

Supporting Community Services for Aging Populations

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Abstract

We were interested in exploring the information needs of an organization focused on people and reliant on human interaction. We partnered with the City of Berkeley's Aging Services Division (ASD) and explored their information needs. We found the desire for information, collection, retrieval and aggregation stems from the fundamental goal to create a productive, safe, and healthy environment for their senior participants. Despite this people-oriented focus, there are multiple information systems in use, many of which are mandated. Some are legacy systems required for reporting and providing justification to funding agencies and others are small custom implementations aimed at a specific local goal. These systems do not share an interface or a data model and often result in redundant data entry. We saw little potential for interoperability given the multiple technical architectures present as well as varying privacy requirements associated with different agency systems. We encountered concerns about introducing new information technology, both to the organization and to senior participants, as a result of how technology may change work practices and concerns over its sustainability.

When we started the project, we anticipated engaging in activities to help design and build a system for recording senior and service provider interactions or 'touch points', to help the City of Berkeley's Aging Services Division (ASD) maintain an awareness of their senior participants' health and safety status. However, after gaining insight into the complex and siloed nature of Berkeley's ASD and social services in general, we found the situation called for something different. The result of our research and design activities is an implementation plan for a context-appropriate information system targeted at the ASD's most immediate information goals, recommendations for introducing this new system, and, more generally, suggestions for a modified business process analysis that aims to further facilitate collaboration and understanding between IT and their partner division.

Introduction

Aging and Social Services in the United States

From 1990 to 2010, the number of adults over age 65 in America has grown at a steady rate of 10 to 15 percent. This rate is about to increase, however, as the number of seniors will grow an estimated 35 percent in the next decade as the generation known as the Baby Boomers – born between 1945 and 1965 – reach the age of 65. (Frey, 2007) This flood of new "young seniors" to the existing senior population has focused public attention on whether America's local communities are prepared to meet the needs of this growing senior population. According to the AARP, a livable community for seniors is one that has affordable and appropriate housing, supportive community features and services, and adequate mobility options, which together facilitate personal independence and engagement in civic and social life. (AARP, 2005) However, scholars

have found that local communities are, for the most part, ill-equipped to serve the needs of aging populations and are advocating policies to make communities more aging-friendly and livable. (Scharlach, 2009)

The elder population in Berkeley, California faces many of these highlighted challenges. In 2000, Berkeley's total population was 102,743 and 10.2% of this population was over age 65 (U.S. Census, 2000). Assuming this senior population grows at the estimated rates of 15% from 2000 to 2010 and 35% from 2010 to 2020 and the rest of the population remains constant, 20.7 percent of Berkeley residents will be over 65 in 2020. Currently, there are 9,071 households in Berkeley with at least one person age 65 or older and in 4,219 homes, seniors lives alone. Of all the homes in Berkeley, 79% were built before 1960 and 55% were built before 1939. Thus, as an urban center, the neighborhoods around Berkeley are relatively old. Most elders in Berkeley, as in most parts of the U.S., are therefore "aging in place". (U.S. Census, 2008)

As a modern city that plays host to the University of California (a large research university) and sits near the vibrant economic region of Silicon Valley, Berkeley has many advantages that translate into benefits for seniors who live in the city. Berkeley's population is racially diverse and well-educated, which leads to high levels of community activism and engagement through multi-cultural and political activities (U.S. Census, 2008). Berkeley also has plenty of cultural attractions, including theatres, museums and music halls, which appeal to senior populations. With the rise in the demand for senior services, the marketplace has responded with life-long learning opportunities and health services for seniors.

Many of these attractions, however, come at a cost and are not easily accessible to seniors living on fixed incomes. In 2006, 8.8% of Berkeley's seniors over 65 received incomes below the federal poverty level. For the many seniors that cannot afford the vital and recreational services essential to a high quality of life, government and non-profit organizations step in to fill the gap. The Older Americans Act of 1973 established Area Agencies on Aging (AAAs) to respond to the needs of seniors across the nation. Today, funding is provided through county level AAAs to service providers, acting as contractors, that provide seniors with various services. In Berkeley and Alameda County's surrounding cities, there are several contractors that receive funding for providing services to aging adults, including the city government itself. (P1 personal communication, March 24, 2010)

Social Services and IT

In the United States, there are two different models used to design and deliver aging services: the recreation model and the social services model. The recreation model focuses on providing opportunities for community engagement through educational and social activities. The social model provides advocacy and vital health, housing, and nutrition services to aging adults. When the recreation and social services are separate, the responsibility is placed on the individual in need to navigate multiple organizations

in order to procure appropriate services. (Forrester 2009) There is an increasing focus in the U.S. to relieve the burden on the citizen or individual by consolidating related services and pursuing a more holistic “No Wrong Door” strategy where citizens access any of a set of related services in the same location. (Forrester 2009) By providing services in a client-centric manner, client safety, comfort, and convenience are top priorities.

This approach appears holistic to the service recipients, but is often made whole through the use of a single physical location and a lot of human effort. Often, each of the underlying services have specific goals, needs, funding mechanisms, and tailored information systems as a result. These different systems result in information silos that lack a common thread to facilitate holistic service provision from an information perspective. These systems are often minimally interoperable, are not necessarily designed from the social service worker perspective, and often negatively impact work practices.

These silos are an acknowledged problem in government and human services. (Mayer-Schönberger and Lazer 2007) There is increasing interest among enterprise software companies to address these silos using information technology. (Forrester 2009) However, technology alone is not a solution to information silos, although it is often touted as such. Focusing only on technological possibilities, rather than assessing information flows, may not result in useful solutions. (Mayer-Schönberger and Lazer 2007) Additionally, while the information flow from client or citizen to service organization has garnered attention, internal information flows require equal attention if information technology is to fulfill its potential in public service organizations.

Project Stakeholders

We partnered with the city of Berkeley’s Aging Services Division (ASD) and their Information Technology (IT) department.

The Aging Services Division

The Aging Services Division (ASD) is a division of the City of Berkeley’s Housing and Human Services Department. The ASD serves all Berkeley residents over age 55. The ASD provides a range of aging-friendly activities and services important for maintaining a high quality of life to Berkeley’s seniors. (City of Berkeley, 2010) The ASD manages three senior centers, which are community and cultural centers that promote fellowship and community involvement. Daily lifelong learning (e.g. computer, foreign languages and other academic subjects) and recreational classes (with titles such as “Soul Line Dancing” and “Sit and Get Fit”) are taught by volunteer and professional instructors. The centers also provide transportation services to and from the center and for critical activities like medical appointments. The centers organize and facilitate recreational trips to local Bay Area attractions. This breadth of services represent a valuable community resource essential to building and maintaining an aging-friendly community.

In addition to providing transportation, activities, and a place to engage with the community, the ASD provides vital services for healthful living. It runs a nutrition program, which serves over 300 nutritious lunches each weekday, either to homebound seniors or at the centers' cafes. Senior services staff assistants at the centers provide trusted advocacy assistance and referrals for housing, health and other social services. Seniors in need of multiple social services and living on a restricted income qualify for and make use of a Targeted Case Management (TCM). The ASD also runs respite care programs supporting disabled seniors' families and care givers.

To fund many of these vital services, the Aging Services Division acts as one of the Alameda county Area Agency on Aging (AAA) contractors. To pay for the non-AAA contract services such as education, transportation and other center support activities, the city of Berkeley uses money from its general fund. Since the start of the economic recession in 2008 and the associated California state budget crisis, the city and other local governments across the state face cuts to these vital services. Currently, the future of educational activities run by the Berkeley Adult School (BAS), is uncertain. (Bhattacharjee, 2010)

The ASD is headquartered at the South Berkeley senior center where there are administrative offices for division level leadership and is run by a division level director. In addition to the South Berkeley senior center, there are two other senior centers that provide services in North and West Berkeley. Each center has a director that manages the center's daily administration and needs, and reports to the division director. Each center also has support staff members who ensure smooth center operation and maintain participant data and information. Social Service Assistants (SSA) provide TCM, operating out of a single center as a base. SSAs work with center directors on a day-to-day basis, but also report to a social services manager located at the administrative headquarters. The social services manager oversees the SSA's work, reviewing documentation and notes logged when providing social services.

Aging Services Division Vocabulary and Scale Metrics

Following the ASD organizational vocabulary, we define a **participant** as a person over 55 years old who participates at a senior center. Currently, there are an estimated 4,500 total registered participants. Approximately, 3,000 are served by the North Berkeley Senior Center, 1,000 by the South Berkeley Senior Center, and 500 by the West Berkeley Senior Center. It is estimated that 25 new seniors register each month across the three senior centers.

We define a **client** as person who uses the ASD's social services. We estimate that there are 200 TCM clients active in the division at any given time.

Department of Information Technology

Berkeley's Department of Information Technology (DoIT) is in a position to help the ASD meet their information management needs. The DoIT's official vision statement is to "equip community members and employees with innovative, secure, environmentally sound, and cost-effective technologies to provide excellent municipal services, facilitate civic participation, and help improve the day-to-day lives of community members." (City of Berkeley, 2009) DoIT leadership recognizes that both they and their partner divisions operate in resource constrained environments. To optimize resource usage, the DoIT uses four guiding principles for making decisions about new IT projects. These principles 1) validate that there is a need for the technology project, 2) ensure that technology infrastructure is cost effective, 3) ensure that projects are funded before they begin and 4) ensure that all projects are prioritized in a standard way (City of Berkeley, 2009).

Our Team

Most of the city's different divisions have a liaison that captures, translates, and expresses the technology and business process needs of the division they represent to the IT department. This liaison then communicates the IT department's perspective including tradeoffs that must be made, implementation costs and challenges, and additional requests for information, back to the division. The ASD and the larger organization to which it belongs, the Housing and Community Services Department, does not have anyone serving in this liaison role. We attempted to facilitate this inter-division communication.

Problem Space

Providing services to seniors is important, so that they continue to live a healthy and active life, and remain engaged in their communities. Currently, the ASD is in a tenuous position due to city and state budget crises and a growing number of seniors. With an estimated one fifth of Berkeley's population over the age of 65 by 2020, it is especially important to understand what the ASD is doing and how they are serving participants now, so that they can plan accordingly for this anticipated growth. However, current systems and processes are not equipped to provide this insight. There are several barriers to moving from the current system state to an improved one. These barriers stem from information silos that have grown out of existing funding structures and different social service goals. Consolidating to a single existing or a new out-of-the-box system is potentially problematic and disruptive to work practices. The city's IT department is in a position to help the ASD, but the responsibility is a shared one. The ASD and DoIT must work together to identify and manage process, technology, and organizational change in a balanced way that represents and addresses the interests of all stakeholders.

We engaged in business process analysis and user centered design activities to capture not only the ASD's specific technological needs, but also the context in which any technology will be used. Our goal was to provide the city with an accurate representation of the ASD's immediate technology needs, the top priorities for implementation based on the division's goals and the complex context in which they are operating while also considering barriers to adoption.

Methodology

Our project drew together a number of different methodological approaches. Methods were chosen based on the appropriateness to the current phase of the project, our own experience, and our partners' organizational requirements. We adopted a user-centered approach for our project. We started by conducting qualitative research and a document review. We then translated the results of this research into business process analyses focused on the processes that best facilitated our users' primary goals. We constructed personas and prototypes of various fidelity levels based on the outlined processes and contextual information derived from our qualitative research. Our research captured and balanced the needs of not only the ASD's leadership, but also the staff, who will be using the recommended system on a regular basis, and the city of Berkley's IT department, who will handle implementation. This methodology was not created from scratch, but rather incorporates influences from a number of different fields including those summarized well by Hackos and Redish in their book *User and Task Analysis for Interface Design* (1998) in which they point to Anthropology, Ethnography, Cognitive Science, Document Design and Participatory Design as inspiration. We also incorporated methods from the book *Document Engineering* by Robert Glushko (2005).

Qualitative Research

At the beginning of this project we were faced with the challenge of gaining insight into the perspective of a group of people we had just met, who worked in a organization whose topology was unfamiliar to us, and in a domain none of us were closely acquainted with. Because of the applied nature of this endeavor, qualitative methods were employed, informed by both academic as well as more practical sources.

In his article *The Epistemology of Qualitative Research*, Howard Becker describes some of the goals of ethnographic inquiry as being to accurately capture point of view of the other, to be open to the unexpected often found in the everyday, and to provide as full of a description as possible. (1996) We found those helpful guides as we embarked on our research. It would be a mistake to cast our experience as ethnography per se, but it was useful to take the lessons offered there. We are of the opinion that maintaining that outlook in our work strengthened the final result.

In their book, *Contextual Design*, Beyer and Holtzblatt describe a "customer-centered" design process, from a perspective much more grounded in consulting, planning, and implementing the kinds of computer based systems we tend to think of when we say information technology. They chose the role of "customer" to center their discussion around as opposed to the perhaps more generic "user" because in a given organization the people making decisions about what systems to implement are not always the ones who will end up using it most. Keeping both perspectives in mind is important in a systems design and implementation process.

We also took inspiration from Bloomberg, Suchman and Trigg and their emphasis on the distinction between usability, typically referring to the interface and usefulness, that is "that a system's functionality actually makes sense and adds value in relation to a particular work setting." (1996) It was our aim to conduct a process that recognized and respected both aspects.

Our qualitative methods can be separated into three main areas: interviewing, observation and direct participation, each of which helped us understand how the existing work practice is a rich web of relationships which support the functioning of the system through distributed channels, such as face-to-face interaction, phone conversations, email, reports, and involving a variety of actors with various levels of formality. In order to generate the eventual requirements and interfaces and instantiate a working system, we made use of qualitative methods to chart those relationships, channels and activities.

Interviewing

In the book *Learning From Strangers* (1994), Weiss describes the general reasons for using qualitative interviewing, such as "integrating multiple perspectives...describing process, and developing holistic description" (9-10) through the following general phases: picking interview subjects, data collection and data analysis. As Weiss notes (14), the general phases are not discrete; a previous interview may impact the next, and analysis may influence the ongoing priorities regarding who to interview.

Prior to beginning any work we generated a protocol for informing our potential interviewees about the project, conveying that it was optional, and asking for their consent to participate.

Picking Interview Subjects

In the process of initiating the project we were connected with the director of one of the senior centers, and that contact became our first interview. Using the snowball technique we were able to go through the staff directory with the director and get advice on prioritizing the following interviews, including their sense of who would be most productive to talk to, what their roles were in the division, and some of the other context such as who is particularly busy or needs more lead time, and who is relatively new or has been around for longer. By annotating the organizational chart with these

informal details, we were able to plan our subsequent interview requests, which were delivered via email.

Interviewing and Data Collection

Interviews were conducted with pre-drafted interview guides customized to the role of the person we were talking to. We were free to deviate from those as we felt appropriate. We recorded the interviews for later comparison with notes, and further analysis after the session. Staff members had to grant us additional permission to be recorded after being informed that it was voluntary, and that the recording could stop at any time. Furthermore, they were informed it would not be shared beyond the four members of the research group and the files would be destroyed at the end of the project. We did occasionally have interviews where the interviewee requested that something not be recorded, so there was an awareness by the interviewee of the presence of the recorder, and that, for some, had an observable impact on their meta-awareness of what they were saying. For us this impact was outweighed by the benefit of having the recording for later.

We were introduced to the division as a whole in a group email, and this provided a calling card of sorts, by which we could reference in our requests. Since it came from a fellow staff member, the center Director, we had some legitimacy and we found other staff responded positively when they were approached. One staff member reached out proactively to request that we talk.

In most cases we conducted interviews with two members of the project team present. This was in some measure logistical, scheduling available time, as well as strategic so that the interviewee did not feel overwhelmed or outnumbered. Having two people gave us the benefit of different perspectives present to ask followup probing questions.

Interviews were always conducted at their office or place of work. By going into their workspaces we were able to elicit specific details of activities they were describing to us, get copies of forms which were being discussed, hear how they were used and where they were filed or entered. This was very helpful in understanding the tasks the system will need to support, and offered a perspective on how both work gets done, the literal tasks, as well as allowing the research team to see where there may be potential areas for improvement, and what other things that would impact.

We interviewed 15 staff, holding positions at every level of the organization and talked with at least one person in each major role. For learning about a small organization we felt it was necessary to have that amount of breadth, since the system we were investigating would potentially have consequences for everyone.

We also interviewed a center director at another regional senior center, to compare and contrast their operations and learn about the systems they employ.

As part of their *Contextual Design* process, Beyer and Holtzblatt (1998) suggest the Master/Apprentice model as a way of approaching a customer in a design process. This was a very useful way of conceiving the relationship we tried to have with our partners in the Aging Services Division. We wanted them to teach us. By framing it in that way, it acknowledged their subject matter expertise and preserved their authority in that domain, so that the end result would better reflect their experience and understanding.

Analysis

After conducting an interview, we typed in hand-written notes, and posted them to a secured collaborative online writing space. We uploaded the audio files to a secure password protected area. Only the group members had access to those locations. For some interviews, we reviewed the recordings and made some transcriptions to improve coverage of what was said.

We paid specific attention to the tasks that were described, and the related artifacts which went along with those tasks. In order to map out the business process, we needed to have an understanding of the conditions and logic behind the multitude of decisions which get made each day. Interviewing was a very effective way of eliciting that information, and we returned to those interviews as we were performing the other analytic methods.

Observation

We augmented our interviewing with participant observation, going to the different senior centers and events and spending anywhere from 10 minutes to 45 minutes watching and taking notes describing what we saw. This method is described in Lofland and Lofland's book *Analyzing Social Settings* (1995) in which the authors discuss three primary data sources, "...looking listening and asking..." and as known observers, we made ourselves and our roles known to both staff and those who used the senior centers, we were able to better understand what happened on a day-to-day basis. Capturing this mundane activity was an important step in getting a holistic view of the center operations, including all of the interactions that were not contained within formalized processes.

In some cases we were interested in observing a particular event that we had heard about in an interview so as to see how it played out in a particular instance. While there was a constant level of activity when we were observing, some of the events we were interested in, new members registering, or registration cards being updated, turned out to be fairly infrequent. To help us get a sense for those particular acts, we asked questions in the interview about specific incidents, such as the last time an event occurred as opposed to more general questions about hypothetical or ideal processes.

Observation notes were typed up and posted to the protected online space where we kept our other research data. Analysis of observation data was ongoing, and depending on the event there was a range of formality in the analysis. The data proved useful in spurring additional questions for the ongoing interviews, as well as for providing concrete details and examples when mapping out business processes.

Participation

To broaden our own understanding of the operation of the division, part of our research plan from the start was to participate in the division operations as volunteers. This would further diversify our roles, which spanned student, intern, and consultant. This proved to be a valuable entree to interactions with a broader range of people in the community. Typically research is seen as a meta-level exercise, where the researcher is the observer, an outsider, and perhaps not held to the same standards as those who must operate in the bounds of the organization. Getting trained on how to clean up from the group lunches, and meeting the seniors and staff while doing it, explaining the project and getting their reactions, or delivering meals with the Meals on Wheels program, each gave us a first hand look at the full range of the organization's activities and the impact that the project may have on different operations.

The data collected from these experiences was mostly visual. We did not typically record or stop to write notes. We were primarily doing work to benefit the staff and participants, but it allowed for interactions that were not structured around our formal roles but rather trained us to do real tasks. These experiences provided details about tasks that were only revealed when preformed, or when, as novice performers, we made mistakes and needed correction. In addition to the activities mentioned above, we also volunteered as assistants in a computer class, as hosts at a Black History Month celebration, and as data entry specialists.

Business Analysis

Using information from our interviews and observation, we conducted a business analysis. The aim of the analysis was to identify the data and process requirements, the interactions between the two and, ultimately, to define the user and system requirements. The procedure for the business analysis was based upon guidelines provided by the DoIT (City of Berkeley, 2010). We wanted to focus on and prioritize real organizational needs, so we identified the six critical business processes and corresponding changes that enable the ASD to meet these immediate goals. These six processes then focused our analysis and design efforts. If these six processes are correctly addressed, they will provide a baseline for building more functionality going forward, including tracking participant encounters, well-being information, and recruitment.

We began by constructing business process maps for the existing conditions and processes. These are called “As-Is” process maps. The process maps consist of

activities, relationships, conditions, and events. (Figure 1) For each activity in the process map, we defined the associated details. These include activity descriptions, measures, performers or roles, inputs, outputs, controls, mechanisms and tasks. We reviewed these with staff to confirm that our understanding matched reality and to identify any pieces we were missing. We then identified problems and opportunities for improvement in the current processes. We proposed possible changes, which included

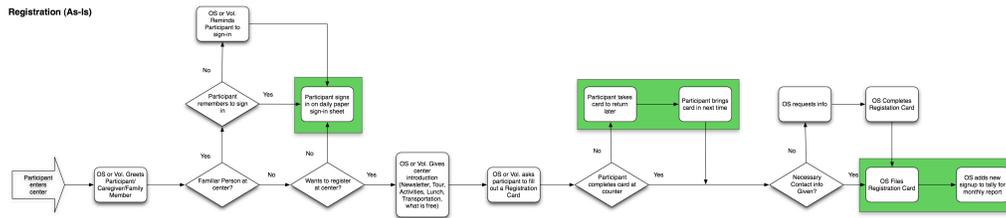


Figure 1: As-Is Process Map

both technological and process oriented changes. We established criteria for cost, value and technical complexity. We then used these criteria to rate the value, technical complexity, cost, and level of change of each proposed improvement. (Appendix A)

After identifying possible solutions to opportunities for improvement, we reconstructed the business process maps, but instead included our potential solutions. We refer to these as “To-Be” process maps. (Figure 2) We also rewrote the activity details for the “To-Be” diagrams. We then created activity detail tasks, which highlight the specific interactions between users and the system. We constructed context diagrams, which provide a visual description of the system interactions. The context diagram and tasks will be used to define use cases and translate them to system code.

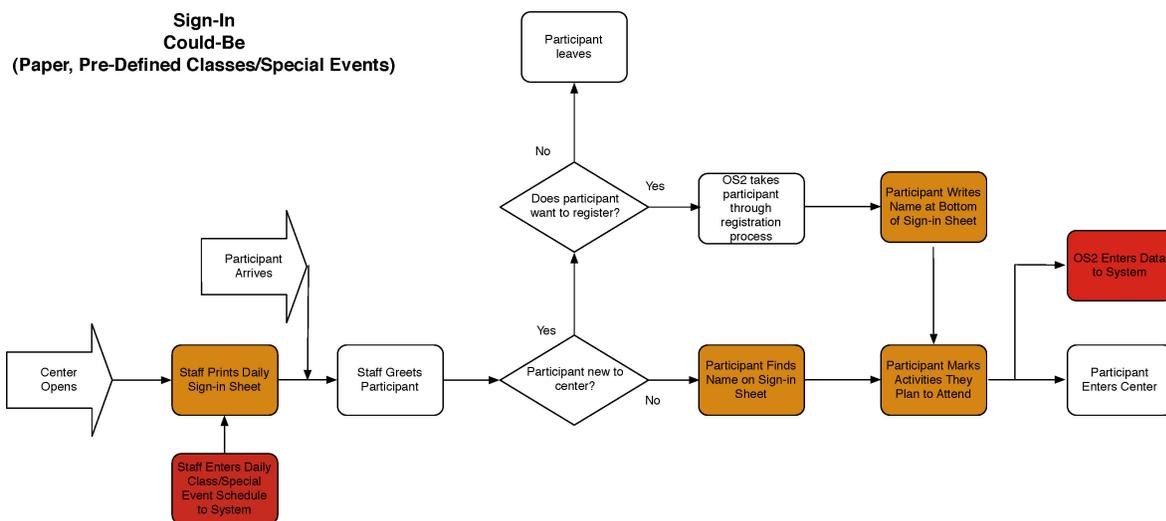


Figure 2: To-Be Process Map

We also summarized our business analysis by writing short narratives to help contextualize the business processes and provide insight into the organization in which the system will operate. We included scale metrics to describe the load the system will experience and how many Berkeley citizens it will impact. We also annotated our process maps to make it clear, while preserving the larger process context, what activities are critical and what changes are required to support other processes or changes. (Appendix A)

Prototyping

We developed our user interface prototypes to be a practical application of the knowledge that we gained analyzing the data from our interviews, observations and participation experiences.

We did three successive rounds of user interface design with ever-increasing fidelity (sketches, paper prototypes, and interactive prototypes) using four different modes (storyboards, interactive paper, click-able computer sketches and interactive pixel level accurate representations) providing tangible artifacts for the staff to react to early on in the project, before any code had been written or additional resources expended on the part of the IT department. Our interfaces were largely technology agnostic, besides our decision to have them be web-based.

Prior to any ink being spilled or pixels colored, our first step in this process was to profile the users, and extract their goals and tasks stated as simply as possible (Appendix B) based on all of our previous experience as well as the supplementary data that we had gathered, such as the paper forms currently in use. Unsurprisingly, there were distinctly different needs depending on the staff member's role in the organization. A director may not ever enter data, but is interested in looking at aggregated numbers, whereas the staff member who is at the front desk and dealing with all of the center participants is going to primarily interact with individual records.

Sketches

After describing the tasks we wanted to explore and test initially, we created sketches of interfaces in a storyboard with some interaction detail and best case application flow. (Figure 3) This design "thinking out loud" made us put concrete functionality on paper, and served as a way to identify things we had not yet thought about in enough detail. These were not shared with the staff, and just served the project team.

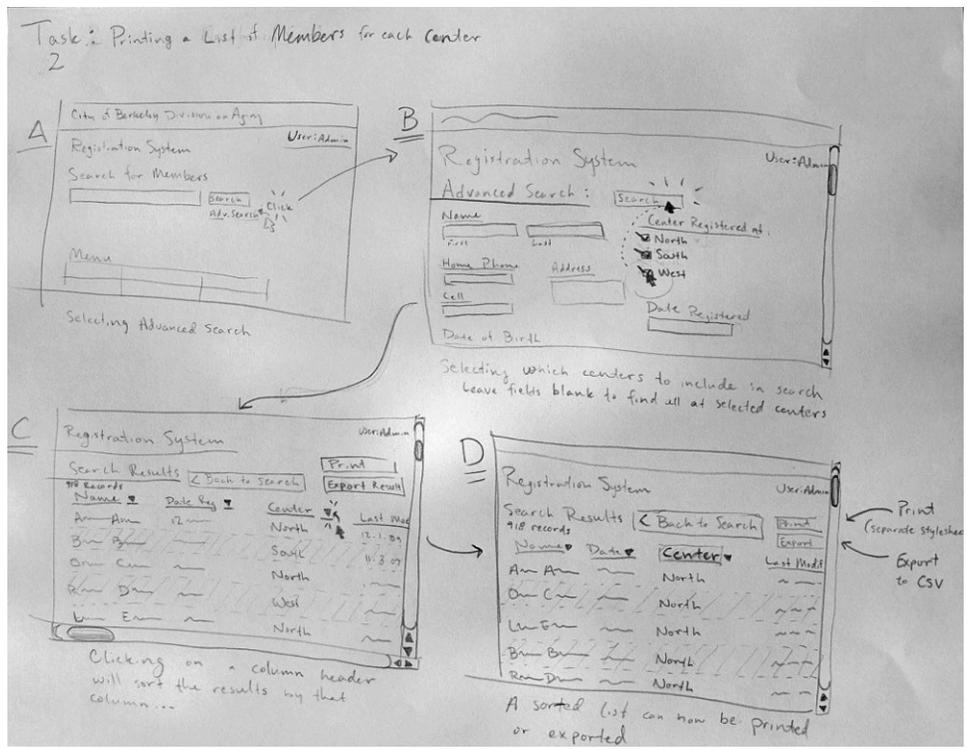


Figure 3: Initial Sketches

Paper Prototypes

From the sketches, we next created "functional" paper prototypes, with much of the interaction capabilities expected of a typical web browser. As pointed out by Houde and Hill in their chapter *What do Prototypes Prototype?* (1997) the particular instantiation is not the end goal, but rather a choice made in a continuum of options relating to what questions are being explored and how best to get at them. For our situation, the tasks we wanted to support and the roles we wanted to test with called for some interaction but not so much that we spent an inordinate amount of preparing the materials. The first thing we wanted to do was check that our interpretations about the categories, fields, click paths and labels made sense to the staff members. By having pre-prepared tasks, but allowing for some flexibility in how they were accomplished we could see how someone different than us would interact with our designs.

We were quite surprised and pleased with the level of engagement that the paper prototypes garnered. As described by Suchman in the paper *Reflections on a Work Oriented Design Project* (1995) having a research and design process that is collaborative as opposed to simply evaluational can yield an experience where each participant can learn from the other. We found that this approach resulted in greater buy-in than expected. By marking up a paper prototype themselves with missing fields

or relabeling a link with a clearer title based on the organization's vocabulary, the staff member was directly contributing to the design of the system that they are going to be the end-users of. That this was a medium which is familiar, (pen and paper) easily mutable, and not intimidating helped as well.

Each paper prototype session was video recorded with the staff member's approval so that the project team could review the tests later, and focus on the tester in the moment. (Figure 4, Figure 5)



Figure 4: Paper Prototyping

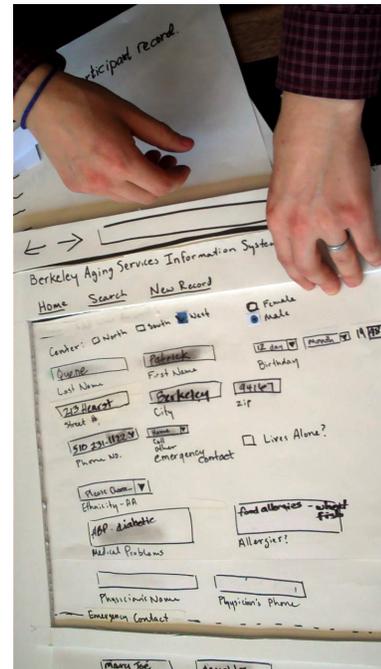


Figure 5: Paper Prototyping

Prototyping Procedure

Each ASD staff member testing the system was given three tasks to complete. Our tasks related specifically to the OS2 front facing role, and included registering a new member, printing an emergency information sheet in the event there was an incident while someone was at the center, and creating a targeted list around some characteristic of interest. A facilitator handled communication with the tester, and there was a person who was playing "computer" doing all the interaction ideally without speaking. Direct questions from the staff member were always answered but not always directly, sometimes the tester would receive a question in return such as "What do you think should happen here" or "What would you like to see happen when you click there?" The role of the computer was to swap out items on the "screen" in response to the actions of the tester, such as "clicking" links with their finger or inputting text with a dry-erase marker.

Interactive Prototypes

Bridging the business analysis and the UI design, the interactive prototypes are intended to represent a more realistic sense of what using the system would be like. We were able to iterate on the design using what we learned from the paper prototyping exercises. It also helped us, the design team, check our work again, our assumptions, and how well we were able to incorporate feedback previously rendered.

Our interactive prototypes were intended to reveal how, in the actual application, our target users would react to the full range of options, not just the task-specific ones that our paper prototypes had presented. The environment is more realistic because it is unified. Some features not fully implemented yet, like back-end storage, were either simulated using data given for a particular scenario or a message would be relayed to the user that there wasn't anything there yet. The prototypes were not yet pixel-perfect fully fleshed out designs, because we felt that the graphic design was not what we were testing. Implemented in the web browser however these were things which gave us a yet higher order approximation of the experience.

Results

Based on our paper prototyping work, we learned about places in our interface where we needed to make changes. For example, our initial idea about the options presented to the user in the course of searching did not make sense to the testers, and were revised, moved off of one "screen" and put on another later in the process. We had not come across, nor would we have been likely to, the user's conception of how a search would work in any of the prior methods of interview, observation and participation. With the paper prototype, however, it was clear and easy to express in the language of the components we were working with, namely, HTML form components.

The prototyping exercise had a number of intangible benefits as well, beyond the things we learned about the interface. Any single method is part of a larger process, and the success of a project is more about the overall result than the placement of a particular feature on the screen. For adoption to occur, the people who will end up using the software need to have some incentive to invest energy in it. Our approach with the prototypes allowed for some of that investment to come early on in the process, and reduced the uncertainty of what would likely result from the process, something which otherwise might be opaque.

Research, Analysis, and Results

Background

We met with ASD leadership to see if there were opportunities for UC Berkeley School of Information students to help with the division's information system needs. Initial meetings revealed that ASD leaders and staff were not satisfied with their current information management state, especially for participant information and senior center and service usage. They were particularly concerned about the participant registration process.

The registration process requires that a senior provide personal demographic and contact information (e.g. name, address, phone, race, date of birth) and emergency contact information (chronic medical conditions, doctor's name, emergency contact name and phone number) when they first visit. Currently, participant registration at the three centers is paper-based. New participants are asked to fill out a five by ten inch registration card. (Figure 6) The cards are stored alphabetically in a small box near the desk of the front office support staff at each center. (Figure 7)

CITY OF BERKELEY WEST BERKELEY SENIOR CENTER **CONFIDENTIAL REGISTRATION**

PLEASE PRINT

TODAY'S DATE: _____

BIRTHDATE: _____

DIVISION ON AGING LAST NAME: _____ FIRST: _____

ADDRESS/CITY/ZIP: _____

PHONE NO. _____ SEX/GENDER: _____ *NATIONAL ORIGIN/ETHNICITY: _____

MEDICAL PROBLEMS? _____

PHYSICIAN'S NAME: _____ PHYSICIAN'S PHONE NO. _____

IN AN EMERGENCY PLEASE NOTIFY: _____ VOLUNTEER? Yes No

NAME: _____ NAME: _____

ADDRESS: _____ ADDRESS: _____

PHONE: _____ PHONE: _____

RELATIONSHIP: _____ RELATIONSHIP: _____

*AA=African American; AI=American Indian; H=Hispanic; W=White; O=Other; AS=Asian Indian; CA=Cambodian; CH=Chinese; FI=Filipino; GU=Guamanian; HA=Hawaiian; JA=Japanese; KO=Korean; LA=Laotian; SA=Samoa; VI=Vietnamese; AO=Asian Other.

Figure 6: Current Registration Card

The registration card serves as an emergency information card for the participant. If a participant experiences a medical emergency on site, the staff makes a photocopy of

the card and provides it to emergency response personnel. When a card is misfiled or nonexistent because the participant did not fill one out, this information cannot be provided to emergency personnel. Staff is also unable to contact family friends, or caregivers.

Registration cards also serve as a source of participant reference information to senior center staff members. When staff members organize activities or want to communicate a message to a segment of the participant population that meet certain criteria (e.g., inviting all participants' with birthdays the following month to a celebration), they go through the registration cards one by one to find the relevant participants. When a staff member needs to invite a participant registered at a different center, they depend on staff members at the other center to search through their center's cards and communicate the information back either by phone or e-mail. Because of the fixed physical location of the cards in each center and the time involved to manually retrieve cards, sharing participant information across centers happens rarely.

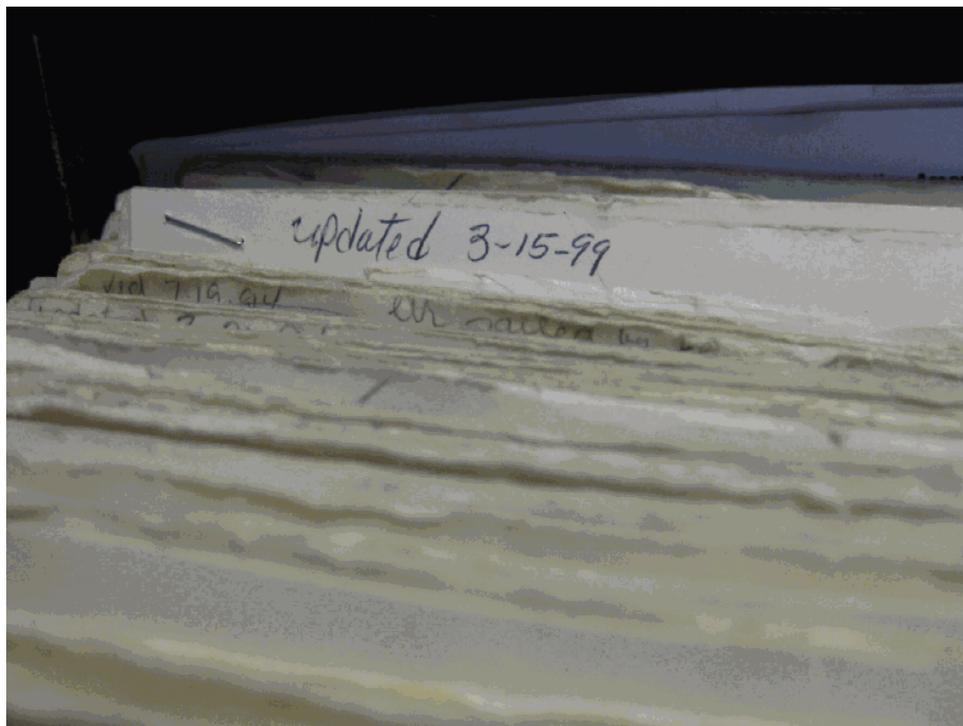


Figure 7: Registration Card File Box

The Aging Services Division's Larger Objectives

We examined the current registration process to identify problems and opportunities for improvement. At a high level, the ASD's mission is to serve aging people in Berkeley. Participant information supports this mission by playing a critical role in the following activities: 1) by serving as participant reference information to staff, enabling them deliver the desired level of service, 2) by facilitating collaboration between staff in a social services environment, and 3) by providing evidence that supports the

justification for funding ASD services. It was clear from our initial meeting with the ASD director that the current mechanisms in place for managing participant information do not help support these activities.

For the first activity, the division needs information that represents the participant. For example, the representation of the participant on the registration card is required to provide adequate emergency services. Based on the descriptions of the current registration and emergency processes, there are clear areas for improvement in the way participant information is handled.

In the second activity, staff members across the organization need information to flow freely from person to person and center to center because the ASD is distributed geographically and provides a range of social services at each center. However, registration information is currently stored locally behind the desk of a single staff member, making access for other staff members at different centers and even the same center difficult.

Lastly, one of the ASD director's principal responsibilities is to make the case for the centers' and services' value. To do so, he needs information that describes the participant population and the services provisioned. Currently the registration cards contain demographics and other descriptive variables, but again, because the cards are stored on paper, there is no practical way to count the participants and describe the population with demographic statistics about the division.

Findings and Implications for Design

After our team met with the ASD's leadership, we knew the division had a compelling information problem and we were eager to explore how to go about designing and implementing a solution for this particular organizational context. The ASD director introduced our team to the director of the DoIT. The DoIT leaders explained the business analysis process they developed for pursuing projects. This process is aligned with the DoIT's four principles, particularly validating a need for the technology exists. Through the business analysis and other qualitative research activities described in the Methodology, our team undertook the task of collecting information about the current state at the ASD and their desired future state as defined by their high level needs. Because implementing the solution would depend on support from the DoIT, their guidance influenced the information we collected and the way we presented it. While our focus was primarily the registration process, we extended our scope beyond the immediate users of the registration cards and examined the larger context by looking to fellow staff members and at the other business processes related to our sponsors' needs. We found that the aging services division needs a centralized repository for participant information accessible at all three centers. We present our specific findings together with their implications for solution design for each of the three fundamental activities: representing the participant, representing the division, and sharing information.

Representing the Senior Center Participant

After identifying registration as a key process, we sought to understand more details surrounding the cards and the process. We asked staff members about the cards, the information, and the management of both. As we interviewed more people, we learned that the registration process and managing the registration cards were part of a larger, more abstract process for representing the participants. After examining the larger process, we identified three groups of activities in which information is collected, updated retrieved, and shared.

Collecting Information from Participants

Providing social services is personal, as is the information required to provide and justify services. Our research revealed that collecting sensitive information often required personal interactions between staff and participants. The registration process involves collecting personal information about participants' chronic medical conditions for use in an emergency. Personal demographics such as date of birth and ethnicity are also recorded. In the course of reviewing the existing registration cards at the centers, we noticed many times the more sensitive information was left blank or obscured. One woman, for example, provided her birthday and month but not the year. Staff members at the centers also confirmed that some participants were unwilling to provide the information to the center.

While some seniors are unwilling to share information, others are unable. When we interviewed a social worker at the ASD, she related a situation when it was difficult to collect accurate information from a client.

“I had one thing when the Fire Department went to this guy’s house and he said that he is bed bound and he seems he is getting no care whatsoever just a relative coming in once a day. So I went out to see him and talked to him and found out he was on hospice care, which is very extensive care. So I wrote back to the fire department and gave them the number of this particular hospice nurse so that if he falls again they can have that. They may get a call again from this person, because he falls. But now they have information of who to call if there is a fall. Sometimes people can't give clear information to the fire department. So I felt because he was on hospice care, he was getting good care but he wasn't able to explain that. So I tried to add information for when it does happen again they can help with that” (P12 personal communication, March 15, 2010).

The social worker intervened and visited the man to understand the situation. It is a common practice for the SSAs to visit participants to see their living conditions and evaluate their needs. SSAs related other situations including older clients with memory loss. In these cases, sending a letter to them as a reminder will not work to obtain the information. Other clients need help with applications for social assistance such as

MediCal and do not fully understand the processes of institutions to which they are applying. For example, a client may need to submit a bank statement but they do not understand the concept of a bank account. In all of these situations, the SSA intervenes to collect accurate information from the participant (P7 personal communication, March 9, 2010).

For registration and personal information updates to take place, a certain amount of allowance for the participant's perspective is required. As Goldsmith and Eggers (2004) noted, an information transfer from participant to institution assumes the participant is willing to provide the information. This motivation depends not only on the user-friendliness of the registration form, but also on inter-personal factors such as trust, privacy and the security of the information once it is stored. If the Division requires more comprehensive information about clients, it will need to take steps beyond implementing new information systems to collect, store, and retrieve the information. Marketing and education efforts will be required. Goldsmith and Eggers wrote, "The position of the government to mandate certain behaviors by citizens creates a reciprocal obligation on the government to not make those behaviors onerous." (Mayer-Schönberger and Lazer 2007)

The ASD staff members are well aware of the need to consider the perspective of the participant. In the past, they have identified and fixed issues related to participants' privacy and usually only collect information that is necessary. For example, several years ago they moved away from collecting participant social security numbers and redesigned the registration cards. From a practical implementation perspective, this awareness on the part of the ASD and its willingness to change demonstrates its commitment to managing delicate information issues like trust, privacy and information security in the future.

In addition, staff members are empathetic to the different ways participants want to represent themselves when staff members collect information. For example, the social worker at the ASD is interested in collecting information about participants' caregivers. However, our interviews with her, as well as several of the SSAs at the center, revealed that it is often challenging to identify the caregivers for a given participant. Furthermore, the social worker reported that the category "caregiver" does not appeal to many participants. Some are reluctant to articulate that they actually need a caregiver. Some may not understand the meaning of the term, or may report a family member when actually a neighbor or another center participant helps them the most. "What I'm finding is that there are all kinds of informal caregivers. Sometimes I'll get a call and there will be like a 90 year old lady and her neighbors take care of her in a variety of different ways and you want to know how they are helping her. And if you try to have a conversation with the 90 year old lady, it's like I don't need a caregiver because I have all of my friends" (P12 personal communication, March 15, 2010). The desire to capture the informal aspects of a participant's social support system as structured information in a digital system signals the need for more detailed and flexible representation of participants.

With the implications for social intervention in the collection of participant information defined, we examined the registration process from an engineering perspective. At the start of the project we tended to see a record in the digitized version of the registration system as equivalent to the paper card, at least as far as the data is concerned. As mentioned, in the case of the woman who would not provide the year she was born, the paper recording systems allow for a high level of local control and modification.

While a name field in a computer interface may be inspired by a space on the paper card to write a name, our testing showed that those were not equivalent spaces. We need to consider carefully how strict to be when recommending building validations into the system. We observed many instances where names were given incompletely, as a first name and a last initial, as initials, or not given at all. To transfer that flexibility into the computer is problematic. Disassociated from the physical object, the cues which may have lent themselves to spurring recall on the part of the staff member who signed the participant up and now wants to connect them to an activity are absent, unless explicitly noted in a separate notes field.

Recommendations:

Paper remains an appropriate medium for initial information intake, and so we recommend revising the current version of the registration form.

There are a number of additions that will be useful in the new system, when search and retrieval are better supported. As a baseline, a few questions regarding participant housing status (does this person live alone, for example), known allergies, email addresses and cell phone numbers, as well as their activity interests were repeatedly suggested as useful. Additionally, forms used by both social services and meals on wheels provide examples of more questions which are useful in specific circumstances. Taking this into account, we suggest clearly delineating an optional section, along with some explanation about why it is important for the ASD to gather this information about the people it is serving. Because this information will get aggregated into a database which clearly extends the ease of access, which is no longer constrained by physical embodiment, a privacy statement should be furnished to the registering participant as well. By making explicit the reasons for asking such extensive questions, and by being proactive in describing the measures the organization is taking to ensure their privacy, we believe that a number of potential problems with mismatched expectations can be avoided. A 55 year old taking a specific class or accompanying a friend to lunch may not want to furnish all the requested information. The division can accommodate these variations by making some parts of the registration form optional. Additionally, designing the system for variations in outcome means that the flexibility and judgment the front office staff have developed is maintained and understood by the system. Management will then understand that some variance in the data may be a more realistic reflection of the operation rather than an indication of deficiency.

We also recommend including additional data fields and a notes field for annotating a record with participant details staff feel are relevant. We envision these notes being used to help track fragile participants' welfare status, known behavioral issues, or other specific information relevant for the safety of the participant and center. This content is largely imagined as sitting unstructured, because of the unpredictability of subject matter.

We recommend further that the sign-in sheet be harmonized with the data entry interface to ease the increase in data entry for users with a variety of skills.

Retrieval of Participant Information

Responding quickly to a medical emergency situation demands faster participant record retrieval. Center staff and directors mentioned repeatedly that when participants experience medical emergencies while at the center, retrieving emergency information is a manual and often slow process. Staff search for the registration card in the card file box right after calling 911. Emergency cards are arranged alphabetically, but it may take time to sort through them. Cards may also be misplaced, slowing down retrieval further and preventing staff from copying the emergency card prior to the paramedics' arrival. This case illustrates the need for participant information to be available on demand in a social services context.

Recommendation:

Information retrieval is most urgent when an emergency occur at the centers. We worked to reduce impediments to finding participant records by recommending a search interface for centralized participant information, making the records accessible no matter where a participant registered. We also designed a template to print an emergency sheet, including the details most relevant to the response and emergency staff. In addition, we recommend that printing an emergency sheet is recorded automatically as an event in a participant's record, and that the system encourage annotating the record with the emergency event details. This helps provide important participant history that staff can use as reference in the future.

We also heard staff express a desire to determine whether or not a participant was receiving concurrent services at another center. Using a division-wide system would reduce the number of steps required to do this, but the system would not replace the need to talk with other staff members.

Updating Participant Information

Staff members expressed the need for a more efficient way to update participant information. It is important that participant and emergency contact information remain current for the safety of participants in the event of an emergency. Senior Center frontline staff also see many participants more frequently than anyone else. In the event

that a senior stops coming to the center for unknown reasons, current emergency contact information is important for determining why. Additionally, cards currently in the centers' boxes that are irrelevant because the listed participants no longer visit the centers or use their services, complicate the manual information retrieval processes. The centers lack a standard process for relegating a participant to inactive status. "You know, we hear a senior passed away and know they passed away, but having the time to go pull that card may not be something that is consistently done" (P8 personal communication, March 9, 2010). Staff expressed their need explicitly: "...if there is a way for you to run a database from that to maybe kick out a letter once in a while, a form letter, to keep a contact" (P8 personal communication, March 9, 2010).

Despite these information update challenges, it is encouraging to note that the Division has taken steps in the past to maintain up-to-date registration records. The centers ran registration drives, during which staff stood at the door and registered each and every person who came in the center not previously registered. Before the drive, information about the event was published in the division-wide newsletter. The frequency of registration drives, however, is unclear, and depends on center directors' awareness and initiative: "Yeah, I thought it was just time to update the information" (P8 personal communication, March 9, 2010). Even following registration drives, says one staff member, "I'm sure there are people who still walk through the door who haven't registered" (P6 personal communication, March 3, 2010). Even if all participants are not convinced to register, this case typifies the extent to which person-to-person interactions, marketing and education efforts assist the transfer of information.

Recommendations:

With a greater reliance on the information retrieval capabilities of a computerized system, keeping information up to date needs to be an ongoing process, built into each center's operations. A system itself can help with this, by offering the ability to automatically flag records, set alerts, and run periodic stale record reports. The Division can set thresholds for inactivity. Additionally, running division wide registration drives at all centers annually offers the opportunity to capture a broad cross section of participants as well as raising awareness about the organization's needs.

Also more accessible records are close at hand for the front-line staff, making it more convenient to modify a record just by virtue of not having to get up and search through a stack of cards.

Updating records also includes removing participant records from the active category, either because someone has moved or they have passed away. We recommend preserving these records, but allowing staff to explicitly mark a record as inactive in these cases. We also include a "deceased" field in the design to provide additional historical understanding as well as maintaining data integrity over time. We imagine that there would be an explicit process to request removal of a record from the system, one not too onerous, but made explicit.

Sharing Participant Information

When we looked at sharing participant information between Division staff members and centers, we started with the same focus on the registration system. As we met with more staff members, the scope and our understanding of information sharing broadened. We learned it was common for staff members to share information across centers on a regular basis, however only from person-to-person and in an informal manner. We found a need for person-to-person and technological linkages to support these information flows.

Sharing Registration Information

Participant information is rarely shared across the three senior centers. North Berkeley Senior Center, for example, provides the broadest class offerings and attracts participants who also visit other centers. Currently, participants are only asked to register once, no matter how many centers they visit. Participants who visit more than one center have a registration card in only a single location. If the participant experiences a medical emergency while at a center different from the one where they originally registered, their medical and emergency contact information is not readily available to staff.

More generally, when asked what the primary benefit of a new registration system might be, a center director replied, "It will enable us to better track who our participants are, when and how they move around to the various centers and also enable us to know who is active and inactive or when someone is deceased. It will be an easier way to manage that flow of information (P8 personal communication, March 9, 2010)." This implies that the centers value the participant information collected at other centers and require remote access to that information in order to serve participants more effectively.

Recommendations:

A single, division-wide, information system with a web-based interface where participant information is stored alleviates many of the difficulties that we identified with the paper system. We encourage making use of the annotation option to add any additional unstructured information to a participant record in order to communicate it across centers.

Sharing Informal Information

Our research also revealed that, while registration information is not easily, frequently, or officially shared, informal information is often shared. We found many cases that illustrate linkages between staff. We found one example in the van driver. The driver drives a city-provided van and transports participants who no longer drive to and from the senior centers and other area locations, including grocery stores and doctors offices. Because he works in close contact with seniors, the driver develops

relationships with the participants he chauffeurs on a daily basis. If the driver notices a situation with one of the participants, he communicates this information to a social worker or an SSA. As the social worker said, "I think it is done pretty informally. Like if a bus driver feels he needs to have an attendant with the senior on the bus, he will just come in and complain about it. And then I will talk with the family caregiver and the senior about why we need that and maybe possibly a higher level of care, maybe an adult day health center instead of a senior center (P12 personal communication, March 15, 2010)."

The social services assistant (SSA) responsible for participant case management, relies on referrals from other staff members like the driver.

For the SSA, it is important to be engaged in day-to-day center activities in addition to their social work. The SSAs' offices are housed within the centers and center directors are their direct supervisors. Only their social work is supervised by a certified social worker who works out of the ASD headquarters. In any case, through our participation as volunteers and observers at the centers, it was common to see the SSAs participate in center related activities and events that had nothing to do with their official social services responsibilities. An SSA may collect payments for a fund-raising dinner party or work in the kitchen serving meals to seniors at large special events. During these times, the SSAs not only socialize with the participants and clients, they also assist their coworkers on the kitchen staff and create goodwill internally. The implication in the profiles of both the driver and the SSA roles is that the informal linkages across the centers and social programs are common, but are strongly dependent on organizational structure and physical proximity of one person to another.

When it comes to sharing social services client information, the flow of information is mostly one way from the centers' staff to the social services program. In our initial interviews, the SSAs explained that the information in their paper client records is strictly confidential and is kept under lock and key. The state health insurance institution that funds the targeted case management program requires their methods comply with the Health Insurance Portability and Accountability Act. Because of the security measures that are required, only the SSA staff members have the access and training necessary to use Cache, the state-imposed software system that manages the client records. Staff members who refer participants to the SSA and want updates on participant status must ask the SSA for an update in person because they cannot look it up themselves. The implication of this example is that security policies by their nature have a chilling effect on sharing information. When designing a system that will be accessed across organizational units and levels of the organization, it is important to understand the sensitivity of the information and what policies govern the security and privacy of the information. In the case of the existing registration cards, the fact that they sit in a box behind a staff member's desk is a de facto security measure that therefore does not require a policy to implement. When a computerized system is built, the de facto security layer will be removed, and will require a formal security policy.

Recommendations:

The sharing of information informally among staff and between staff and participants is one of the foundations upon which the division operates, and is not seen as a narea where change is required or easy to implement. We think that it could be easier to record some of those interactions, and preserve them for others to access asynchronously. Our proposed system design accomplishes this without imposing too much overhead or trying to prefigure the usage patterns, which need to evolve in concert with the staff's use of the software.

Although they may contribute and benefit from using the registration system, SSAs are not considered among its principal stakeholders since they are already documenting the particulars of their case-managed clients separately in Cache. The lessons of the secured environment of Cache are applicable to our proposed system. We recommend therefore that a security policy should accompany the proposed system. The policy should describe the data contained in the system in terms of its sensitivity. We recommend that the policy include procedures that consider the tradeoff between enabling information sharing among staff and protecting participant information.

Representing the Aging Services Division

To a large extent, the activities the ASD engages in around data collection are driven by the funding structure they operate within.

Operating under a holistic model, including the provisioning of social services, nutrition and recreation, there are a number of different agencies that the Division needs to report to, including the city, the county, the state, and other independent funding agencies. The ASD's largest funder is the city of Berkeley itself, and their required reports to the administration and city council provides the impetus to track and aggregate basic descriptive statistics, captured in documents like the monthly Performance Report (see more under Information Quality below).

For Targeted Case Management clients, the ASD bills Medi-Cal, a state program and the Division's next largest funding source. Medi-Cal has its own set of requirements for documenting interactions and will either grant or disallow payment on a case-by-case basis. For the SSAs, this requirement structures their information tracking, recording and reporting practices, with the help Cache as mentioned above. Information that falls outside the requirements but is still helpful in their work is captured in other less formal ways, often on paper. As one SSA we interviewed related, "there are occasions when clients are unwilling to provide information, but it is needed for the system. The SSA will work to get the information at a later time, or will not be able to provide service. A large part of the willingness to share then becomes about trust and establishing a personal relationship." (P2 personal communication, Feb. 7, 2010).

The Area Agency on Aging (AAA), a county-level organization that was spawned from the 1973 federal Older Americans Act (OAA), is the next largest funder. Funding mandated by the federal OAA are distributed to the states, which in turn distribute funds to the counties. The Alameda County agency provides grants for nutrition and social service programs. The county must provide information about its activities to the California Department of Aging. The California level institution has created a standard specification for reporting data that all local agencies must use. The Alameda County agency uses its own information system that complies with this standard. Berkeley Aging Services Division needs to provide data and information to their Social Assistance Management System (SAMS) information system. Independent grants are the last source of funding. These are diverse, and typically require some amount of data during the initial application phase describing the particular demographic that will be served. Currently the Division is hampered in applying for these grants because it does not maintain the required data in an easily retrievable way. In addition to more efficient reporting, the division must ensure that the data that it collects meets the specifications of each of the funders described above. Other organizations that routinely apply for similar aging service programs have defined a “minimum data set” that represents the bare minimum data that may be needed to apply for funding across a wide spectrum of agencies (See Appendix).

The various funding sources each have their own informational interests and requirements, so it becomes incumbent on the ASD to meet ever changing and, essentially, ever increasing requirements. Reporting demands do shift the practices of their organization, necessitating new office processes in order to track a new variable for example. In a recent case, the ASD was asked to begin reporting nutrition figures in a much more granular fashion, resulting in a new paper and sign in process. The new process required staff training, and an orders of magnitude increase in the amount of manual data reentry on the part of ASD staff. As budgets get ever tighter in California, there is a continued effort on the part of service providers to avoid service cuts because of funding reductions. Having numerical descriptions of the ongoing services they provide is the conduit through which the magnitude and importance of their work will be conveyed to funding organizations. Therefore, for "proof", it was important that any system we designed take into consideration that responsibility. It was important to recognize that the division's social processes are as much a factor in determining the appropriateness of database fields or the usability of the user interface as are external requirements.

Recommendations:

The funding requirements listed provide the incentive to maintain a system that matches the required data formats of the various agencies. One recommendation is to consider the data specifications of the State of California Department of Aging when building the technical specifications of the proposed system. , We also recommend that the ASD create a unique “minimum data set” tailored to their needs. To consider the social process at work in determining the correct data requirements, we recommend that the “minimum data set” gathering process involve input from a wide

selection of staff member roles in the Division on Aging. For example, the team could include staff members who understand the perspectives of the participants, staff members with responsibility for data entry, and division leaders who have responsibility for applying for grant funding.

Siloed Information as a Result of Funding and Objectives

In addition to the various information systems the ASD must currently interact with for funding purposes, the centers have their own immediate information needs related to participants. The centers use not only externally mandated systems, like the large, centrally managed Cache and SAMS, but also other information systems aimed more at division, center, and program specific information goals. These local systems are often internally built by division staff and volunteers using desktop office software tools like Microsoft Access. While these internal systems facilitate immediate division level information needs, without support from the city's central IT department, they are not always sustainable. One staff member recalled that a small participant database system had been built and used successfully to manage center performance at one center for many years. However, the system fell into disuse when the staff member that built it left the center.

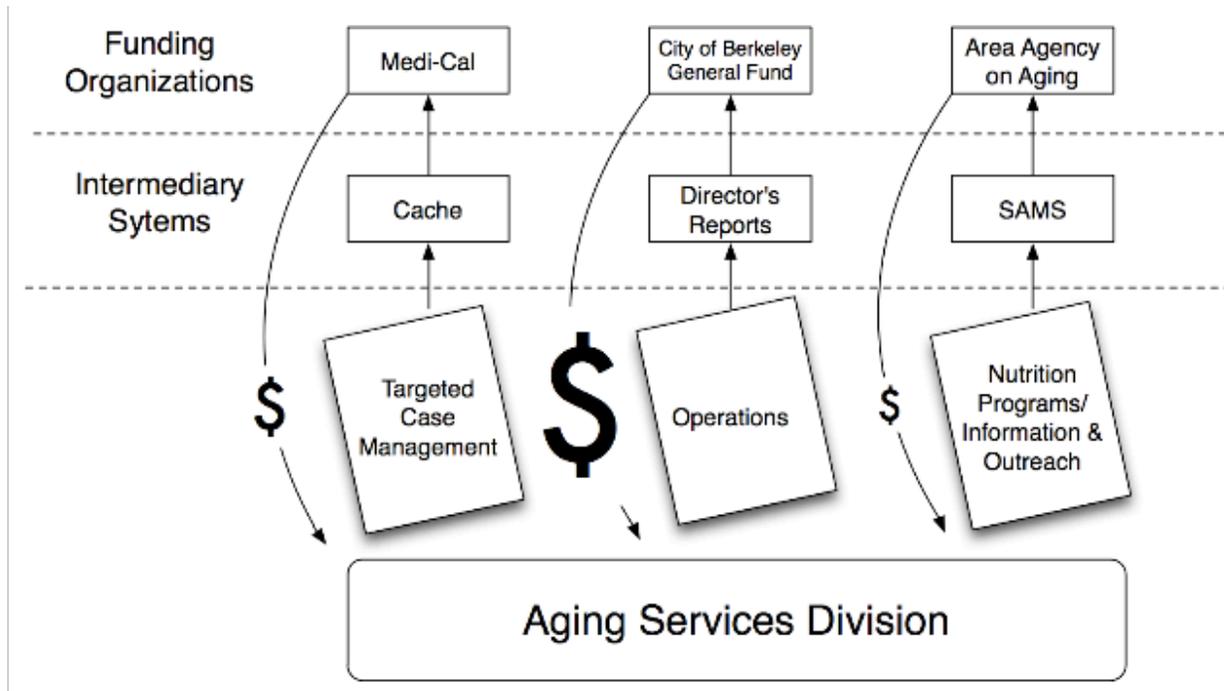
The ASD is also still firmly rooted in paper. For a majority of the center and division staff, with the exception of email, most daily activities, including tracking of and communication to participants, is still captured and distributed using paper. The paper registration cards at the centers contain a lot of the same information found on the forms used for the nutrition programs and the social services case management forms, which ultimately end up being entered elsewhere. A lot of this redundancy is a result of the different reporting needs for the various funding mechanisms. However, some has also arisen because each program serves a particular subset of participants. For example, the Meals on Wheels population consists of mostly homebound seniors unlikely to attend the in-center lunch program. Many of the Meals on Wheels participants are also SSA clients, with an additional set of files, both paper and electronic. keep another set of paper and electronic files for each client. While Meals on Wheels and social service management are beginning to converge, information collected by one program is still not easily shared with another.

The ultimate result of these various external, unsustainable, paper-based information recording and tracking mechanisms, and the different goals associated with each, is a collection of out-of-sync information silos that result in redundant work (Figure 7). The implication for design is that uncoordinated implementation of information systems may solve short term needs, but is costly in the long term.

Recommendations:

The Information Technology Department, based on their principles described at the beginning of this document, is aware of the risks of implementing systems without considering the larger context. This context also includes the larger city of Berkeley. When implementing the proposed system, we recommend that the final solution

adhere to the second guiding principle listed in the IT Master Plan: “Standardization, integration, and consolidation are key to maintaining a scalable technology infrastructure that maximizes return on investment” (Information Technology Master Plan, City of Berkeley, 2009).



Information Quality

The use of multiple systems and paper to manage different programs and the human interaction required to pass one piece of information from one system to the other has led some center staff to question the accuracy of reports that are based on these processes. Office staff prepare the monthly ASD Performance Report in each of the senior centers. The report represents the monthly activities for each center as statistical counts, for example, the number of people who participated in center classes and activities during the month. Each of the programs represented on the report is managed by a different staff member and, in many cases, the designated staff member is the only person with access to this information, often with a single paper record serving as the exclusive data source. At the end of the month, staff members count the relevant center activities and send the report to an office specialist in the center. The office specialist aggregates everyone's information into one center-level report, and passes it on to the division director. Each transfer of information is an opportunity to introduce error. In effect, accurate information gets "lost in translation". When errors do occur, it is very difficult to track down where they were introduced.

Data accuracy is also affected by the inconsistent definition of business processes that are measured in the reports generated locally at each center. This inconsistency follows from the distributed nature of the reporting process. When these counts are aggregated in the final Performance Report for the ASD, the division is not able to compare information for the same process across centers. For example, when reporting on the educational classes, the definition of total attendance may differ from one center to the other. One center may count participants every time they attended a class and another center may count the unique participants only, that is, they count the participants one time if they attended at least once during the month.

The use of paper also presents a barrier to achieving organizational objectives. Since the ASD depends on grants to fund services and activities, it needs to be able to compile and submit service usage metrics and statistics. The process of collecting, aggregating, and analyzing this data is slowed down by the use of paper.

Figure 7: Information Flows

Recommendations:

We recommend that the proposed system provide staff members with local control over reports, so they can gather previously unanticipated slices of data to assist in analytical endeavors and the grant writing process. We suggest including the functionality to extract a set of data directly from the system. This means that all of the exploration or formatting functionality does not have to be included in the proposed system, but rather applications which staff are already familiar with like Microsoft Excel can be used in conjunction with data exported from the system.

In addition, we recommend that the proposed system include standard, predefined reporting capabilities for the division. Staff members can use these predefined summary statistical reports (for example, total number of senior center attendees per month) to cross reference and validate the locally generated reports previously described.

To support the accuracy of ASD operational reporting, we recommend that ASD staff members work together to define and standardize the data attributes that they use to report ASD operational performance. We expect a higher level of standardization will result in increased confidence in the accuracy of the reports that staff members use to monitor the performance of the ASD.

Because the reporting functions required by the ASD's institutional funders (as mentioned in the previous section) and the division itself are similar, we recommend that staff participating in both processes work together on two tasks: 1) specifying the standard operational reporting requirements of the Division and 2) specifying the

“minimum data set” for external reporting (as mentioned above). Working through these tasks together will ensure the most widely useful data is captured and available for reporting.

Implications for Adoption

In the course of learning about the organization it became clear that there were a number of distinct perspectives on the data this system would ideally collect. These perspectives flowed from the work that people did, their roles in the organization and how that work structured their interactions. For the most part the data of interest represented who was registered, and what those registered seniors do or need.

Staff members can be roughly divided into those who interact with the participants on a daily basis and those who administer the division. Staff members who interact with the participants at the center a lot, tend to have an atomistic view of the data. The registration card represented a known person with whom they had some level of interpersonal relationship. However, the administrative staff had fewer interpersonal interactions with seniors, and their duties required that they spend more time looking at numbers in aggregate, abstracted from the individual participant comings and goings. As a consequence, the tasks, goals and eventually the user interface designs were quite distinct. Rather than prioritizing the administrator however, it became clear that supporting the front lines was the crucial foundation upon which reliable information inputs would be generated. If the system were optimized for data aggregation, the lack of flexibility could be quite problematic.

Staff at all levels in the Aging Services Division described and demonstrated conflicting attitudes about information technology projects and initiatives to upgrade or provide new information systems. Skeptical attitudes stemmed from experiences with previous projects, relationships with other staff members and participants, and the divisions’s structure and location relative to rest of city government. Having worked for the city for at least five years, most Aging Services staff members have witnessed many changes, including information systems, that have come and gone.

We heard about a a small homegrown system developed using Microsoft Access that once existed. It was built and sustained by a former staff member. It was an example of the kind of hyper local development efforts that grew out of a real lived understanding of the "business" as it were, but it did not take into account the larger organizational and social context. Consideration of the larger context is required to implement a system in a sustainable way, a way that will persist beyond the single person test. To us, this context is as important as specific system requirements to successful system design.

We discovered a second example of a failed or under utilized information system when we were walked through a staff member's use of a reporting system mandated from outside. This system contained functionality beyond that particular reporting task,

including the ability to track a number of variables that in which the division is interested. However, this system had never been used for anything beyond the one required data-entry task required by the county. The system's introduction was accompanied by little training. It was essentially dropped on the staff with a user manual and a help line. As out-of-the-box software it did not reflect the lived experience and language of the local staff and was introduced with little regard for existing practices. It yielded a situation where there was little incentive or support to go beyond what was required as a baseline, no matter what capabilities the system had. It was difficult for staff to even see the system's potential because it was disruptive to their work practices.

Designing Information systems for an organization that allow for lasting integration into the day-to-day work routines requires more than developing and delivering a list of requirements, or the heroic efforts of a single individual. We observed barriers to adoption because design efforts were not broad and inclusive enough. These constrained and local efforts were too "bottom up" and were not accompanied by any marketing to peers. We also saw barriers to adoption associated with mandated or "top-down" systems. Providing a checklist of features, or mandates to use systems, regardless of how they fit into the lived reality of the work, can undermine the initial intentions with implementing the selected system.

Business Process Analysis Enhancements

Based on our work with staff at the senior centers, we found that, with their increased desire to demonstrate numerically the services they provide, significant process change is called for in concert with any technical changes. For the additional reporting capabilities provided by new technical infrastructure to be useful, more rigorous information capture is required. Even if information technology capabilities exist, recommendations must be balanced with an understanding of the resource constraints. In the division's context, using lower-tech solutions and relying on driving process change is a more appropriate approach for achieving the present goals and driving adoption.

We explored different methods for capturing participant activity along a spectrum of technological complexity. We found existing systems which automate much of the process through typical commodity tracking systems like grocery store and barcode scanners and touch screens check-in interfaces, but generally encountered skepticism that the participants would be comfortable and able to use it. There were also concerns that the centers would not receive ongoing adequate technical support for it. We also explored using a template-based paper sign-in sheet that is customized with the centers' daily activities by staff each morning. Participants then check off the activities in which they plan to participate. The proposed information system would have an interface mirroring the sign-in sheet for data entry. We heard fewer concerns about this potential data capture method despite the additional work it created for office staff.

Based on our findings, we more generally conclude that introducing information technology into an organization where there was previously none or minimal dependency upon it without first considering the location specific motivations as well as required process changes is inappropriate. If the technology fails to meet expectations, either because it is not suitable to the organization's goals or there is insufficient adoption, the organization is likely to blame the technology while the root problem is elsewhere, namely in the inadequate investments to drive the required process change associated with the technological change. The process change becomes overshadowed by the technology introduction. This can lead to incorrect conclusions that technology is a problem, which may encourage technology resistance when, instead, the organization should actually be reviewing their approach to process change and seeking organizational solutions to accompany or precede technological change.

Recommendations:

We recommend augmenting the existing business analysis process with site visits and low-fidelity prototyping activities. These activities will help IT development staff develop a grounded and empathetic understanding of work processes very different from their own that extend beyond what is conveyed in business process documentation, no matter how complete. Resource constraints will impose limits on these activities, but they can be done incrementally, as new projects arise, and to different extents providing varying, but still valuable levels of insight and impact. Simple paper prototypes provide inexpensive and fast ways to capture user needs and desires and can accommodate even the most restrictive budgets.

Each center also needs to own the process change required for information technology adoption at all levels. Leadership is responsible for communicating and reiterating the motivation to change. They must make it clear why tracking additional information is necessary not only to center staff, but also to participants, many of whom feel that, as Berkeley City residents and taxpayers, the center belongs to them. As outsiders and students, during our different encounters, we were in a position to attempt to evangelize these changes from a more neutral position. However, after the system is actually in place, similar efforts will need to continue internally in order to ensure success. Front-line staff will need to explain the new information processes to the participants to ensure they understand the role the new processes play in the ongoing success of the community center and the quality of services provided.

In addition to the technical requirements we have outlined for the systems, we have recommend several process changes to maximize the value of the proposed system and help reinforce adoption. We first recommend that centers use scheduled activities like classes or trips as opportunities to register and update participant information. These activities serve to ensure that there is an accurate portrait of active participants, that their information is current, and may help capture participants initially hesitant to register. We also recommend ongoing communication to seniors and staff about the importance of the information collection and demonstrating the results, when possible,

by highlighting new or additional grants received. These process oriented changes can help both the seniors ensure they are providing accurate details about the services they are using and emphasize the importance of the data to mission of the organization.

The observations and inferences we made based on our research at the City of Berkeley's senior centers are likely applicable to other organizations, particularly human services, non-profit or government organizations focused on serving people and human interaction. The delicacy of the data being collected and the process of instituting organizational changes, both technologically and those involving work process, are challenges familiar to many other organizations.

Conclusion

Focusing solely on the technical possibilities when solving information problems does not ensure a successful outcome. Portraits of both the informational flows and work contexts are equally significant. It is important that both the leadership and individual contributors' perspectives are captured and that solutions reflect and support a shared understanding of organizational goals. Exploring these contexts and flows is also useful for helping IT departments understand work organizations with objectives significantly different from their own. IT development and work activities are primarily focused on building and supporting technological solutions. In social service organizations, technology is secondary to the immediate people oriented goals and the human interactions required for social service provision. The work environments are also different. IT work is often done at a desk, relying heavily on other technological infrastructures, and often allowing for the use of multiple communication channels. Face to face communication or 'encounters' are critical for effective social service delivery. External pressures, like funding mechanisms, also influence these work practices. Knowledge and an understanding of the nuances associated with each of these work practices develop over time and exist primarily as "situated knowledge", "knowledge embedded in the work practices of a particular organizational site", as defined by Deborah Sole and Amy Edmondson (2002). Each departments' and individual's work practices rely on this situated knowledge, but there is often little opportunity to gain exposure to the situated knowledge possessed by other people or organizations.

Business process analysis procedures are a step in the right direction. They are effective at capturing the immediate information technology needs of an organization and building a relationship between IT and other divisions, using a shared vocabulary. However, in the process of constructing a business analysis and distilling business ramblings to activities and system interactions for conversion to code, the context and situated knowledge that cannot be translated to code, but is essential for work processes, is sometimes missed. Understanding this additional context, from multiple perspectives, is not only important for building the initial system, but also for assessing

its cost and value, both immediate and ongoing, its adoption, and, ultimately, its success.

To mitigate this loss, we suggest using processes designed to facilitate further communication and collaboration between IT and divisions. We augmented the business process analysis approach with more general qualitative research methods. We gained additional understanding into not only the external pressures and constraints placed on the organization and leadership, but also how these constraints were understood and perceived within the organization. We advocate using business process analysis to reveal and document the high priority business processes and desired system interactions, while also using qualitative research methods and prototyping techniques to collect additional contextual information for annotating process diagrams, facilitate understanding at multiple levels within an organization, and evangelize process change and technical solutions.

Tension between an organization's Information Technology department and the departments they serve is well known, acknowledged, and even a topic of conversation and humor. This tension naturally emerges from the different, larger business-oriented priorities and costs that IT departments must juggle. IT departments also balance their priorities with the individual division's work obligations. Each sub-organization operates from its own perspective, but continues to struggle to see from the other's perspective. We encourage additional efforts to bridge these perspectives using qualitative research and design methods. We do not claim that these efforts will help identify opportunities to eliminate the need for human touch points in social or general service delivery. Rather, they can provide insight into and reiterate the importance of human interactions. These research efforts will add additional time to the development process, but can scale to accommodate a given schedule and budget and have the potential to provide insights that can help avoid failure, either by building the wrong system, or by lack of adoption.

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Guide to Appendices

Appendix A: Business Process Analysis

- Registration Process Business Analysis
- Directors Report Business Analysis
- Emergency Report Process Business Analysis
- Sign-In Process Business Analysis
- Update Registration Process Business Analysis
- List Making Process Business Analysis

Appendix B: Process Improvement Criteria

Appendix C: Task Analysis

Appendix D: Minimum Data Set

Appendix E: Implementation Plan

Appendix A: Business Process Analysis

- Registration Process Business Analysis
- Directors Report Business Analysis
- Emergency Report Process Business Analysis
- Sign-In Process Business Analysis
- Update Registration Process Business Analysis
- List Making Process Business Analysis

Update Registration (As-Is) Process

Scale of Process

The Aging Services Division (ASD) serves all Berkeley, CA residents over the age of 55. According to the U.S. Census, there are an estimated 24,912 residents age 55 and over and 12,192 age 65 and over in Berkeley.[1] The ASD manages three senior centers in North, West and South Berkeley, respectively. In all, there are an estimated 4,500 existing participants with associated paper registration cards containing basic contact information (see exhibit 1 for a blank registration card). The approximate number of cards at each center is as follows:

- 3,000 at North Berkeley Senior Center
- 1,000 at South Berkeley Senior Center
- 500 at West Berkeley Senior Center

An unknown number of the participants with cards may be “inactive” (that is, they may have participated at one time but have not actively participated at a center with the last 12 months). Similarly, staff members believe some seniors are participating without ever having filled out a card or have a card on file, but with outdated information. Updates to registration cards generally happen only when a senior alerts a staff member to a change in their personal status or information. In the past, the centers have conducted registration drives in order to update participants' cards. It is important that up to date contact and medical information are kept for participants, so that it is available in the event of an emergency.

Summary of As-Is Problems and Opportunities

Currently, updates to registration cards are not made frequently enough. The paper registration cards do not allow for easy retrieval and it is difficult to identify cards with current or stale information. If a card can not be found or is stored at a different center, there is no way to know. The OS will fill out a new and potentially redundant card.

Centralized, electronic storage of registration information with a common web-based user interface allows for faster and easier retrieval of participant records and, in turn, making it easier to update participant information, track when the participant records were last updated, and potentially notify center staff when participant information might be stale.

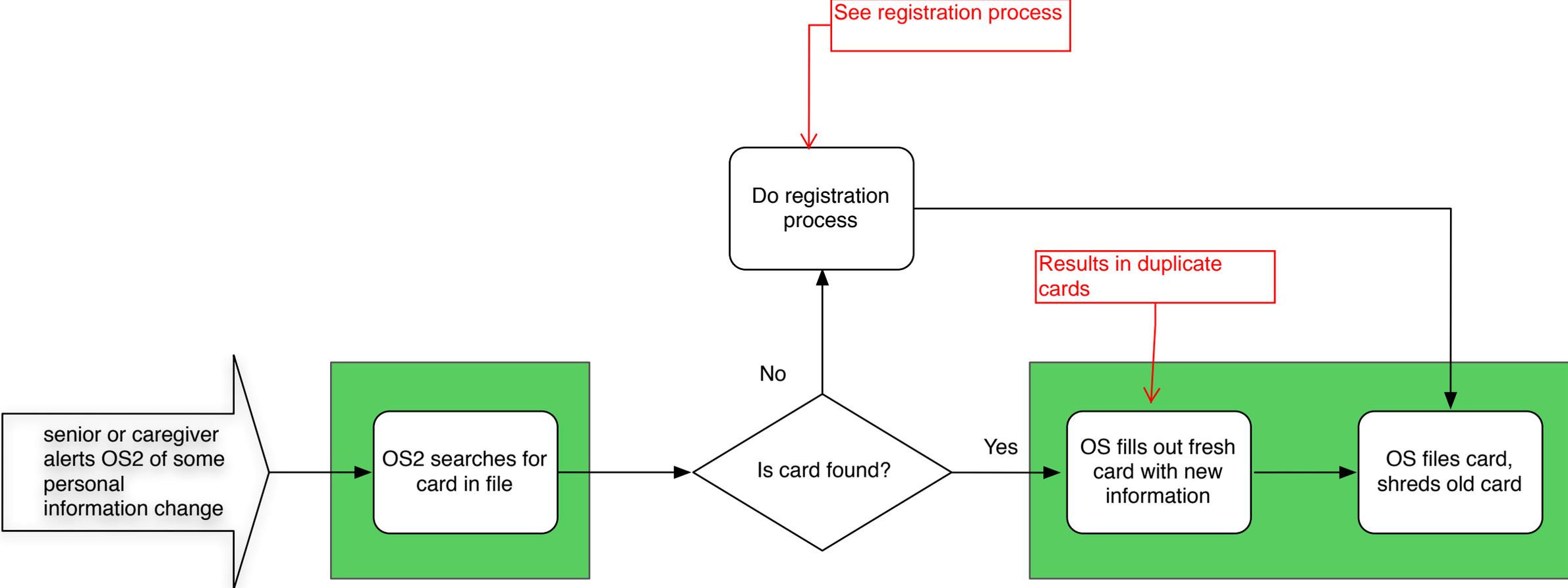
As-Is Process Narrative

A participant senior moves from his current home to an apartment. He now has a new address and home phone number. Several weeks after moving, he tells the OS2 at the senior center he visits weekly that his phone number and address have changed. The OS 2 goes to the card file box and is able to find the participants card. She pulls out a

new card and copies most of the information from one to the other. She then fills in the new address and phone number with help from the participant. After completing the new and updated registration card, the OS2 places it in the file box and thanks the participant for letting her know that he had moved. She then shreds the original card.

[\[1\]](#) U.S. Census, "American Community Survey: 2006-2008 American Community Survey 3-Year Estimates", www.census.gov, 2008.

Updating a Record (As-Is)



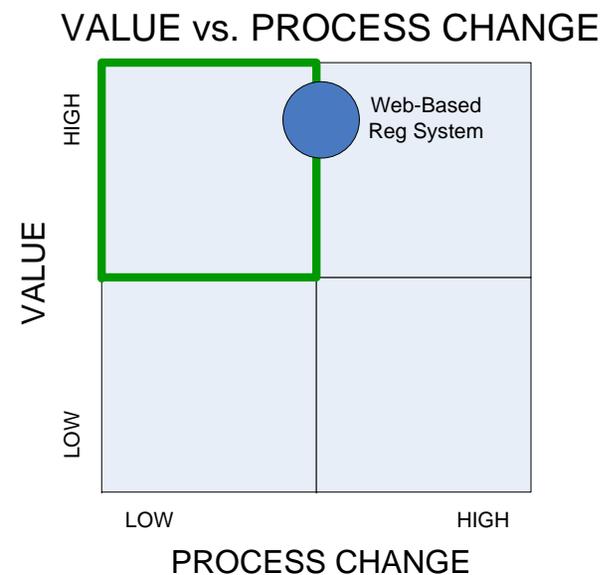
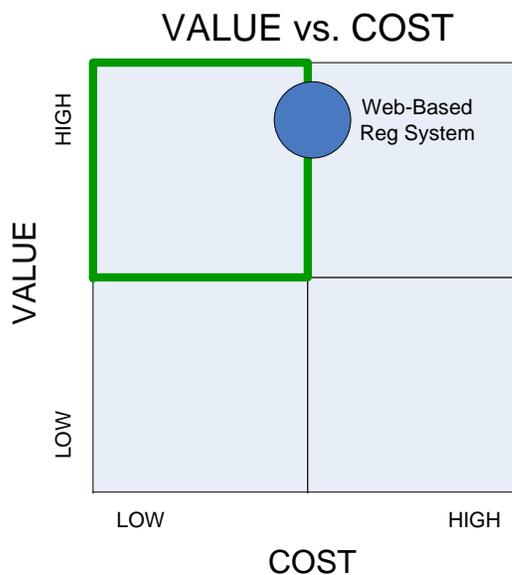
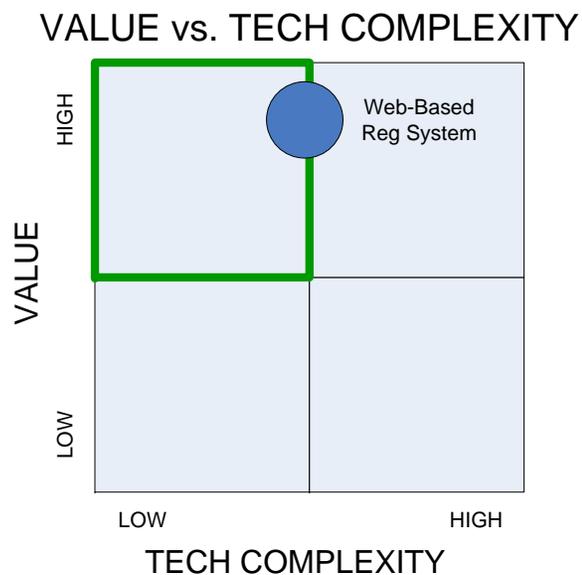
Process Improvements: Updating a Record

Process	As-Is Activities Involved	Problem/Opportunity	Proposed Change	Value	Tech	Cost	Level of Change
<i>Name of processor sub process</i>	<i>list</i>	<i>describe</i>	<i>describe</i>	<i>low, medium, high</i>	<i>no, low, high difficulty</i>	<i>low, medium, high</i>	<i>low, medium, high</i>
Update Registration Process Improvements	OS searches for card in file cabinet/box	Searching for/Finding cards is a slow manual process because the cards are paper and stored in a file box	COULD-BE Use an electronic registration system. An electronic database registration system facilitates easier retrieval as well as entry.	High - Up to date participant information is important for safety and liability in case of emergency.	Medium - Use of standard in-house software tools, scale and availability of the system are normal.	Medium - Standard software and in-house skills.	Medium - Some staff training required.
	OS fills out fresh card with new information	An electronic system facilitates easier and more frequent updates.	COULD-BE Instead of filling out a new paper card, the OS will make changes to the electronic record. This is more efficient because of the retrieval process. The date and time of record update can also be automatically recorded. Additionally, the Division on Aging will be able to	High - Up to date participant information is important for safety and liability in case of emergency.	Medium - Use of standard in-house software tools, scale and availability of the system are normal.	Medium - Standard software and in-house skills.	Medium - Some staff training required.
	OS files card, shreds old card	Replacing paper cards with electronic records can facilitate easier and more frequent updates and eliminates the refiling and shredding step.	COULD-BE Use an electronic registration system with editable records.	High - Up to date participant information is important for safety and liability in case of emergency.	Medium - Use of standard in-house software tools, scale and availability of the system are normal.	Medium - Standard software and in-house skills.	Medium - Some staff training required.

Process Improvement Comparisons – Updating a Record

Web-Based Registration System with Database, ASD Staff Use Only
Represented as a COULD-BE Scenario

Note: Top left box (in bold outline) is considered the “best case scenario” among the three comparisons. This box represents HIGH VALUE and LOW TECH COMPLEXITY, COST or PROCESS CHANGE. These criteria are defined in the section “Process Improvement Criteria Definitions”.



Updating a Record (Could-Be) Process

Scale of Process

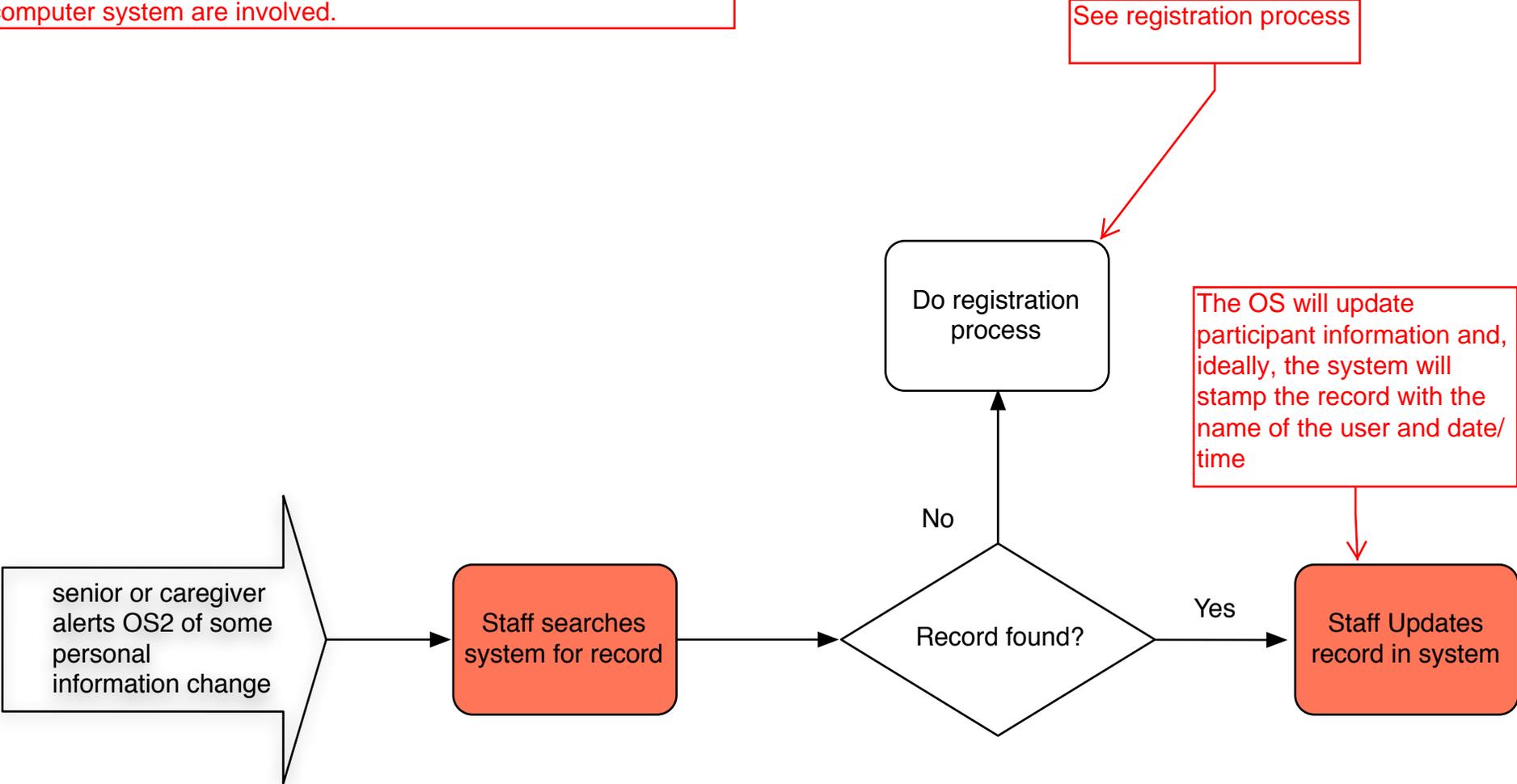
- Estimated 4,000 existing participants with paper cards.
 - 2,500 at North Berkeley
 - 1,000 at South Berkeley
 - 500 at West Berkeley
 - An unknown number of participants with cards may be “inactive”.
- Registration happens once, but periodic drives are needed to update medical information and emergency contacts.
- Digitizing, or entering data from each card in a system takes an estimated 3 minutes per card. Updating or modifying a previously digitized card takes from 1 to 3 minutes per card depending on the extent of the information changing.

Could-Be Process Narrative

A participant senior moves from his current home to an apartment. He now has a new address and home phone number. Several weeks after moving, he tells the OS2 at the senior center he visits weekly that his phone number and address have changed. The OS 2 searches in the centralized participant registration system for the participant. After finding the digitized record, the OS2 updates the participant information provided by the participant. She then saves the record. The system automatically marks the record with the date and time last saved along with the name of the staff member that last modified the record. The OS2 thanks the participant for letting her know that he had moved.

Updating a Record (Could-Be)

Red color in boxes denote High Tech interactions with a computer system are involved.



Sign In (As-Is) Process

Scale of Process

The main purpose of the Sign-In Process is to record the participation at the senior center for reporting at a later date. On a daily basis, an estimated 350 to 500 participants visit the three senior centers in North, South and West Berkeley. The breakdown by center is 200 to 250 at North, 100 to 150 at South and 50 to 100 at West. In the current As-Is Process, since many seniors sign in on two or more sign-in sheets a day (one at the main entrance and others depending on whether they have lunch or class), the actual number of "sign-ins" a day across all centers is estimated at 750 to 1,500. With approximately 220 business days a year, participants sign-in at the front desk, lunch and classes between 165,000 to 330,000 times a year.

As-Is Problems and Opportunities

There are a number of problems that exist in the current Sign-In Process. The first problem is the inability of staff to identify a participant from the name they write on the sign-in sheet. The names are illegible in many cases. As the process works now, the sign in sheet is limited to counting the names on each paper sheet and sum them up for reporting at the end of the month. This is a limiting factor because ASD management have requested the ability to identify the participants at the center and to report the characteristics of the populations the ASD serves to funders. Without knowing who is using the center on a daily basis, it is impossible to know if the ASD is living up to its mission.

A related problem is that the front desk staff must make a determination for themselves of who is and is not registered at the center when the person walks in the door each day. Often they must do this from memory and to do this for all entering participants would require having undivided attention directed on who walks through the front door. Since front office staff have many responsibilities, this is not feasible. Staff members have observed that there may be participants who are taking classes or having lunch who have not registered at the center. While these participants may sign in to the center or the classes, their demographic information is not stored through the registration process and can not be used for reporting to funders.

A reporting accuracy problem is also apparent in that participants may sign in up to three or four times a day as they sign in on multiple sign-in sheets. From reviewing sign-in sheets on the same day, both at the main entrance and at classes, participants may sign in on one of the two sheets but not both. This affects the accuracy of the current participation numbers used by Aging Services.

The main opportunity is to reduce the participant identification problem by using information systems to assist participants sign-in. If paper sign-in sheets are still desired, they can be pre-printed with the names of active participants who only need to mark their attendance with a check mark. Higher technology solutions involving electronic touch-screens can achieve the same function in a way that streamlines the back-office counting and data entry process. This solution also enables staff to identify

participants who have not registered. When a participant can not find their name on the list or touch-screen, the participant will write their name down as a guest and therefore will identify themselves as “unregistered” to the center staff.

A second opportunity lies with the ability to combine all sign-in sheets (i.e. sign-in to the center, lunch and classes) onto one sheet. Having one sign in sheet will eliminate doubts about accuracy across sign-in sheets as there will only one place to sign-in.

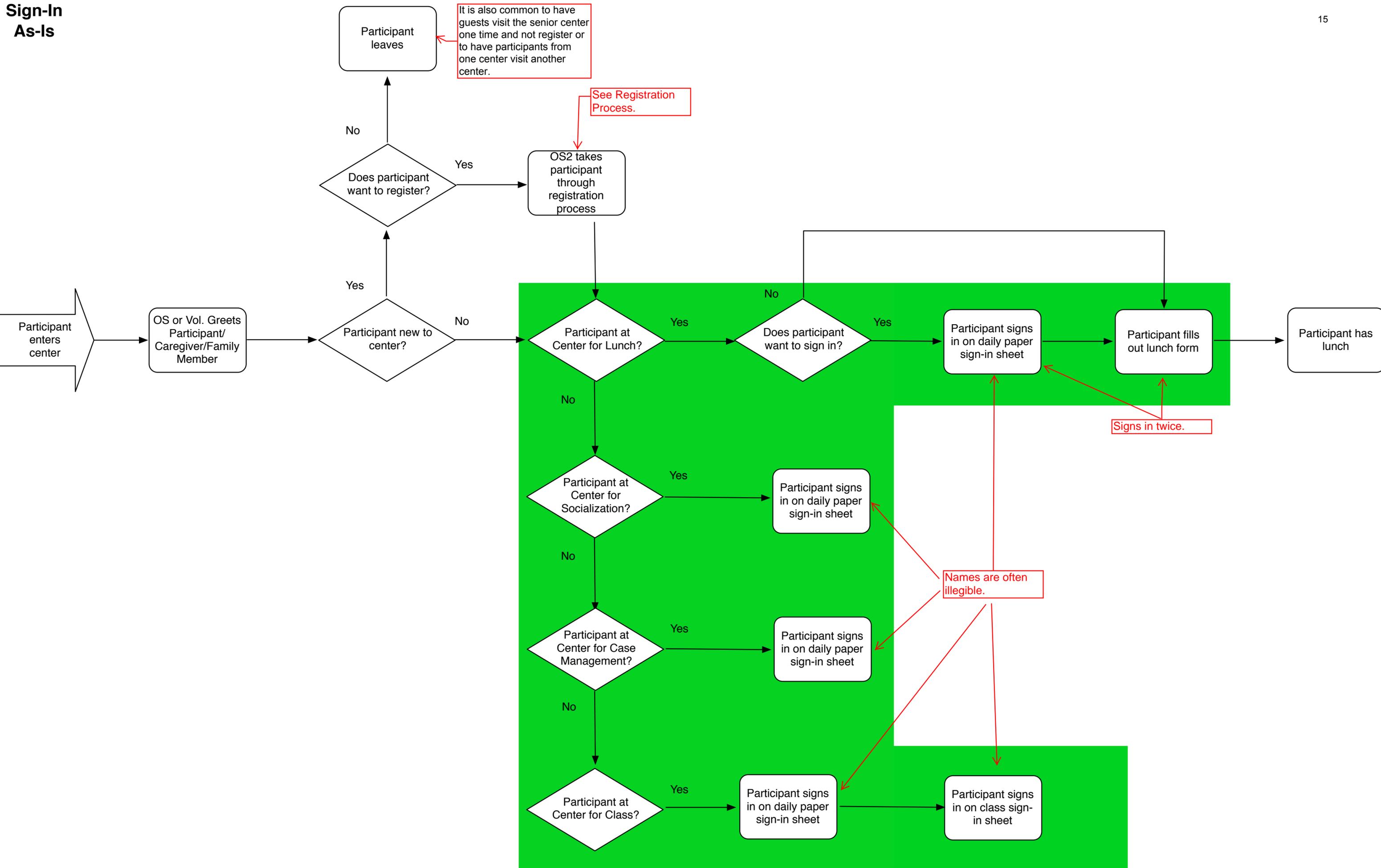
As-Is Process Narrative

When a participant enters the senior center (almost always through the main entrance of the center) they pass into a reception area with one or more staff members or volunteers seated nearby. A staff member may greet the participant. The staff person at the front desk will assess whether the participant is familiar to the center or not. If the participant is new to the center, the staff member determines if the participant would like to register, and if so, takes the participant through the registration process (see the Registration Process). If person does not want to register, they may stay only briefly and then leave. (NOTE: It is common to have guests visit the senior center one time and not register or to have participants from one center visit another center. Since counting these guests and “visiting participants” is not crucial for reporting purposes and represent insignificant numbers of participants, they are not captured in this business process.)

If the participant is familiar, already registered, and wants to sign in to the center, they write their first and last name (either legibly or illegibly) on the sign in sheet at the main entrance. If they are only at the center to eat lunch and do not wish to sign in on the sign in sheet, they may pass through to the lunch room (without signing in on the front desk sign in sheet.) Once in the lunch area, the participant fills out the paper lunch form with a pen and has lunch. A participant who has lunch may sign in both times, of course, once at the front desk and once at lunch.

After signing in at the front desk, if the participant is at the center for a class or planned activity, the participant goes to the room where the activity takes place. At the beginning of the class, the participant signs in with a pen on the paper sign in sheet of the class with the first and last name (either legibly or illegibly).

Sign-In As-Is



Process Improvements - Sign In Process

Process	As-Is Activities Involved	Problem/Opportunity	Proposed Change	Value	Tech	Cost	Level of Change
<i>Name of processor sub process</i>	<i>list</i>	<i>describe</i>	<i>describe</i>	<i>low, medium, high</i>	<i>no, low, high difficulty</i>	<i>low, medium, high</i>	<i>low, medium, high</i>
Sign In Process Improvements	Sign in to center (General Paper Scenario)	Written name of person is legible for the purposes of counting people but not for matching names. There are opportunities to match names of participants with their activities at the center. One opportunity is more grant funding based on ability to submit names to the Area Agency on Aging and indicate general activities at the center. General activities would include: Socializing, Lunch, Classes, Special Event, Appointment. In this option details of Classes would not be tracked by this system, but would continue to be kept on individual class sheets. The chief beneficiary, or the stakeholder with the most to benefit, is the Social Services Manager, who has written new grants that would require this functionality. This new form would also help to identify who is not registered, as anyone who is not on the printed sheet would have to write in their name. This is an immediate daily list of those participants who are likely not registered.	COULD-BE General Paper Sign In: Implement a new sign in sheet that is printed from a registration database. The sign in sheet will serve as a form where the participant will use pen and paper to indicate attendance by marking a check next to their name and also indicate the GENERAL activities they will be participating in that day. At end of day, staff will enter sign in form data into an client activity tracking system.	Medium - Enables and justifies grant funding, better accuracy in data collection, helps identify unregistered people.	Medium - Web-based system could use standard software, scale and availability are normal.	Medium - Implemented with CoB software tools and skills.	Medium - Participants still sign in on paper. Staff will have the additional task of marking names in an electronic form at the end of day.
	Sign in to center (Pre-Defined Classes/Special Events Paper Scenario)	In addition to the above, a second opportunity is to report participant demographic data by the detailed level of the participants' activities at the center on funding applications. A third is improved direct marketing of new programs to participants.	COULD-BE Pre-Defined Paper Sign In Option: Similar to the General Option above, except the daily activities will be printed in detail on each sheet. These detailed activities may include the time of the activity and a short name. The participant would mark their name to each activity they intend to do as they sign in.	High - Grant applications, demographic details by activity reporting and marketing opportunities, better report accuracy	Medium - Web-based system could use standard software, scale and availability are normal.	Medium - Implemented with CoB software tools and skills.	High - Participants still sign in on paper. Staff will have the additional task of marking names in a web form at the end of day. Task will take longer than above to mark detailed activities. Staff has new task of managing activities master list on a periodic (at least monthly) basis.
	Sign in to center (TouchScreen Scenario)	All of the same benefits of the above, without adding extra tasks and hours of work to staff	COULD-BE Touch Screen Sign In Option: A new electronic user interface will be implemented at the Sign In desk. Participants themselves will identify themselves with the system and mark their daily activities as they sign in. As in the Pre-Defined Option, the staff will manage a master activities list on a periodic basis (monthly). Staff may also guide participants through the interface if they are unfamiliar with it.	High - Grant funding, demographic details by activity reporting and marketing opportunities, better report accuracy	High - Touch screen interface with usability features for participants is not standard in the city. Plus web-based management system would still be required.	High - Touchscreen interface requires special hardware, specialized software may be required.	Low - Staff time will be saved with electronic counting and entering names. Staff has new task of managing activities master list on a periodic (at least monthly) basis.

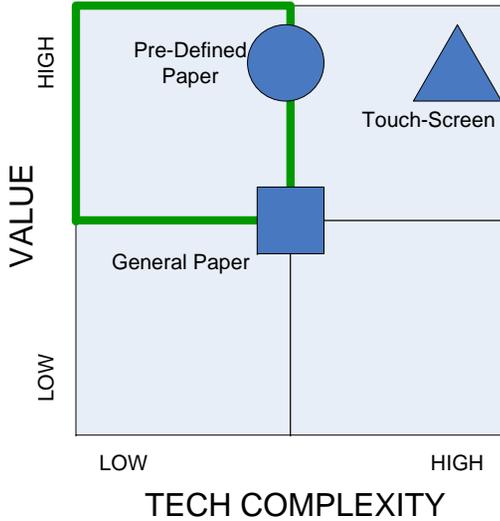
Process Improvement Comparisons – Sign In

Sign-In Scenarios

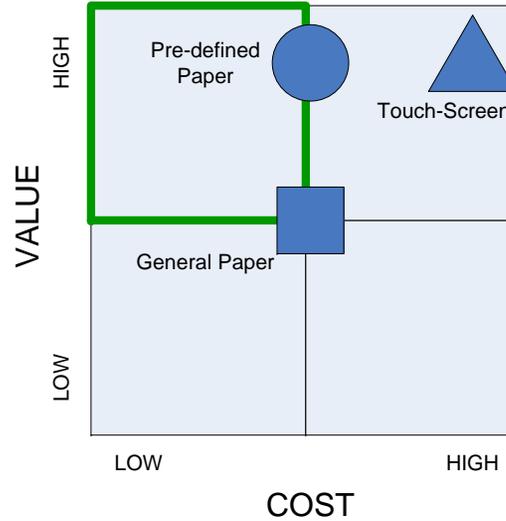
Represented as a three COULD-BE Scenarios

Note: Top left box (in bold outline) is considered the “best case scenario” among the three comparisons. This box represents HIGH VALUE and LOW TECH COMPLEXITY, COST or PROCESS CHANGE. These criteria are defined in the section “Process Improvement Criteria Definitions”.

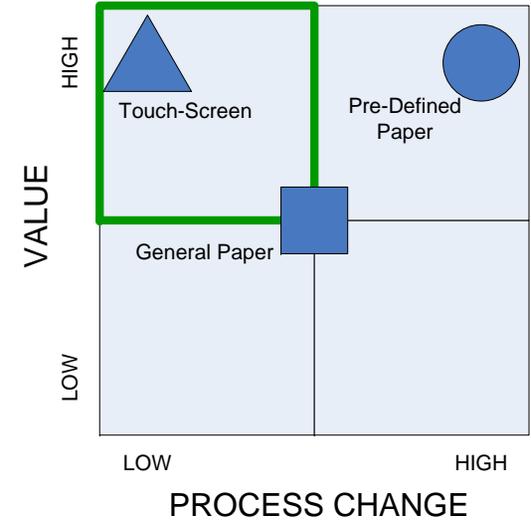
VALUE vs. TECH COMPLEXITY



VALUE vs. COST



VALUE vs. PROCESS CHANGE



Legend

-  Paper Scenario with General Activity Categories
-  Paper Scenario with Pre-Defined Classes and Activities
-  Electronic Touch-Screen Scenario

Notes

While the Paper-Based Scenarios have Medium costs, the Pre-Defined Paper scenario is expected to have a High level of change in the ASD organization, due to the size of the data entry task on a daily basis. The convenience of the Touch-Screen for staff, while at High cost, is represented with the Low level of change.

Sign In (Could-Be) General Paper Scenario

Scale of Process

Scale is the same as in As-Is Process.

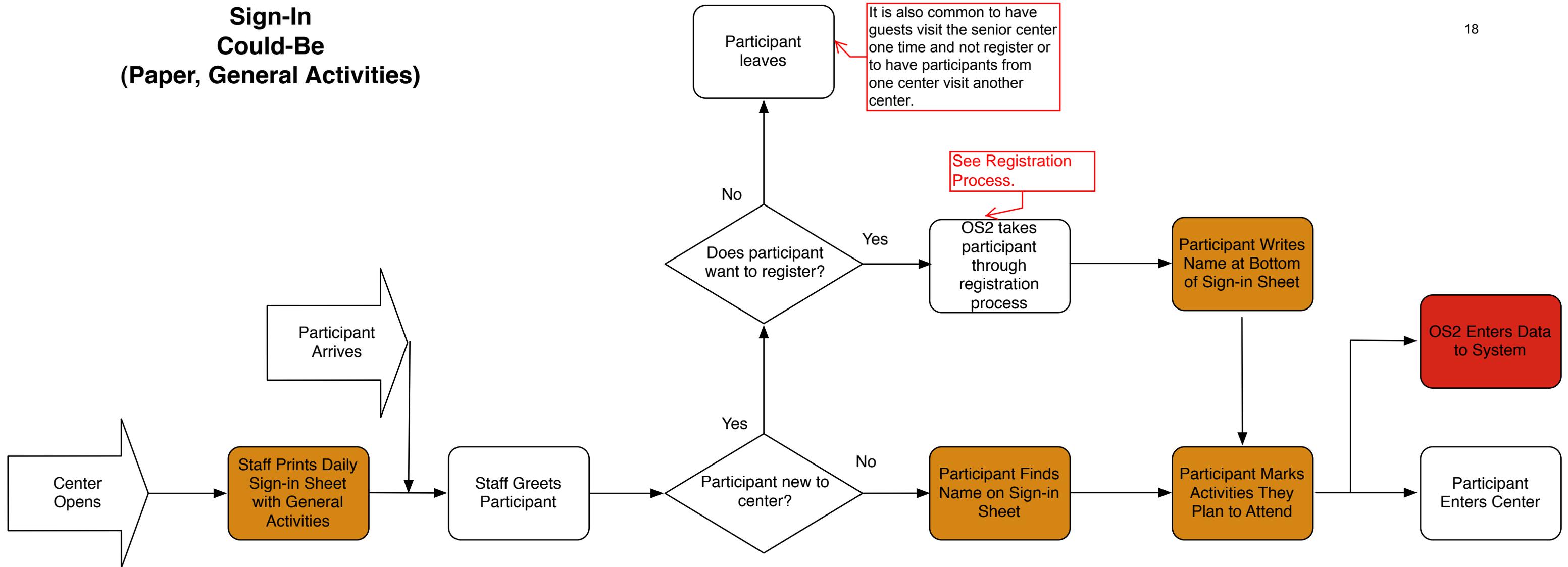
Process Narrative

Before the first participant arrives at the center, the staff of the center prints a paper sign-in sheet from the registration system and places it on the front desk. The sign in sheet has the names of all active participants printed on one side of the page. On the top of the page are column headings for the various general activities to do at the center (e.g. Center Activities, Appointment, Lunch, Special Event, etc.) In this could-be scenario, these headings are static and do not change from day to day. This is the key difference between this “general-paper” scenario and the “pre-defined-paper” scenario.

When a participant enters the senior center (almost always through the main entrance of the center) they pass into a reception area with one or more staff members or volunteers seated nearby. A staff member may greet the participant. The staff person at the front desk will assess whether the participant is familiar to the center or not. If the participant is new to the center, the staff member determines if the participant would like to register, and if so, takes the participant through the registration process (see the Registration Process). If person does not want to register, they may stay only briefly and then leave. (NOTE: It is common to have guests visit the senior center one time and not register or to have participants from one center visit another center. Since counting these guests and “visiting participants” is not crucial for reporting purposes and represent insignificant numbers of participants, they are not captured in this business process.)

Since a newly registered participant’s name is not printed on the sign-in sheet, they write their name at the bottom of the sheet with a pen. Then they mark the activities they plan to do in the boxes next to their name. A participant that is familiar to the center finds their name on the pre-printed sign in sheet and likewise marks with a pen the activities they plan to do. The participant then enters the center. At the end of the day, a staff member collects the sign-in sheet, opens up a data entry screen of an attendance tracking system, and transcribes the attendance marks for each participant into the system.

Sign-In Could-Be (Paper, General Activities)



Could Be (Pre-Defined Paper) Scenario

Scale of Process

Scale is the same as in As-Is Process.

Process Narrative

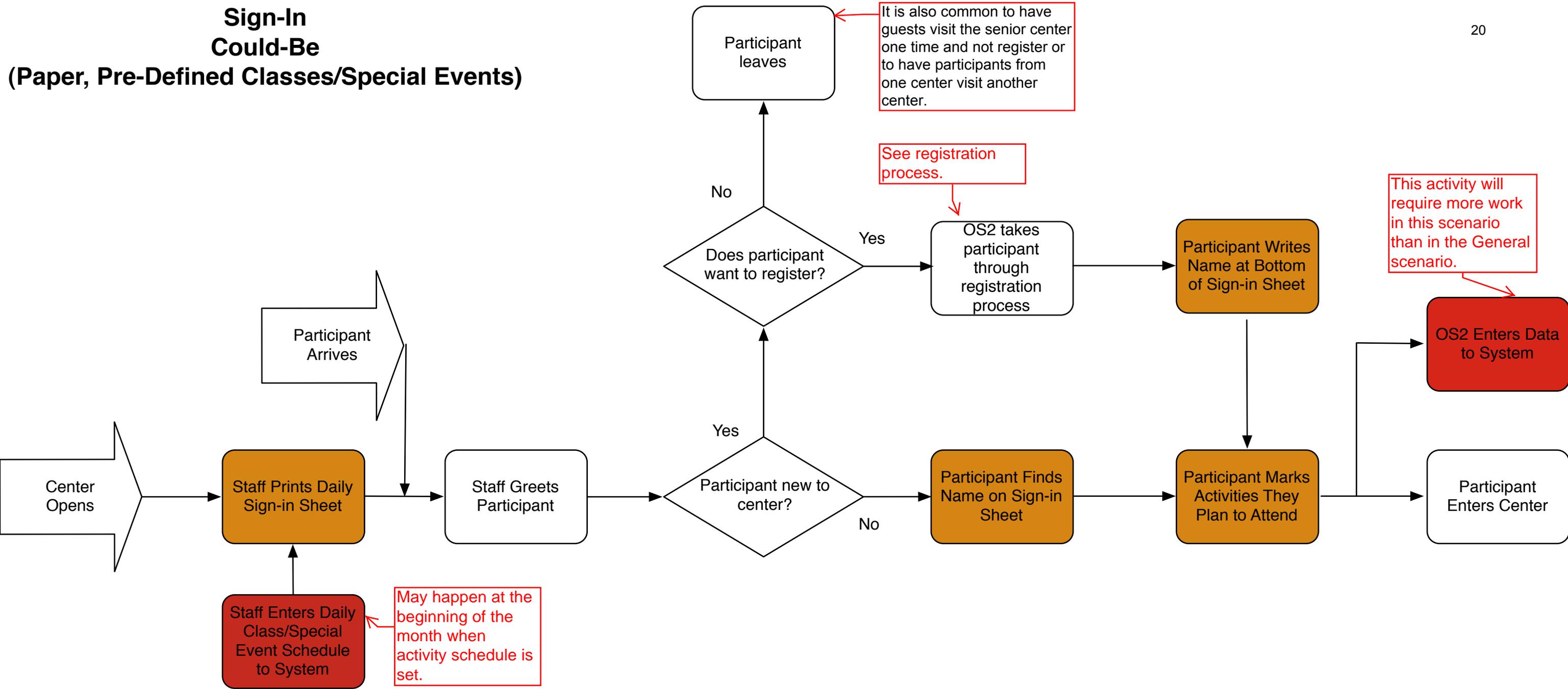
At the end of the month, when the activity schedule for the next month is reasonably stable, a staff member enters the activity schedule for the month into an information system. This list of activities includes the name, time, date and resources needed for each activity. Each activity is also categorized in a way that can aid the reporting process later on. For example, a class activity with the specific name “AM Computer Workshop” may receive a more general label “Computing”. This scheduling activity may be performed at anytime during the month, however, it is expected to happen most often at the end of the month before the new month’s newsletter is sent out.

On a daily basis, before the first participant arrives at the center, the staff of the center prints a paper sign-in sheet from the registration system and places it on the front desk. The sign in sheet has the names of all active participants printed on one side of the page. On the top of the page are column headings for the various specific activities to do at the center that day with the time of each activity. In this could-be scenario, these headings are dynamic and change with the offerings of the center from day to day. This is the key difference between this “general-paper” scenario and the “pre-defined-paper” scenario. There may still be some general activities listed everyday, however, for example “Appointment” and “Center Activities”.

When a participant enters the senior center (almost always through the main entrance of the center) they pass into a reception area with one or more staff members or volunteers seated nearby. A staff member may greet the participant. The staff person at the front desk will assess whether the participant is familiar to the center or not. If the participant is new to the center, the staff member determines if the participant would like to register, and if so, takes the participant through the registration process (see the Registration Process). If person does not want to register, they may stay only briefly and then leave. (NOTE: It is common to have guests visit the senior center one time and not register or to have participants from one center visit another center. Since counting these guests and “visiting participants” is not crucial for reporting purposes and represent insignificant numbers of participants, they are not captured in this business process.)

Since a newly registered participant’s name is not printed on the sign-in sheet, they write their name at the bottom of the sheet with a pen. Then they mark the activities they plan to do in the boxes next to their name. A participant that is familiar to the center finds their name on the pre-printed sign in sheet and likewise marks with a pen the activities they plan to do. The participant then enters the center. At the end of the day, a staff member collects the sign-in sheet, opens up a data entry screen of an attendance tracking system, and transcribes the attendance marks for each participant into the system.

Sign-In Could-Be (Paper, Pre-Defined Classes/Special Events)



Could Be (Touch-Screen) Scenario

Scale of Process

Scale is the same as in As-Is Process.

Process Narrative

At the end of the month, when the activity schedule for the next month is reasonably stable, a staff member enters the activity schedule for the month into an information system. This list of activities includes the name, time, date and resources needed for each activity. Each activity is also categorized in a way that can aid the reporting process later on. For example, a class activity with the specific name "AM Computer Workshop" may receive a more general label "Computing". This scheduling activity may be performed at anytime during the month, however, it is expected to happen most often at the end of the month before the new month's newsletter is sent out.

When a participant enters the senior center (almost always through the main entrance of the center) they pass into a reception area with one or more staff members or volunteers seated nearby. A staff member may greet the participant. The staff person at the front desk will assess whether the participant is familiar to the center or not. If the participant is new to the center, the staff member determines if the participant would like to register, and if so, takes the participant through the registration process (see the Registration Process). If person does not want to register, they may stay only briefly and then leave. (NOTE: It is common to have guests visit the senior center one time and not register or to have participants from one center visit another center. Since counting these guests and "visiting participants" is not crucial for reporting purposes and represent insignificant numbers of participants, they are not captured in this business process.)

Once the participant is registered, whether they were registered that day or not, they can find their name on the electronic sign-in touch screen. Then on the screen they mark the activities they plan to do. The participant then enters the center. In this scenario, there is no need for a staff member to perform the activity of transcribing attendance marks into the system.

Registration (As-Is) Process

Scale of Process

The Aging Services Division (ASD) serves all Berkeley, CA residents over the age of 55. According to the U.S. Census, there are an estimated 24,912 residents age 55 and over and 12,192 age 65 and over in Berkeley.¹ The ASD manages three senior centers in North, West and South Berkeley, respectively. In all, there are an estimated 4,500 existing participants with associated paper registration cards that contain basic contact information (see exhibit 1 for a blank registration card). The breakdown of the cards by center is as follows:

- 3,000 at North Berkeley Senior Center
- 1,000 at South Berkeley Senior Center
- 500 at West Berkeley Senior Center

An unknown number of the participants with cards may be “inactive” (that is, they may have participated at one time but have not actively participated at a center with the last 12 months). Similarly, staff members believe some seniors may be participating and have not yet filled out a card. An estimated 25 to 50 new seniors register each month across all three centers. Registration happens once, but periodic drives are needed to update medical information and emergency contacts.

Summary of As-Is Problems and Opportunities

There are a number of problems in the As-Is Registration Process. The high-level problem is that the paper-based storage system of an estimated 4,500 index cards does not enable staff to know for sure who their participants really are. This is a liability and safety issue as cards must be kept for each participant in order to have access to medical and emergency contact information. With the cards stored in a small metal file cabinet in each center, it is difficult for a staff member at one center to know if someone is already registered at a different center.

At the time of registration, some participants do not have all of their information with them and must take the card home to finish filling it out. The participant must bring the card back in to the center a few days later to hand over. When new participants are registered, a sticky (Post-It) note is used to tally new participants for the month. Names are not recorded, only the tally so new members are not formally identified. If new members are to be welcomed with a letter, their cards would not be accessible as they are sorted by Last Name and not by Participant Start Date.

Centralized, electronic storage of registration information with a web-based user interface would create the opportunity for easier and faster access to information by staff across the three centers. With a web-based system, there is an opportunity for participant self-service from home by allowing them to type in their registration information and update their registration information at home using the internet. Having the ability to identify new participants would allow staff to formally welcome them to their center and provide an improved “customer experience”.

¹ U.S. Census, “American Community Survey: 2006-2008 American Community Survey 3-Year Estimates”, www.census.gov, 2008.

As-Is Process Narrative

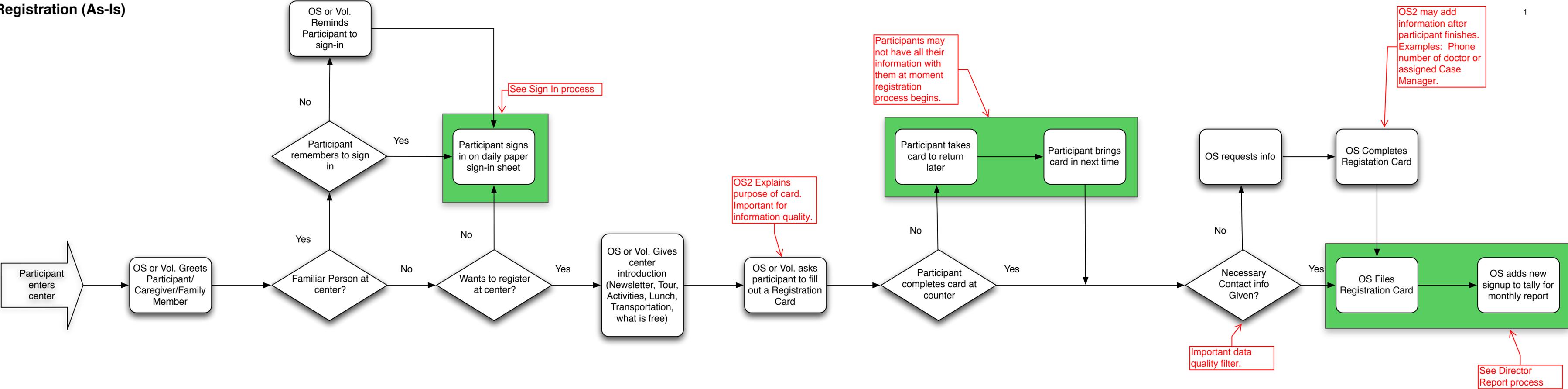
As a participant senior enters the Senior Center, they are greeted by OS2 staff member or volunteers who sit at the reception desk. The OS2 takes a number of steps to identify the participant as familiar to the center or not. If the participant is familiar, meaning they are registered, they follow the normal sign in process (documented in detail in a separate diagram).

If the participant is not registered, the OS2 will take the participant through a conversation that serves as an orientation to the center. This orientation includes an explanation of the registration card and its purposes: to assist center staff in the event of an emergency and to assist with operations of the center. Center staff have noted that participants may resist providing all of the necessary information, and the above explanation is important.

The participant takes the paper card and either fills it in at the desk or they may take it home with them in the case they do not have all of the required information handy. When the participant hands over the card, the OS2 checks the card for completeness. This is an important data quality filter. If the card is not complete or is incorrect, the OS2 requests more information from the participant. Sometimes the participant can provide enough information to allow the OS2 to finish completing the card. For example, the participant may say Kaiser Permanente is their health care service. The OS2 may lookup the phone number for Kaiser for the participant. In some cases, the OS2 also adds additional information to the card to help with center operations. For example, they may add name of the center Case Manager if the participant is a client for these services.

When the card is complete, the OS2 files the card alphabetically in a box of registration cards near the front reception desk. The OS2 manually adds a mark to the tally of new participants. This is a running tally kept during the month and is used for end of month performance reporting (report process is documented in a separate diagram).

Registration (As-Is)



Areas for improvement marked in green.

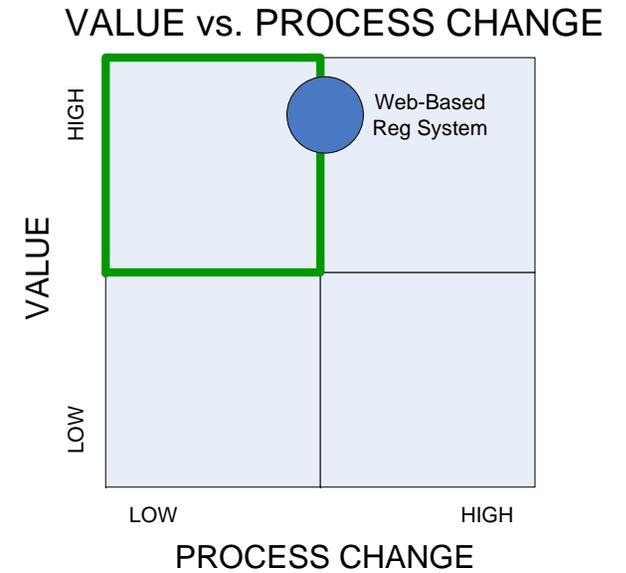
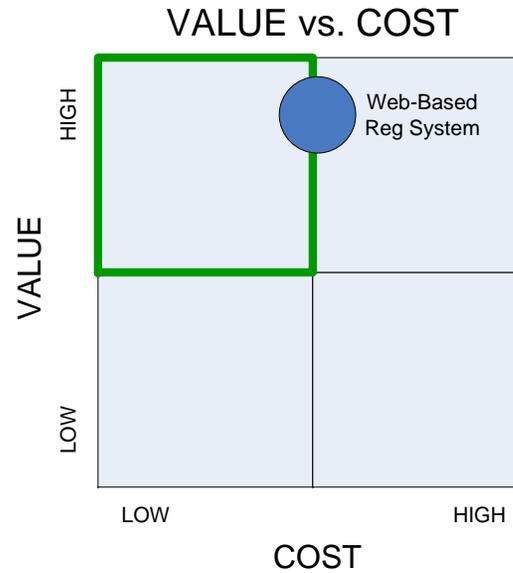
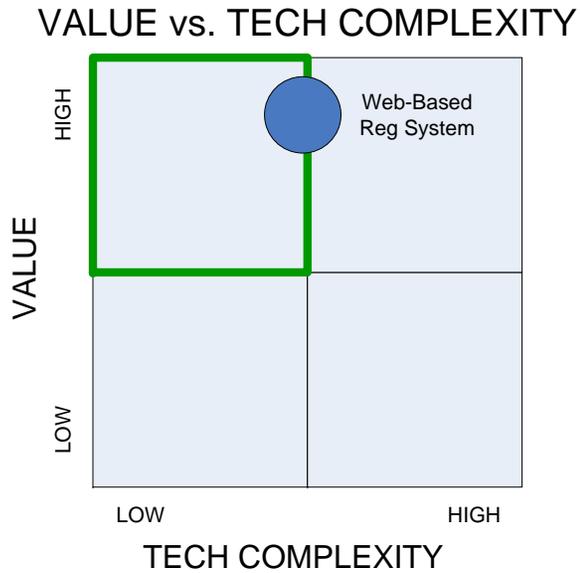
Process Improvements - Registration

Process	As-Is Activities Involved	Problem/Opportunity	Proposed Change	Value	Tech	Cost	Level of Change
<i>Name of processor sub process</i>	<i>list</i>	<i>describe</i>	<i>describe</i>	<i>low, medium, high</i>	<i>no, low, high difficulty</i>	<i>low, medium, high</i>	<i>low, medium, high</i>
New Registration Process Improvements	Take card and return later	At the time of registration, some participants do not have all of their information with them and must take the card home to finish filling it out. The participant must bring the card back in to the center a few days later to hand over. There is an opportunity to allow participant to access their registration information through a self-service interface and edit/update their registration information at home using the internet.	An externally accessible (outside City of Berkeley network) website will be made accessible to participants. Participants will add, edit and delete information from their profile.	Medium - Self service reduces cost of data entry, adds some convenience to participant.	Medium - Use standard in-house software tools, scale and availability of the system are not critical but normal.	Medium - Standard software and in-house skills.	High - A large amount of education of participants anticipated.
	Brings card in next time	This activity may be avoided if participant uses self-service interface above.	See externally accessible website above.	Medium	Medium	Medium	High
	File registration card	With the cards stored in a small metal file cabinet in each center, it is difficult for a staff member at one center to know if someone is already registered at a different center. However, electronic storage of registration would allow centralized storage of information and potentially faster retrieval.	COULD-BE There will be an entry in the database for each participant. An interface will enable immediate retrieval of the necessary information.	High - Affects all participants in the ASD, the basis for revenue generation through grant funding.	Medium - Use standard in-house software tools, scale and availability of the system are not critical but normal.	Medium - Standard software and in-house skills.	Medium - Some staff training required.
	Add new sign up to tally for monthly report	Post-it note is not scalable and may get lost. Names are not recorded so you do not know who are new members. A welcome program of communication to new participants would require this information.	COULD-BE (Same scenario as above.) Each entry of a new participant to the database will automatically include the start date. A simple query of the database at the end of each month will generate the names / number of new participant for that month.	High	Medium	Medium	Medium

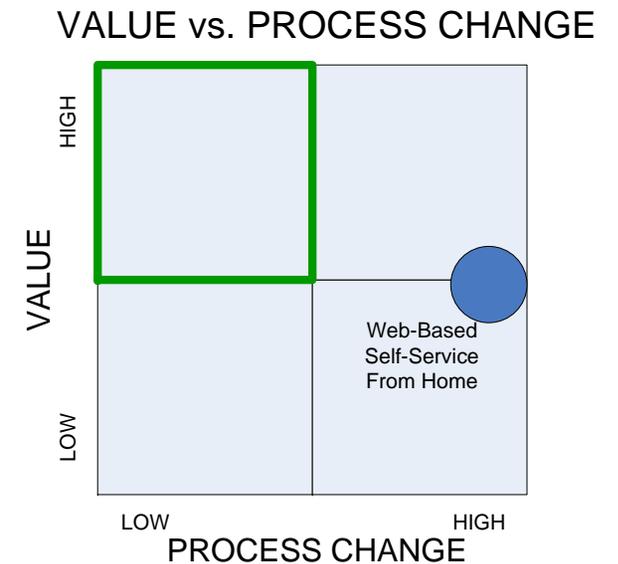
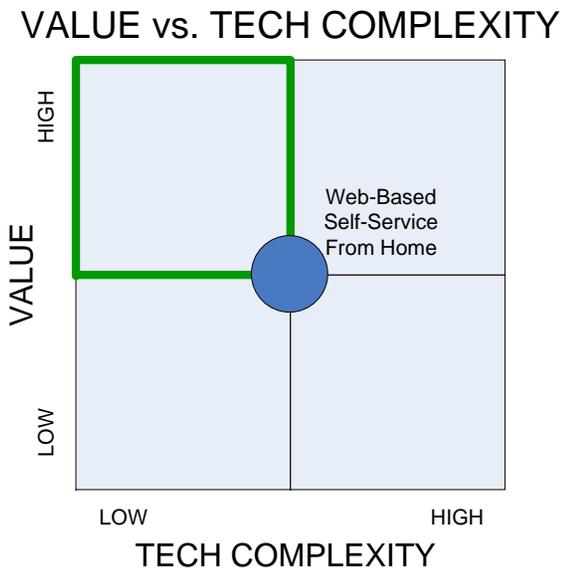
Process Improvement Comparisons - Registration

Web-Based Registration System with Database, ASD Staff Use Only
Represented as a COULD-BE Scenario

Note: Top left box (in bold outline) is considered the “best case scenario” among the three comparisons. This box represents HIGH VALUE and LOW TECH COMPLEXITY, COST or PROCESS CHANGE. These criteria are defined in the section “Process Improvement Criteria Definitions”.



Extension to Above System: Web-Based Participant Registration Self-Service From Home
NOT YET Represented as a COULD-BE Scenario



Registration (Could-Be) Process

Scale of Process

- Estimated 4,500 existing participants.
- Estimated 50 new seniors registered a month.
- Registration happens once, but periodic drives are needed to update medical information and emergency contacts.
- Digitizing, or entering data from each card in a system takes an estimated 3 minutes per card.

Could-Be Process Narrative

As a participant senior enters the Senior Center, they are greeted by OS2 staff member or volunteers who sit at the reception desk. The OS2 takes a number of steps to identify the participant as familiar to the center or not. If the participant is familiar, meaning they are registered, they follow the normal sign in process (documented in detail in a separate diagram)

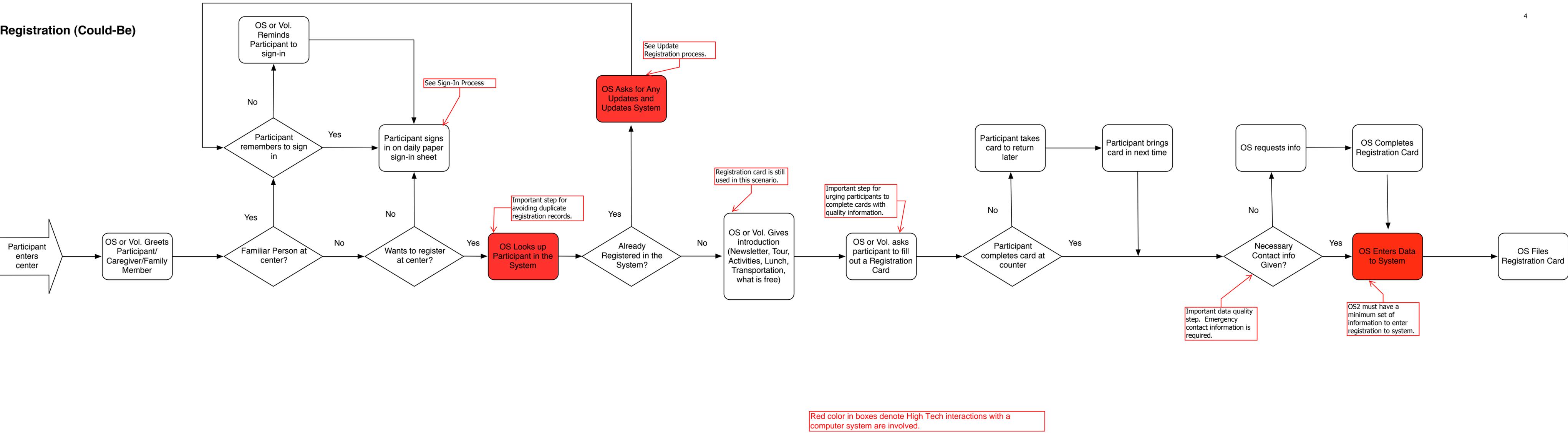
If the participant is not registered, the OS2 will ask for the participant's name and search for them in the registration system. This is important for avoiding duplicate registration entries. If the participant is already in the system, the OS2 will ask the participant if any of their contact or medical information has changed and will update the system accordingly (see Update Registration process for details).

If the participant's name is not listed in the system, the OS will take the participant through a conversation that serves as an orientation to the center. This orientation includes an explanation of the registration card and its purposes: to assist center staff in the event of an emergency and to assist with operations of the center. Center staff have noted that participants may resist providing all of the necessary information, and the above explanation is important. (In this scenario the paper card is still used but its purpose is limited to serve as temporary storage of information on its way to an electronic system.)

The participant takes the paper card and either fills it in at the desk or they may take it home with them in the case they do not have all of the required information handy. When the participant hands over the card, the OS2 checks the card for completeness. This is an important data quality filter. The card must have emergency contact information. If the card is not complete or is incorrect, the OS2 requests more information from the participant. Sometimes the participant cannot provide enough information to allow the OS2 to finish completing the card. For example, the participant may say Kaiser Permanente is their health care service. The OS2 may lookup the phone number for Kaiser for the participant. In some cases, the OS2 also adds additional information to the card to help with center operations. For example, they may add name of the center Case Manager if the participant is a client for these services.

When the OS2 has gathered the minimum amount of information, the OS2 transcribes the information from the card to the electronic information system. The OS2 files the card alphabetically in a box of registration cards near the front reception desk.

Registration (Could-Be)



List Making (As-Is) Process

Scale of Process

There are an estimated 4500 registered participants within the Berkeley Aging Services Division's current registration system. At each of the three centers, the division has scheduled anywhere from 5 to 20 activities per business day, including classes, food service, trips to off-site locations both cultural and related to personal business, social activities, special events, and meetings. Matching up the participants who are interested in the particular activities results in a very large number of possible permutations.

Summary of As-Is Challenges and Opportunities

An important part of the ongoing process of nurturing a strong community within the ASD is maintaining participation levels and attracting new participants. This effort relies on outreach, including telling current and prospective registrants about activities that match their interests.

There is currently a hurdle here because the information is not stored anywhere centralized and retrieval is a labor intensive manual process.

This can be supported by a centralized store of interests and having an accessible way of generating lists of potential participants easily and without that labor. Digitization accommodates this particularly well, due to the added affordances of query based access.

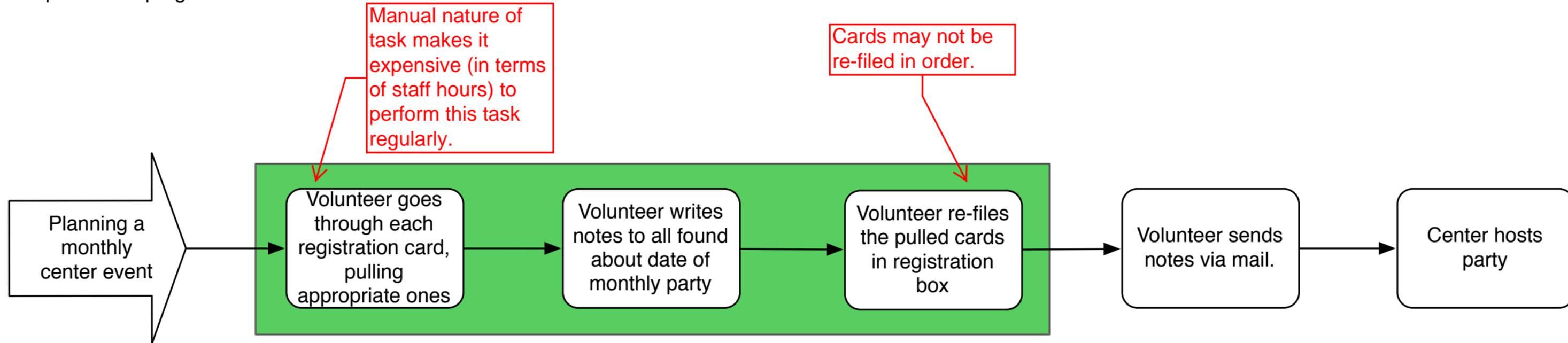
A specific example of list-making can be found in the monthly birthday celebrations held at each center.

As-Is Process Narrative

As May approaches, the West Berkeley senior center staff prepare for the coming month's events, including the Monthly Birthday celebration. In order to generate the list of invitations to registered seniors who were born in May, ASD staff and volunteers have to sort through the registration cards for their center, pulling out each card with a May birth month. After copying the address information off of the card onto envelopes, pre-printed invitations are sent by postal mail. The registration cards then need to then be refiled.

Birthday List (As-Is)

This describes a single event type, however there are other similar events where the determining factor is not birth month, but rather birth year, or another variable, such as eligibility, or past participation in a program.



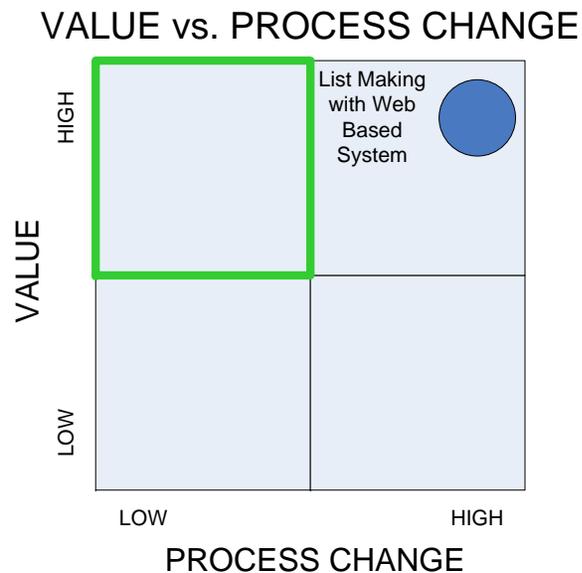
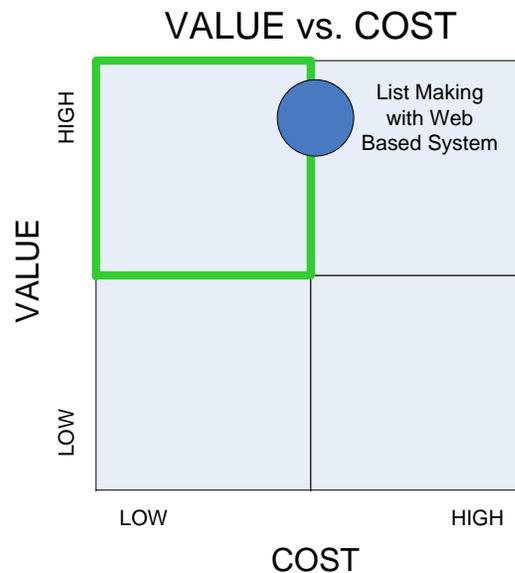
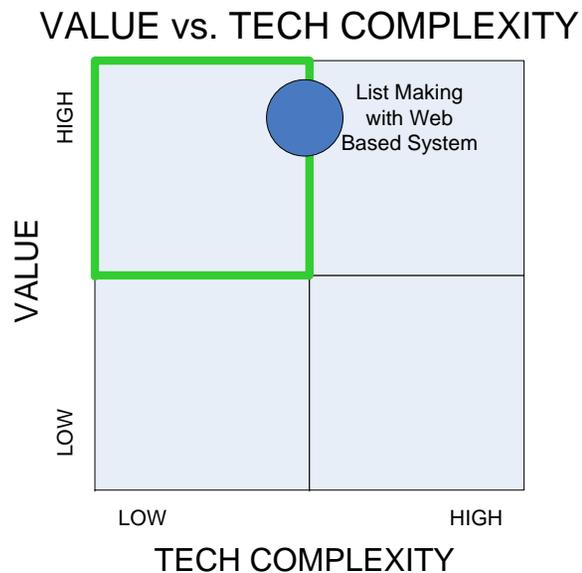
Process Improvements - List Making

Process	As-Is Activities Involved	Problem/Opportunity	Proposed Change	Value	Tech	Cost	Level of Change
<i>Name of processor sub process</i>	<i>list</i>	<i>describe</i>	<i>describe</i>	<i>low, medium, high</i>	<i>no, low, high difficulty</i>	<i>low, medium, high</i>	<i>low, medium, high</i>
Birthday List Process Improvements	Go through each registration card, pulling appropriate ones	Some cards may be missed	COULD BE Retrieving birthday dates from the registration system will ensure that all relevant participants are included in the list. With an electronic system there will be no need to re-file cards.	High - List making supports participant engagement in center activities, an important part of ASD mission	Medium - Standard software, normal scales and availability	Medium - Standard software, in house skills	High - With the new capabilities, this list making business process may grow and involve more staff time. Training of staff required.
	Write notes to all found about date of monthly party	Time consuming	COULD BE Included in above Could Be solution. Printing labels of all participants will save time of writing on envelopes. This function may be performed with MS Office software from a downloaded list of participants.	Medium - Efficient use of staff time	Medium - Standard software, normal scales and availability	Medium - Standard software, in house skills	Medium - Training on label printing required.
	Re-files the pulled cards in registration box.	Order may not be restored	COULD BE Included in above Could Be solution. With an electronic system there will be no need to re-file cards	Medium - Efficient use of staff time	Medium - Standard software, normal scales and availability	Medium - Standard software, in house skills	Low - Little will change for the business process as currently few lists are made.

Process Improvement Comparisons – List Making

List Making with Participant Information Stored in Web-Based System
Represented as a COULD-BE Scenario

Note: Top left box (in bold outline) is considered the “best case scenario” among the three comparisons. This box represents HIGH VALUE and LOW TECH COMPLEXITY, COST or PROCESS CHANGE. These criteria are defined in the section “Process Improvement Criteria Definitions”.



List Making (Could-Be) Process

Scale of Could-Be

We observed a variety of sub-communities with shared interests among the Berkeley ASD participants. Our proposed scenario includes functionality for capturing information about registrant's interests, having some pre-built queries for particular lists which are going to be used often, and documenting the process of how to add more as the system and needs evolve. Division wide, there may be 20-40 targeted outreach efforts per month. This "could-be" reduces the difficulty of each one of those. A list may have 10's of people or it may have 100's of people. As email addresses are also captured, and continue to diffuse into the population the ASD serves, there is an opportunity to use that medium as opposed to the postal service.

Could-Be Process Narrative

Using the proposed system, to generate the May birthday invitation list a staff member would go into the web based system, find the list builder interface for the birthday lists, select the month of interest and the center, and then perform the query. The system would return a list of members for review as well as participation at events and offer the ability to print mailing labels for those in the found set. There are no cards to sort through or refile, and the time it takes to send off would be greatly reduced.

In addition to the typical registration information, a number of different flags are available to be checked in a person's electronic record, set either when they initially register or updated at a later time. These interests might include things like wanting to be alerted about upcoming casino trips, free legal consultation session, particular classes or transportation services.

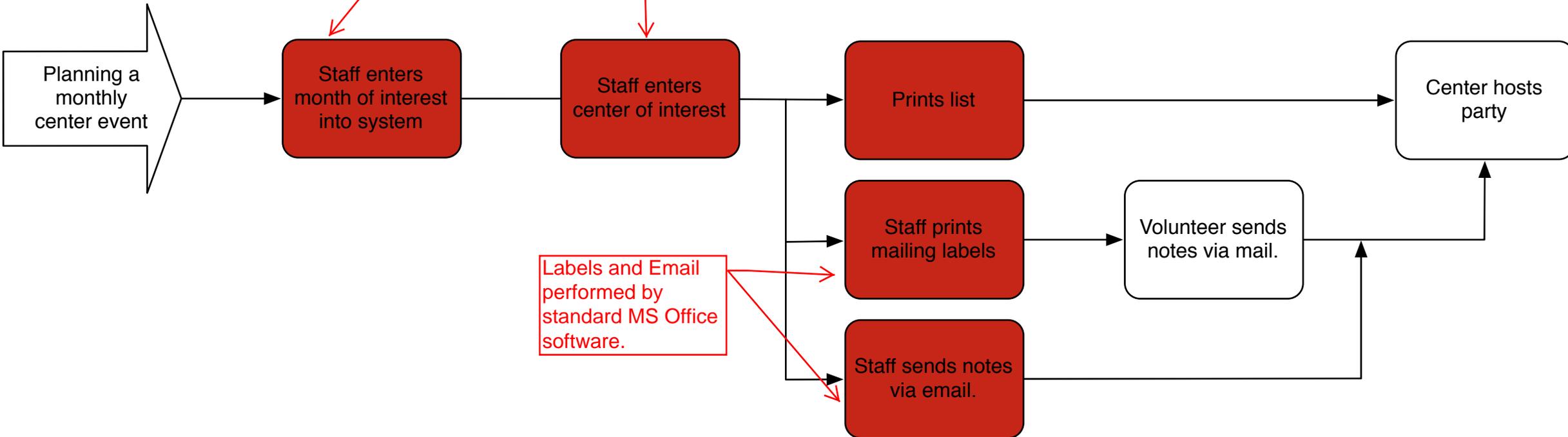
Lists could also be generated for general interests activities open to participants from any center, not something that can currently be accommodated without lots of coordination.

Birthday List (Could-Be)

This describes a single event type, however there are other similar events where the determining factor is not birth month, but rather birth year, or another variable, such as eligibility, or past participation in a program.

Other variables for selecting participants must exist in the database that supports the web-based system. These variables are likely populated by the Registration and Sign In Processes.

Labels and Email performed by standard MS Office software.



Emergency (As-Is) Process

Scale of Process

Some seniors experience medical emergencies while they are visiting the center. The frequency varies across the center, from 1-2 per month (North) to 3-4 per month (West). Although not very frequent, medical emergencies require fast response and retrieval of the participant's registration card where medical information and emergency contacts are listed. The center notifies the emergency contacts, and it is essential that the paramedic received the medical information.

Summary of As-Is Problems and Opportunities

There are several problems associated with the current As-Is process. First, the activity of manually searching the box for participant's registration cards is time consuming, especially if a card had been put in in the wrong order.

Additionally, issues associated with the registration process apply in this case as well: the registration cards box contains cards for inactive participants, and therefore the retrieval process is unnecessarily prolonged. An unknown number of participants are not registered and therefore a search may end without retrieving the required information. Some participants are registered in one center only but experience the medical emergency while in another, in which case information can not be retrieved.

Electronic storage of the registration information would allow easy and fast retrieval of the necessary information when an emergency occurs in any of the three centers, regardless of which center the participant visits the most.

Process Narrative

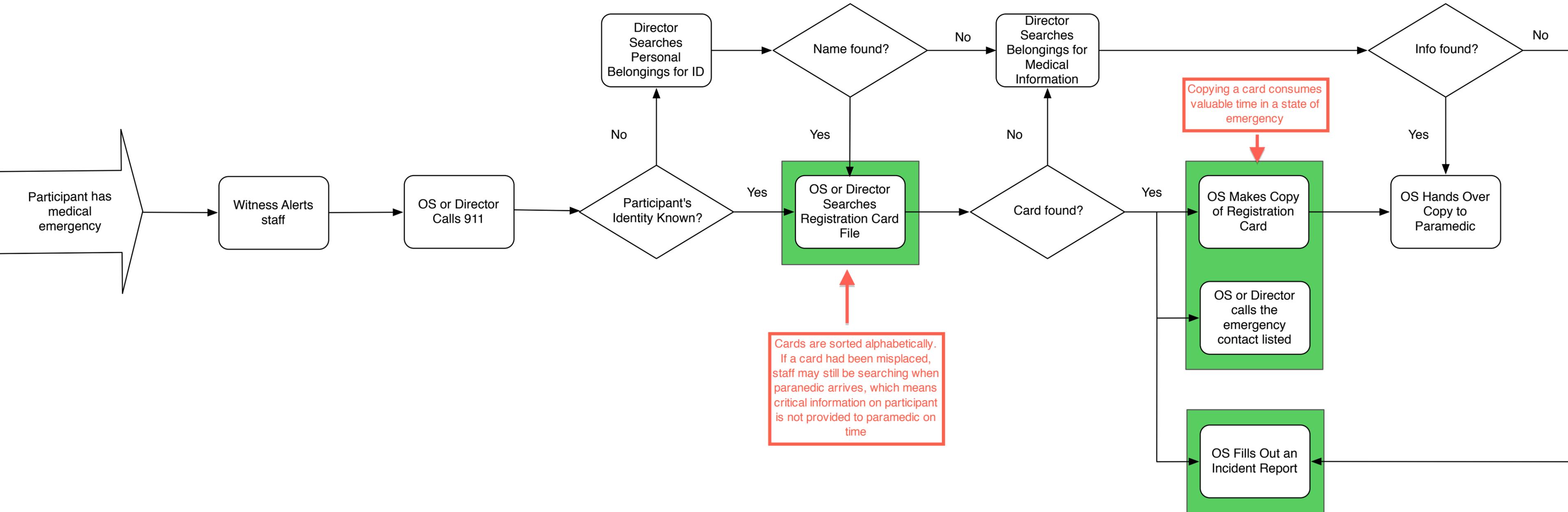
A participant experiences a medical emergency at one of the centers and it is noticed by another participant, volunteer or staff. The person witnessing the event notifies the staff, either the OS and or the center director, or volunteers sitting at the front desk. The staff person (OS or Director) calls 911 and reports the emergency. After calling 911, the process proceeds depending on whether the participant is familiar, meaning they are registered , or unfamiliar, meaning they are not registered.

If the participant is familiar, staff searches the registration cards box near the front reception desk for the participant's emergency card. If a registration card is found, staff makes copy of the registration card (which lists all medical information essential to the paramedic), calls the emergency contact persons listed on the card, and hands over the copy of the card to the paramedic upon arrival. If a registration card is not found, center director searches belongings for medical information and provides whatever information found to the paramedic upon arrival.

If the participant is unfamiliar, meaning they are not registered, center director searches belonging for ID. If a name is found, staff searches the registration card box, just in case the participant is registered. If a card is found, staff follows the same route as with any registered participant. However, if a name is not found, as often is the case with unfamiliar participants, director searches belongings for medical information and provides whatever information found to the paramedic upon arrival.

In all cases, staff fills out an incident report.

Emergency (As-Is)



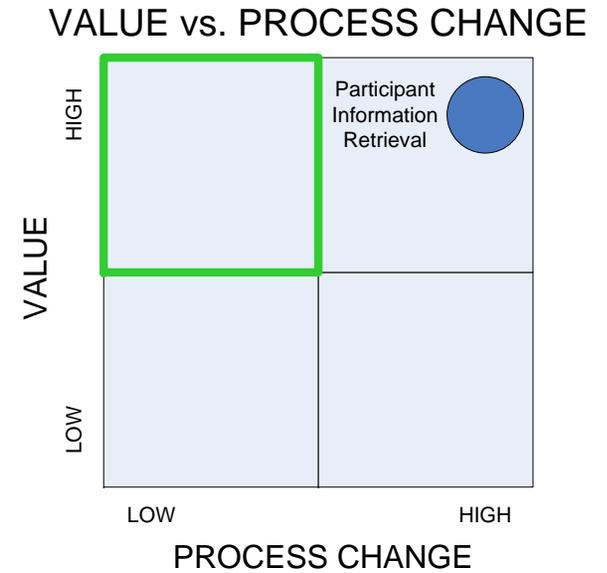
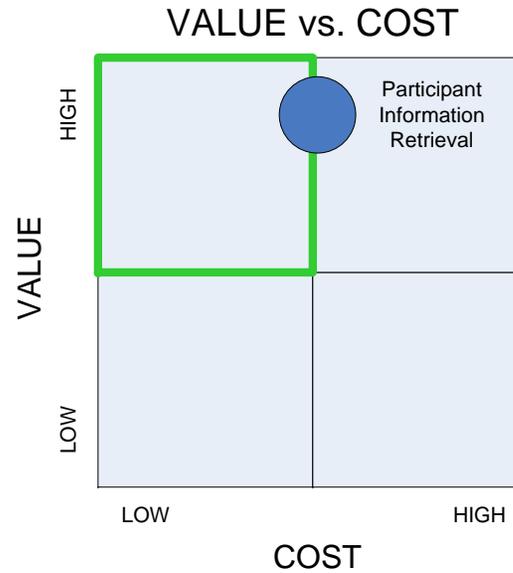
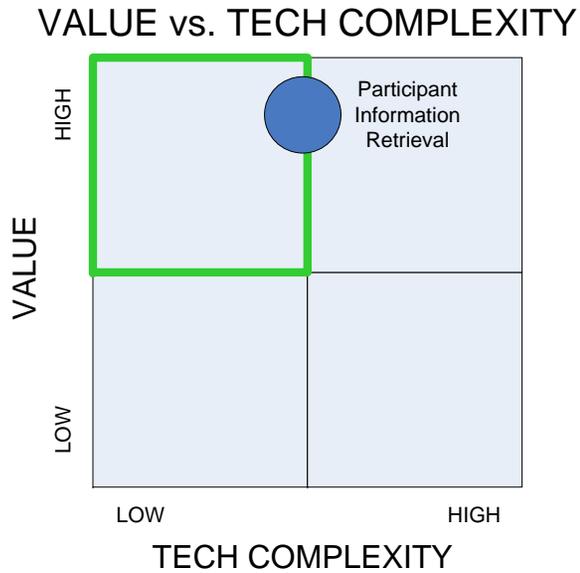
Process Improvements: Emergency

Process	As-Is Activities Involved	Problem / Opportunity	Proposed Change	Value	Tech	Cost	Level of Change
<i>Name of processor / sub process</i>	<i>list</i>	<i>describe</i>	<i>describe</i>	<i>low, medium, high</i>	<i>no, low, high difficulty</i>	<i>low, medium, high</i>	<i>low, medium, high</i>
Emergency Process Improvements	Search card file for registration card	<p>-In an emergency situation, getting a copy of the registration card as soon as possible in time to hand over to paramedic is crucial. Cards are sorted alphabetically. However, if for some reason a card is misplaced, it could take longer time to find.</p> <p>-2 out of 3 centers have a secondary storage area of cards. if the card is not located in the default location, staff would need to look at the secondary location.</p> <p>-If participant is not registered, valuable time is wasted looking for the card instead of searching participant's belongings or asking case manager.</p>	<p>COULD-BE</p> <p>Registration card will be replaced by entries into the database. When an emergency occurs, the OS / volunteer will search for the participant's name and most up-to-date information will be retrieved, no matter which center participant is at.</p>	<p>High: retrieval of emergency information will be immediate in all three centers, no matter where participant originally registered. Critical time will not be wasted on searching cards, emergency contacts will be contacted sooner, and medical information will be available for paramedic upon arrival.</p>	<p>Medium: Use standard in-house software tools, scale and availability of the system are not critical but normal.</p>	<p>Medium: Standard software and in-house skills / a part of the registration system</p>	<p>High: staff will no longer have to spend time searching for cards and copying. Registered participants will always have their emergency report retrievable within seconds, without the chance of "lost card". Staff training on retrieval process will be essential.</p>
	Call emergency contact listed	Emergency contact information on registration card may be outdated, even if updated on the card in another center	<p>COULD-BE</p> <p>Emergency contact information will be a field (s) in the database and therefore any update made a one center will be immediately accessible to all centers. No additional update necessary.</p>	<p>High: participants' emergency contact information will be accessible in any of the three centers, regardless of where they originally registered.</p>	<p>Medium: Use standard in-house software tools, scale and availability of the system are not critical but normal.</p>	<p>Medium: Standard software and in-house skills / a part of the registration system</p>	<p>High: registered participants' emergency contact information will be accessible in a case of medical emergency</p>
	OS Makes copy of Registration Card	<p>The copy of the original card has the potential to be varying degrees of legible.</p> <p>The opportunity with a networked database is to print a report, customized for the needs of the first responders</p>	<p>COULD-BE</p> <p>Have report based information sheet as opposed to copying a paper artifact</p>	<p>High: Affects all participants experiencing emergencies. Printed emergency report will be done quicker and easier to read, all ensuring the paramedic receives and can understand critical information on participant's health situation</p>	<p>Medium: Use standard in-house software tools, scale and availability of the system are not critical but normal.</p>	<p>Medium: Standard software and in-house skills / a part of the registration system</p>	<p>Medium: staff will save significant time by one click replacing photocopying activity. Staff training on printing functionality may be required.</p>
	Fill out incident report	Information taken from registration card as input to incident report may be outdated	A last updated field in the database will enable alerts to the staff to keep data up to date.	<p>Medium: Assists staff in verifying details for incident report.</p>	<p>Medium: Standard software and in-house skills / a part of the registration system</p>	<p>Medium: Standard software and in-house skills / a part of the registration system</p>	<p>Medium: staff will be able to verify dates and details of emergency incidents for purpose of filling out incident report</p>

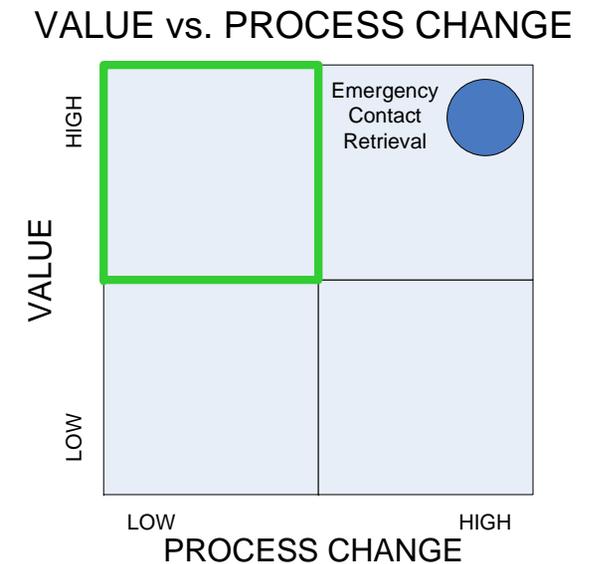
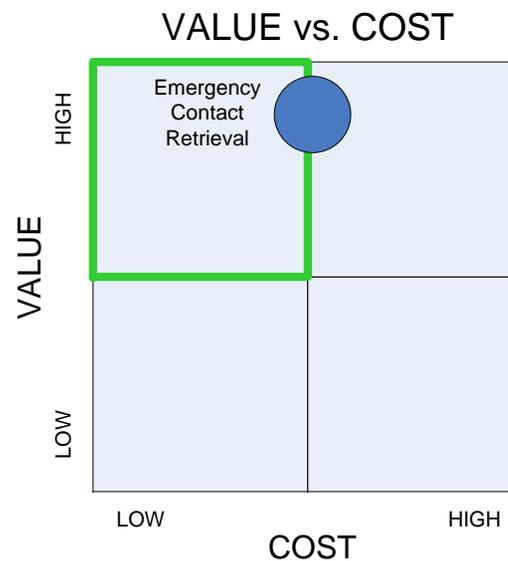
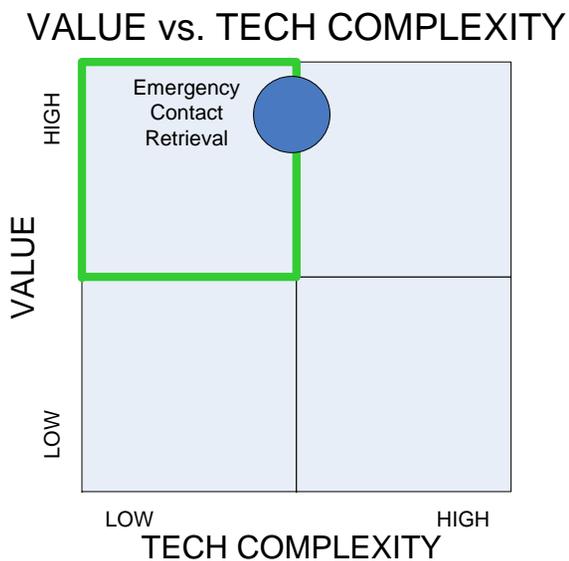
Process Improvement Comparisons - Emergency

Participant Information Stored in Central Database for Fast Retrieval
Represented as a COULD-BE Scenario

Note: Top left box (in bold outline) is considered the “best case scenario” among the three comparisons. This box represents HIGH VALUE and LOW TECH COMPLEXITY, COST or PROCESS CHANGE. These criteria are defined in the section “Process Improvement Criteria Definitions”.



Emergency Contact Information Stored in Central Database for Fast Retrieval
Represented as a COULD-BE Scenario, Extension of Above Scenario



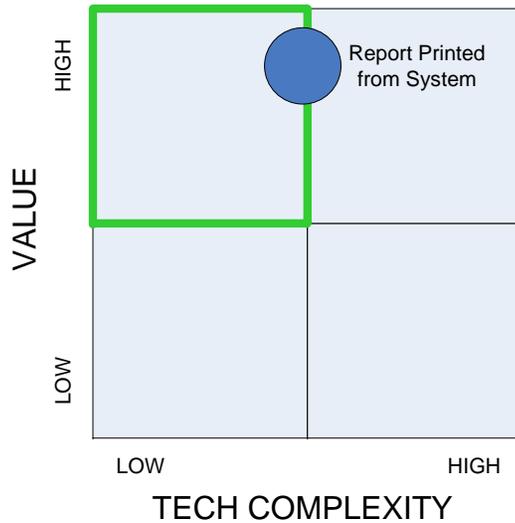
Process Improvement Comparisons - Emergency

Report-based Emergency Sheet (Sheet is printed from system.)

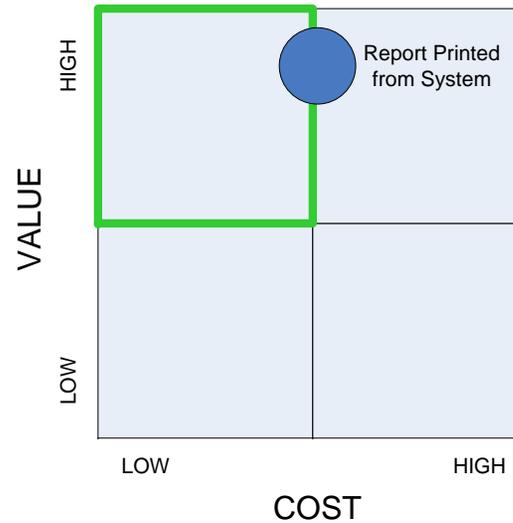
Represented as a COULD-BE Scenario, Extension of Above Scenario

Note: Top left box (in bold outline) is considered the "best case scenario" among the three comparisons. This box represents HIGH VALUE and LOW TECH COMPLEXITY, COST or PROCESS CHANGE. These criteria are defined in the section "Process Improvement Criteria Definitions".

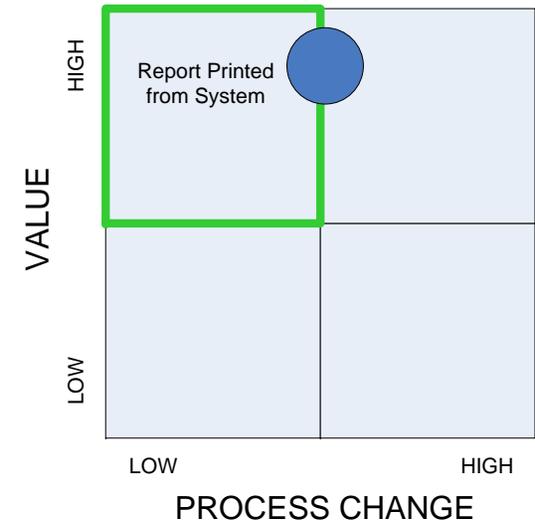
VALUE vs. TECH COMPLEXITY



VALUE vs. COST



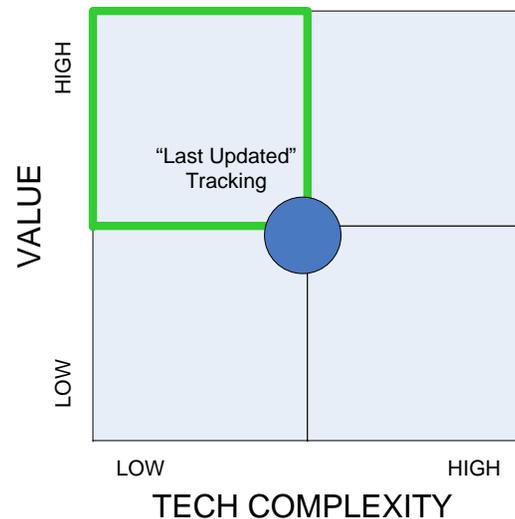
VALUE vs. PROCESS CHANGE



Last Updated Tracking In Database to Keep Data up to Date

Represented as a COULD-BE Scenario, Extension of Above Scenario

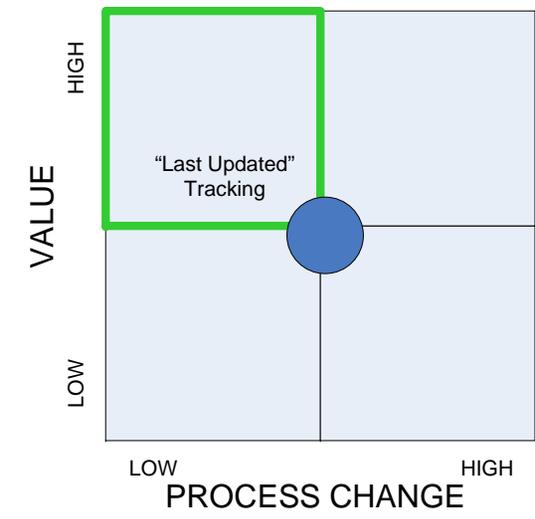
VALUE vs. TECH COMPLEXITY



VALUE vs. COST



VALUE vs. PROCESS CHANGE



Emergency (Could-Be) Process

Scale of Process

Some seniors experience medical emergencies while they are visiting the center. The frequency varies across the center, from 1-2 per month (North) to 3-4 per month (West).

Process Narrative

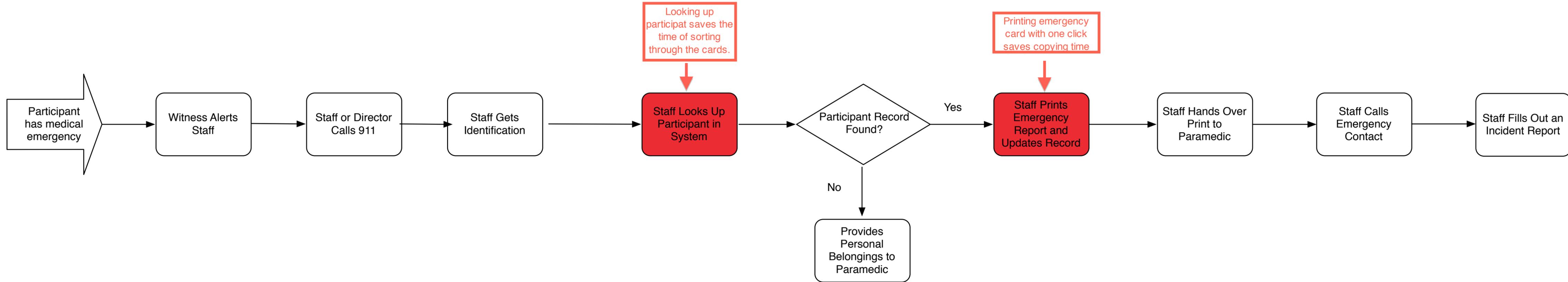
A participant experiences a medical emergency at one of the centers and it is noticed by another participant, volunteer or staff. The person witnessing the event notifies the staff, either the OS and or the center director, or volunteers sitting at the front desk. The staff person (OS or Director) calls 911 and reports the emergency. After calling 911, the process proceeds depending on whether the participant is familiar, meaning they are registered , or unfamiliar, meaning they are not registered.

If the participant is familiar, staff looks up participant in the system and prints the participant's emergency report (which lists all medical information essential to the paramedic), calls the emergency contact persons listed on the card, and hands over the printout of the card to the paramedic upon arrival.

If the participant is unfamiliar, meaning they are not registered, center director searches belonging for ID. If a name is found, staff looks up participant in the system, just in case the participant is registered. If a card is found, staff follows the same route as with any registered participant. However, if a name is not found, as often is the case with unfamiliar participants, director searches belongings for medical information and provides whatever information found to the paramedic upon arrival.

In all cases, staff fills out an incident report.

Emergency



Director's Report (As-Is) Process

Scale of Process

The Director's report (Senior Programs Performance Report) is compiled at the beginning of each month by the OS2 at each center to reflect the previous month performance for that particular center. The OS2 at each center sends the report to the OS3 who compiles them together for the Division Director's review. There are 8 different sub-processes that take place before the compilation process of the report can begin. Multiple staff members and class instructors are involved in the process of data collection.

Summary of As-Is Problems and Opportunities

Out of those 8 sub-processes, 4 have dependencies on other individuals other than the OS2 providing data or compiling reports and handing over to the OS2. Those individuals are the Case Managers, driver, and class instructors. The dependency on that information increases the risk for the report not be compiled on time or not include all the required information.

The remaining 4 sub-processes perform activities on data that is related to registration and attendance. The OS2 needs to record average center attendance, number of new registrants, and class attendance and sessions. All these three are calculated manually and are very time-consuming.

Electronic storage of registration information would allow the OS to skip the new participant tally calculation, since the number may be automatically calculated by the system. Weekly input of sign-in sheet to the system would prevent work load at the end of the month. If sign-in sheets include activities at the center, the system would also generate the numbers of class participants and sessions.

Process Narrative

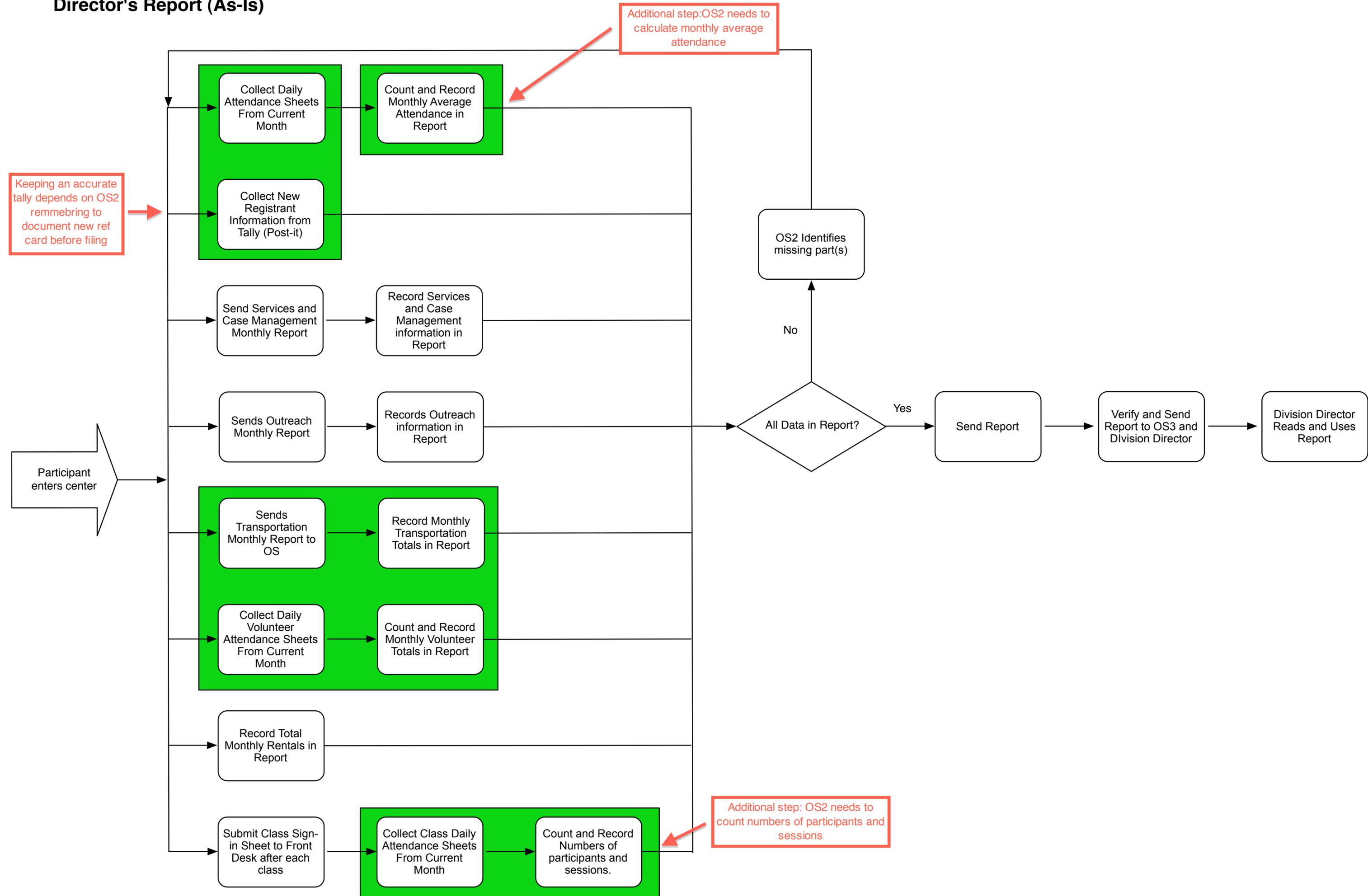
The current process is comprised of 8 sub-processes, each of which culminates in the OS2 recording the data in the Director's report. 3 sub-processes are completed by staff: 3 reports are submitted to the OS by the Case Manager (sub-process 1: services and case management monthly reports, sub-process 2: outreach monthly report) and 1 by the driver (sub-process 3: monthly transportation totals).

1 sub-process is dependent on class instructors to initially submit sign-in sheets to the front desk, based on which the OS2 counts and records the number of participants and sessions in the final report (sub-process 4).

The remaining 4 sub-processes are dependent only on the OS2. The OS2 collects the attendance sheets from the entire month, and counts and records the monthly average attendance (sub-process 5). The OS2 also calculates the new participant tally, which they keep at their desk and update each time a new registration card is filled out (sub-process 6). The OS2 copies total rentals based on reports they previously prepared (sub-process 7). Finally, the OS2 uses the volunteer sign-in sheets to calculate monthly volunteer average (sub-process 8).

Following the report compilation, the OS2 verifies that all required information is included in the report, and sends it to the center Director. After reviewing the report, the center Director sends the report to the OS3, who submits it to the Division Director for review.

Director's Report (As-Is)



Process Improvements - Directors Report

Process	As-Is Activities Involved	Problem/Opportunity	Proposed Change	Value	Tech	Cost	Level of Change
<i>Name of processor sub process</i>	<i>list</i>	<i>describe</i>	<i>describe</i>	<i>low, medium, high</i>	<i>no, low, high difficulty</i>	<i>low, medium, high</i>	<i>low, medium, high</i>
Directors Report Process Improvements	Daily attendance, volunteer, and class attendance reporting activities.	Since the OS2 counts attendance one time at the end of the month and records the total for the month, the daily and weekly totals are not recorded in excel, they are used only on paper in the process of recording the total. Names of attendees are not recorded in excel either. Therefore, the demographic attributes that participants have can not be linked to attendance statistics. The many data entry steps in the process introduces inaccuracies in the reports.	Low Tech: Record the daily counts into excel and then add up the weekly and monthly counts from this lower level of detail.	Low - Only frequency of data is improved.	Low	Low	Medium - OS2 would count more frequently
	Daily attendance, volunteer, and class attendance reporting activities.	see above	COULD-BE Medium Tech: Attendance and activity data will be stored in a web-based system with database. Pre-defined reports can provide key metrics for ASD performance.	High - Improved report accuracy. Can associate participant's attendance to their demographics, which is helpful for grant funding.	Medium - Web-based system, data stored in database, report development.	Medium - Standard software is expected to have "normal" cost.	Medium - OS2 would require training on creating reports in the new system.
	New Activity: Directors/ Administrators view graphical visualization in the system on a daily basis	The Directors report is static and is prepared monthly. Center Directors and Administrators use the current report for measuring center performance. However, this report is not as useful for the day to day management of the centers or the ASD.	A report that is updated automatically on a daily basis can provide Center Directors and ASD Administrators with a fast snapshot of their operations. These reports, often called dashboards, are helpful for managers who do not have time to generate new reports manually every day. This can be a helpful tool for organizations who would like to ease the transition toward a more metric-oriented culture of management.	Medium - Automatic reporting is convenient to directors and administrators in the backoffice.	Medium - Standard reporting tools and skills exist in City.	Medium - Standard software is expected to have "normal" cost.	Medium - Center directors and administrators would have training on use of dashboard.

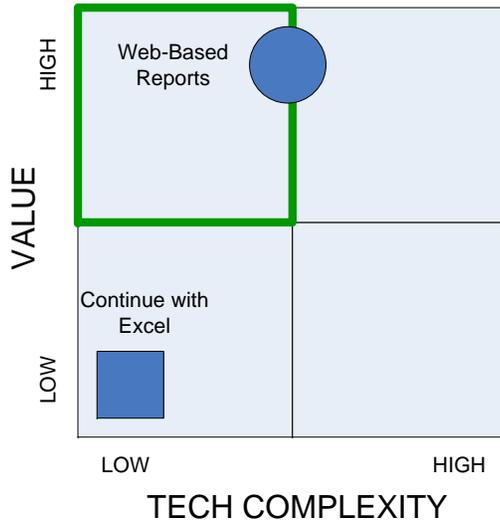
Process Improvement Comparisons – Directors Report

Reporting Scenarios

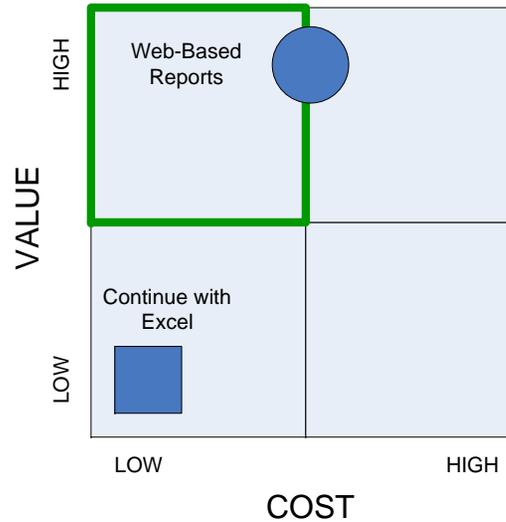
Represented as one COULD-BE scenario, the Web-Based System scenario

Note: Top left box (in bold outline) is considered the “best case scenario” among the three comparisons. This box represents HIGH VALUE and LOW TECH COMPLEXITY, COST or PROCESS CHANGE. These criteria are defined in the section “Process Improvement Criteria Definitions”.

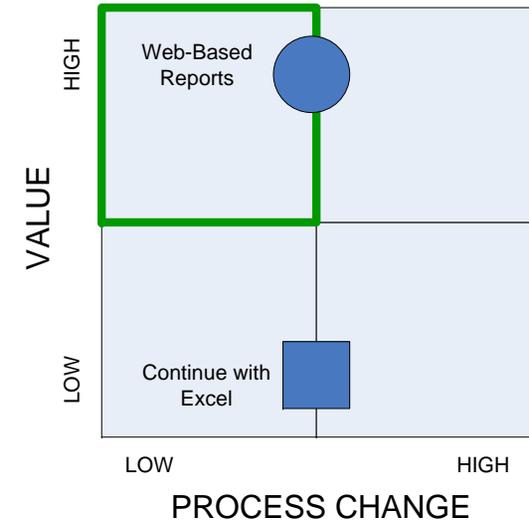
VALUE vs. TECH COMPLEXITY



VALUE vs. COST



VALUE vs. PROCESS CHANGE



Legend



Continue use of excel only with more frequent reports



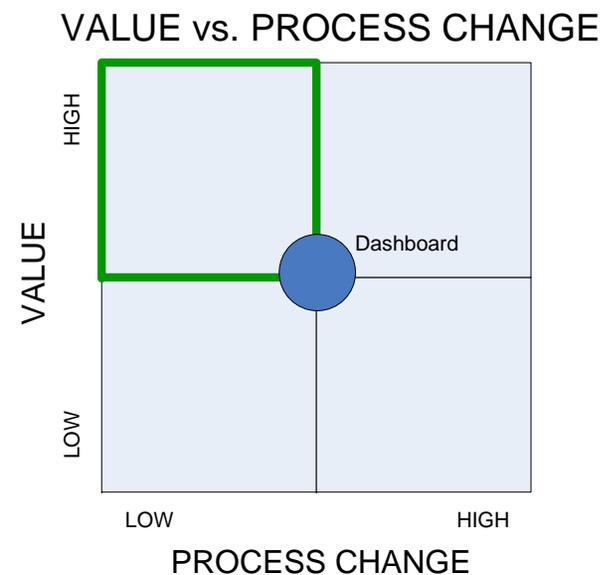
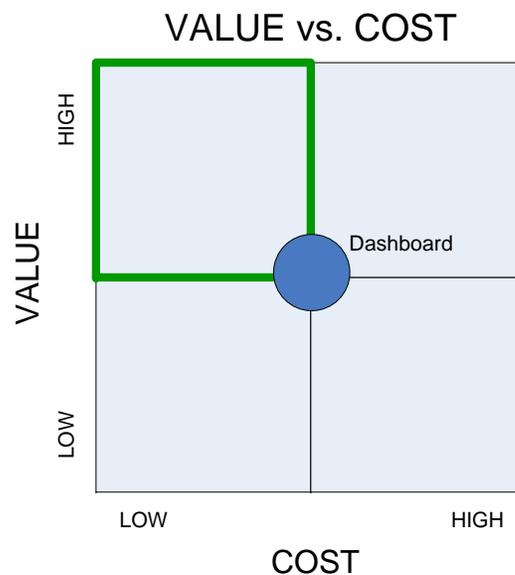
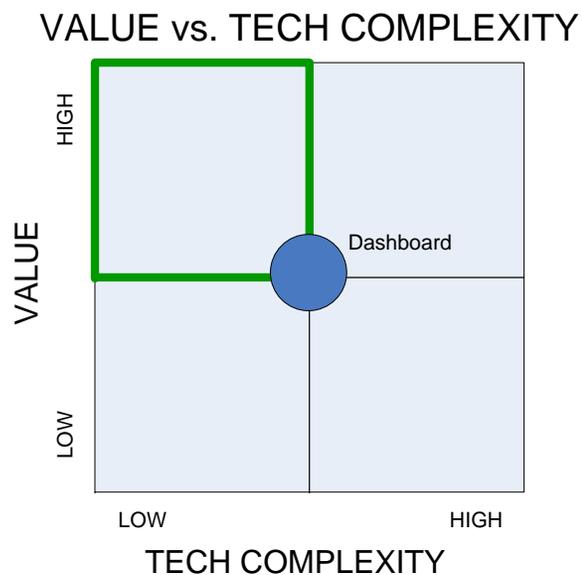
Pre-Defined reports in Web-Based System

Process Improvement Comparisons – Directors Report

Reports and Graphical Visualizations Updated Daily (Dashboard)

NOT YET Represented as a COULD-BE Scenario, Possible Extension of COULD-BE

Note: Top left box (in bold outline) is considered the “best case scenario” among the three comparisons. This box represents HIGH VALUE and LOW TECH COMPLEXITY, COST or PROCESS CHANGE. These criteria are defined in the section “Process Improvement Criteria Definitions”.



Director's Report (Could-Be) Process

Scale of Process

The Director's report (Senior Programs Performance Report) is compiled at the beginning of each month by the OS2 at each center to reflect the previous month performance for that particular center. The OS2 at each center sends the report to the OS3 who compiles them together for the Division Director's review.

There are only 5 sub-processes that take place before the compilation process of the report can begin. Multiple staff members, but no class instructors are involved in the process of data collection.

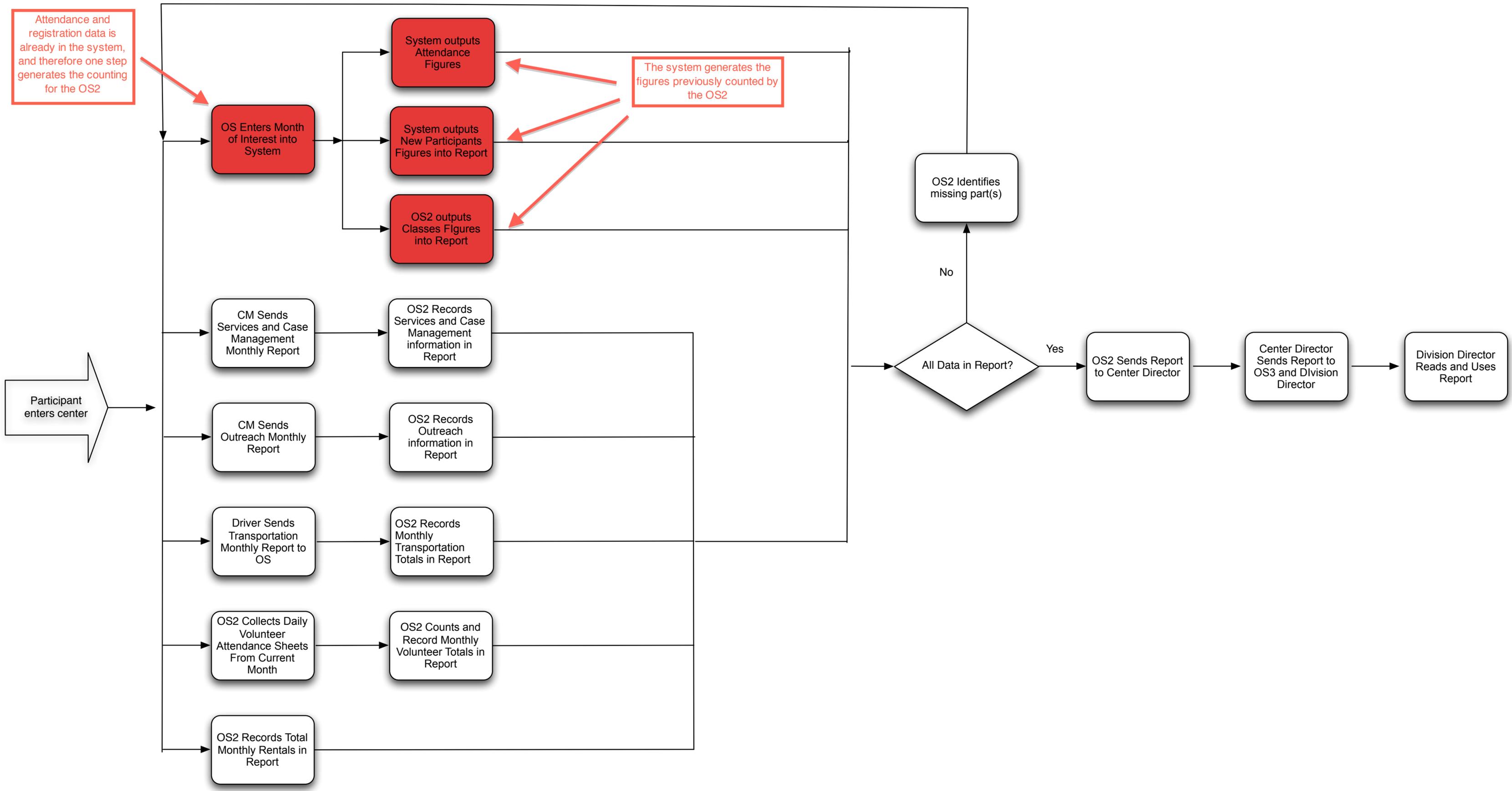
Process Narrative

In the Could-Be scenario, no change is introduced to five of the sub-processes from the As-Is situation: the Case Manager and the Driver continue to compile their reports. The OS2 continues to count monthly volunteer totals and record monthly rentals. (See As-Is Process Narrative)

The registration, sign-in and class participation sub-processes change significantly. Assuming that the new Could-Be registration and sign-in processes are in place, attendance figures, classes figures, and count of new registrants can be retrieved from the system. To do that, the OS2 enters the month in to the System, and the system outputs the desired figures into the Director's Report.

Since 5 of the 8 sub-processes are not supported by the system, the OS2 needs to record the figures reported sub-processes by those into the report. After verifying that all required information is included in the report, the OS2 sends the report to the center Director. After reviewing the report, the center Director sends the report to the OS3, who submits it to the Division Director for review.

Director's Report Could-Be



Appendix B: Process Improvement Criteria

Process Improvement Criteria Definitions

Value

Value means the level of business value. This is the benefit the sponsoring customer or business unit receives from the solution. It may be in the form of financial benefit or intangible benefits (e.g. customer satisfaction). In city government, the value is often found in improvements to services to city residents. A "HIGH" value solution either has a large scope, meaning a large number of participants can receive the benefit, or if the scope is smaller, the solution provides a large benefit to each participant. A "MEDIUM" or "LOW" value solution may have a lesser degree of benefit to participants. These lower level labels may also apply to solutions that do not benefit the "core" business (that is, the principal services that the ASD provides) and instead supports peripheral processes, for example, back office support such as reporting, accounting, email communications or data entry.

Tech Complexity

Tech means the level of complexity in developing the technology. The development complexity depends on: 1) the current technology environment that the City IT Department manages and 2) the required architecture for the new solution. The current IT environment includes the standards that IT department has already established and the skill set of the existing staff. Berkeley IT has standardized on Microsoft SQL Server database software, Microsoft's .NET web-based architecture software, and has developed skills in writing software applications in the Java language. The architecture can be described in terms of the configuration of the computer software, hardware and network environment, for example, the solution may be web-based or installed on client PCs. The scale and availability of the system are also important considerations. The larger the scale and the higher the availability of the system, the more complex the architecture. The "HIGH" Tech criteria, therefore, means there is a high level of technology complexity required that may not be included in the standards or the skill sets of the current environment, or that a high level of scalability or availability would be required. A "MEDIUM" Tech criteria means the technology can be implemented entirely by City IT with their current environment and the scale and availability of the system are not out of the normal range. A "LOW" Tech criteria means the solution can be implemented in large part without the intervention of the IT Department.

Cost

Cost of the solution is the overall monetary cost of implementing the solution and maintaining the technology over a specified time period, usually three to five years. The implementation costs may include software licenses, development labor costs, hardware costs, and network costs. The maintenance costs may include ongoing software license fees to pay for outside customer service and IT labor costs. A "HIGH" Cost solution is a solution with high software license fees, requires special new hardware, has high development costs or is expensive to maintain. A "MEDIUM" cost solution may include use of software that the IT Department has standardized on to develop a solution in-house. Because specialized skills are not needed, the development costs are expected to be normal and license fees are bought "in bulk" as they are used for other solutions in the City. A "LOW" Cost solution is one where existing software and hardware can be leveraged to a new application, and little to no development is required.

Process Change

Change means the level of change the sponsoring customer or business unit with encounter in its business processes after implementing the solution. A new technological solution may introduce new activities into a business process or eliminate others. Staff members with responsibilities for these activities may not welcome new activities or the elimination or change of their tasks, especially tasks that are important to their role in the organization. A "HIGH" level of Change is one where the activities of a large number of staff members are affected or some employees are affected to a large degree. A large amount of training and communications may be needed. The changes may lead to adding or reducing personnel. A "MEDIUM" level of Change is one where the activities of the staff are changed but, on balance, any changes do not have a significant affect on the overall business process. Some staff training may be needed. A "LOW" level of Change means staff activities are almost unaffected and little training or communication with staff is required.

Appendix C: Task Analysis

Berkeley Seniors Project – Qualitative Assessment/Task Analysis

Noah Kersey

TEAM MEMBERS AND ROLES

This report represents four interviews and a number of observations and volunteering experiences. The first two interviews included the entire final project group, four members, and the second two interviews were conducted in pairs. Noah did further observation in a computer class, a lunchtime meal, and a community town hall meeting. Noah drafted this report.

The focus of our final project is on the information systems for the City of Berkeley's Division on Aging. The project involves a great number of relationships already in place, and our challenge is to first chart the existing landscape, then situate and scope our intervention.

DESCRIPTION OF USERS

Division Manager

Responsible for overseeing three senior centers, along with the other services the division provides such as the Meals on Wheels program. Center directors report to them, and they submit a variety of reports to the city, county and state. They are responsible for the budgeting, and are the main person concerned with looking for funding opportunities, external grants for example, to supplement the money that the city provides. They would not be inputting information into the system directly but are interested in querying it for analysis and management purposes.

Director

The director is responsible for overseeing a single center's day-to-day operations, dealing with personnel, facilities, and activities. This user seems to do everything once and a while, and so while they would not typically be entering new clients into the system, it may happen. They are responsible for reporting to the division manager, and those reports typically contain numbers about usage, (of classes, activities, meals, food vouchers, case manager visits) along with a number of other things. Their interest and likely interaction in the system is most often going to be querying it for reporting purposes, but they may also have to jump in and register a new client, modify a record, or retrieve a record for some specific purpose (perhaps a medical emergency).

Case Manager

Case managers coordinate social services for senior residents of Berkeley. They are the conduit through which information flows from face-to-face interactions with clients to outside agencies (i.e state, county or NGO), health providers, and other staff internally in the form of reports and referrals. They have a dedicated case management system which only the social service staff are allowed access to, which has case records, client history and a log of their utilization, including confidential information protected under a number of different laws, including HIPPA. Only clients who are eligible for social services (the requirements vary but include income, age, disability and location of residence) are included in this system. Clients who use the senior center for the classes and activities do not necessarily interact with a case manager. The case manager's

use of the system would likely be both in querying for both broad demographic analysis as well as for pulling up individual records. This user expressed a desire for there to be something that spanned all three centers, as opposed to how it is currently where records are kept separately, and on paper.

Office Specialist

The Office Specialist is on the front lines of the center's goings-on. They greet members as they arrive and say goodbye as they leave. They provide information about activities, other member's whereabouts, and from time spent personally observing, act as the hub of the senior center. They would be the primary person to register new members, and modify or update the registration information, consequently they are an important part of the ongoing viability of any updated system. They will be using the system the most frequently.

PROBLEM THAT THE INTERFACE/SYSTEM SOLVES AND HOW

Broadly, the challenge is to re-envision the tracking of members division-wide as opposed to each center keeping a record on the members who happened to register there. Narrowly, it is to transition an existing paper-based document to a networked electronic form, in a way that respects both the end users' needs and the administrative and resource constraints. The interface is a response to several challenges: information being instantiated on paper and thus opaque to managers who may want to look at or query aggregated data, information being inaccessible to those not in the same physical location, absent a phone call to another person, as well as information being vulnerable to potential loss or being out of date. To overcome those hurdles, we imagine a computerized system, available to all the staff at each center, which includes the information *and the functionality* currently embodied in the registration process and related artifact. Simply put, we are attempting to overcome the limitations inherent in a stack of cards with a database.

CONTEXTUAL INQUIRY/INTERVIEW DESCRIPTION

Our contextual inquiry was not conducted “by the book” because of limits on the amount of time the staff was able to spend with us, however our interactions, including interviewing, observation and participation, helped us understand how the existing work practice is a rich web of relationships which support the functioning of the system through distributed channels, such as face-to-face interaction, phone conversations, email, reports, and involving a variety of actors with various levels of formality. Our main focus is on the collection and reuse of the data which is now opaque.

Interviews were conducted with pre-drafted interview guides customized to the role we were talking to, but we were free to deviate from those as was appropriate. We recorded the interviews for later comparison with notes, and further analysis. Permission was granted for all recording after staff members had been informed. By going into their workspaces we were able to elicit specific details of activities that they were describing to us, get copies of forms which were being discussed, and hear how they were used, where they were filed or entered. This was very helpful in understanding the tasks the system will need to support, and offered a perspective on how both

work gets done as well as where there may be potential areas for improvement or efficiency gains.

While there was a constant level of activity when we were observing, the events we are interested in, new members registering, or registration cards being updated, turn out to be fairly infrequent. To help us get a sense for those particular acts we asked questions about specific incidents, such as the last time an event occurred as opposed to more general questions about hypothetical or ideal processes.

TASK ANALYSIS

1. *Who is going to use system?*

The system will be used by division administrators, center directors, case managers, office specialists, and seniors themselves. Within that group, there are likely 3-4 distinct user types: Administrator, Initial Contact, someone we will call the Daily Contact who has ongoing and repeated interaction, and possibly the Seniors themselves.

- Administrator: Concerned with synthesizing data for reports to others, funding applications, and assessing the operational strategy.
 - More interested in the data in aggregate as opposed to specific records.
 - Busy and has a lot on their plate at all times, called upon to do a little bit of everything once and a while.
 - They are interested in measuring, in demographics and in tracking things over time. This may be at the level of a single center, or at the level of all three.
 - They have a lot of balls in the air, they have to prioritize and distribute resources.
 - They are computer literate.
 - Predominantly generates and consumes English, however understands need for other languages.
- Initial Contact: This user is welcoming a new senior into the division and so is concerned with a single record.
 - They know the resources the center has to offer.
 - They can be multi-lingual (Spanish most common).
 - They are computer literate
 - They want less redundancy in paperwork, they don't want to fill things out multiple times.
- Daily Contact
 - They have ongoing relationships with seniors.
 - They may be staff or volunteers
 - They use the computer.
 - They encounter with a wide variety of people, and handle a wide variety of issues. Things are unpredictable.
- Senior
 - They are 60+ years old

- They are a mix of computer literate and not.
- Some are mobility impaired.
- They come for a wide variety of reasons, incl. classes, meals, social services
- They live in Berkeley

2. *What tasks do they now perform?*

We looked broadly at this question, because we did not want to close any door prematurely and we anticipated that our initial conception of what a registration system would look like would be limited by our inexperience. We wanted to leave room for pursuing opportunities to include or streamline other work processes if it made sense. What follows is a list of what we discovered, however we will narrow down the desired tasks, so it better reflects our initial scope.

- Administrator
 - Manage personnel
 - File reports
 - Attend meetings
 - Request information
- Initial Contact
 - Explain center info to new client
 - Fill out registration form (Possibly actually writing for them) on paper
 - Collect money and file in envelope
 - Give out brochures/newsletters/list of available service
 - Refer people to Case Manager for Social services intake process
- Daily Contact
 - Welcome people
 - Make changes to paper registration cards if informed
 - Provide info to First Responders in an emergency, (copy of registration card)
 - Count attendance (sign-in sheet), collect numbers from others
 - Generate Reports for administrator (Paper->Computer->Paper)
 - Do mailings/Get addresses from other centers
 - Help with event programming
 - Coordinate Volunteers
 - Track payments
- Senior
 - Register (Fill out card)
 - Sign-In (Sign sheet upon arrival)
 - Notify staff/volunteer of change in information (not done regularly)
 - Pay for service or activity (if attending class or field trip, eating lunch)
 - Socialize/Hang Out

3. *What tasks are desired?*

The potential computerization makes some things possible that were not before, or change the work practice for the tasks. These are the things we initially expect will be included:

- Administrator
 - Access demographic data for the Aging Services Division
 - Access usage trends across and between centers
 - Access a list of all registered members
- Initial Contact
 - Input initial information into system, balancing trust and completeness
- Daily Contact
 - Update Member record
 - Retrieve record
 - Print an emergency situation appropriate record
- Senior
 - Sign-in
 - Add or modify information

4. *How are the tasks learned?*

Currently, tasks done by the staff are learned from training by other staff and occasionally by seniors, and tasks done by seniors are coached by either staff or seniors. This includes ongoing reminders by staff on things like signing in, paying and referrals. There are example reports that the office staff follow like templates for generating new ones, and the report format is unlikely to change since it is used outside the division. Most training and coaching is done face to face, but we also heard about situations where questions were asked by email and phone as well, because new situations arise regularly. One of the things that comes up repeatedly in discussions about converting from paper systems is the loss of flexibility that coded categories, fields, and ontologies enforce, embodying the assumptions of the process which created it, and so we are aware of that danger and wary of it.

5. *Where are the tasks performed?*

All tasks happen at one of three senior centers. Administrators have their own offices, typically furnished with desks, computers, and phones. The other tasks happen in the foyer, where there is a front desk behind which the staff are located and a hallway the seniors move through, with the sign-in sheet in the public space. There front office people have a computer, but there is currently no computer available to the public to use, either for a sign in or for internet access etc. outside of computer labs which are run by the adult school, and then only for a limited time in the morning. Interactions also occur at senior's homes, hospitals, and other agencies' offices. There is also a shuttle, and the driver is one of the more informed staff, they get the opportunity to observe a senior's living situation, shopping habits, and errands. This is a rich potential source of information about ongoing well-being. The registration experience is intermittent, it doesn't happen very often so we didn't get to witness an actual one but getting walked through it we did find that it does happen in the open, public space, so there is not much privacy for communicating more sensitive information verbally, if a staff member was entering it into the computer for example. It is also a place prone to interruption, as traffic of all sorts moves through.

6. What's the relationship between user & data?

This is a very interesting aspect of our project. From the administration's perspective, the increased availability of the aggregate data could be very useful for getting grants, justifying current usage, and thus funding, however we are cognizant that it is a turbulent time for anyone getting money from the State of California and so the data could also be used to justify re-prioritizing resource distribution, which runs counter to interests we heard seniors express at a Town Hall meeting where they spoke of longstanding relationships with centers and staff, the maintenance and preservation of which is paramount to them, regardless of the more abstract budgetary issues. The data is constituted through the actions and personal information of those who have legitimate ambivalence about how it may be used. On the other hand it is quite clear that everyone would like to see easily accessible information ready at hand in an emergency. The system that we are designing will not be able to preclude usage of it that runs contrary to the desires of some, but it will need to remain a consideration for us. Considering the staff, the data describes personal information of individuals they have ongoing relationships with, demonstrate care for. Currently the centers are like separate entities, so with a combined database there would be records for people who are likely unfamiliar. The seniors themselves tell us about smaller groups who are tight and look out for one another, so potentially there is a role for them in keeping each other's records up to date.

Since some of the proposed information is confidential, there would be access restrictions, so that only Aging Services Division staff would be able to call up those fields. Access would be restricted to senior centers, and likely further restricted to the City's network.

7. What other tools does the user have?

Besides a standard computer, the staff have typical office technology, printers, faxes, email, and telephone. Many seniors have cell phones. Their level of use is not clear at this point, but it is likely quite variable. They will have a variety of documentation from medical encounters, or outside agencies which may be relevant. In a future time we could imagine them having Personal Health Records, such as Google health, where some of their information that the DoA currently tries to track would more appropriately live.

8. How do users communicate with each other?

Much of the interaction between staff and seniors is face to face. That relationship building is crucial. Between staff at different centers, routes of communication include meetings, email and phone as well as printed reports. For staff who work at the same center, face to face communication is much more common. Little bits of information are constantly passed informally.

9. How often are the tasks performed?

Interaction between seniors and staff occurs at most every day. Reports of the kind that a new registration system would allow are currently run once a month, once a quarter and then semi-annually. Grants are applied for on a rolling basis, and emergency situations, while rare, do occur at one of the three centers on an average of once a month. Case managers are in touch with patients at least every six months. Each encounter is a chance for information to change, and a record needing to be updated. Staff all agreed that periodic "updating drives" would be a good idea, anytime from twice a year to every two years.

10. *What are the time constraints on the tasks?*

Seniors do not come to the center to fill out forms, or spend time updating records, they came to take advantage of a service. The information collection is a side effect, and the time it requires needs to be minimized. Similarly the staff have pressing concerns with day-to-day operations, so reports are likely to be done only when they are mandatory. This means that our system is a means to an end, but not an end in itself.

11. *What happens when things go wrong?*

Incorrect or outdated information in the system could be dangerous. The current paper based system is used in emergency situations, given to first responders and used to call whoever has been provided as the contact. In addition, some staff discussed the value in data like medical conditions, allergies, and medications. This data is often not just something that gets written once and then it stays the same, it must be maintained. Reporting data can afford more leniency, because currently there is nothing that relies on it to be precise. One of our goals is for this to be supported by IT, so that from the standpoint of the program, there would be dedicated staff who could help troubleshoot. There needs to be a clear backup program, so that important information is not lost now that it is bits rather than atoms. The paper base process of tracking participation, the sign-in sheet could continue with little negative impact, besides more time spent tallying up each day's visitations.

SAMPLE APPLICATION TASKS

Search for a registered senior's phone number

Running a query on the system would involve launching the interface, likely on the web, and from the home screen providing as much or as little as the staff member (this functionality is so far imagined as staff only) feels is necessary to retrieve the record. It may be a last name, or a fragment of a name. If their search returns one result they will get the contents of the single record displayed, if it turns up more than one, they will get a list of records. Along the top will be controls for going to the home screen, a search box with the current search (and option for advanced) and a new search link. Along the bottom, there will be record modification tools, including delete record, add new record, and save.

Run a monthly report on new signups

We would provide a reports section linked from the main page, and from there a collection of the common reports (queries) which would be setup ahead of time and linked as a button. The staff member who wanted the results would go there, and press the button. She would get the resulting numbers in copyable plaintext, or download-able in csv format. Se would also have the opportunity to see records found by the query to check out what was going on if there were unexpected results (number too high for example).

Constructing a search for people at a specific center

Searching for "West" in the search box would give both people named West and the people who registered at the West senior center. Advanced search allows a field specific query to be constructed.

Printing an emergency card for first responders

If a senior has an emergency, the staff person will, after calling 911, need to retrieve their record and print a copy of the relevant info for the first responders. They will search as before, and after finding the record, they will hit a special print button with the needed information and the date last updated. A click will have to invoke some print functionality that is integrated with their existing infrastructure.

Updating information for a senior who moved

Office staff get notice that a senior has moved from their own house in Berkeley to a mother-in-law unit behind their grownup child's house. The Aging Services Division staff need to retrieve the member's record as described above and then edit the address field, saving the new record, and indicating who made the change. This task involves moving from a retrieve mode to an edit mode, and then the record must be saved with appropriate metadata. This is a task of medium difficulty because it requires engaging with the system in two different modes, and maintaining a sense of the bigger picture so updates can be tracked.

Entering a new registrant into the system

Entering a new member is not likely to be the easiest task, because it involves asking for information which is potentially sensitive, often before a relationship has been established. No one comes to the center to fill out paperwork, they are there to take a class, eat lunch or participate in an activity. The staff member will need to enter a sizable amount of information into the computer, including checking to see if the person is in the system already, checking that there are no obvious data entry errors, and completing the transaction with whatever is appropriate direction is needed from a customer service perspective. I consider this more of a difficult task, because it needs to be done right in a chaotic environment by a variety of people.

Constructing a complex query and saving it as a report

For less frequent interactions with the system, like reporting, the system will support some less frequent tasks, anywhere from monthly to semi-annually. To facilitate those will require allowing a person to construct an advanced search and then save that query, so by way of example, the director may want to get a sense for the variation in ages at the different centers, and so will need a list by center and ordered by age, excluding those with no age given. After making that query the user will be able to save it and it will appear on the saved reports page. This is difficult because it is done infrequently, and because it requires keeping the continuity of intention between a number of steps, the search itself, refining it if the results are not quite right, and then saving it to another area.

CONCLUSION

This was a very productive experience, we were able to learn a great deal quickly about the varied activities that happen each day at the senior centers. From this vantage point, our system will have a user group that interacts frequently with it, and then an equally important group which will be using the system less frequently, but for analysis of the ongoing activities. I expect that we will need to consider design opportunities for some of the paper forms and processes that occur outside the system as well. This multichannel information system design is an interesting challenge.

Appendix D: Minimum Data Set

Example of a “Minimum Data Set”

Center Participant Information

Contact Information:

Preferred Name

Email

Address

Phone Number

Emergency Contact/Next of Kin

Basic Demographic Information:

Gender

Age/Date of Birth

Marital Status

Race/Ethnicity

Country of origin

Language

Religious Affiliation

Education

Occupation/retirement status

Income category

Family

Home ownership

Household composition

How long at current address

LTC insurance

Disability status

Interest in Center:

Date of application/enrollment

Type of membership/cost

Reason for joining

How did they hear about center

Interest in volunteering

Interest in particular services

Appendix E: Implementation Plan

Implementation Plan

Business Need

The primary purpose of the project is to improve information collection, access, and sharing across the Aging Services Division's operational units and, in turn, improve the social, nutritional and recreational services provided to participants. Many participants use more than one service or more than one of the senior centers. The paper records currently used for registration limit the staffs' ability to track participants using multiple services or centers. The Division's partners and institutional funders increasingly require more detailed service usage metrics and the proposed information system will improve retrieval of this type of information. Finally, the Division management would like to ensure the centers' services are aligned with the needs of the local community. It is important for the centers to understand who their participants are and what are their interests in order to plan future programs and services.

The current methods for archiving customer information at the Aging Services Division severely limits how well it can be utilized. It is difficult and inefficient to access, retrieve, share or update registration information. A new registration system will better facilitate the collection of participant information and allow information sharing across subdivisions. Participant activity and attendance information can be used by administrators to make operational decisions. Detailed participant information is also a requirement for funding reporting and new grant applications. In addition, staff at the centers will enjoy greater opportunities to reuse the stored information in service of center goals, such as increasing participation in activities and building community through events.

Implications For Designs

The issues related to social services and technology, and the organizational challenges we identified, have fundamental implications for design. It is important that the system design address the identified issues. The design must address staff's skepticism about participants adopting the system and the level of support required long-term. To that end we have defined minimum system functionality that would meet ASD objectives and engaged staff at multiple levels in prototyping activities. We also considered several different options for the core processes and chose those that maximized adoption not necessarily the highest-tech.

Project Objectives

- Improve information collection, access, and sharing across the Aging Services Division's operational units

- Ensure system design addresses motivation and adoption barriers.

PROJECT TEAM

Position	Name
ASD Director, Project Sponsor	Kelly Wallace
Director, West Berkeley Senior Center	Patty Thomas
Director, City of Berkeley IT Department	Donna LaSala
Data Warehousing Coordinator	Ernesto Rodriguez
Senior Information Systems Specialist	Sue Sabatino
Consultant / Graduate Student	Jesse Dedman
Consultant / Graduate Student	Heather Dolan
Consultant / Graduate Student	Noah Kersey
Consultant / Graduate Student	Karen Braverman Bujanover

Key Project Requirements

During the business analysis we conducted we identified six business processes that are key to the operations of the ASD. These processes are necessary for the provision of services to participants at the centers.

To maintain the participant-centric view in the system, we carefully chose requirements that address the main processes the ASD is dealing with: participant information retrieval, participant information updating, list making and reporting.

The six critical business processes we identified during the business process analysis and the changes we suggested to improve them dictate the system requirements. The six business processes that we have identified and analyzed include two core processes, Registration and Sign-In, that define the fundamental system requirements. We identified the fundamental requirements to the implementation of those two core processes. Following the Moscow prioritization (Ash, S., DCDM Consortium, 2007), we define these processes and associated subprocesses as “must-have” requirements. In addition to the those, we also identified requirements that are not necessary but may add value to the system. The remaining four business processes are derived from those two core processes and add some additional requirements.

Requirement	Description	Objective
We-based Registration Database	Entry, update and retrieval of participant registration information across centers	Create participant records in database, for later update and retrieval
List making mechanism	Query the database based on particular criteria, flagging, business rules	Create lists of participants for targeted activities
Reporting tools	Query the database for fields that are relevant per reporting needs	Meet external and grant proposals requirements

The requirements are further broken down to required features that match the six business processes we identified:

Requirement	Description	Objective
Registration and Updating Records		
Interface for retrieval of participant database	When an OS enters the participant name, the system returns relevant records to choose from. The database must be stored in a central location and allow staff at multiple centers to search participants in and outside of their center. This is especially important to avoid duplicate registration entries. Also, quick access to a participant's emergency information will no longer be limited to the center	Retrieve participant information

	where the participant originally registered.	
Interface for creating a participant record and entering participant data	Database stores each participant record.	Create a new participant record in the database
The system validates the form data	Based on pre-defined business rules for maintaining data quality	Ensure all required data is entered
Interface for editing or updating records	Allows access to existing records	Update participant record with changes over time
Sign-In		
Data Model supports AAA reporting fields	The AAA funds nutrition service programs. Since lunch participation will be aggregated by the system instead of via separate sign-in sheets as is currently done, the system should include data needed for the AAA reporting needs.	Reuse the data in the registration system for the purpose of reporting to AAA and others
Interface for administering activities	Center staff enter activities data to system, to be reflected in daily sign-in sheets	Include daily activity data for scheduling and demographic entry
Interface for scheduling specific activities	Center staff enter special events and activities other than ongoing classes and lunch, to be reflected in daily sign-in sheets	Include daily activity data on sign-in sheet
Sign-in sheets can be printed from the system with the names of participants.	Criteria for determining name list can be defined by user	Collect sign-in data from participants and connect their attendance to activities
Emergency		

Searching participant name and retrieving most recent information	Entering a name in an interface queries the database for participant emergency information	Retrieve record for participant and offers ability to print emergency report
Emergency contact information is stored in the database and retrieved with other participant information.	Store emergency contact information in participant record	Retrieve emergency contact information for retrieval and use immediately after emergency occurs
System generates a standard emergency report and prints the report.	Only emergency contact information, physician's contact information and medical information are retrieved	Retrieve emergency information in order to provide to a paramedic and call emergency contacts
The system will provide mechanisms that assist staff in keeping Emergency Contact up to date, including making the last updated field visible on the record.	Flag last updated field	Alert staff to recent changes, which occur often especially with medical information
Reporting		
Pre-defined reports are available including New Registrants in the Month.	Automate creation of lists that are used on a regular basis (e.g., New Registrants, Birthday List) by defining triggers	Reduce staff efforts by having standard list/pre-made queries
Defining the user-defined criteria of reports for ASD performance	Choose among fields for those relevant to reporting objective	Define performance report criteria
Interface for generating and viewing pre-defined report for ASD performance	Use interface to choose fields relevant for report purposes	Generate pre-defined performance report

Ability to download report tables in standard formats such as csv	Export data in reusable format (i.e. .xsl, .csv)	Enable staff to incorporate system output to reports external to the system (e.g., the Director's Report)
List Making		
Interface for entering criteria for lists	Menu/filter functionality that lets staff define the specific details of their query	Inform the system about the list criteria
Viewing and editing list	Screen displays retrieved entries and menu/filter allows further refining search / making changes to retrieved list	View list, refine search, edit list
Ability to download list and use in MS Office	Export results to .xsl format	Allows staff to reuse / incorporate with other documents
Printing list	Print retrieved results	Provide a hard copy for staff (e.g., driver pickup list)

Should, Could and Would-have Requirements

While requirements listed above are all Must-have requirements, two additional requirements are desired, but not necessary for the implementation:

1. Web interface for self-service registration (Should)
2. Sign In Touch Screen (Would)

Those additional requirements are related to the registration and sign-in processes respectively. We proposed a self-service registration option, which will require adding an external Website accessible to the public. We also diagramed a Could Be scenario where participants sign-in via a touch screen, which we prioritize as a Would-have, for reasons explained above.

Project Approach

The preliminary steps of qualitative research, business process analysis, prototyping and requirements gathering have been completed. Qualitative research included interviews, observations, and participation in the function of volunteer. Following that, we conducted

business process analysis, focusing on six key processes that are detrimental to the ASD operations. Based on the qualitative research, we also designed user interface prototypes and tested them with ASD staff and directors. The prototypes also informed the business analysis in the outlining of To-Be diagrams.

Cost Benefit Analysis

The cost benefit analysis is based on four variants: the value to ASD and participants obtained by implementation of the system with our proposed solutions; the level of technological complexity entailed; the cost of the implementation; and the efforts involved in driving the required organizational process change.

As a part of our business process analysis for the Aging Services Division, we assessed the level of technical complexity and related cost associated with each suggested process improvement for each of the six processes we identified and analyzed. We ranked the technical complexity of the suggested process improvement changes on a scale of low, medium, and high.

Low technical complexity means that no significant intervention on the part of the IT department is necessary for implementation, whereas a High technical complexity indicates that the standards and skills currently included in the IT department development environment will not suffice and that the department would need to reach out for external resources. We aspire at a medium technical complexity, which we define as the case in which the City of Berkeley IT would implement the technology with their current environment and development skills, and the scale and availability of the system would be within the normal range for software projects at the City of Berkeley.

The reasoning for aiming at the Medium technical complexity emanates from the realization that as a municipality, City of Berkeley is limited in terms of IT investments. We addressed that limitation during the business process analysis by introducing more than one Could-Be scenarios for the Sign-In process, in case the technical complexity of the High technical complexity scenario (touch screen) would be too expensive.

In order to achieve that goal, i.e., utilize the existing development environment, we explored the software packages the IT department currently has in place. The City of Berkeley is currently operating two separate proprietary software packages that may be customized for the purpose of the ASD registration system. Those are two different systems addressing different need:

Lagan, a customer relationship management system, and NextGen, an electronic medical records management system.

Both systems are compatible with the standards of Berkeley IT, which standardized on Microsoft SQL Server database software, Microsoft's .NET web-based architecture software, and has developed skills in writing software applications in the Java language.

The senior population in Berkeley is expected to continue growing in the next decade at a rate of 35%, so that 20.7 percent of the Berkeley residents will be over 65 in 2020. The current methods used and the paper-based collection, storage and retrieval of information would not scale. Adopting the design recommendations made in this plan, designing a system with technical complexity of scale and availability within the normal range for the City of Berkeley IT department, the cost would be minimal compared to the benefits to the organization. The required process change is significant, but will only be so for the short-term. The value to the seniors of Berkeley, and to the ASD, both in its service provisioning to Berkeley seniors in the long run and in its communication efforts to funding agencies, outweighs the cost.

For a definition of the criteria we used for assessing the system components and detailed categorization of each process at the activity-level granularity, see Appendix A: Business Process Analysis, and Appendix B: Process Improvement Criteria.

Critical Success Factors

Objective	Critical Success Factor	Prime Measures
Ensure system design addresses participant motivation and adoption barriers	Ease of use for participants	Participants cooperate and sign-ing on sign-ing sheets, provide required data
Articulate what ASD is serving and to whom	Staff Motivation	

The first critical success factor is the ease of use for participants.

Risk Plan

We identified two main risks to the project. First, there is a possibility that the project will not move forward and the system will not be implemented. There are several reasons for that. The

role of the liaison between the ASD and the IT department, which we assumed for a period of four months, will now be vacant. Even though a lot of the work that must take place up front has already been completed, it is still necessary for the two parties to communicate clearly and frequently.

A second, even graver risk is the limited adoption by participants. There is a significant role for the participants in the successful operation of the system. They must contribute their part, i.e., provide the required information. First, they need to provide information during registration time (which they are already doing currently). More importantly, they must sign-in to the center each time they visit, and provide the lower granularity information on which activities they plan to attend.

The design choices have this already taken into consideration. A critical decision was to avoid using a touch screen. Apart from the high cost associated with it, it is also likely that a touch screen would not be adopted owing to accessibility challenges and language barriers.