewski, 1987). This theory is premised on the basis of a small number of offenders who pose a threat to society, and, therefore, need to be isolated from the rest of the society (Greenwood & Abrahamse, 1982; Office of Juvenile Justice & Delinquency Prevention, 1995). The high-risk offenders represent 15% of youths, yet they commit 75% of all violent offenses (Huizinga et al., 2000). Based on the belief that isolation of offenders reduces crime, punitive juvenile court policies and long-term incarcerations gained momentum in the 1980s. Many states, including California, Texas, New York, and Illinois, passed a number of statutes designed to promote higher rates of youth incarcerations based on a “get tough policy.” In 1994, California lowered the age of adult court transfer from 16 to 14. The “three strikes” law also placed certain juveniles (16 or older) eligible for longer sentences (Males et al., 2006).

Even today, many states try 13- or 14-year-olds as adults for a broad range of offenses, including nonviolent crimes (Piquero & Steinberg, 2006). In addition to an increase in recidivism among released offenders, the cost to tax payers is enormous. California, for example, spends more than half a billion dollars to incarcerate fewer than 2,000 youths, whereas almost the same amount of money can provide community-based prevention and intervention services to over 100,000 youths. This disparity would be justified if incarceration proved to be effective.

California prison data, however, show that 75% of the incarcerated youths reoffend within

three years of release. In addition to the cost of incarceration, states such as California, Texas, and Ohio are facing additional financial burden stemming from lawsuits contending "chronic and systemic abuse" in juvenile prisons (National Juvenile Justice Network, 2008, 2). New York is planning to close four out of five juvenile prisons over complaints of "inadequate programming and unsafe conditions" (National Juvenile Justice Network, 2008, 2.).

This financial strain, coupled with limited success with incarceration of youths, has caused many states to rethink their priorities and reallocate funding from state-funded youth prisons to treatment and services within the state-funded community programs. These funds are not to duplicate existing services, but to be utilized for developing evidence-based community services. The Reclaim Youth program in Ohio, Youth Aids in Wisconsin, and Redeploy in Illinois have developed fiscal realignment programs. Although the nature of services provided by these states may differ from one another, they all work toward reducing overrepresentation of minorities in the juvenile justice system, providing effective mental health services in the community, and helping young people to become productive citizens. In order to successfully implement these strategies, public awareness and support are critical. Research has shown that the public values community-based programs, especially for nonviolent youths, over incarceration.

Public Perception of the Juvenile Justice System.

A public perception poll conducted by the Center for Children's Law and Policy (2007) shows strong support for juvenile justice reform in Illinois, Pennsylvania, Louisiana, and Washington. The public favored rehabilitation, treatment, and community supervision and supported the idea of moving juveniles out of state correctional institutions and placing them in community-based facilities. They also supported redirecting funds spent on incarceration into community-based programs. As for minority youths, the public viewed that poor youths, African American youths, and Latino(a) youths are likely to receive more severe sanctions than Caucasian youths. Other studies also show growing public support towards community-based treatment of delinquent youths (Piquero & Steinberg, n.d.).

Redeploy Illinois Project.

Four pilot sites (Macon, Peoria, St. Clair, and the Second Judicial Circuit with 12 rural counties) initially received the RI grants. Evaluation of the programs shows success in terms of cost reduction and a decrease in overall incarcerations. Approximately 400 youths were diverted from commitment to IDJJ, representing a 51% reduction. The estimated cost savings to the state was $19 million. Besides the cost, the RI programs show success in mobilizing communities, providing direct services to youths, and diverting the youths from further involvement in crime. To improve community awareness, and to recognize the issue, RI program evaluators recommend interviews with youths, family members, victims, and key players. The proposed URG will conduct in-depth interviews to identify attitudes and perceptions of stakeholders.

Members of the Illinois Redeploy Oversight Board, the Illinois Department of Human Services, and McLean County Court Services have shown support for the study. The study will serve as a model for other counties and states.

Objectives

The goal of the proposed project is to assess the impact of the Redeploy Illinois program on juveniles, families, victims, service providers, and the justice system. The following are the specific **objectives**:

1. Assess the attitudes and perceptions of youths (approximately 10–15) regarding the services received and the Redeploy Illinois program;
2. Examine the views of family members of RI youths;
3. Assess the views of victims of youths on RI program versus incarceration; and
4. Analyze the views of the probation officers, attorneys, and service providers

These objectives will allow examination of a number of **research questions**:

1. What is the impact of the Redeploy Illinois program on youths in terms of meeting their psychological, social, educational, and medical needs? (Objective #1)
2. How do youths view their placement in community-based programs versus commitment to IDJJ? (Objective #1)
3. What is the impact of the Redeploy Illinois program on the families of youths who are placed in the community-based programs? (Objective #2)
4. What are the views of the victims of youths regarding community-based placement of youths versus commitment to IDJJ? (Objective#3)
5. What are the views of probation officers, defense and prosecuting attorneys, and service providers regarding the Redeploy Illinois program and the youths placed in the program? (Objective#4)
6. What contextual factors (e.g., race, age, prior offense, lack of services) affect the placement of youths in community-based program versus commitment to IDJJ? (Objective#4)

Methodology:

Data Collection

The proposed study will primarily use the probation records of youths who are eligible for the RI program. Once the juveniles are identified, social history information will be gathered from the hard files, housed in the McLean County Probation Department. The RI planning grant reports 72 commitments involving 52 youths to IDJJ from 2004–2007. These included 28 court evaluations and 44 full commitments. Of the 52 youths, 78% (n=41) were males and 21.2% (n=11) were females. Caucasians (46.2%, n=24) and African Americans (48.1%, n=25) were represented in almost equal numbers, although the population of African American youths in the county between the ages of 13 and 20 was approximately 10%. The county will start placing eligible youths in the RI program starting from February 2009. We anticipate an average of 10– 12 juveniles placed in the program per year. As required by the RI pilot grant, the PI is currently working with RI program coordinators. At a recent meeting, the PI informed the members of Redeploy Illinois Oversight Board, Juvenile Detention Alternative Initiative, and Department of Human Services, her plan to conduct a qualitative study of RI participants. The agencies have agreed to provide full cooperation and have shown an interest in expanding the study in other counties. The following section explains specific data collection strategies.

Objective 1: The PI will begin gathering information pertaining to the youths *as early as June 1, 2009.* Even this initial data collection will, of course, be preceded by IRB approval for the entire study. The youths will be informed of the purpose of the study, the length it will be take to complete the interview, and the confidential nature of the study. They will also be informed that they can stop the interview at any time. We anticipate that the interview will take approximately 30–45 minutes. These interviews will be typed into a laptop computer at the time of the interview or audio-taped and transcribed later. Questions include services offered, youths' views about the services received, and their attitudes towards the program.

Objective 2: Interviews of family members or primary caregivers will be conducted to assess their views about the program versus commitment to IDJJ. These interviews will last anywhere from 30–45 minutes. These will be either entered into a laptop at the time of the interview or audio-taped and transcribed later. These interviews will be conducted following the IRB protocol.

Objective 3: Victims will be identified from the probation files and, with their consent, will be interviewed to assess their views regarding placement of youths in community-based programs versus incarceration. These interviews will be conducted following the IRB protocol.

Objective 4: Two probation officers, 4 attorneys (two defense attorneys and two assistant prosecuting attorneys), and service providers will be interviewed to gather information pertaining to their views on RI youths and whether the program is meeting the overall goal of the program. The interviews of probation officers and attorneys will be conducted in the courthouse. The county has selected three local agencies to provide services to youths. These interviews will address the service gaps and areas for improvement. These interviews will detect any contextual factors (race, age, prior offense, risk levels of youths, family stability, gang involvement, lack of services, etc) that might contribute to disproportionate minority confinement.

Analysis

The qualitative data will be analyzed to gain insight into subjects' views about the Redeploy program, in addition to identifying whether the program met the needs of the youths. Analyzing this unstructured information will be tedious and time-consuming. Therefore, the researcher will use computer software (ATLAS-ti). ATLAS-ti is a powerful tool to analyze large body of textual data. First interviews will be either directly entered into a laptop computer or audio-taped, depending on the situation. If audio-taped, the interviews will be transcribed. Once the interviews are entered in to a word document, the data will be coded using two types of coding: question-level coding and thematic coding. Question level coding will identify responses for specific questions, whereas thematic coding will identify themes such as social needs, medical needs, psychological needs, educational needs, community-based placement, positive views, negative views, etc. Finally, ATLAS-ti will be used to identify, based on frequency of the terms, which factors are important across all groups and subgroups.

Methodology

For this URG funding, the research methodology will primarily focus on "Product/Process Testing" method. However, in traditional methodology, the final product evaluation requires learners' involvement, so IRB approval is needed. Typically, research methodologies, i.e., "Product/Process testing" and "Traditional Methodology" build a strong case for any external funding. The description below only describes the "Product/Process Testing methodology."

a) *Innovation.* The key product used in this proposal is a wearable internet-of-things (IoT), also known as "wearables" or "smart wearable technologies." They are small internet-enabled devices that provide physiological feedback to the consumers (wearers) to encourage positive behavioral changes (Lehrer et al., 2021). These wearables are equipped with information and communication technologies (ICTs) allowing these wearables to collect physiological data and upload the data to cloud platforms for data analyses and insights. The study proposed a small, less-intrusive wearable IoT capturing learners' EEG (electroencephalogram) brainwaves called "Emotiv MN8". According to Emotiv.com, the device measures stress, distraction, and attention levels using EEG along with its proprietary machine learning (ML) algorithm. **Figure 1** shows the proposed wearable IoT device used in this study.

Figure 1: Picture of Emotiv MN8—Bluetooth earbuds with EEG-capturing ability

For additional information about Emotiv MN8, https://www.emotiv.com/workplace-wellness-safety-and-productivity-mn8/

For EEG used in classrooms, https://kids.frontiersin.org/articles/10.3389/frym.2020.00096

b) *Data Collection*. The data collection and analytics process will follow the process suggested by Camacho et al.'s (2020) learning analytics cycle: data capture, data collection, analysis and classification, and results. The learning analytics cycle addresses the following concerns:

i. *Data Capture and Collection*. Can Emotiv MN8 capture what it intends to capture in real time? What is the nature of EEG waves that Emotiv MN8 captures? Does the device collect and store the data from the learners? Data format and captured log are reviewed. For more detail about EEG, please visit https://kids.frontiersin.org/articles/10.3389/frym.2020.00096

ii. *Analysis and Classification*. What is the graphical or visual presentation of learners' involvement throughout computer programing? What are the behavioral patterns exhibited by the learners as they engage in computer learning activities? Does Emotiv MN8's tool correctly classify engagement vs. non-engagement? What may other machine learning (ML) algorithms be used to analyze or classify different learner interactions?

iii. *Results*. The results will point to the success and the potential use of wearable IoT in a computer programming setting. That is the ability of the research to discern differences in learners' attention, focus, and distraction while engaging in computer programming. *Please note that IRB approval is required for all human subject research. While waiting for IRB approval, PI may experiment with the device (on himself) in the summer months*.

c) *Feasibility*. This study's project feasibility involves four assessment categories: operational, technical, economic, and risk. The following describes each category.

i. *Operational feasibility*. Operational feasibility includes assessing the device's performance and application in the *b) Data Collection* stage (mentioned earlier). Additionally, the task includes the researcher's checklist of system requirements as advertised by the vendor, which includes Emotiv MN8 along with its analytics tools.

ii. *Technical feasibility*. While the researcher is quite comfortable with traditional quantitative research methods in IS/IT discipline, the full study proposed to an external grant agency may involve other interdisciplinary researchers specializing in machine learning, education, and neuroscience. As for the proposed URG, the researcher has the confidence to complete it within the required timeframe, January 2024-5.

iii. *Economic feasibility*. There could be a better alternative to capturing learners' focus and attention. While relying on the self-report survey is less accurate compared to a physiological measurement device, newer and more complex wearable IoT could be more effective in realizing the objectives of this study. Emotiv MN8 is the device of choice at the time of this proposal writing. However, a better device may be available by the time of potential funding. The researcher will conduct cost-benefit analyses as necessary to determine the cost-effectiveness of the entire system and will communicate any technological changes to CAST (within the proposed budget). Please see Section V, Budget.

iv. *Risk assessment*. The use of wearable IoT for educational purposes is rare, at least not in the United States. Concerns over students' personal information, privacy, and security are the most important. For example, the typical employee-related barriers to wearable IoT adoption in the workplace are privacy and security concerns and compliance (Khakurel et al., 2018; Schall et al., 2018). Since wearable IoTs may be used to collect learners' focus and attention information, they may not be too enthusiastic about sharing their personal physiological and biometric information with their instructors. The researcher of this URG is aware of these challenges and will seek IRB approval when involving students. The risk-benefits assessment stipulated by IRB will be evaluated. Additionally, best practices of wearable IoT monitoring in the workplace will be observed in educational settings: voluntary participation, transparent data collection, predictive accuracy and reliability of analyses, the scope of data use, and secured repository (Marchant, 2019).

d) *Design and Evaluation*. The researcher will examine the process of design and evaluation through the lenses of Information Systems (IS) Analysis and Design (SA&D). **Figure 2** illustrates the functional requirements of the proposed system using a standard use case diagram. All "oval" symbols (use cases) from the diagram represent the system scope—Emotiv MN8 and its application—that must be evaluated in the study.

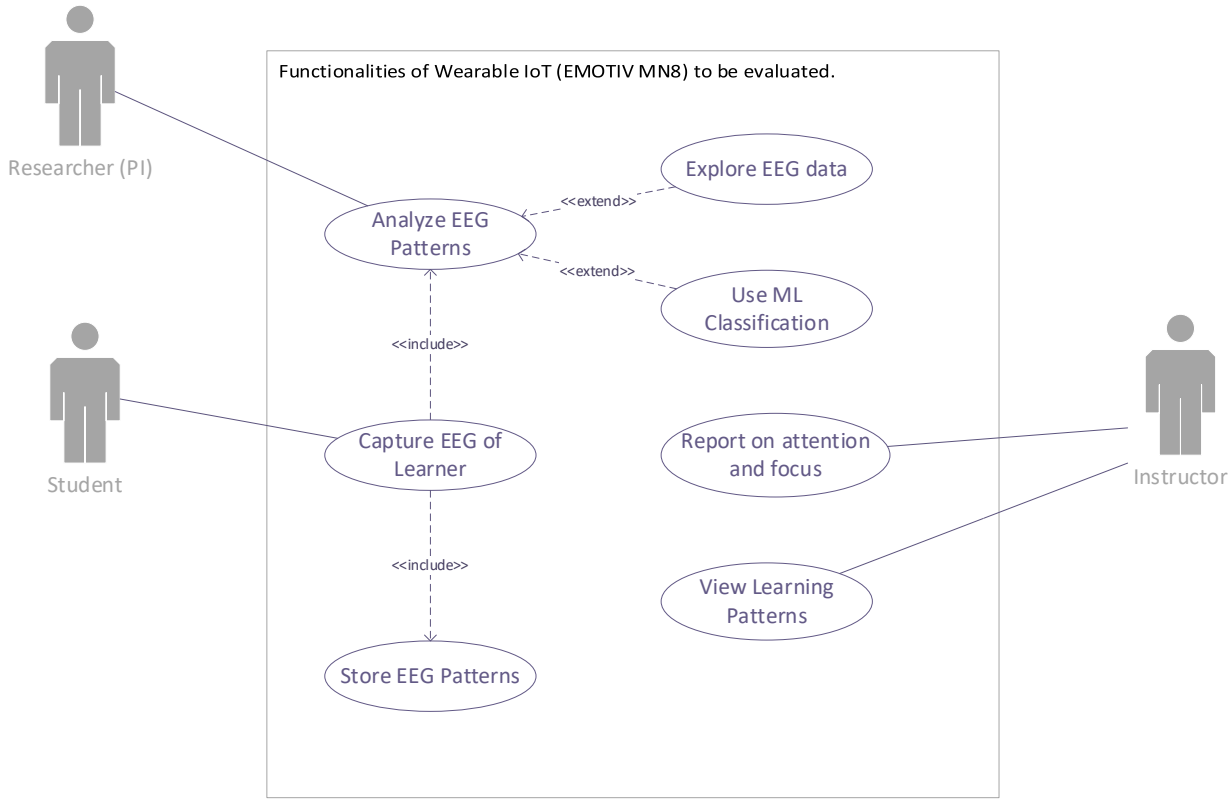


Figure 2 Set of Evaluation Criteria—Oval Symbols (Use Cases)
Note: <<include>> = related functionality; <<extend>> enhanced functionality

In non-technical terms, both Emotiv MN8 and its application will help the researcher and instructor (likely the researcher himself) address these main evaluation questions through the use of wearable IoT:

1. What are the learners' brain waves (or EEG patterns) as they engage in computer programming activities?
2. Are there any differences in the brain wave patterns between passive (listening to lectures) and active learning (engaging in programming) in computer programming?
3. Which type or combination of brainwave patterns inform us of learning engagement, or which brain wave patterns or combination capture different brain statuses, e.g., boredom, anxiety, apathy, and other emotion?

For technical design/evaluation of each functional requirement, a brief description of the "test plan" (MIL-STD-498, 1994) include the following:

- Requirements addressed: a) analyze EEG patterns, b) capture EEG of the learner, c) store EEG patterns, d) explore EEG data, e) use machine learning (ML) classification, f) report on attention and focus, and g) view learning patterns.

- Prerequisite conditions: Wearable IoT is attached to the learner, the learner engages in computer programing activities, system repository operating, and the recording process starts.
- Test Inputs: The research will determine the needed data input for each functional requirement. For example, Input data set for a) analyzed EEG patterns: “set of brainwaves…”, input data set for b) capture EEG of learner: “raw data saved in the repository or database…”, and so on.
- Expected Test Results. Each functional requirement will accept the input and return the correct results. For example, the expected test result for a) analyzed EEG patterns: “an aggregate result or classification of brainwaves," b) capture EEG of learner: "retrieval of raw data," and so on.
- Other quality attributes: range and accuracy, the minimum number of combinations of input and output, number of system breaks, processing errors, or irregularities.

Research Methodology

To accomplish the proposed research objectives, the study adapts a four-step methodology which is explained below. Step 1 deals with mathematical modeling and steps 2, 3, and 4 are related with laboratory testing of structural as well as hydrological properties of parking materials. All the testing will be performed in Turner Hall labs and will plan to avoid conflicting with scheduled TEC classes.

Step 1: Develop a Stormwater Storage Model to Estimate the Runoff Storage in Parking Lots (Objective#1)

A mathematical model is developed to estimate the runoff storage capacity required for the parking lot. Equation 1 shows the basic model. Even though the model is simple, the volume of inflow rainfall and outflow runoff from PPs are not constant, and they vary with time. The inflow rainfall is based on the intensity, duration, and frequency (IDF) of the rainfall event. For example, if the PP is designed for a 4-hour 1-inch rainfall event. The inflow of runoff onto the parking lot depends on the intensity of rain over the four hours and other factors.

Similarly, the outflow varies depending on the parking lot layers and underlying soil infiltration capacities (Huang et al. 2016). The simulation model estimates the total runoff storage required through the parking lot such that no overflow occurs during expected rainfall events. The model also helps design the storage capacity needed if the PPs are used as temporary storage (detention). For model development, the rainfall frequency, duration, and intensity and soil infiltration rates will be taken from the Bloomington-Normal region.

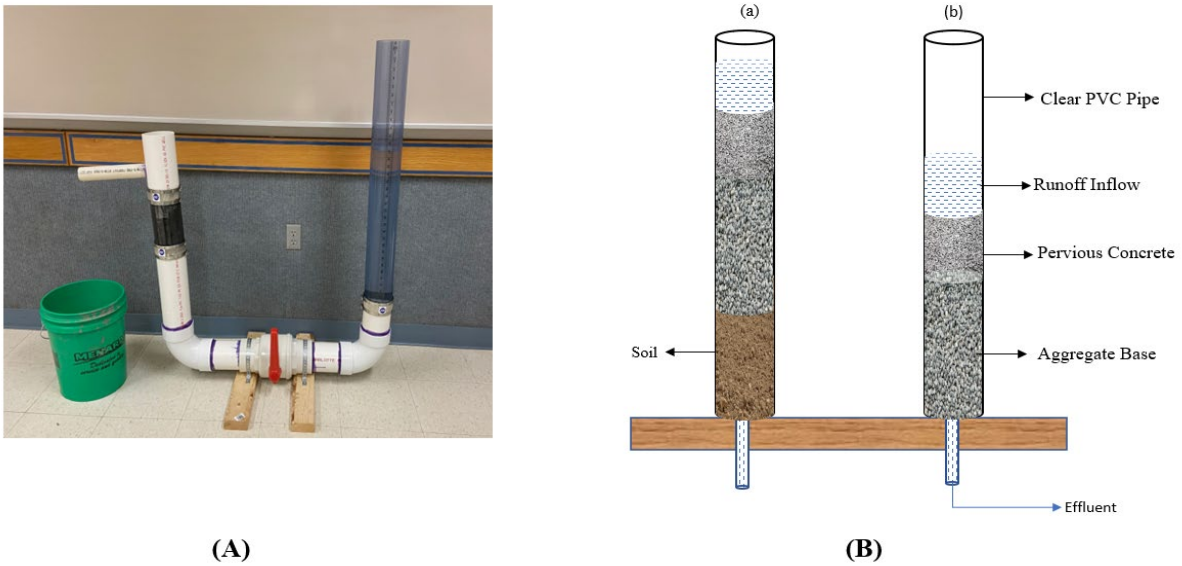
$$\Delta Storage = inflow + Outflow \qquad (1)$$

Step 2: Develop Suitable Pervious Concrete Mix Design (Objective#2)

In steps 2 and 3, the traditional parking lot design is used as a benchmark to satisfy the parking lot's structural requirements. For instance, if the conventional design needs a 2,000-psi compressive strength concrete, the target is to achieve the same or higher strength while maintaining the required hydrological properties derived from step 1. Typically, the concrete is produced by mixing designed cement, sand, aggregates (rocks), and water. Previous studies eliminated the usage of sand in pervious concrete to provide adequate pores. However, a lack of fines leads to a lower strength. The permeability of the concrete depends on the size of aggregates. The proposed study examines the influence of four factors, namely, % of aggregates, aggregate size, and % of sand on strength and permeability of pervious concrete.

The testing plan includes developing the right proportions of cement, sand, and aggregates. Three particle size distribution tests on each sand and aggregate materials will be performed. The particle size distribution tests help to identify the right proportions of aggregates and sand, which will be used for making concrete samples. This study will develop approximately four concrete designs by varying the cement content. For compressive strength testing, three samples from each concrete design will be tested for 28-days compressive strength. The permeability of each concrete structure will be examined through a setup developed for this study, as shown in Figure 2a. All the materials required for concrete design will be collected from the ready-mix concrete plant within the vicinity of the Bloomington-Normal region Il.

Step 3: Select the Reservoir Layer and Create the PP Lab Specimen (Objective#2)
The bottom layer beneath the pervious concrete is the load supporting and reservoir layer. This layer is where 70-90% of runoff is stored during the rainfall. In general, aggregates are used in the reservoir layer (usually, these aggregates are different from those used in concrete). Two to three types of aggregate materials will be collected from ready-mix concrete plants within the vicinity of Normal. A total of three particle size distribution tests will be conducted on each aggregate material. Further, the proper distribution of aggregates that satisfy permeability and storage requirements will



(A) **(B)**

be selected. The permeability of pervious concrete from step 2 and reservoir layer from step 3 will be tested using the column tests shown in Figure 2b. Specifically, a 4-inch diameter clear PVC pipe will be used for developing a PP cross-section. In each column, the designed thickness of parking materials will be inserted. A known amount of water will be poured into PVC for testing permeability. If the permeability does not satisfy the expectations, adjustments will be done in step 2 and step 3.

Figure 2: (a) Permeability testing of pervious concrete set up (b) Permeable parking lot specimens

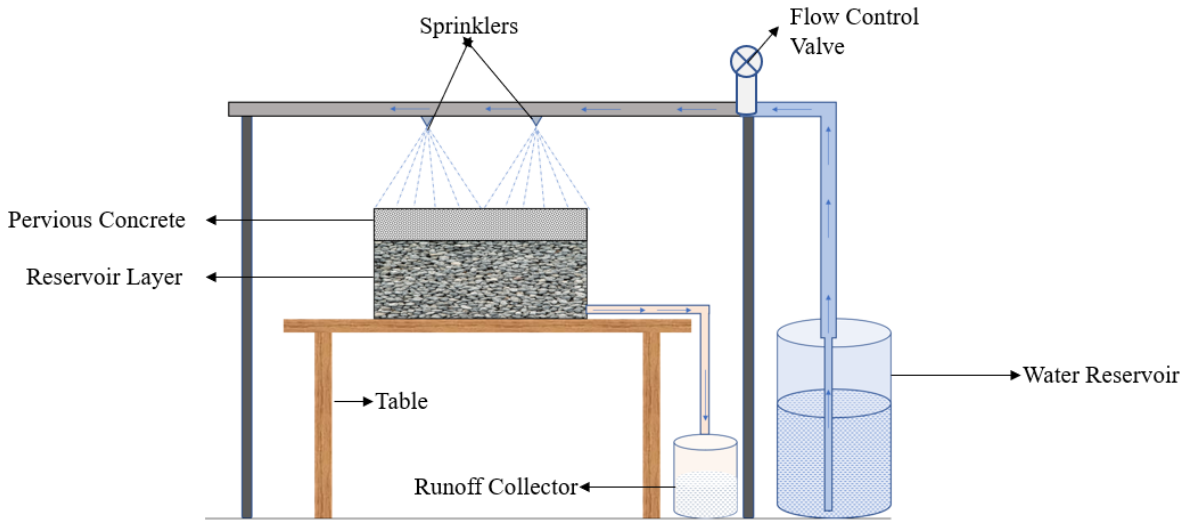


Figure 3: Experimental set up for testing the performance of PP under a simulated rainfall

Step 4: Conduct the rainfall simulation test to verify the performance of the PP (Objective#3)

In this step, a laboratory setup shown in Figure 3 will be used to simulate a rainfall event and test the developed design and materials' performance. In this setup, a rectangular tank will be made, which represents a permeable parking lot. A simulated rainfall will be created using sprinklers and a flow control valve, and the performance of PP will be examined. The sprinkler system will help to create the rainfall for the required duration and intensity. In the column test (Figure 2b), the runoff can flow only in the vertical direction. In contrast, the runoff will flow in all directions in real conditions (Figure 3), and this setup can represent the real-world conditions. Overall, one appropriate sample obtained from Steps 2 and 3 will be tested in this step for ten rainfall cycles to verify the storage and permeability efficiency.

TIMELINES

Timeline (the use of diagrams is encouraged to demonstrate the timeline):

	2016						2017					
Task	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Obtain IRB approval; Set up focus groups; Mail letters to focus group participants	X	X										
Conduct focus groups		X	X									
Develop survey and assemble mailing packets			X	X								
Mail pre-notification postcards				X								
Mail first survey/letter/return envelopes				X								
Mail reminder postcard					X							
Mail second set of survey/letter/return envelopes						X						
Mail thank-you letters							X					
Analyze survey data						X	X	X				
Develop funding proposal									X	X		
Submit USDA grant proposal											X	
Submit manuscript to NACTA Journal and/or Choices												X

Timeline:

The (tentative) timeline for this project is provided below:

Date(s)	Action Plan
December 2016	Secure updated contact list of Illinois Park & Recreation Association's (IPRA) list of professionals (~2,300 professionals from +350 park districts, forest preserve districts, conservation districts, special recreation associations, & municipal park and recreation departments within the state of Illinois)
February – March 2017	Obtain IRB approval
April - May 2017	Work with Gale Wheatley (KNR staff) to use $1500 of my 2016 New Faculty Start Up funds that I have earmarked for the purchase of a three-year license to use Qualtrics (online survey software). Once purchased, I will develop the online survey. Content/questions from the survey are provided in the "Instrumentation" section of this proposal.
April - May 2017	Utilize IPRA's 2016 contact list to prepare email invitation.
May 2017	Pilot test survey to ensure readability, grammar, appearance, flow, etc.
June 2017(first week)	Send out initial email invitation to sample. Initial email will describe the study; invite the professionals who plan to retire in ten years or less to participate in the study, and; provide the invited professionals with a link to the online survey.
June 2017 (second week)	Email reminder with link to online survey sent to sample
June 2017 (third week)	Email reminder with link to online survey sent to sample
June 2017 (fourth week)	Final email reminder with link to online survey sent to sample
July 2017 (first week of July)	Data collection terminated
July – Second week of August 2017	Data cleaning & analyses
August 2017	Results & report writing
September 2017	Submit first manuscript to *Journal of Public Park and Recreation Administration.* JPRA is a peer reviewed journal and is recognized as one of the top journals for public park and recreation management issues.
August – October 2017	Prepare and submit 2nd manuscript to *Public Personnel Management.* PPM is a well-recognized peer review journal for researchers and practitioners engaged in public sector HR-related research.
October – November 2017	Prepare and submit manuscript to *Illinois Park and Recreation* magazine (a magazine for professionals in the field).
November 2017 – January 2017	Begin discussions with Illinois Association of Park Districts' Research Advisory Council or other funding sources regarding potential (external) funding for additional retirement and/or bridge employment research within public parks and recreation.

BUDGET JUSTIFICATIONS

Budget Justification Instructions: Each budget item **must** be clearly and completely justified.

$250 for Boom Recorder software package to record 24 audio channels simultaneously
$150 for Gator protective case to protect the MOTU hardware device
$150 for DB-25 parallel cables and connection wire
$100 for high-quality electret condenser microphones
$300 for amplifier and filter circuit components e.g. op-amps, potentiometers, resistors, capacitors
$75 for mini breadboards to mount amplifier and filter circuits
$50 for pin-out DB-25 circuit boards
$100 for HD video camera to provide video input for processing
$200 for backing substrate, mechanical support, and mechanical fasteners
$150 for (2) high-quality function generators
$75 for test speakers
$100 for speaker test stand holder
$300 for Beamform Interactive software plug-in to ImageJ software

Total Equipment: $2,000

Total Salary: $3,000

Salary Justification: the microphone array will require approximately one month of dedicated work to assemble the amplifier and filter circuits, design and fabricate the mechanical components, assemble the test assembly, test and calibrate the array. The analysis of the data will require approximately two weeks, and writing results will require approximately an additional two weeks. The requested salary is less than half of my normal monthly salary.

Budget Justification Instructions: Each budget item **must** be clearly and completely justified.

Salary
Salary is requested for August. My major tasks are to design and set up the entire system, pre-test the system, supervise students to take samples and analyze samples, analyze data, and prepare one manuscript.

Labor – Students will perform the following tasks:

- Build the system
- Analyze samples for pH value, alkalinity, solid content, volatile content, ammonia concentration, and dissolved oxygen level
- Measure biogas volume and composition
- Analyze data and make figures
- Prepare a research poster and present it at university research symposium

Students will earn $10 per hour for an estimated 60 hours of work.

Equipment
1. Incubator. $505. http://www.vetlab.com/Incubator%20(New).htm

Commodities

1. One anaerobic digester with three feedstock chambers. Needs to be self-built. No commercially available. Estimated cost: $500.

2. 2-L media bottle. 4 for $159.80. https://www.fishersci.com/shop/products/fisherbrand-reusable-glass-media-bottles-cap-13/fb8002000

3. Biogas bags. 20 bags for $260 http://yhst-1993699541410.stores.yahoo.net/tb5box.html

4. Biogas analyzer calibration gas kit. $350. http://www.landtecna.com/?product=calibration-gas

5. Ammonium salicylate reagent powder pillows, 2 pack for $195.98. http://www.hach.com/nitrogen-ammonia-reagent-set-tnt-amver-salicylate-high-range/product?id=7640209854&callback=qs#

6. One poster. Estimated $50.

7. General lab supplies, such as gloves, chemicals, containers, pipette tips. $379.22.
