

MANAGING ORGANIZATIONAL MEMORY IN PUBLIC GARDENS

by

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(Under the Direction of Marianne Cramer)

ABSTRACT

Organizational memory has been studied widely but not in public gardens. If organizational memory is not managed knowledge is potentially lost when gardeners leave or retire. Organizational mission, together with design intent, provide direction for managing public gardens. Interviewing landscape architects determined they do not rely on gardeners to provide information on design intent. From their information, a foundation for determining sources of design intent in public gardens has been created. Through surveys and interviews with public garden professionals it was found that there is gardener longevity in gardens, plant recordkeeping is performed at most gardens, internal gardener training programs are minimal, and there are limited repercussions for not keeping records. Based on the literature review and results from the surveys and interviews, a protocol of open ended questions was designed to be used by public gardens and their managers to facilitate the process of organizational memory management.

INDEX WORDS: Landscape architecture, Organizational memory, Institutional memory, Gardening, Gardener, Horticulture, Horticulturist, Public garden, Management, Planning

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CHAPTER 1

INTRODUCTION

This thesis emerged from the author's experience working in two different public gardens with a similar issue: both had significant portions of their organizational memory erased. Losing organizational memory is not a localized event specific to these two gardens, it is a global trend examined in detail by researchers in a variety of fields. When public gardens do not manage their organizational memory they risk losing pieces of their culture and heritage and negate the hard work needed to develop the gardener's knowledge and experience in garden management. Gardener knowledge is an asset garden managers should cultivate in the organization, record for the future, disseminate widely, and use for planning purposes.

Problematic

When organizations do not record their history, they risk repeating past mistakes, wasting time and effort solving problems when a solution has already, historically, been found (Walsh and Ungson 1991). The author's argument is that managing organizational memory is more than writing information down, it involves a conscious and deliberate shift in organizational thinking from concentrating on products and results to one that concentrates on processes and people.

Employees bring knowledge and experiences to an organization when they are hired, but they also learn and become assimilated into the cultural traditions of their particular workplace. Over time employees develop their own unique set of skills and experiences and contribute to the organizational memory of the organization (Carley 1992). Longevity is key for organizational memory development (Walsh and Ungson 1991). When gardeners have worked for a decade or more, a considerable breadth and depth of knowledge can be lost if the gardener leaves.

Gardeners with the National Trust in England¹ often stay for many years in a garden (Fretwell et al. 2001). In the author's experience this continuity often occurs in the US. This is encouraging for potential organizational memory development within public gardens.

Gardeners manage the landscape on a day-to-day basis and have an intimate knowledge of growing conditions and plants (Fretwell et al. 2001). As gardeners age and retire, important design and horticultural management information may be lost and never be recovered. Gardeners are in a unique position with regard to the horticultural management of the garden: they are the ones managing the property and realizing the design intent on a day-to-day basis (Firth 1980, Sales 1988). As a gardener gains more experience, certain aspects of the job become second nature; e.g. knowing where the lawn specifically dries out, or how hard the boxwood can be pruned before they won't regenerate. This tacit knowledge is invaluable to the successful management of a garden and can only be understood and mastered through working in the garden (Fretwell et al. 2001). Research by De Long and Davenport (2003) has shown that recording experiences before the employee leaves, or dies, can be useful for long term management planning. If the gardener's experiences are not recorded, future gardeners must relearn skills the previous gardener did by rote.

While gardeners are responsible for the care and upkeep of the plants, they are also responsible for maintaining the design of the garden, and by extension, the design intent (Sales 1988). Establishing design intent in part helps determine what changes have occurred in the garden over time and how they fit into the original intent when the garden was designed (Page, Dolan, and Gilbert 1998). Design intent can help to organize the garden and, combined with the mission, give a structure and purpose to the public garden. The author's contention is design intent does not always have to be fixed; it depends on the individual garden and how it has

¹ Founded in 1895, the National Trust seeks to protect historic places and green spaces, and opening them up for ever for everyone. See their website for more information: <http://www.nationaltrust.org.uk/> (Accessed April 10, 2015)

changed over time. Multiple design intents may evolve over the life of the garden as mission, use, or ownership changes.

If design intent is not recorded from the original source, landscape architects that specialize in determining design intent can be hired to assist in interpretation. Often, however, design decisions are left to gardeners to interpret as necessary to maintain the garden; their changes may not reflect the original intent. A comment made in one of the landscape architect interviews sums this idea up nicely: “There's kind of a chasm...between those who maintain and those who design...in preservation, maintenance is preservation. That's the first line of defense against the loss of integrity of a historic landscape.” The gardeners are there to make sure the intent is realized and doesn't deteriorate over time. Collaboration and sharing between designers and gardeners make for stronger designs, with intent that can be realized, managed, and continued over time.

Informing gardeners about design intent enables connections to be made between different areas of the garden creating a more unified whole and enabling management of the garden on a site scale. Public gardens set themselves apart from other types of gardens by having an organizational mission that all employees seek to fulfill. When connections between the mission and the design intent are made clear to gardeners, this can give them freedom to explore personal creativity, while still furthering the mission and managing design intent. When the connection is not explained, then it is possible the gardener might manage the garden in ways that do not further the mission or move away from the original design intent. Design intent, and how gardeners manage it, should be a vital part of the organizational memory of the public garden.

What is not clear is how public gardens are managing their organizational memory, particularly the knowledge and experience contained in the garden's longstanding gardeners. As gardeners age there is potential for them to retire, or leave, the garden. This loss of organizational memory could represent a significant loss of knowledge assets for the garden if not properly

managed before gardeners retire. As these more experienced gardeners retire, the question is raised: **In the context of mission and design intent, how can garden managers encourage organizational memory development from gardener knowledge and experience?**

The primary thesis question raises other questions to be answered as well: How can organizational memory be used to further the mission of the public garden? How much influence do managers have over the management of memories? How does the culture of the organization affect organizational memory development? What role do gardeners play in the development of organizational memory? What role do gardeners have in the management of design intent? Do public gardens have long term gardeners? How are public gardens managing organizational memory?

Purpose

The purpose of this thesis is to develop a protocol for managing organizational memory in public gardens, specifically focused on how gardener knowledge and experience can be better cultivated, recorded, disseminated, and used.

Significance

Though findings from this thesis are concentrated on public gardens in the United States (US), there are broader applications outside of public gardens. Organizational memory management can be applied to any organization. Within public gardens, gardeners are the backbone of landscape management. Their knowledge and experience are what maintain the design intent, further the organization's mission, and are critical to the development of the organizational memory.

Landscapes are constantly growing and changing; if there is to be management consistency, then knowledge and experiences should be recorded, disseminated, and used to further the organization's mission. Managing information and knowledge assets will become more critical as technology develops and allows better recording of information and knowledge.

Managers can take the consolidated research from this thesis to apply directly to their own organizations. This thesis will show that managing organizational memory is critical for public gardens to continue to develop and grow as organizations, and will make suggestions on ways public gardens can better manage their organizational memory.

Definitions

The definition of organizational memory for this thesis has been combined from two definitions (Fiedler and Welppe 2010, Walsh and Ungson 1991) and is defined as “The process of retrieving stored information from the organization’s history in order to inform present decisions.” Another term, institutional memory, is occasionally used interchangeably with organizational memory (Boardman and Vandaele 2010, El Sawy, Gomes, and Gonzalez 1986, Tuomi 1995) but is not used in this thesis as it is less commonly used in references.

Public gardens are defined by Rakow (2011, 3) as “...a mission-based institution that maintains collections of plants for the purposes of education, research, conservation, and/or public display.” Mission is defined as “...the broad purpose of the garden” (Matheson 2011, 51) and should inform the use of the garden. The author’s contention is that design intent should relate to the garden’s mission. For the purposes of this thesis, two definitions (Maney 1990, O’Donnell 1987) have been combined together to define design intent as “the creative objectives of the landscape designer that were applied to the development of the landscape, either fully or in part, while meeting the needs of the client and taking the features of the landscape into account.”

Limitations

The protocol is theoretical and is meant to engage public gardens through a series of questions; though it has not yet been tested in public gardens. The protocol is designed for garden managers to begin evaluating the potential for organizational memory management within public gardens and has been developed through research using landscape architects and public garden professionals in the US.

Prior to this thesis research, public gardens have not been a focus of organizational memory research. Research in the field of knowledge management is often focused on corporations or businesses so little research precedent exists to follow in developing the protocol for public gardens. Time is the major limitation for the completion of this project. Ideally more time would be spent working in a diversity of gardens to fully understand where, and how, the organizational memories are stored and used.

Delimitations

The protocol is designed for garden managers who can read and speak English, though it is assumed the questions would still be understandable if translated into another language. As of 2014, all public gardens contacted for this research were members of the American Public Gardens Association (APGA) and located in the US, and all landscape architects were members of the American Society of Landscape Architects (ASLA) and based in the US.

This thesis is focused on purposeful design change over time as it pertains to capitol or infrastructural improvements. Environmental or climate change, and their effect on the garden over time, will not be discussed in this thesis.

Chapter Summaries

Chapter 2 presents a literature review examining how organizational memory is managed in fields outside of public horticulture. The connection between mission and organizational memory is examined, as is the role of gardeners in the development of organizational memory. Further, the Chapter examines the influence of managers and how organizational culture can affect organizational memory development in public gardens. Based on research from the literature review, the author determined four organizing themes for managing organizational memory: cultivating, recording, disseminating, and using knowledge to develop organizational memory. The classification system is condensed into a graphic depicting how organizational memory can be used in a garden. The four-step classification will be used throughout the rest of

this thesis to provide a framework for how organizational memory can be managed in public gardens.

Research methodologies, for both sets of surveys and interviews, are described in Chapter 3. To determine the role of gardeners in managing design intent landscape architects were queried in a survey and series of interviews; analysis is in Chapter 4. A flow chart for locating design intent within the organizational memory is also found in this Chapter. Chapter 5 answers whether public gardeners have longstanding gardeners in their gardens, and summarizes the results of the Public Garden Professionals Survey. Chapter 6 reports on how organizational memory is specifically used within public gardens, and suggests ways to use gardener experience to create planning documents.

Chapter 7 begins with a graphic depicting a how organizational memory can be managed in public gardens. The graphic should be used in tandem with the protocol; a series of open ended questions drawn from the preceding Chapters that public gardens can use to manage their organizational memory. Further avenues for research are outlined at the close of Chapter 7.

CHAPTER 2

LITERATURE REVIEW

Public gardens, at the most basic level, are organizations, and although research on public gardens as organizations is lacking, organizational processes in general have been thoroughly studied and researched. Information has been compiled from a variety of fields, such as Organizational Behavior, Organizational Studies, and Knowledge Management, and from specific professions such as architecture and construction (Ozorhon, Dikmen, and Birgonul 2005), or consulting (Olivera 2000, Wijnhoven 1999).² Consulting and construction are both knowledge-based fields dependent on stored organizational memory to improve the quality of their results. This literature review applies the results of that research to public garden management in order to provide a research base to answer the main thesis question. The answers to the following four secondary questions are discussed in this Chapter.

1. How can organizational memory be used to further the mission of the public garden?
2. How much influence do managers have over the management of memories?
3. How does the culture of the organization affect organizational memory development?
4. What role do gardeners play in the development of organizational memory?

The first four sections of the literature review make connections between organizations and organizational memory. The main topics for each section are as follows:

1. The effect organizational structure can have on memory
2. How organizational memory can be used in an organization
3. How knowledge relates to organizational memory
4. Public garden's mission and design intent

² For a further listing of research in fields using organizational memory, see Appendix E

The remaining sections in this Chapter are divided into the four themes: cultivate, record, disseminate, and use, to create the knowledge base with which to apply information from the surveys and interviews.

Organizing the Workforce

Public gardens are made up of a diverse group of people: gardeners, designers, administrators, volunteers, etc. Since Carley (1992) defines organizations as groups of people working together with a common mission, then this qualifies public gardens to be organizations. Organizations can leverage the skills of many individuals to be more than the sum of its parts (Ebbers and Wijnberg 2009). Both Carley (1992) and Joshi et al. (2010) put organizations into one of two types — hierarchies and teams. Hierarchies have the following characteristics:

1. A centralized leadership that makes most of the decisions,
2. Cope well with routines or non-complex situations,
3. Specific job descriptions for each employee, and
4. Typically are more forgiving of hiring people that may not fit in, organizationally.

Within a hierarchy, information flows up the organizational ladder, losing value and context as it gets simplified and communicated through each level (Carley 1992, Joshi et al. 2010). Unfortunately, top-down management discourages knowledge development at lower levels, preferring to leave the creation of new knowledge at the top (Nonaka, Toyama, and Konno 2000). Typically, people on the bottom physically doing the work are developing most of the knowledge (Brown and Duguid 2000, Nonaka, Toyama, and Konno 2000).

A team structure provides advantages over hierarchies for managing organizational memory. Some benefits of teams include the following characteristics:

1. Shared authority among many members; leadership is based on experience (von Krogh, Nonaka, and Rechsteiner 2012)

2. Solve problems faster and are more flexible about changing organizational or project direction (Carley 1992, Joshi et al. 2010)
3. Encourage good communication, so everyone is aware of what is going on in the organization (Berente, Baxter, and Lyytinen 2010)

Carley (1992) also notes that organizations often start small, utilizing a team structure, and develop a hierarchy as they become more complex over time.

Memory in Organizations

Individuals in an organization who are the ones retaining memories of past events (Walsh and Ungson 1991), though Chen and Edgington (2005), de Holan and Phillips (2004), Stein (1995) and Walsh and Ungson (1991) all found that memories are subject to degradation over time. Organizations do not technically remember, but the process of remembering in individuals can be used as a model for how memories are maintained in organizations (Anand, Manz, and Glick 1998, Walsh and Ungson 1991). Unlike humans, organizations do not have a brain, so Walsh and Ungson (1991), in their seminal article on organizational memory, define six 'storage bins' (brain) where organizational memory is stored:

1. Individuals: memories in individuals can be stored within the mind as computer based documents or in written records (Jennex and Olfman 2004)
2. Culture: embodied in stories of the past help to explain why the organization runs the way it does (Akgün, Keskin, and Byrne 2012, Feldman and Feldman 2006, Hedberg 1981, Moorman and Miner 1997).
3. Transformations: using memories to make decisions
4. Structures: norms or established behaviors (Moorman and Miner 1997)
5. Ecology: physical layout or atmosphere
6. External archives: memories that are stored off-site, either as written records or as memories in the minds of past employees

These six bins are all important to organizational memory management in public gardens. Though not written specifically with public gardens in mind, Walsh and Ungson's work can be applied to public gardens in the following ways: Individual gardeners retain memories of their experiences and can create written records in the form of garden notebooks, spreadsheets, or databases. Garden history and lore can be found in the Culture bin, and Transformations can be found within a public garden's budgeting process or in trying renovation pruning based on past experiences. Structures can be found in habits and policies and could include things such as cleaning up the garden on specific days or filing pesticide reports in the second drawer of the filing cabinet. Ecology was defined by Walsh as inside environments but the author is expanding that definition to include the physical environment outside. So much of what happens in the garden is tied to the landscape and how gardeners interact with it, thus it is a critical piece of the organization memory. Contained within these six 'storage bins' is the organizational memory of the garden. The organizational culture of the garden makes some of the 'storage bins' more or less accessible, though memories in the 'storage bins' can theoretically be accessed and used by anyone in the organization to evaluate or develop knowledge.

Using organizational memories in organizations can prevent 'reinventing the wheel' every time a new challenge arises. In this way, decisions in the present can be made using the knowledge from the past (Coffey and Hoffman 2003, Pollitt 2000, Tuomi 1995, Walsh and Ungson 1991) to facilitate learning in the present (Nissley and Casey 2002, Smith and Steadman 1981, Stein 1995). Moorman and Miner (1997) and Stein (1995) both reported that using organizational memory can provide strategic direction to the organization by examining what decisions, and the consequences, have been made in the past.

Organizational memory provides a source of knowledge from experienced workers upon which those with less experience can draw (Coffey and Hoffman 2003, Stein 1995). This kind of knowledge can then be used by organizations to better position themselves strategically within

the field (Chen and Edgington 2005, Goh 2002, Hansen, Nohria, and Tierney 1999, Stein and Zwass 1995). However, using organizational memory can also be harmful to growth if past success is valued more highly than future development, damaging potential growth through avoidance of change (El Sawy, Gomes, and Gonzalez 1986, Walsh and Ungson 1991). Stein (1995) believes that because memories exist does not mean that they are useful or helpful to where the organization is presently positioned. Moorman and Miner (1997) further found that the more organizational memory the organization has, the more difficult it is to change organizational direction, should the organization deem changes necessary.

Memories can be abused if the organization is not considering how the information will be used. Creating a new solution is not always necessary when routine solutions are acceptable, however, sometimes new solutions are necessary and routines need to be discarded (Stein and Zwass 1995, Walsh and Ungson 1991). Management's job is to determine what memories are useful or harmful to the organization. Knowledge is power, and organizational memories can be deliberately manipulated or changed (Moorman and Miner 1997), ignored (Chen and Edgington 2005, Nissley and Casey 2002), or withheld to consolidate power by telling a revised version of the organization's history (Markus 2001, Pollitt 2000, Walsh and Ungson 1991, Wexler 2002).

Learning from Memories

Rowlinson et al. (2010) and Walsh and Ungson (1991) have characterized knowledge as a component of organizational memory. Memories contain details about a specific event and the surrounding context. In order to create knowledge from memory, the memory is processed in order to gain insight into what happened or should have happened. In order for organizations to grow and develop, they need to create new knowledge (Chen and Edgington 2005, Nonaka, Toyama, and Konno 2000, Rusaw 2005). According to Tuomi (1999), knowledge is gained through amalgamating individual pieces of data into useful information, which can then be analyzed and used to create knowledge. Public gardens can process information about events

contained in the organizational memory with new information to expand the overall knowledge in the garden.

Researchers have distinguished two types of knowledge, explicit and tacit. Explicit knowledge is information that can be easily quantified and recorded, generally when something was done, what was done, or how much was done (Feldman and Feldman 2006, Goh 2002, Nonaka 1994, Olivera 2000). Tacit knowledge explains how or why something was done and includes experiences, learning by doing, or personal beliefs. Tacit knowledge is generally more difficult than explicit knowledge to quantify and record (Anand, Manz, and Glick 1998, Goh 2002, Nonaka 1994, Olivera 2000). Tacit knowledge is based on experience and accumulated over time (Alwis and Hartmann 2008), meaning the longer someone is in the organization, the more likely it is that they will have a greater amount of tacit knowledge.

Sales (2009) recommends public gardens compensate their gardeners at a level high enough to encourage continuity in garden staffing. Continuity is necessary for landscape management because of the long lifespan of plants in a garden. Gardens do not grow overnight and require continual, consistent care for optimal appearance. The longer an employee is in a position, the greater the potential for organizational memory to accumulate in an organization (Bhardwaj and Monin 2006, Walsh and Ungson 1991). Tacit knowledge is important in public gardens because much of horticulture is learned through experience (Sales 2009). This accumulation of knowledge is not easily, or quickly, transferred into written documentation. In public gardens, gardeners come to know the nuances, microclimates, dry patches, or particular needs of individual plants by working in the garden over time. This knowledge and experience contributes to organizational memory.

Managers are responsible for determining how the accumulated memories of each employee can be cultivated and used. If management does not effectively manage memories, then the organization is not likely to generate much, if any, new knowledge (Bhardwaj and Monin

2006, El Sawy, Gomes, and Gonzalez 1986, Lang 2001, Walsh and Ungson 1991). Casey and Olivera (2011) found that managers control how memory is recorded, disseminated and used, and Boardman and Vandaele (2010) and Carley (1992) found that managers can be a good source for organizational memory due to their knowledge of the organization and mission. Once managers buy-in to the mission, they are in a better position to encourage employees to work toward furthering the organization's mission (Lang 2001, Maney 1990, McGuire 1981, Nonaka 1994).

Hedberg (1981) suggests any organizational memory usage should support the mission of the organization. Further research by Nonaka (1994) and von Krogh, Nonaka, and Rechsteiner (2012) shows that managers need to maintain perspective to ensure new knowledge is useful for furthering the organization's mission, both externally and internally (Nonaka 1994, von Krogh, Nonaka, and Rechsteiner 2012).

Public Garden Organizing Principles

The author's contention is that mission and design intent are two of the primary organizing principles behind public gardens. The mission is why the garden exists, and design intent is why the garden looks the way that it does. The garden's appearance is directly related to the abilities, experiences, and knowledge of the gardeners (Fong 1989, Sales 1985). The use of the garden should be a vital part of the mission, and the design intent should relate to the use of the landscape to further the mission (Maney-O'Leary 1992). The mission of the organization should be well embedded into the organizational memory and used to guide work in the garden.

Public gardens manage the landscape within the bounds of a specific mission and design intent. Having an established design intent for a garden provides a framework for managing design changes over time to accommodate different uses (Berg 1988, Maney 1990, McGuire 1981). Individual gardeners manage change based on their interpretation of the design intent (Sales 2009). Managing for design intent, within the context of the mission, requires the individual gardeners to give up some measure of their own personal horticultural tastes to

preserve the desired look and feel of the garden (McGuire 1981). In order to manage design intent, public gardens should hire trained, competent people to manage their landscapes (Berg 1988, Maney 1990, Raducan 2009, Sales 2009).

Garden managers take primary responsibility for communicating mission and design intent to gardeners, to ensure that the gardeners manage with the mission and design intent in mind, and are responsible for envisioning the larger picture for the garden's growth and development (Sales 2009, 1988). McGuire (1981, 83) suggests hiring managers who are "...not only educated but are visually literate." In this way they see not only what needs to be done from a horticultural perspective, but also what needs to be done to continue to preserve the design intent in combination with the mission.

For professionals looking to learn about determining design intent the National Park Service (NPS) produces a series of bulletins and guides that provide assistance in determining and documenting cultural resources on a site. Of the many publications available, the two most relevant on determining design intent are National Register Bulletin Number 18, "How to Evaluate and Nominate Designed Historic Landscapes," and "A Guide to Cultural Landscape Reports; Contents, Process and Techniques" (the Guide). One interviewee also recommended the Olmsted Center for Landscape Preservation³ as a source of further knowledge about managing design intent within the garden.

The Guide (1998, 112) contains a similar definition of design intent as was determined in Chapter 1 and explains how to determine design intent by "...interpreting the written and graphic record or oral history for the landscape." Written and graphic history includes maps, plans, or correspondence, while oral histories could include interviews with gardeners and other people related to the site. The gardener should be informed of the garden's design intent, otherwise they will probably manage in a way that maintains a level of physical attractiveness but might not

³ For more information see <http://www.nps.gov/oclp/index.htm> (accessed December 26, 2014)

reflect the design intent. This is particularly true if the intent is difficult to manage in the landscape (Firth 1980). In this way the design intent can shift over time, reducing the clarity of form and potentially clouding the connection between the mission and the design intent. Ideally, the designer would record the design intent into the organizational memory to ensure it was accessible to all (Birnbaum 2000).

If the original garden designer is not also the gardener tension can develop between the design intent and the physical implementation of the landscape. Working together, the designer and the gardener can ensure the design intent is properly realized, both initially and as the landscape grows and matures. When this relationship is neglected, problems arise in the landscape (Firth 1980). Van Valkenburgh and Saunders (2013) note that garden designers do not always understand maintenance, and gardeners do not always understand design. A design might be innovative and visually stunning, but if it is going to last, the design intent has to take into account garden use and ongoing maintenance (Fitch 1976).

Cultivate a Trusting Environment

Research has shown that in any organization the single biggest barrier to knowledge generation is trust. If there is not a culture of trust and sharing built into the organization, then the employees will be unlikely to participate in the system since they may not see the benefits of sharing information (Goh 2002, Hansen, Nohria, and Tierney 1999, Lang 2001, Nonaka 1994). If openness and trust do not exist they can be cultivated, but changing the underlying culture of the organization can be a painful and extended process hampering knowledge generation and organizational memory development (Hedberg 1981, Jennex and Olfman 2004, Joshi et al. 2010). If employees don't trust one another, they may not share information, and if information is not shared between people, less knowledge is generated.

Boardman and Vandaele (2010), Gong and Greenwood (2012), Jennex and Olfman (2004) and Joshi et al. (2010) have found through their research that too much personnel turnover

in the organization reduces opportunities for employees to get to know one another, trusting relationships between coworkers are less likely to develop reducing the potential for organizational memory transfer. Ebbers and Wijnberg (2009) further posit that this creates the impression that everyone is replaceable, reducing the likelihood for trust to be built among coworkers. If turnover is high, little organizational memory can develop since there is not enough continuity for information to be communicated between people (Ozorhon, Dikmen, and Birgonul 2005, El Sawy, Gomes, and Gonzalez 1986). Research by Ebbers and Wijnberg (2009) and Rusaw (2005) has shown that when employees leave an organization, they take away not only their own knowledge, but the potential to educate others about what they do and how it can be done.

When employees do leave, research by Dychtwald, Erickson, and Morison (2004) and Stein (1995) suggests it is a good practice to maintain communication with former employees at their new jobs or keep them engaged as consultants, keeping the knowledge accessible and allowing the organization to lose as little memory as possible after employees leave. Further, it keeps experienced people engaged with the organization and may provide a further source of information or research in the future. Bhardwaj and Monin (2006), Chen and Edgington (2005), Gong and Greenwood (2012) and Rusaw (2005) have found that some organizational memory is always lost when employees leave, and Carley (1992), Hedberg (1981), Stein (1995) and Olivera (2000) found that major losses of organizational memory are not always dependent on how many people leave but what particular experience leaves and how critical it was to the structure and functioning of the organization.

When new employees are hired conflict can develop between employees that have been with the organization for a long time and new hires. Ebrahimi, Saives, and Holford (2008) found generally that the longer an employee is with the organization the more contacts they have with other employees, and they better understand, and can navigate, the organization's culture. New

hires, however, might be more technologically savvy, have current knowledge fresh from research institutions and colleges, and may already have bought into the mission of the organization. Feldman and Feldman (2006), Goh (2002) and Joshi et al. (2010) determined that the differences in age, skill sets, and organizational commitment to mission can create an environment where older and newer workers may not be willing to share information.

Stein and Zwass (1995) suggest that to begin cultivating trust, first determine how well members of the organization work together. If people do not like, or at least respect, each other trust issues have to be overcome before knowledge can be shared. Joshi et al. (2010) extends that suggestion by recommending that if the organization makes the culture prominent and develops clear work expectations, it can help new employees figure out how they fit into the organization and can help develop trust faster. In a situation where employees do not trust one another enough to share tacit knowledge, the organization may determine that cultivating the required level of trust is not worth the resources to acquire it, and then concentrate on recording explicit information into databases (Ebrahimi, Saives, and Holford 2008). However, this approach ultimately puts the focus on developing databases rather than developing the knowledge, thinking ability, and engagement of employees.

Create a Community of Sharing

When management encourages an environment conducive for sharing and collaboration, employees often feel secure enough in their jobs to be able to share their knowledge with others (Ekambaram, Langlo, and Johansen 2010, von Krogh, Nonaka, and Rechsteiner 2012). An organization can further develop this source of organizational memory by encouraging an atmosphere of open dialogue between all hierarchical levels (Nonaka 1994, Goh 2002, Joshi et al. 2010, Rusaw 2005). Researchers (Dychtwald, Erickson, and Morison 2004, von Krogh, Nonaka, and Rechsteiner 2012) support the idea that if an organization couples an atmosphere of sharing with a culture that values experience and encourages teaching, then the organization has begun

the process of managing its memory. It is particularly important to develop connections between more and less experienced employees where the amount of knowledge to be transferred is greatest. Ebrahimi, Saives, and Holford (2008), Harvey (2012), Joshi et al. (2010) and Walsh and Ungson (1991) found that deliberately creating groups with mixed experience levels encourages sharing and transferring information.

Managers can begin developing an atmosphere of sharing by explaining why managing organizational memory is important to the organization, and, by extension, to employees. If employees don't see any perceived benefit to themselves, it is unlikely they will embrace the idea of managing organizational memory (Markus 2001, Stein and Zwass 1995, Yongsun and Choi 2005). For dialogue to happen, employees need both space and time to share knowledge (Anand, Manz, and Glick 1998, De Long and Davenport 2003, Lang 2001, Nonaka, Toyama, and Konno 2000). In public gardens, this can be done formally with specially constructed studios or work spaces, or informally in existing break rooms. Gathering spaces encourage chatter; break rooms or head houses are places where gardeners can talk informally and share work experiences. Regardless of method, Bhardwaj and Monin (2006) found that the more that knowledge can be disseminated, the less likely it is to be lost when an employee leaves.

Rewarding collaborative efforts over individual ones also encourages sharing (Alwis and Hartmann 2008, Goh 2002, Joshi et al. 2010, von Krogh, Nonaka, and Rechsteiner 2012). People sometimes withhold knowledge because they don't want others to get credit (Alwis and Hartmann 2008, Douglas 1986). If rewards are to be given for sharing, research finds that monetary rewards are not the best way to encourage it (Brown and Duguid 2000, Goh 2002, von Krogh, Nonaka, and Rechsteiner 2012). Von Krogh et al. (2012) finds that connecting rewards to the achievement of higher organizational goals or personal development goals are more effective at encouraging employee sharing. Sharing organizational goals with employees shows how each individual fits into the larger organizational mission and encourages buy-in from employees

toward accomplishing the mission (Brown and Duguid 2000, De Long and Davenport 2003, Liyanage, Ballal, and Elhag 2009, Stein and Zwass 1995).

Sharing information across the organization can be facilitated through forming interdepartmental groups with the goal of exchanging knowledge and ideas. Teams remember better because there are more people with similar memories; they can compare stories (Markus 2001) and share stories to reinforce memories. This is particularly helpful in large organizations with multiple departments that have to work together (Harvey 2012, Lang 2001, Nonaka 1994, Wexler 2002), but can also be relevant in small organizations by providing a scheduled time and space for people to talk to one another.

If a team is assembled for a specific project, Anand, Manz, and Glick (1998) and Berente, Baxter, and Lyytinen (2010) have found it can be beneficial to involve a representative from every department that could contribute to the success of the project. This ensures all involved departments have a voice and can share their concerns and ideas with one another. Establishing a team leader or leaders capable of communicating between all parties and ensuring all voices are being heard can help facilitate sharing between departments (Cohen and Levinthal 1990, Johnson and Paper 1998, McGuire 1981, von Krogh, Nonaka, and Rechsteiner 2012). Any type of group work builds trust within the organization; once people know each other they are more likely to trust, share, and learn from one another (Bhardwaj and Monin 2006, Goh 2002, Harvey 2012, Nonaka 1994).

Encouraging a Learning Culture

Research shows that there are four main factors that should be present if an organization is going to develop a culture of learning:

1. Intention: considers whether the organization encourages their employees to ask questions (Ekambaram, Langlo, and Johansen 2010, Nonaka 1994)

2. Autonomy: considers how much room employees are given to make their own decisions about solving problems (Chen and Edgington 2005, Cohen and Levinthal 1990, El Sawy, Gomes, and Gonzalez 1986, Nonaka, Toyama, and Konno 2000). Having a safety net, and not punishing gardeners if they fail (Bhardwaj and Monin 2006, Goh 2002, Johnson and Paper 1998), encourages experimentation and builds knowledge through learning what works and does not work.
3. Environmental fluctuation: considers how often new experiences are given to employees to force them to make new decisions and create new knowledge (Chen and Edgington 2005, El Sawy, Gomes, and Gonzalez 1986, Moorman and Miner 1997, Nonaka, Toyama, and Konno 2000) or experiment with new ideas or techniques (Hedberg 1981, Ozorhon, Dikmen, and Birgonul 2005).
4. Absorptive capacity: takes into consideration how much employees can absorb and process at one time (Cohen and Levinthal 1990). Knowledge is not generated as efficiently if employees are overwhelmed continuously with new information. Having an existing culture of learning creates a base for new knowledge to be added sequentially. Knowledge builds upon itself. If there isn't an extensive base of knowledge, the knowledge generation process will be slower, or employees may be less willing to integrate new ideas into their existing knowledge base (Boardman and Vandaele 2010, Cohen and Levinthal 1990, Markus 2001).

People learn through repetition and eventual mastery of routine activities; once mastery of routine tasks is accomplished new tasks can be added to the employee's schedule (Casey and Olivera 2011, Feldman and Feldman 2006, Nonaka 1994, Stein and Zwass 1995). Once a process is mastered it can be separated into its component parts and examined to see if it could be made more efficient. This can then be followed by standardization to ensure the task is done the same way each time (Fiedler and Welpé 2010). The last stage would be to examine and evaluate the

process periodically to make sure it is still the best way, or most efficient way, to perform a task (Hansen, Nohria, and Tierney 1999, Walsh and Ungson 1991).

Ideally the organization would have a training program to train or update their employees with new knowledge and information that can then be reinforced through organizational memory. Professional development is one way to build knowledge in an organization and to encourage employees to stay longer and build more organizational memory. Furthermore, employees are far less likely to leave if there are training or other educational opportunities available within the organization. Training programs can be internal or external to the organization; both provide for knowledge generation (Chen and Edgington 2005).

The National Trust in England provides internal training for its gardeners through workshops and classes, designed both for the gardener and the garden manager. This organization has historically found it beneficial to train their own gardeners because they teach specific skills necessary to manage a diversity of programs and plants within the National Trust holdings. They have developed a 'Careership' apprenticeship to build up the ranks of skilled gardeners. Additionally, gardeners are encouraged to further educate themselves about their work through outside courses, job swaps, or other training (Fretwell et al. 2001). A new policy within the National Trust is attempting to centralize gardener education rather than having education the purview of individual gardens (Cosgrove 2015).

Another way to bring in new knowledge is to hire people with specific skills or experience. When given the option, research shows it is preferable to hire experienced people: they have a base of knowledge to draw from and generally need less overall training (Carley 1992, Cohen and Levinthal 1990). Alternatively, individual learning can come from outside the organization through networking with other organizations, sharing knowledge back and forth (De Long and Davenport 2003, Goh 2002, Nonaka 1994, Olivera 2000). This collaboration is particularly helpful when another organization has knowledge that is not present in the first one

and is willing to teach and train to expand knowledge in the field (Berente, Baxter, and Lyytinen 2010), not just in individual gardens.

Recording⁴ Knowledge in Organizations

In order to begin the recording process, a good starting place is to determine what knowledge is existing in the organization, where the knowledge is stored, and what knowledge is necessary to record into the organizational memory (Coffey and Hoffman 2003, De Long and Davenport 2003, Maney-O'Leary 1992, Nonaka, Toyama, and Konno 2000). The easier the knowledge is to locate within the organization, the better it is lodged in the organizational memory (Anand, Manz, and Glick 1998).

After determining what knowledge is available and manageable to record, and where the information is located, the physical and conceptual layout of the knowledge management system can be determined (Brown and Duguid 2000, Coffey and Hoffman 2003, Jennex and Olfman 2004, Maney-O'Leary 1992). The knowledge management system will have to take into account how data is imputed, managed, and removed across the system (Brown and Duguid 2000, Moorman and Miner 1997, Stein and Zwass 1995). Both explicit and tacit knowledge can be collected and used, though organizations generally are better at managing one or the other, rather than both (Hansen, Nohria, and Tierney 1999, Wijnhoven 1999). Wijnhoven (1999) further notes that explicit information is generally easier to record and store and is typically managed first; tacit knowledge can be difficult and time consuming to record and can be left as tacit, provided it is widely shared throughout the organization.

⁴ For the purposes of this thesis, recording is taking selected information and knowledge from the minds of the gardeners and entering it into a collection device, such as a log book or database. Many ways exist to record knowledge; this thesis is not looking to point out ways that are better or worse. A method may be better for one garden with a different mission or more or less resources than another garden may not be able to duplicate. What method of recordkeeping a garden chooses depends on the resources of the garden and how committed they are able to be about managing their organizational memory.

If a program to record tacit knowledge is established, De Long et al. (2003) suggests to first determine how much time is needed to record the information and to then make sure the information is recorded periodically before employees leave the organization. Most people are willing to share their knowledge; it is just a matter of asking them to do so in an organized way (Coffey and Hoffman 2003) so it can be useful to the organization.

The eventual audience for the records partially determines how thorough the records will be. Gardeners enter data more completely if they know the result will be for public consumption, rather than as a personal reference (Markus 2001). Employees need time scheduled into their day to record information. Management is responsible for giving employees time to record information thoroughly. (Alwis and Hartmann 2008, Coffey and Hoffman 2003, Hansen, Nohria, and Tierney 1999, Lang 2001).

Sales (2009) notes that finding a balance between recordkeeping and daily garden maintenance is difficult. Management is responsible for impressing on gardeners the importance of recordkeeping. When records are being created, making multiple copies of the information, and then storing in different locations, is a good practice in case some get lost, misplaced, or forgotten (Nonaka 1994, Nonaka, Toyama, and Konno 2000, Olivera 2000). However, this needs to be balanced with spending the time to organize the information in an understandable and retrievable format.

Oral histories or interviews, recorded and transcribed, are a generally accepted method to record experiences and memories (Coffey and Hoffman 2003, De Long and Davenport 2003), and have been used by landscape architects to establish design intent or learn about garden history from people associated with the garden or landscape (Vernon, Garvey, and Williams 1990). It is preferable to record people when they are still involved and engaged with the organization. However, if the designers or other influential people disengage from the landscape before recording their intent, they can be brought back at a later point to verbalize their ideas and

inform staff what the original intent entailed (Birnbaum 2000, McGuire 1981). Primary sources, people who have experienced the event firsthand, are the best sources of information about a garden's history and management practices (Birnbaum 2000, Maney 1990). Recording memories is a time-consuming process; having a specific project or issue, and having specific end results, streamlines projects and makes the end results more useful to the organization (Ackerman 1998, Coffey and Hoffman 2003, Harvey 2012, Moorman and Miner 1997). Ideally, multiple viewpoints would be recorded to give the most complete explanation of the event (Tuomi 1995).

Written records can help to record past events (Akgün, Keskin, and Byrne 2012, Smith and Steadman 1981, Tuomi 1995, Walsh and Ungson 1991). Recording context about the event (how and why), in addition to the more traditional who, what, when, and where (Stein 1995, Stein and Zwass 1995, Tuomi 1995, Walsh and Ungson 1991) is important for capturing a more complete event memory. Since event memories deteriorate over time recording information as soon after the event as possible is critical for memory management, even if it may be time consuming to do so (Tuomi 1995). One of the easiest ways to start keeping records is to record daily activities in a notebook, which can then be transferred to the computer at a later time (Maney 1990). Michener (2011) gives suggestions on what public gardens should be recording in their plant records, including specifics about species, sources and date. If the garden is located in a colder climate, winter provides an excellent opportunity for entering information into databases. Garden maps should be kept in addition to other records to show locations and types of plants (Sales 1985).

Technology can be used to store data and context long term (Akgün, Keskin, and Byrne 2012, Hansen, Nohria, and Tierney 1999, Olivera 2000, Tuomi 1995), though with the speed technology changes, information can be made rapidly obsolete or inaccessible (Pollitt 2000, Wijnhoven 1999). Emails, for example, can store information well but can be lost if systems are transferred or merged (Jennex and Olfman 2004). Part of determining the recording process for

an organization is to determine how the various systems will be supported and maintained over time to ensure the information remains accessible and relevant (Coffey and Hoffman 2003, Maney-O'Leary 1992, Olivera 2000, Wijnhoven 1999). One way to store data is through the use of databases (Olivera 2000). If designed correctly, databases can be used to quickly access and analyze data to form information and knowledge.

The easier it is to enter data into a system, the more likely people will do it willingly (Markus 2001). Requiring timely and accurate data entry through the use of individual performance objectives and reviews is one method to encourage accurate data entry (Hansen, Nohria, and Tierney 1999). If using the database is not within the employee's skill set, then they may require additional training to become familiar; assuming that all employees have the same familiarity with technology is not a good practice (Anand, Manz, and Glick 1998, Dychtwald, Erickson, and Morison 2004, Ebrahimi, Saives, and Holford 2008, Lang 2001).

Disseminating Knowledge Within the Organization

Knowledge is disseminated by making it available to people within the organization. Technology makes information available upon request and connects people from different locations that otherwise wouldn't have been able to communicate easily otherwise (Ackerman 1998, Gong and Greenwood 2012, Hansen, Nohria, and Tierney 1999, Olivera 2000). Gong et al. (2012) notes that technology can store recorded knowledge in a variety of formats, increasing the types of information stored. This, in turn, could decrease the effect turnover can have on the garden by recording and making assessable more knowledge from more people. As technology improves, the cost of data storage decreases, facilitating storing more detailed information (Hansen, Nohria, and Tierney 1999, Stein and Zwass 1995).

Management determines who has access to the information (Brown and Duguid 2000, Jennex and Olfman 2004, Olivera 2000, Stein and Zwass 1995); theoretically, the more people who have access the better the information will be distributed throughout the organization (Goh

2002, Nonaka 1994, Nonaka, Toyama, and Konno 2000, Tuomi 1999). Additionally, the easier the system is to use, the more people will use it (Olivera 2000). Storing information on servers or intranets facilitates transmission by centralizing access (Ebrahimi, Saives, and Holford 2008, Gong and Greenwood 2012).

Informal dissemination ties people closer together and develops a more sustainable culture of sharing within garden staff. Informal dissemination does not have to have management approval to happen, though formal dissemination programs would probably require management approval.

Formal dissemination programs include:

1. Mentoring (De Long and Davenport 2003, Goh 2002, Hansen, Nohria, and Tierney 1999, Harvey 2012)
2. Job coaching/shadowing (De Long and Davenport 2003, Markus 2001)
3. Apprenticeships (Nonaka 1994, Sales 2009)
4. On-the-job training (De Long and Davenport 2003, Liyanage, Ballal, and Elhag 2009)
5. Rotating workers through various areas (Cohen and Levinthal 1990, Nonaka 1994, Nonaka, Toyama, and Konno 2000)

Tacit knowledge, in particular, can be difficult to record and, as mentioned previously, it is often easier to disseminate widely within the organization rather than recording. Tacit dissemination can be as casual as:

1. Informally chatting on breaks (Brown and Duguid 2000, Ekambaram, Langlo, and Johansen 2010, von Krogh, Nonaka, and Rechsteiner 2012)
2. Creating metaphors on how processes work (Brown and Duguid 2000, Nonaka 1994)
3. Storytelling about garden successes or failures (Bhardwaj and Monin 2006, Brown and Duguid 2000, De Long and Davenport 2003, Feldman and Feldman 2006).

All these methods share memories, knowledge, and experience amongst employees, introduce new employees to how the organization works, or are ways new employees can become familiar with how the organization works and learn from experienced people in different areas of the garden.

Using Organizational Memory

Recording and disseminating knowledge is necessary for management of organizational memory. Using stored knowledge to create new knowledge is a means for a garden to develop and grow as an organization. By using gardener knowledge of horticultural processes, policies and procedures detailing specific procedures and techniques can be recorded to teach future employees about garden management. Some of the ways stored knowledge can be used is through the creation of best management manuals and plans (Ekambaram, Langlo, and Johansen 2010), preservation management plans (Maney 1990), preservation maintenance plans (Coffin and Bellavia 1998), or landscape management plans (Fong 1989, Sales 1988).

A landscape management plan is a document where gardener knowledge can be incorporated into the horticultural planning process. These plans provide continuity from one gardener to the next to relate what has been done in the past and how it was done, and can be depicted through text or diagrammatically (Sales 2007). The plan should be updateable and examined periodically to ensure relevancy (Sales 1988), and at a minimum contain an overall design intent for the entire garden, with sections dealing specifically with individual sections of the garden. Additionally, there should be notation of the minimum level of care necessary to maintain the garden's design intent, taking the garden's resources into account (Sales 1985).

Some occupations have developed organization-wide Knowledge Management Systems to contain the knowledge and experience from all their employees (Ackerman 1998, Brown and Duguid 2000, Coffey and Hoffman 2003, Rusaw 2005). This may not be within the resources of

any but the largest individual gardens, but an organization like the APGA could potentially host such a system if there were enough demand for it.⁵

Lessons Learned from the Literature Review

As noted by Walsh and Ungson (1991), organizational memory is stored in six ‘storage bins.’ These ‘bins’ are accessed to draw on organizational memory to use in making planning decisions. Since the mission is the driving purpose of the organization, any use of organizational memory should assist in fulfilling the garden’s mission. This can help managers and gardeners to sort through information with varying degrees of usefulness; if it relates to the mission it should be included, if it doesn’t relate to the mission consider spending less time managing that particular piece of knowledge.

No two public gardens have the same resources, mission, or design intent, implying there may not be one universal way organizational memory should be managed in all public gardens. Managing organizational memory, and developing knowledge from the memories, is a continuous process requiring buy-in at all levels of the organization. Knowledge development relates directly to organizational culture and structure; if the garden is structured hierarchically there is already reduced potential for organizational memory development. Knowledge is typically developed at the bottom of the hierarchy at the gardener level. In this way, they are the ones creating much of the knowledge in the organization. Gardens can encourage more organizational memory development through cultivating an open culture of trust, sharing, and learning, beginning with stewarding the knowledge of their employees, rather than concentrating entirely on managing plant collections or databases.

Management is responsible for determining how the culture of the organization will be expressed, and also for encouraging employee knowledge growth that furthers both the mission and the design intent. Gardeners are on the front lines of developing new knowledge within the

⁵ For a list of articles about Knowledge Management Systems in practice, see Appendix F

organization – they are working in the landscape, experiencing its changes day-to-day, and solving problems as they occur. These intellectual assets, when cultivated, disseminated and used, are what will set the garden apart from others, and will determine how effectively the garden is able to encourage and manage growth.

Both tacit and explicit knowledge are valuable to public gardens, but the tacit knowledge of how the garden grows is what makes good gardeners better. If the resources are not there to record the tacit knowledge then encouraging garden-wide dissemination could help to hedge against loss of skills. Encouraging and providing opportunities for employee learning and development increases the capacity for organizational memory and allows the public garden to grow and change to help fulfill its mission.

Formal dissemination programs such as mentoring have been shown to be effective in developing ties between employees, connecting them together and making them more likely or willing to share knowledge. They help new gardeners assimilate into the culture faster and provide a teaching outlet for older gardeners to share their knowledge. In an experience-based field such as horticulture, transference of hands-on skills is critical for gardens to survive.

Based on the lessons learned in the literature review, research on organizational memory can be modified to be used in public gardens. There are four organizing themes that arose from the research for this Chapter: cultivate (trust, share, and learn), record, disseminate, and use. Particularly within the cultivate section, these different themes build upon one another in creating an organizational memory management system. Cultivating a culture where gardeners trust one another makes them willing to share information, and this then encourages learning. Without an existing culture of trust and sharing organizational memory management will probably not be as effective a tool as it could be since there will be less potential for learning from and using organizational memory as an essential knowledge asset. When combined with records within the organizational memory, new knowledge can be formed that can then be disseminated and used to

further the mission of the garden. This process is summarized by the author in the graphic in Figure 2.1, and will be seen again in Chapter 7 in conjunction with the protocol.

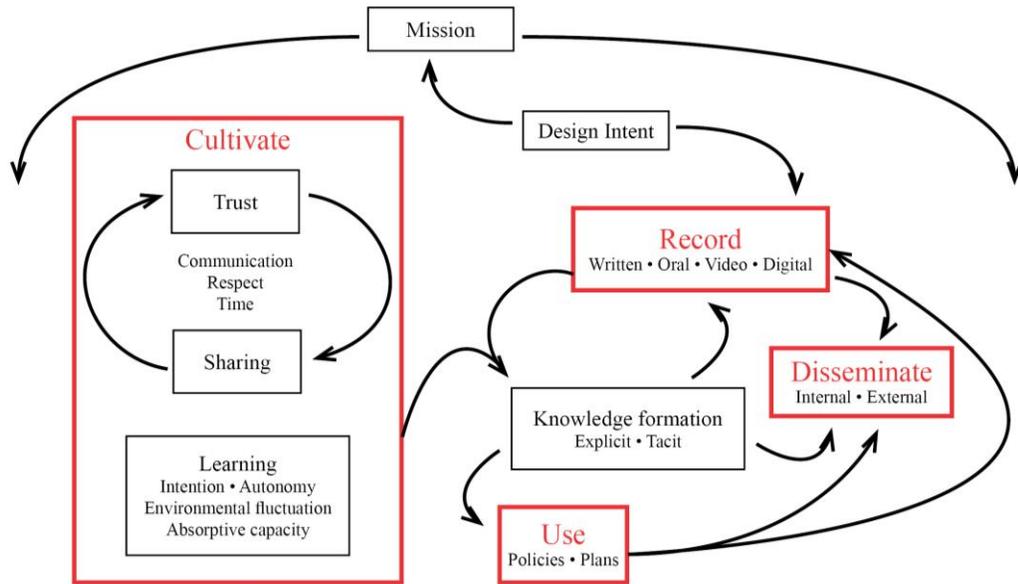


Figure 2.1: Managing Organizational Memory in Public Gardens

CHAPTER 3

METHODOLOGIES

The two main data collection methods were:

- 1) An email survey and series of interviews of landscape architects who completed a Cultural Landscape Report (CLR)⁶ and are members of the ASLA
- 2) An email survey and series of interviews of public garden professionals that are members of the APGA.

Using interviews to gather information is an accepted practice in social science research and was performed by many of the authors discovered through the literature review. Ekambaram, Langlo, and Johansen (2010) and Harvey (2012), for example, both used interviews to gather the data they needed to complete their research. In order to locate the people to interview it was determined through consultation with researchers that a survey would be the best way to locate prospective interviewees. In order to encourage honest and detailed answers during the interviews, the interviewee's names and their associated gardens are confidential.

Landscape Architect Survey

A survey for landscape architects was developed by the author to determine how landscape architects define design intent, who are their best sources of design intent, and where those sources of design intent are located. The questions were tested on a landscape architect and then revised and reordered based on his feedback.

⁶ A CLR is a National Park Service (NPS) guide used to document cultural landscapes and plan for the preservation of their significant cultural landscape features. There are three parts to a CLR: Part 1 - site history, existing conditions, and analysis and evaluation, Part 2 – treatment, Part 3 – record of treatment. For more information, see (Page, Dolan, and Gilbert 1998), available online at: http://www.nps.gov/cultural_landscapes/Documents/Guide_to_Cultural_Landscapes.pdf (accessed January 6, 2015)

The author determined that the most likely source of landscape architects knowledgeable in determining design intent are ones who have written a CLR. Part of writing the CLR involves research and documentation of the landscape's design intent that then informs future management decisions. As one of the leading preservation associations in the US, the NPS uses the CLR as a management tool for documenting and determining treatment for their historic landscapes and employs landscape architects to write the reports for them. Since the landscape architects are using a process developed and approved by the NPS, the author decided that writing a CLR would give them the experience to answer the survey questions authoritatively. Unfortunately a central repository of all CLRs in the US does not exist. Many CLRs written for NPS properties can be found in the NPS's online storage portal,⁷ but updated contact information was not available, and the reports were limited to NPS sites. To expand the survey pool beyond the NPS, a new method was adopted.

The primary advocacy organization for landscape architects is the ASLA. When becoming a member of ASLA, an option exists to join one of their Professional Practice Networks, targeted to specific interests in the industry. The author determined the most relevant category to be the Historic Preservation Professional Practice Network (HPPPN). The author assumed members of this group would be interested in documenting and researching landscapes, and some would have written a CLR. A list of HPPPN members was downloaded from ASLA's website on March 18, 2014. Members of the network who did not have an address in the US or an email were excluded from the contact list. Since the number of members of this group that have written CLRs is not known, this method of finding potential survey respondents was not expected to achieve a significant response rate.

⁷ Website available at: <https://irma.nps.gov/App/Portal/Home> (accessed January 14, 2014)

Qualtrics, an online survey management program, was the platform for the survey.⁸ The survey was hosted on the Qualtrics website and the link to the survey was sent through email to the selected professionals. A copy of the survey questions can be found in Appendix A. Through Qualtrics, 354 emails were sent from April 10-15, 2014. The survey closed on April 24, 2014, allowing a response time of nine to fourteen days, and was not resent. Nineteen landscape architects completed the survey. Due to the limited response, the survey is not statistically significant and industry-wide trends cannot be determined. Though not significant, the answers to the survey can be used as a starting point to begin looking at how information about design intent is compiled and used by landscape architects. The most valuable survey result was determining professionals with whom to conduct in-depth interviews.

Landscape Architect Interviews

Two criteria were used for choosing interviewees:

1. Respondents conduct interviews for determining design intent.
2. Respondents wrote Part II of the CLR, the landscape management portion.

These two criteria allowed the author to select respondents who potentially engage workers on site to help determine design intent as part of their standard method of inquiry, rather than relying entirely on written sources. Using responses gathered from the survey, questions were developed by the author and tested on a landscape architecture professional. The questions were then rearranged to create a better flow. A copy of the survey can be found in Appendix B. All interviewees were informed about the research nature of the interview and gave their consent to be recorded and interviewed. Due to time constraints, four interviews were conducted between September 11, 2014, and October 21, 2014 and were numbered sequentially, 1, 2, 3, and 4. Interviews were conducted at the convenience of the interviewee over the telephone or in person, were in no particular order, were recorded using a downloadable smartphone application called

⁸ For more information, see <http://www.qualtrics.com/> (accessed September 23, 2014)

TapeACall,⁹ and sent to be transcribed by an online transcription service.¹⁰ Interviews lasted between twenty-five minutes and one and a half hours.

Table 3.1 shows the method of interview, type of practice, and whether the interviewee generally works alone, or collaboratively with multiple people, to complete the CLR. The interviews exposed that all interviewees had at least fifteen years of experience researching and writing about cultural landscapes. Through their experience over time they certainly have the qualifications to speak authoritatively on their process.

Table 3.1: Landscape Architect Interviews, Background Information

	Interview Method	Recorded and Transcribed	Type of Practice	Method of Working
1	Phone	Yes	Private	Individual (I)
2	In person	Yes	Public	Collaboration (C)
3	Phone	No, notes taken	Public	Both (I and C)
4	Phone	Yes	Private	Individual (I)

Public Garden Professional Survey

The survey targeted members of the American Public Garden Association (APGA), a national nonprofit organization established in 1940 that advocates for the needs of the public garden community. Their mission states that “APGA serves public gardens and advances them as leaders, advocates, and innovators.” (APGA 2014a). Members of the APGA are professional gardeners or are associated with public gardens in some capacity. There are three membership categories:

1. Individual: a single person joining the organization
2. Institutional: the garden is a member of the organization
3. Corporate Partner: private companies donate, then get recognition and advertising

As an institutional member, the institution’s staff also become members and enjoy the benefits of belonging to the APGA (APGA 2014b). As of January 2014, approximately 490

⁹ For more information see <http://www.tapeacall.com/> (accessed January 6, 2015)

¹⁰ For more information see <https://www.rev.com/> (accessed January 6, 2015)

institutional members are found in the US (Moussa 2014), though this number fluctuates from year to year depending on renewals. As a benefit of membership in the APGA, members have access to a searchable online database of all members. The database can be queried by an individual's name or an organization's name. When an organizational search is performed, employees of the garden are listed if the garden or individual provided the information. Additionally, members can participate in Professional Sections targeted to specific segments of the public garden community, such as 'Historic Landscapes' or 'Plant Collections.'

In order to better inform the survey questions it was necessary to have a basic understanding of what existing knowledge public gardens currently record, how they record it, and if there is anything they would like to record which they are not recording. The author determined that the 'Historic Landscapes' section would be the best source of base information because:

1. The author had prior contacts with individual members in this section, and
2. Historic gardens often have an interest in preserving their history so it was assumed they would be more likely to be recording information about their respective gardens.

Forty members of the 'Historic Landscapes' section, from forty different gardens, were contacted through email from December 2013 to January 2014. Twenty-four members responded (60%). The answers provided base knowledge to develop survey questions.

To begin developing a contact list for the survey, the APGA database was used as a source. Two different contact lists were developed:

1. Members of the 'Plant Collections' section, a total of 79 gardens.
2. Additional gardens were selected at random, up to three from each US state and the District of Columbia (DC), for a total of 132 gardens.

Some states did not have three gardens listed in the database, and so all gardens were selected from those states. Members from countries outside of the United States were not included in the

survey. In order to not contact gardens more than once, any gardens that had personnel participating in the “Historic Landscapes’ and ‘Plant Collections’ sections were not included in the contact groups for the survey.

As noted by Rakow (2011) public gardens distinguish themselves from other gardens by keeping plant records. The author assumed that members of the ‘Plant Collections’ section would be more knowledgeable and more interested in keeping records, and so would have more to share on the subject. In order to get a perspective from gardens that might not manage their records as intensively and to try to get information from a broad geographic area, the additional garden contact list was added.

Member’s names and emails, garden, organizational title, state, and zip code were recorded from APGA’s database. If multiple people from a garden were members of the ‘Plant Collections’ section, then only one was contacted. Preference was given to garden managers, curators, and plant recorders; the assumption was that they would have either more knowledge of the routine garden activities or more knowledge of plant records systems.

Presidents, vice presidents, and chief executive officers were given secondary preference, they are assumed to be more removed from the routine garden work, but would still be able to comment on how the organization manages its resources. Researchers, volunteer or membership coordinators, or staff not directly related to horticultural operations were not contacted, assuming that they would probably not know enough about horticultural operations to comment. Gardeners were not necessarily targeted because they might not have the same knowledge of organizational structure that a manager would. If job titles or emails were not listed in the database then the garden or individual was not contacted.

The contact list for the additional gardens was built using the organization search function through the APGA database and then delineated by state. Up to three gardens were chosen at random from the list of remaining gardens in each state to determine which gardens to

contact. Corporations and landscape architecture firms were excluded, as were gardens that did not have any employees listed in the database or if job titles and emails were not listed in the database. If any state included less than three member gardens, then all gardens were included, provided they fit the previous criteria. The same information about individual members was collected from the random gardens as was collected from the Plant Collections Professional section members and similar job descriptions were contacted. If emails were undeliverable (incorrect or outdated addresses), other members of the garden were contacted as per the job description criteria. If all emails from the garden were undeliverable then the garden was excluded and another garden chosen through a random drawing of the remaining gardens in the state.

Qualtrics was again used as the platform for the survey. The survey was hosted on the Qualtrics website, and the link to the survey was sent through email to the selected professionals. Before sending it to the target group, five professionals tested the survey and made comments and suggestions. The order of the survey was rearranged based on their feedback, and some of the questions were modified to reflect their recommendations. Due to bounced emails and duplicated gardens, the final contact list was less than the original list. The final surveys were emailed on March 6, 2014 to 203 gardens in all fifty states and DC. See Appendix C for a copy of the survey. A reminder email was sent to any non-respondents on March 18, 2014, and the survey closed on April 4, 2014, after twenty-nine days. A total of seventy-eight gardens (38%) responded to the survey from thirty-seven states and DC.

Public Garden Professional Interviews

Based on the results from the survey, two criteria were defined for selecting interviewees for the Public Garden Professional Interviews:

1. Having gardeners on staff who had worked in the garden for ten years or more.

2. The garden had completed a landscape management plan.¹¹

Selected gardens were divided into three categories, small, medium, and large (Table 3.2), based on the number of employees listed under the organization in the APGA's online database (accessed April 15, 2014). One of the twenty-three was excluded because the garden was not an Institutional member, therefore no data about other employees was available. Garden size ranges were delineated based on total number of employees listed in APGA's database, not total number of gardeners.

Table 3.2: Size Breakdown of Interviewed Gardens

	Number of employees	Potential interviews	Actual number interviewed	Garden number
Small	<14 employees	12 gardens	4 gardens	1, 2, 8, 9
Medium	24-61 employees	8 gardens	4 gardens	3, 6, 7, 10
Large	>250 employees	2 gardens	2 gardens	4, 5

The questions were tested on a garden manager, then reordered and modified based on feedback from the manager. A copy of the questions can be found in Appendix D. Interviews were conducted over the phone between April 30, 2014 and July 23, 2014. Interviews lasted between thirty-one and fifty-eight minutes, and were recorded and transcribed using the method described for the Landscape Architect Interviews. Interviewees will be referenced as gardens 1-10; numbers were assigned in the order the interviews were performed (See table 3.2). The order of the interviews reflects the availability of the interviewees. Transcriptions were read by the author, and overarching ideas were extracted from the interviews and categorized into the following topics: mission and design intent, organizational structure, cultivate, record, disseminate, and use.

¹¹ The definition of what a landscape management plan is was open to interpretation by the individual gardens; it was one of the available boxes to check on the survey.

CHAPTER 4

LANDSCAPE ARCHITECTS SURVEY AND INTERVIEWS

This Chapter continues to investigate the secondary thesis question: what role do gardeners play in the management of design intent?, and introduces a graphic for determining sources of design intent in a public garden. Once the sources are determined, their knowledge can be recorded and fixed into the organizational memory of the garden. These questions were investigated using a survey, followed by a series of interviews, querying landscape architects about how they determine design intent in the landscape. The survey questions are in Appendix A and the interview questions are in Appendix B.

Survey Analysis

Although codified by the NPS, a standard definition for design intent was far from universal among surveyed landscape architects. Fifteen people defined design intent in fifteen slightly different ways. It appears that individuals have taken the idea of design intent and adapted it to fit the needs and philosophies of their practices. Through examining the various definitions three criteria describing the interaction between the designer and the landscape seem to be most often used by the responding landscape architects to determine design intent: context, objective, and implementation.

1. Context: determined by looking at the outside cultural attitudes and influences that may have influenced the designer as they manipulated the landscape
2. Objective: the goals and visions of the designer for the landscape, often a visual interpretation of the owner's intentions
3. Implementation: the physical manifestation of the designer's ideas in the landscape.

Taking these three criteria into account, and also through evaluating the existing landscape, reviewing historic documentation and photographs, and in discussions with interested stakeholders, design intent can be determined for the landscape. All the respondents use photographs and written primary sources to determine design intent, and a large majority use planting records. Other sources of design intent include oral history interviews, newspaper and magazine articles, aerial photos, archival material, and historic maps and plans. Written documentation and photographs were preferred rather than oral histories.

Eleven respondents, out of nineteen total, use interviews as a tool for determining design intent. Respondents were then asked to rank the usefulness of a variety of employee categories in helping to determine design intent. The best ranked positions were site archivists and historians, probably because they have the most access to historic documents and know the history of the organization better than many of the other employees. Site owners, their families, and site directors, were all considered to be good sources of information, though not as good as the site archivists and historians. The respondents indicated that current and retired landscape staff were considered to be of neutral value, comparable to retired staff (general) and board members.

Extrapolating from the survey, respondents generally determine design intent using a wide range of primary source materials rather than interviews or oral histories. When interviews are used, the best sources of design intent are historians and archivists, not gardeners. Though gardeners are working in the landscape every day, it appears that this does not necessarily qualify them for speaking about design intent. The survey was then used to choose landscape architects to interview in detail about how they determine design intent in a landscape.

Interview Analysis

Aside from the two publications about design intent published by the NPS few sources of information are available about how landscape architects, or public gardeners, can learn about determining design intent. All the interviewees were asked about their processes of determining

design intent. Through analysis of the interviews, a clear linear process for determining design intent was not apparent. The actual process varies from site to site depending on multiple factors such as availability of information, access to the site, time to complete the project, etc. It seems to be helpful to the process if the researcher is flexible and willing to change tactics as more information is uncovered. See Figure 4.1 for a diagram based on information from the interviews, graphically representing a method of determining who is a source of design intent, who manages design intent, and where information to determine design intent can be found.

Much of the interviewees' knowledge about determining design intent appears to be tacit knowledge of how a landscape functions as a whole, based on their experience observing landscapes and piecing their individual histories together. Half of the interviewees developed their knowledge of design intent through personal experience over time, and the majority worked with other qualified professionals to improve their knowledge and experience. Disseminating knowledge about determining design intent to gardeners may prove difficult, since much of the knowledge about determining intent is tacit knowledge from landscape architects. Encouraging team formation between designers and gardeners could help transfer the knowledge and about managing the landscape with design intent in mind.

For most of the interviewees, period context is important for determining design intent. This includes new ideas, shifts in the garden's design, and any outside cultural influences that occurred at that time of the garden's design that could have affected the design. One of the interviewees noted that in an ideal situation the designer would record their intent, though they also noted that this rarely happens. However, they did mention that if the designer is not there to communicate their intent it might be possible to talk to the garden designer's long term employees who may be familiar with the designer's body of work. This could give insight into the designer's thought process and could help to explain design decisions. Half of the interviewees suggested using monographs or books about the designer, if they are famous

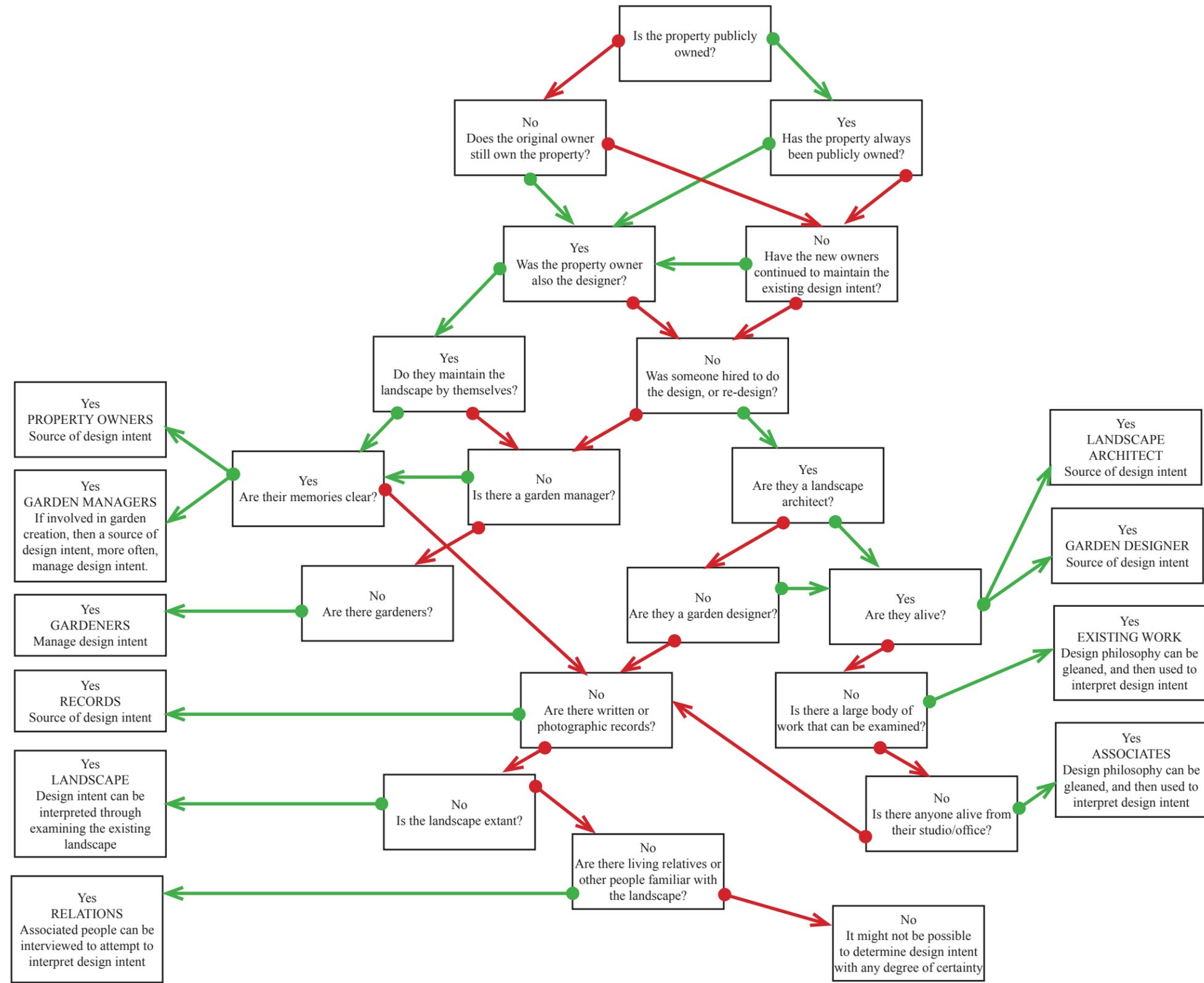


Figure 4.1: Locating Design Intent in Public Gardens

enough, to try to determine design intent based on their previous work, noting that their styles would probably change over time so the context of the time period becomes particularly informative.

One interviewee noted that design intent is not always recorded, but is implied in the landscape's formal expression. Another interviewee looks at planting plans to determine how the landscape pieces fit together and then is able to speculate on how the plants could make the space feel, based on their knowledge of spatial relationships. The majority of the interviewees stressed the importance of visiting the site to record existing vegetation and features. If there are no plans available, site observation, or reading the landscape, may be one of the only ways to determine design intent. One interviewee suggested visiting sites multiple times during the research process because ideas about design intent and how the landscape features relate to each other develop deeper meaning, and may change, as research into site history continues.

Many sites have multiple players influencing the design over many years. Part of the research, for one interviewee at least, is to determine which players had influence over the design, which players influenced the implementation, and when these shifts in design happened. When multiple people design on a site over time it can be difficult to determine responsibility for different parts, or how much a specific individual's ideas had on the overall design. Design intent can change over time depending on who was in control of the design, who was managing the site at the time, or whether the site changed ownership.

Although the survey outlined major primary sources of design intent, one interviewee would add public town records and annual reports to the list. If there is no primary source documentation, one interviewee suggests getting information from secondary reputable sources, like site historians. The information has already been filtered through their research and may have to be adapted based on the landscape architect's own research into the site. All the

interviewees stressed the need to use the site itself as a source of design information. Reading the landscape was critical for all the interviewees in helping to determine design intent.

None of the interviewees performed oral histories, though one interviewee noted that if someone else was already recording oral histories, they would certainly use them as reference. According to at least half the interviewees, oral histories are more commonly about the individual's experience and life, or about the culture of the site, rather than about the physical layout. Using a format approved by an organization, like the Oral History Association,¹² can be time-consuming and expensive and, in the experience of the interviewees, not justified by the quantity and quality of information obtained. Specific guidelines for landscape architects were developed by Vernon, Garvey and Williams (1990) and can be used as a place to start conceptualizing how an interview could be conducted.

Though all interviewees did interview people associated with a site, none of them generally used interviews as a major source of information about design intent. For one of the interviewees, interviews comprised less than 10% of their time on a project. For the interviewees, determining design intent is left to the experience and skill of the investigating landscape architect, though the impressions of people living and working on the site are still taken into account. When hired for a project, one interviewee noted that clients typically don't want to pay for interviews because they are time consuming and expensive, and don't always reveal useful information. Another interviewee said though interviews could potentially be illuminating, there are many limiting factors (age of the site, the people involved, and how much access the interviewer has to potential interviewees) that influence the usefulness and applicability of the resulting information. Though interviews are not usually performed, half the interviewees had stories of finding people associated with the site that had extensive memories about the site and

¹² For information about designing questions for oral histories, see <http://www.oralhistory.org/about/principles-and-practices/> (accessed November 12, 2014)

were willing to assist them in the development of their work. However, in the interviewees experience over multiple sites, this was the exception, rather than the rule.

In order to maximize the usefulness of the information collected, at least half the interviewees conduct interviews with specific ideas of what information they hope to get out of each interview. They arrive with a specific set of questions about the site or site layout, but also remain flexible to changing focus or topic if the interview takes an interesting or fruitful direction. In the majority of the interviews, the client has compiled a list of names of people to interview. From there a snowball effect usually occurs in that the first person might suggest more people, and those people suggest additional possibilities, and so on. Alternatively, one interviewee suggested using a group discussion or round table method, where selected, interested people are brought together in order to talk to one another about their memories of the site. If resources are an issue, using a group setting can save time and money though only doing one set of interviews, rather than multiple individual ones. People remember better in a group setting when they can bounce ideas and recollections off one another (Markus 2001).

When choosing people to interview, the interviewees prefer people who have a direct relationship to the site or are older members of the community. When interviewing people, one interviewee recommended taking the role of a neutral observer. In their experience they found people were more willing to share information if they thought they were talking to an impartial observer. Though gardeners may be too busy with their jobs to assist in the landscape architect's research and inventory, one interviewee reported there was usually at least one person on site interested in assisting with the project. Within the NPS system, one interviewee found the landscape staff were actually more knowledgeable about changes in the landscape than management because they didn't have the flexibility to leave their positions, thus increasing the ability to accumulate memories over time.

One interviewee further suggested interviewing people before they depart and disengage from a site. If a worker leaves a job and doesn't remain involved the worker's memories may not be complete, or they may not be interested in talking about a project that happened in the past. If it has been too long the memories may still be there, but the worker might not be as interested in discussing what happened on the site. After all the interviews were complete, all the interviewees checked the information they gathered with what they had discovered from other sources.

When interviewing gardeners, the majority of the interviewees found gardeners to be knowledgeable about plants and growing conditions on site, but they were not familiar enough with the concept of design intent and generally did not consider the larger picture of how all the parts of the garden mesh together to create a unified design. Unfortunately, the Landscape Architect Interviews were performed after the Public Garden Interviews, so it was not possible to ask the public garden professionals questions about this disconnect.

The interviewees reported gardeners, and other landscape staff, are helpful in determining how the landscape has been managed over time, especially the routine activities. Though landscape maintenance activities were performed on a daily basis, the connection was not always made between maintaining the landscape and managing for the design intent. One interviewee found if gardeners were not made aware of the design intent, then they sometimes replaced material requiring more attention with material that was less maintenance, even if it didn't necessarily relate to the overall design intent.

Cultivate Knowledge Generation

At least half the interviewees noted gardeners are generally more concerned with the maintenance and upkeep of individual plants rather than design as a whole. Typically, gardeners are hired to maintain the landscape and, in the author's experience, not trained as designers. Another reason for a lack of knowledge about design intent may be that management has not shared the information, effectively preventing the design intent from being perpetuated.

Communicating design intent to gardeners is critical for a design to be managed correctly over time – if the intent is not communicated to the gardeners then they cannot be expected to implicitly know the larger vision for the landscape. As has already been seen, the garden manager is responsible for informing employees about how to manage design intent. One interviewee advocated for explaining to all gardeners why determining, and managing, for design intent is helpful, specifically making it relevant to the work the gardener is performing. If the design intent is not clear, another interviewee recommends the gardener ask questions about the intent, rather than making guesses or assumptions which may be incorrect. The garden's culture would have to allow for asking questions so the gardener feels comfortable admitting they might not know everything.

A part of knowledge generation is professional development. Professional development is necessary for landscape architects to maintain their licensing, but, aside from pesticide or arboricultural certification, the interviewees found that gardeners are not required to update or maintain their skills in an organized fashion, or to educate themselves about what design intent is or how it relates to the garden they are maintaining. Half the interviewees stressed that professional development is critical for knowledge generation about determining design intent.

Recording and Disseminating

Many of the interviewees noted that proper recordkeeping is important for determining change over time. At least half the interviewees suggest gardeners keep journals of changes in the landscape and take before and after photographs to document changes. One interviewee noted that designers, as well as gardeners, should record their ideas and changes when working on a site. While working on a landscape, one interviewee recommends designers record their “aesthetic ideas,” so that this information can be passed to the gardeners who will be managing the landscape.

A formal way to record the “aesthetic ideas” might be to create a Design Intent Manual for each project. Landscape architect W. Gary Smith did this for his design at Longwood Gardens (McKee 2014). Included in this manual was a history of the particular garden, design studies and perspective sketches, lists of meetings that took place between the designer and the gardeners, and a set of plans and as-built documents. These materials were put together in a loose leaf notebook with a written summary describing the garden’s mission, design principles, plant combinations and desired design themes, and a master list of plant species (Smith 2014). This guide serves as the record from the designer of what their design intent was for the garden. It is a physical piece of information that can be used as a teaching tool for garden staff to instruct about the mission and the intent of the particular garden. It also becomes a resource that can be added to as the garden changes and develops.

In order to manage the dissemination of design intent before workers leave, one interviewee recommends two different, but related, processes: overlapping workers and garden management succession planning so continuity of design intent is ensured. When gardeners overlap, they work closely with one another. Working closely with another person can provide insight into their thoughts, helping to create a more complete picture with which to base future design decisions. In this way, tacit knowledge about how the design intent is managed is disseminated, reducing the potential for organizational memory loss when gardeners leave the garden. Gardeners frequently are the ones continuing to modify the design over time, but without knowing the reasons behind the intent, parts that are difficult to manage can be simplified in ways that can reduce the clarity of the original intent.

Combined with overlapping gardeners, planning for succession allows time for recording and disseminating to be built into the creation of the landscape. Successor training could begin at any point; the longer the successor can have with the previous gardener, the more knowledge can

be transferred from one person to another. Having a defined path of succession allows for organized knowledge transfer, rather than in a rush when a person leaves unexpectedly.

Making Gardeners Better Caretakers of Design Intent

According to the interviewees, gardeners are generally not reliable sources of design intent. There is no reason they should not be. Gardeners have a lot of place knowledge they contribute to the organizational memory including knowledge of plants, access, use, and seasonal climate changes. The building blocks certainly exist for gardeners to become valuable caretakers of design intent. Since gardeners will be the ones to maintain the site, they should be made aware of how all the pieces fit together. If the design intent is not shared, then gardeners will probably manage the space in ways that promote aesthetics or easy management rather than a specific intent. By knowing the design intent, individual gardeners can use their site-specific knowledge to create spaces that are able to be better managed over time.

If gardeners are to be good managers of design intent, then public gardens will have to expand their gardener training and education to include the garden's design and incorporate more history and research about their specific site. Gardeners should be able to use the design intent as a guide for completing their work. There is much that gardeners can learn about design that could influence how they think about and manage. More contact between experienced gardeners and designers could help share knowledge between the two different fields, resulting in landscapes that hold up better over time. In their recent article, Van Valkenburgh and Saunders (2013) encourage more collaboration between designers and gardeners. If the designer doesn't know enough about landscape management and garden use or doesn't take garden resources into account when designing, then it is unlikely the design intent will be preserved in its original form.

Lessons Learned from the Survey and Interviews

The gardener's role in respect to design intent seems to be that of a caretaker, managing the landscape in coordination with both the mission and the design intent. Gardeners are

excellent sources of information about growing plants, but not a good source of information about how all the parts fit and blend to create a unified whole, so are generally not the best sources of design intent in public gardens. This could partially be due to a lack of design training, or it could be due to a lack of information sharing between garden management and gardeners. The more information about design intent that is shared with gardeners, the better they will be able to manage the landscape in ways that reflect the design intent. If the garden has developed a learning culture, then the gardener could experiment with a variety of plant materials, while still remaining true to the design intent.

The greater the involvement the gardener has with the garden, the more likely they are to be a good source of information. The culture of the garden, and how much the themes of trust and sharing present themselves in the garden, will probably affect how much available knowledge gets stored in the organizational memory of the garden. Trust also affects how trusting the gardener is, and how willing they are to share this knowledge with an outside person trying to determine design intent for the landscape.

Additionally, it was found that gardeners need to become better at recordkeeping, particularly photography and mapping, as it relates to changes in the landscape or the design intent. Maintaining better records makes determining changes easier, which helps facilitate determining how landscapes have changed over time. To aid in further knowledge dissemination it is suggested that public gardens plan for succession and overlap gardeners to ensure management techniques for maintaining design intent are passed from one gardener to another.

CHAPTER 5

PUBLIC GARDEN PROFESSIONAL SURVEY RESULTS

This Chapter explored recordkeeping trends in public gardens and answers the secondary thesis question of whether or not there is gardener longevity in public gardens.

The three goals of the public garden professional survey were to determine:

1. What explicit knowledge public gardens are recording.
2. If there is staff longevity in public gardens.
3. A group of public garden professionals to interview.

The survey responses are presented according to how they fit into the process of organizational memory development: cultivate, record, disseminate, and use. As discussed in Chapter 3, the survey was distributed through email to 203 public gardens. Seventy-eight completed the survey, 38% of the total emailed. Responses came from thirty-seven states and Washington DC.

Cultivating an Atmosphere of Trust, Sharing and Learning

When asked whether design intent is used to inform planning decisions, 70% of gardens answered in the affirmative. The high percentage in the affirmative suggests at least one person in a garden management position is thinking about design intent when making planning decisions. It is not known if the level of design thinking is similar to that practiced by landscape architects.

One of the main questions the survey was seeking to answer was if there are gardeners at public gardens who work at the garden for a long time. To answer this question, survey respondents were asked to note the years served of the longest serving gardener, results displayed in Figure 5.1.

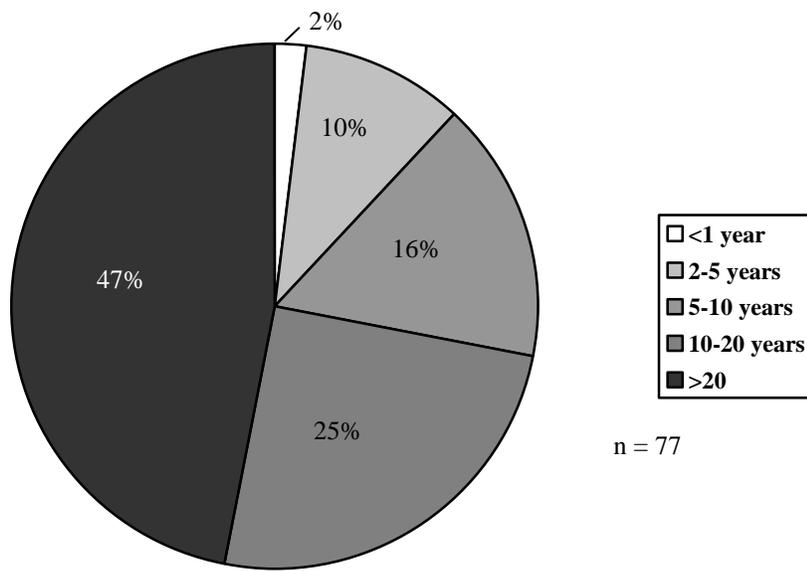


Figure 5.1: Years Employed of Longest Serving Gardener

In 72% of gardens at least one gardener who has been there for ten or more years, while only 12% of gardens have their longest serving staff member with less than five years at the garden. Of the public garden respondents, the majority have at least one staff member with significant longevity (ten or more years) in the garden.

Recording Knowledge from Gardeners

A clear majority of respondent gardens (90%) record some form of plant records, either on paper or using a variety of digital programs. Paper records were the most common method of storage, either in log books or filing cabinets. Having a majority of gardens keeping plant records is encouraging; that said, recording information on paper has a limited ability to be used to create more knowledge due to its relative inaccessibility. One respondent mentioned their information is stored in a variety of places in different filing cabinets and in different offices. If a gardener were trying to use the records, they would have to go to multiple places, rather than one central repository.

Paper records generally require less training and input of resources than digital programs to be able to use, and don't have the same technological leap. Only three respondent gardens depend entirely on written records; all the others rely on a mix of digital and paper, or solely digital. Computer spreadsheets or database programs have more versatility to sort and compare data in order to help make planning decisions, though they can become obsolete if technology changes.

A few gardens are storing record information on individual hard drives. In order for sharing to occur it is crucial to have information accessible to all parties, preferably on a shared server or central computer. Some respondents did mention having a shared server or a server that is backed up on a regular basis. Backing up files, or keeping copies, are a necessary hedge against computer failure and subsequent loss of stored information. Many gardens manage their plant records through the use of databases, as can be seen in Figure 5.2.

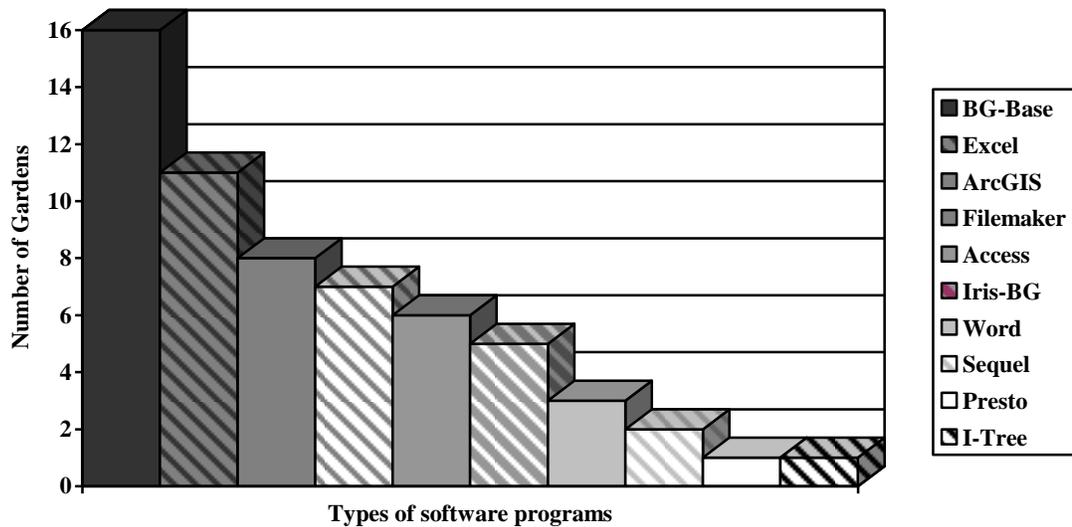


Figure 5.2: Plant Recordkeeping Programs

Computer programs used for plant recordkeeping can be grouped into proprietary databases, general use databases, and Microsoft Office programs. BG-Base was developed in 1985 in partnership with the Arnold Arboretum in Boston, Massachusetts, specifically for the

public garden industry to manage their living collections (BGBase 2013). IrisBG is a newer system, developed in consultation with the Oslo University Botanical Garden in 1996. IrisBG is more common in Europe but is becoming established in the United States (IrisBG 2014). One of the benefits to these databases, aside from being created specifically for public gardens, is the mapping function that is attached to the plant record system. The individual plant record can be located spatially in the garden and information about the plant can be stored in the database. This allows the user to print maps or export useful information about the collection that can be printed and given to staff or volunteers to aid in their individual knowledge development. Both IrisBG and BG-Base require training to be able to use and require significant resources to purchase and maintain. A few of the respondents made note of the cost of the systems and how they were not able to afford the program or have the extra staff to manage the program.

ArcGIS is run through Environmental Systems Research Institute (ESRI); ESRI and APGA have a partnership to provide reduced rates and training to members of APGA.¹³ ArcGIS is a mapping program that can be tied to spreadsheets or databases to display information. The learning curve for ArcGIS is also steep, but it can be used to locate and map plants in the garden. When utilizing systems that run off Global Positioning Systems (GPS) there can be problems with locating plants to a specific degree of accuracy. As with BG-Base and IrisBG, ArcGIS is expensive to maintain. Other database programs are Presto,¹⁴ and I-tree,¹⁵ and Structured Query Language (SQL) databases, but these were not commonly used.

¹³ See <http://www.publicgardens.org/content/esri-partnership> for more information about this partnership (accessed September 23, 2014)

¹⁴ For more information see: <http://prestodb.io/> (accessed September 23, 2014)

¹⁵ For more information see: <http://www.itreetools.org/index.php> (accessed September 23, 2014)

General use databases include Microsoft Access and FilemakerPro. Neither database has a mapping function. Neither program was designed specifically for public garden plant recording, so any entry fields have to be designed by the individual garden. However, they are less expensive to purchase and maintain, easier to learn and implement, can be bought off the shelf, and have training tutorials and technical support available from the distributors. Also, it is possible the databases can be linked to other mapping programs, or converted to IrisBG or BG-Base if the decision to upgrade is made.

Within the Microsoft Office suite of programs, Microsoft Excel and Microsoft Word were used most often. Excel and Word are both useful for recording and disseminating information, though Excel is better suited for sorting and filtering, and can link to databases where Word cannot. If the end goal is to upgrade to a larger database at a later date the Excel spreadsheet can be constructed to make the process as seamless as possible. Word is an excellent storage mechanism for meeting notes or as a digital record for day to day work, but not for recording plant accessions and deaccessions. Microsoft Office programs are useful programs to begin the recording process because they are available on most computers and are relatively easy to learn. Due to their general usage, gardeners are more likely to have encountered Microsoft Office programs thus requiring less training to record information than BG-Base or Access.

Garden maps were maintained by 84% of responding gardens. Garden mapping was most commonly done by hand (twenty-four gardens), or by hand in combination with digital mapping programs. A number of gardens cited cost of digital programs, or a lack of trained staff, as a reason they were recording by hand. Digital mapping, while expensive, makes it much easier to update as information changes over time, and doesn't necessitate redrawing entire maps by hand as gardens change.

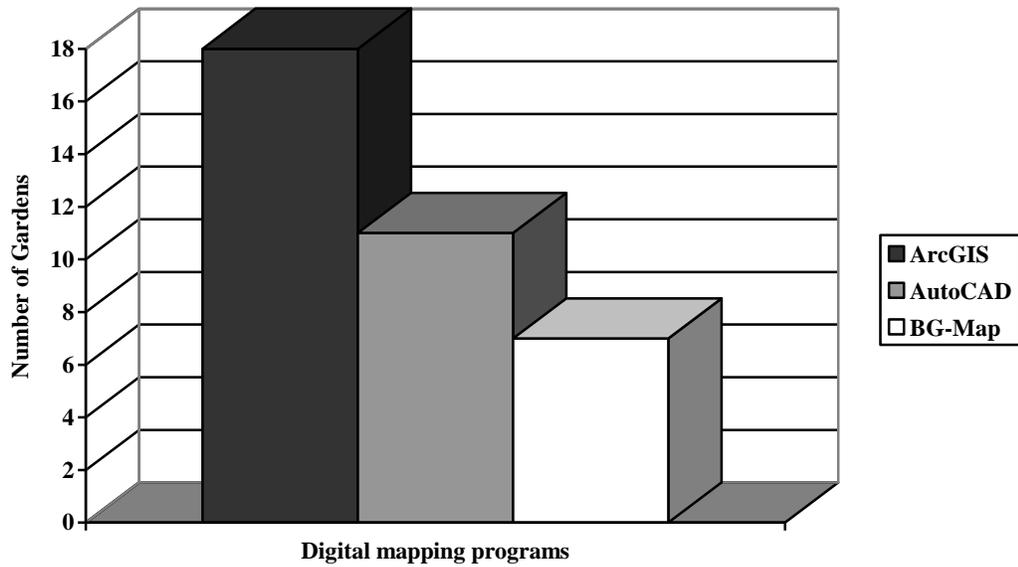


Figure 5.3: Digital Mapping Programs

ArcGIS was the most common mapping program, but AutoCAD and BG-Map were also common (Figure 5.3). Other programs used for mapping (one garden each) included Office Max, Iris-BG, Treekeeper, I-Tree, Sketchup, Adobe Illustrator, Adobe InDesign, and GoogleDocs in combination with Google Maps. Producing garden maps is a good repository for organizational memory and gardener knowledge. The gardeners are transferring their tacit knowledge of the space to explicit knowledge in the form of maps to aid in future planning and management. Recording while the memories are fresh will preserve them in a form that can be processed and used to determine where other plants should be placed.

Oral histories were produced in 44% of the gardens, an encouraging number when considering the amount of time they take to produce in an established format. Topics covered in the oral history interviews are discussed in Chapter 6. Video interviews (27%) don't necessarily have to be as formal as oral histories, but they do need a certain amount of training to produce and store properly. As with other technology, ensuring media does not become obsolete is a concern.

In the 27% of gardens creating pruning schedules, their records were kept in journals, on Excel spreadsheets, PDF calendars, or worked into the landscape management plan. Other gardens relied on remembering pruning schedules from previous years; one garden specifically cited ‘memory’ as the storage mechanism. Multiple gardens relied on general knowledge of staff or managers to ‘know’ when to prune based on the calendar year. This shows that though the information is present in the garden, it still needs to be recorded and disseminated in order for it to be secured in the organizational memory of the garden. Pruning schedules are generally built into work schedules through dialogue between garden managers and gardeners.

Disseminating Knowledge

In 73% of responding gardens the most common document produced is the annual report. Gardens have also produced books about their garden history, important people associated with the garden, or keep archives about garden history. The annual report is often more for the board and stakeholders than it is for historic documentation, thus its usefulness in horticultural planning can be limited. Master plans were created in at least one garden, and some gardens produce a variety of educational or interpretive materials.

Using Organizational Memory

45% of respondent gardens created some form of landscape management plan. It is not clear from the survey how the plan was developed. If gardeners are willing to share their knowledge, the landscape management plan can be an excellent way for tacit knowledge of the landscape to be recorded in a form that can be disseminated to other gardeners. Further discussion of the creation of these plans is covered in the next Chapter.

Lessons Learned from the Survey

The Public Garden Professionals Survey accomplished its stated goals of determining the existence of gardener longevity, examining explicit knowledge collection, and identifying

public horticulture professionals to contact for more in-depth interviews. The survey confirmed that there are a majority of gardens with at least one gardener with ten or more years of experience. Confirming this information shows that there is potential for organizational memory development within the public garden industry. The importance of design intent is recognized by a majority of garden managers, though it is not clear how it affects their management.

Explicit knowledge collection was examined through a discussion of plant record keeping. Looking at the figures, there is no standard digital program for plant records management in public gardens. Recordkeeping is performed both digitally and by hand, and record storage is not consistent throughout the industry. Available recordkeeping technology has not been universally adopted across the industry. Lack of staff training and financial resources are two of the reasons given as barriers to adoption of digital recording. Staff training, and the recording, dissemination, and use of knowledge is discussed further in the next Chapter.

The last goal of the survey, selecting gardens to interview was accomplished with the selection of twenty-three gardens as potentials for further interviews. Criteria for selection and the process is discussed in Chapter 3, but one of the main criteria was the completion of a landscape management plan. The landscape management plan can use gardener knowledge and experience to assist in horticultural planning, but it is not much research done on how public gardens develop them. Using the results of the survey, a series of interview questions was developed to attempt to determine how gardens are currently cultivating, recording, disseminating, and using the organizational memories of their gardeners.

CHAPTER 6

PUBLIC GARDEN PROFESSIONAL INTERVIEW RESULTS

This Chapter begins by continuing the discussion about organizational structure from Chapter 2, applying information learned from the literature review directly to public gardens. The next section picks up where Chapter 4 ended, discussing how garden managers view the design intent in their gardens, and how it connects to the mission. Based on research from the literature review, the final sections frame the information from the interviews within the context of organizational memory management, using the four themes (cultivating, recording, disseminating and using) as the structural basis for the Chapter.

Twenty-three gardens were identified as potential sources for in-depth interviews in order to answer the secondary thesis question of how gardens are currently managing their organizational memory. See Appendix D for the list of interview questions. Public garden managers from ten gardens agreed to be interviewed: four small gardens, four medium size gardens, and two large gardens. Since there has not been an in-depth study of organizational memory management in public gardens, these interviews are laying the base for the current state of organizational memory in public gardens.

Gardener knowledge is an important asset that can set a garden apart from other organizations. When management recognizes gardeners can be valuable sources of knowledge to benefit the organization, they can begin to manage their knowledge resources. As long-term employees grow older and retire, their tacit knowledge will be lost if it is not recorded and managed. New staff will have to relearn what the previous gardeners have spent years learning and doing. Three of the interviewees stated they were some of the newest on staff and in two of the cases the interviewees had both been there for ten years or more. Based on this random

sample of gardens, the stockpile of tacit knowledge could be a horticultural goldmine for their gardens should management decide to take advantage of it.

Organizational Structure

As determined from the literature review, organizational structure can have an effect on organizational memory development. Interviewees were asked how the garden’s structure is organized. The results are in Table 6.1.

Table 6.1: Organizational structure

	1	2	3	4	5	6	7	8	9	10
Hierarchy	x		x	x	x	x	x	x	x	x
Team		x								

Garden 2 is a small garden with only a few employees who share all the work that needs to be done. Teams can be more conducive for sharing memories than hierarchies, provided all members work well together (Carley 1992). The other gardens have developed a hierarchical structure, leading to more precise job descriptions and greater employee specialization. In both large, and some medium size gardens, specialized positions like plant recorders, integrated pest managers, and specialized gardening positions were created to utilize the skills of particular gardeners. This level of specialization may not be possible in smaller gardens where resource constraints may constrain organizational growth or specialization. Specialization may also lead to more rigid job descriptions with specific tasks and less sharing between hierarchical levels. This could limit knowledge transfer and might encourage us-versus-them attitudes, alienating lower and upper layers in the hierarchy.

Mission and Design Intent

Interviewees were first asked for the mission statement of their organization. All could recite it, and at least half mentioned the mission was available online. Posting the garden’s mission online makes it readily accessible to anyone interested in the garden’s primary objectives. A classification of the mission statements showed two most common themes to be education and

discovering knowledge about plants (research). Only one garden did not reference either of these two ideas, though that particular garden’s mission is based around a related topic, community engagement. Many of the gardens were designed to facilitate plant research or public understanding about plants, a direct connection to the organization’s mission. A summary of design intents, as related by the interviewees, is listed in Table 6.2.

Table 6.2: Garden Design Intent

	1	2	3	4	5	6	7	8	9	10
Plants organized taxonomically	x		x	x						
Plants organized by geographic origin	x									
Showcase of hardy plants for the area					x	x		x		
Continuation of original design		x							x	
Put plants where they grow best			x				x			
Public enjoyment			x		x	x		x		
Garden as an outdoor teaching classroom				x				x		x

From their answers, there appears to be some confusion between the purpose of the garden and the design intent. For example, the purpose may be public enjoyment, while the design intent would facilitate enjoyment through the specific creation of spaces and the interaction between those spaces. This relates back to the disconnect in understanding of design intent between landscape architects and garden managers, and managing for aesthetics, rather than design intent. At least two gardens assumed staff understood the design intent of the garden, even if it was not specifically recorded. A general consensus among interviewees was that staff just ‘get it.’ One garden made design intent information available on their website, though did not make it required for staff to read the information. Making the information available allows for staff to read and process at their leisure, though also makes the assumption that staff are finding and using the information for their work.

Some interviewees mentioned their gardens use the plant collection as a teaching tool, even going so far as to incorporate the teaching aspect into the design intent. Since many of the gardens’ missions involve learning and education, it follows that gardens are educating the public

about plants and would include that aspect of the garden into their mission. It is possible that gardeners, who work with the plants every day, could be good sources of knowledge about plants, and could be used to help further the educational mission.

Cultivate a Trusting Environment

The manager is responsible for developing the culture of trust within the organization in order to begin the process of organizational memory management (Sales 2009). At least four of the gardens (from a range of sizes) specifically noted this in their interviews, and stressed that the decision to develop organizational memory has to come from management. With one exception, management divided their landscapes into smaller zones to facilitate management and maintenance. This ensures that every part of the landscape is a specific person's responsibility and makes an individual, or a small group of individuals, responsible for maintaining the design intent of their particular portion of the property.

Most of the interviewed gardens form teams across departments to build trust and encourage sharing. The management of two of the gardens specifically noted they encourage building ties between workers so they trust each other and care about the organization and the direction it is going. Furthermore, when people become more familiar with one another they can expand their network within the organization and create more opportunities for interaction and trust building. Sharing the workload among many people may be advantageous, particularly in smaller gardens where there may be fewer people to do the work. Encouraging staff to think about issues and problems outside their job description helps to spread the decision making among more people, reducing the stress levels, and could provide opportunities for knowledge development for underutilized employees.

Embracing new ideas isn't size dependent; one small and one large garden each noted that they actively embrace gardeners trying new ideas. If the garden allows gardeners more

freedom to be creative, this probably will result in a more dynamic institution. Two gardens specifically stated they allow their gardeners to explore individual interests, provided the interests

- 1) fit in with the mission, and
- 2) they still complete their routine work.

Knowledge can be built at all levels of the hierarchy; at least four of the gardens acknowledge this and encourage new ideas to come from their gardeners. When employees are learning and challenged, they are more likely to stay longer, leading to potential for more organizational memory to grow in the garden. Low turnover, specifically pointed out in three of the gardens, suggests employees feel their contribution is valued and they are vital to the success of the organization; they trust that the garden wants them to stay for an extended period of time.

At least one of the gardens gave the gardeners responsibility for notifying other departments of specific fertilizer or pesticide treatments that need to be applied. This indicates that management trusts the gardeners enough to not only recognize a problem when it exists and attempt to solve it themselves, but to seek out alternative sources of knowledge without direct managerial oversight. Two of the gardens specifically noted that they allowed their gardeners to select and place plants in their garden zones. Again, this indicates management trusts the gardeners have an understanding of the mission and the design intent to be able to make planting decisions without direct guidance. When management trusts the gardener to learn through trial and error, new knowledge is created in the garden.

On a broader scale, developing trust with outside organizations can breed goodwill in the larger community. All ten gardens made connections with outside organizations, and at least one of the gardens encourages its gardeners to volunteer outside the organization, generating trust between organizations that can facilitate later collaboration on projects or events. The most common organizations the interviewed gardens contacted regularly were APGA, other local gardens, nearby organizations, and landscaping companies. Connecting to outside groups

expands the potential for knowledge transfer between gardens and can help build trust and encourage sharing knowledge and plants between gardens.

Create a Community of Sharing

Garden managers are responsible for cultivating an environment where staff share with each other. One of the medium-sized gardens developed communication issues when gardeners were not able to communicate effectively due to personality differences. This situation can hinder transfer of information and knowledge. Without sharing information, knowledge cannot be easily transferred or formed. As noted by three gardens, if the culture does not support sharing, information is only discovered randomly when gardeners divulge a relevant piece of information.

Sharing can begin with garden managers explaining the mission and design intent to gardeners. Only one of the gardens noted they regularly review the mission with all the staff to make sure everyone is on board and knows what is happening. Sharing knowledge widely can empower gardeners to make decisions on their own without waiting for directives from management. Creating an environment conducive to sharing can be facilitated through regular evaluations with staff to make sure everyone is aware of problems or issues. To make sure all staff are working toward a similar purpose, one garden noted they review larger organizational goals with gardeners while also reviewing personal goals and objectives. Feedback can work both ways, from management to gardener and gardener to management, provided there is enough trust for information to be shared in a non-confrontational way. Feedback can lead to disagreement, leading to discussion on processes or ideas, finishing with compromises and new solutions to problems that increase the organizational memory. Fewer than half the interviewed gardens stated that they encourage feedback from their employees to management, creating an environment where people can share opinions without losing their jobs.

Encourage a Learning Culture

Since the majority of gardens in this study have a focus on education, the author assumed gardens would have multiple opportunities for staff development. This does not appear to be the case. Of the interviewed gardens, only one garden specifically noted they provide yearly training to update gardener knowledge, and two gardens said they have specific training sessions on equipment. At least three gardens offer gardeners the opportunity to take the same classes offered to the public, but there were no structured classes offered by the garden just for gardeners in order to build on their own skills.

The exception to this was continuing education credits for either arborist or pesticide training where gardens would pay for classes. This is different, however, since some gardens require their gardeners to be certified, whether the gardeners want to be or not. It is not necessarily building knowledge the gardener is interested in, even if it does add to the organizational memory of the garden. By not offering structured training for their gardeners, gardens are missing an opportunity to develop gardener knowledge and improve the standard of horticulture at the garden. If gardens create training programs for their gardeners, they can be tailored to the individual mission and design intent of the garden and would help to develop gardener knowledge toward a specific goal, rather than through individual whims or interests.

Though few specific classes were offered just for gardeners, almost half the gardens encourage employees to further their personal growth. Gardeners have to seek and find educational opportunities themselves, and the classes might not be paid for by the garden. At least two of the gardens host conferences or meetings to bring in new sources of knowledge to the garden, both to educate themselves and their partner organizations. By hosting, they are setting themselves up as the go-to source of knowledge in their area.

Two of the gardens teach computer skills to garden staff to make sure everyone has the same basic knowledge. It is easier to build new knowledge if base knowledge is already existing

(Carley 1992). Training gardeners in technology builds a familiarity that can make adding new technology easier. Ensuring everyone is at a base level of technology facilitates access and dissemination of information, increasing the potential for learning.

When hiring for permanent gardening positions, one garden crafts job descriptions carefully and includes portions of the mission statement. By having the mission specifically stated the new hire will have bought into the mission from the very beginning. Another garden crafts specific job descriptions, but includes gardeners with interests or skills outside the job description on teams where their particular interest or expertise can be used. In this way others in the organization can learn from them and better incorporate their knowledge into the organizational memory.

One way learning can occur is by being a student, but learning can also occur through teaching. Two gardens actively encourage staff to teach classes at local colleges or at the garden, and three gardens indicated they encourage employees to participate and present at national meetings. In order to disseminate the knowledge from the conference to other staff, one garden requires employees to give a presentation to staff when they return from a meeting or conference.

Recording Knowledge from Gardeners

Garden 10 noted that keeping good records is standard for museums. If the garden wants to be taken seriously as a collection, good recordkeeping is important. Nine of the gardens managed their plant records on a garden wide scale and had the full support of gardeners and managers about the need to keep good records. In the nine gardens, the decision on what records to keep was made by management.

When creating plant records, data is generally recorded in the field and is then entered into a master database or log book (Table 6.3)

Table 6.3: Recording plant records

	1	2	3	4	5	6	7	8	9	10
Gardener writes data in field, records in the database	x	x			x					
Gardener writes data on form, gives to someone else to record			x	x	x	x	x	x		x

Garden 5 has their gardeners enter data onto a card to give to another person to enter, but is trialing a program where gardeners enter the information themselves. They are having good success and are finding the information to be more accurate and entered in a timely manner if the gardeners enter it themselves. When information is passed from one person to another some information may get changed, simplified, or lost (Joshi et al. 2010). If the person who did the work enters the information then there is a greater possibility it will be entered more accurately and completely, with potential for adding additional contextual information that may have not been asked for on a specific form.

When gathering data, forms standardize the collected information. If the form and the database relate, forms can make the process of recording data into a database more efficient. Once the data is recorded it can be combined with other data to create information, which can then be processed to create knowledge. The complexity of the digital recordkeeping system affects how many people at the garden are trained to use it. As is the case with the majority of gardens, there is less overall training involved since only a few people need to know how to enter data into the database system. When only a few people enter data, a higher level of consistency is ensured because data are entered the same way each time.

Though BG-Base was the most common database in the interviewed gardens, it was not very popular. One manager was positive, while the other respondents noted it was too big, not terribly user friendly and doesn't always communicate well with newer programs like ArcGIS. One of the gardens did note that there is a 'skinny' version available if the size is too cumbersome. The one garden to use IrisBG was very complimentary about the program. It is a newer program so it was designed to interact with ArcGIS. It allows the user to export garden

features to a map and then upload it to the internet. When the garden purchased IrisBG they converted their existing SQL system directly into the database, rather than having to re-enter all their data into the new system. Additionally, they noted that IrisBG has the ability to show on a map where the plant was collected from. Neither BG-Base nor IrisBG are exclusive to a particular garden, ensuring there is an outside source of knowledge and training should something happen to the person managing the system at the garden.

SQL was chosen by two gardens because it is a common programming language, can be customized to the needs of the garden, and there are many technology companies that know how to troubleshoot and train others to use the system. Designing a proprietary database system might not be possible at a garden with limited funds, but it does have the advantage of tailoring the system to record exactly what the garden wants. One garden designed their SQL database to connect directly to their plant requisitions system so plant orders are processed directly through the system rather than having to be added at a later date, streamlining the process and allowing substitutions to be updated easily. Designing a plant records system is typically outside the traditional realm of gardeners, but there is no reason why job descriptions can't be expanded or training provided for interested gardeners. Managers would have to make the determination whether training gardeners in new systems is in the best interest of the garden's mission.

Adding data to databases are controlled through access privileges, either read access or write access. Read access allows users to view the database, but not update or change data, while write access allows users to view, enter, and update information (Table 6.4).

Table 6.4: Updating and Viewing Data

	1	2	3	4	5	6	7	8	9	10
Everyone has read access, most have write access			x		x		x	x		
Everyone has read, few have write access				x		x				x

More training is required for write access. Not all gardens deem it necessary for everyone in the garden to be trained to update the database.

When mapping the garden digitally, ArcGIS allows the garden to map its collections and share that information easily online. ArcGIS is the preferred mapping software for the scientific community; if gardens want to easily share information with researchers then it is advisable to use ArcGIS. Assistance is provided for gardens looking to map their gardens with ArcGIS through the Alliance for Public Garden GIS.¹⁶ Should the garden already have garden maps in AutoCAD, they can be converted to ArcGIS if necessary.

Although there were no questions about photography in the survey or interviews, two of the gardens volunteered that they take many photographs to document the garden. Photographs can be digitally archived using a Digital Access Management (DAM) system. The DAM system can be used like a library card catalog, with keyword search terms, tags and metadata added into the database to make finding pictures easier. This system is time consuming to update and maintain, so might not be practical for smaller gardens. Even if a DAM system is not used, gardens can develop other methods, such as folder storage systems or naming conventions, to organize and find photographs.¹⁷

According to the interviews, garden management is responsible for enforcing record keeping in gardens. Two gardens have stated repercussions when recordkeeping was not completed, or was not completed in accordance with stated policies and procedures. One garden required all gardeners to enter 300 notes into the database every year, and then wrote it into their performance evaluation to ensure it was completed. By adding it to the performance review it now becomes something the gardener has to do; recording knowledge benefits gardeners because it can be used as a reference for what other gardeners are doing in the garden. Notes track garden changes over time and can be used as a learning tool.

¹⁶ For more information, see <http://publicgardensgis.ucdavis.edu/> (accessed November 2, 2014)

¹⁷ Longwood Gardens has begun to manage their photographic assets through a DAM. For more information, see <http://www.publicgardens.org/files/The%20Digital%20Asset%20Management%20System%20and%20Beyond.pdf> (accessed November 2, 2014)

Recording tacit knowledge is more difficult than recording explicit, and is not practiced as often. Oral histories or interviews are one way to record tacit knowledge, but can be a time consuming process. Table 6.5 shows which gardens conduct oral histories and who they are recording when they do.

Table 6.5: Oral Histories in Public Gardens

	1	2	3	4	5	6	7	8	9	10
Previous site residents	x	x								
Previous owners		x							x	
Visitors or volunteers		x			x	x				x
Garden directors/management staff						x				x
Retired staff					x				x	

One garden made oral history recording an ongoing project that was revisited every few years to see what kind of information they needed to record and who might have it. That same garden noted that they tried recording audio of current garden staff but the staff were less amenable to it than volunteers or already retired staff. The interviewee stated that gardeners seemed concerned about being recorded. The interviewee speculated that gardeners may have thought if they were recorded, they would eventually be pushed out of their job. In this instance, explaining the purpose behind recording the oral history is important to ensuring gardeners feel comfortable sharing knowledge.

One of the gardens created movies of gardeners working in the garden as a teaching and marketing tool for their website. Though this can record gardener’s tacit knowledge and can be used to establish the garden as a place where the public can find knowledge, it doesn’t necessarily share the knowledge with other staff members unless they were aware of it and use it. In the gardens interviewed, there was no consistent, targeted way gardeners were being interviewed about their work in the garden. The NPS uses oral histories to record employee experiences before they retire. These can be used to influence planning and management documents. They have also developed a recording system called the Facility Management Software System for

employees to record routine tasks and projects. This can then be used as a record of what has changed in the landscape over time (Dolan 2013).

Employee exit interviews were conducted in about half the gardens. Since interviews are conducted through the human resources (HR) department they are confidential. Therefore, garden managers were not aware of what information was being recorded. Garden managers could conduct their own exit interviews using questions targeted to record specific knowledge, though none of the gardens noted they did. Alternatively, when gardeners leave the organization it can be helpful to keep them involved and engaged in order to keep the knowledge close. One garden asked its gardeners to join the board, keeping knowledge in reach and accessible, and building a larger community of knowledge to draw from in the future.

Disseminating Knowledge in the Garden

Computer-based technology can make knowledge dissemination much easier. About half the gardens have a philosophy of making knowledge accessible to everyone by either putting it online or on central servers (Table 6.6). Individual computers are ideal for accessibility.

Table 6.6: Computer Availability

	1	2	3	4	5	6	7	8	9	10
Individual gardener computers			x		x		x		x	
Shared gardener computers	x	x		x		x		x		x

The size of the garden does not seem to affect whether each gardener has their own work station or not. There seems to be a general assumption among the gardens that if the information is there, gardeners will look for it, use it, and then have the time or initiative on their own to develop new knowledge and share it with others.

At least two gardens have daily morning meetings to provide a space for gardeners to gather as a group and address issues, while at least half have periodic staff meetings. Staff meetings gather the whole staff together and serve as a vehicle to tell everyone what is going on

organization-wide, and educate staff on future projects and garden direction. Work breaks were also mentioned as a way for information to be informally disseminated between gardeners.

Outside of staff meetings, at least half the garden managers encourage asking questions if gardeners are having a problem. Providing a safety net of available knowledge encourages gardeners to try things on their own, safe in the knowledge that a backup source of experience is behind them; reducing the potential for failure (Bhardwaj and Monin 2006). Two of the interviewed gardens have developed knowledge resource centers where gardeners can go for help. Providing multiple ways for information to be passed from gardener to gardener - including email, voice mail, and walkie talkies - gives more opportunities for dissemination to occur. One garden has each gardener contribute to searchable, viewable, weekly task lists in Google Docs that turn into a running commentary on what is being done in the garden week by week. Gardeners are required to fill them out. While information is being added, there are opportunities to read about what other gardeners are working on. It is an online, garden-wide, version of the gardener's notebook.

One of the gardens orients new employees to the entire organization and then trains them in the specific area they will be working. About half the gardens form teams of people with a diverse range of experiences. Three of the gardens specifically pair older workers with younger ones to maximize tacit knowledge transfer. All the gardens had internship programs; teaching through an internship, or apprenticeship, program is a way to transfer knowledge from gardeners.

One garden overlaps workers before they leave so knowledge is disseminated tacitly, even when it is not necessarily recorded, and two other gardens overlap workers for key management positions. Overlapping workers is an ideal way for knowledge to be transferred tacitly; however, two of the gardens noted that since they are affiliated with the government they are not technically allowed to overlap workers and don't always have the option to use this

method. To ease the transition, the garden could cultivate an atmosphere that would encourage gardeners give enough notice before they left to be able to help train their replacement.

Formal mentoring was practiced in one garden. In general, the interviews indicated that gardens are not taking advantage of the benefits of tacit knowledge transfer that mentoring can encourage. Mentoring can build trust among people of different ages and experience levels and can ease the transition of starting a new job by providing a safe space to talk through any issues new gardeners may be having. It can help older gardeners realize they have an incredible stockpile of knowledge that should be shared with other gardeners to help them learn, grow, and fully appreciate the complexities of the garden.

External dissemination is much more prevalent in gardens than internal dissemination (Table 6.7). One garden mentioned partnering with an outside organization to trial new horticultural technology, becoming the knowledge center for this particular type of technology. At least three gardens encourage gardeners to publish articles, though it was noted that research and writing were secondary to finishing assigned garden tasks. In at least one garden, writing is not encouraged for gardeners as it would take them outside of their job descriptions.

Table 6.7: Opportunities for External Dissemination

	1	2	3	4	5	6	7	8	9	10
Newsletters	x	x				x				
Newspaper/magazine articles		x				x		x		
Books or journal articles			x	x			x	x		
Email blasts		x								
Blogs			x	x	x					
Web base apps for finding plants in the garden			x		x					
Gardening how-to videos					x					
Classes for the public		x	x	x	x	x		x		x
Post policies online			x	x	x					

Gardeners are not always involved with writing publications at the garden, particularly with gardens that have highly specialized job descriptions. One garden has published their landscape management plan online, but three others said they had no plans to do so. It is the author's

contention that not publishing the landscape management plan is a missed opportunity to disseminate information to other gardens about how horticulture in gardens can be managed.

Using Organizational Memory

There are many useful policies and procedures that can be written for a public garden. When writing multiple documents, one garden makes it their policy to make sure documents have the same organizational message and reference one another. Safety policies, employee manuals, intern handbooks, CLRs, master plans, invasive species policies, or standard operating procedures are examples of policies that are written about the garden that could be written using gardener assistance. Using experienced staff to assist in writing and developing policies is one way to use organizational memory and engage workers in the organization.

Creating a landscape management plan was one of the criteria to be interviewed for this thesis. In addition to the landscape management plan, interviewees mentioned three other documents gardens may consider developing and implementing that could include gardener knowledge and experience to good effect: a collections policy, a collections plan, and an interpretive plan (Table 6.8).

Table 6.8: Additional Management Documents

	1	2	3	4	5	6	7	8	9	10
Collections policy	x		x	x	x		x	x		x
Collections plan							x	x		
Interpretive plan					x	x				x

The collections policy is used to explain what plant information the garden is going to record, and how they are going to record it. This is usually developed by garden management, though gardeners occasionally have input. It can be a way to make sure the garden does not stray too far from its core mission. The collections management plan is similar to the collections policy, but details what plants the garden is going to collect, how they are going to collect them, and from where. This is also typically developed by garden management, but depending on the

size of the garden, educational background of gardeners, and interest of the gardeners, individual gardeners may have some involvement in development. It is helpful for gardeners to be familiar with both of these documents because they relate back to the overall mission and design intent, informing gardeners on why they do the work they do.

Respondents said that gardeners were involved in the third document, the interpretive plan. This document outlines the specific design intent of each garden, the main ideas behind the display, and how the specific garden will educate the public. The interpretive plan can be broad-based, or focus on one area of the garden in particular. If the interpretive plan is too prescriptive, flexibility to change or update parts of the display may be limited. Since gardeners generally are the ones maintaining the plants in the interpretive space, having their input encourages gardener buy-in and legitimizes the plan, making it more likely to be used and updated.

In at least half the interviewed gardens, gardeners participated in the conversation about the contents of the landscape management plan. The landscape management plan is one of the principal ways gardener knowledge can be codified and used for horticultural planning. Involving the gardeners in the creation of plans and policies adds in the gardener perspective and their specialized knowledge of the job, including what is feasible to expect and what is not. In this way, a plan is grounded in the experience of the gardener. Fong (1989) also notes that implementation of plans can be more efficient because the gardeners are aware of the process, having participated in it from the beginning. Having a part in the creation of the plan gives the gardener more ownership, and allows them to contribute their knowledge to the development of policies that affect the organization. Explaining the purpose behind creating the plan to gardeners may help relieve any worries that by recording their knowledge they may no longer be seen as essential to the operation of the garden, and thus may be seen as replaceable. The landscape management plan is not a replacement for having trained, capable gardeners. It is a tool that can

be used to help facilitate learning and knowledge dissemination, as well as providing continuity for maintaining design intent and landscape maintenance.

The Arnold Arboretum defines the purpose of their landscape management plan as a “...detailed game plan that communicates the shared goals and priorities collectively developed by the horticulture team” (The Arnold Arboretum of Harvard University 2011, v). Note that this purpose includes organizational goals as well as being developed collaboratively. The plan details what, where, when, who, and, in some cases, why and how. It also includes zone maps, mowing and snow removal maps, a season by season schedule of tasks, long term projects, lists of pests and weeds, and a place for the gardener to make notes for later updates to the guide.

For one of the interviewees, the purpose of their landscape management plan is to record gardener knowledge to pass on to future generations of gardeners. They note that a plan makes managing the landscape more efficient first by dividing the garden into zones, and then pointing out specific places where attention to detail is needed. The plan can be a learning tool to introduce new gardeners to their maintenance areas and to give guidance on what time of year garden tasks typically occur. Additionally, the plan shows the garden is making an effort to document how much work is needed to manage the garden. This effort to justify and support expenditures and resources helped one garden obtain grants and another garden to attract outside funding sources.

Two gardens with more of a dynamic, or innovative, organizational culture did not want to add too much prescriptive information to the landscape management plan that might stifle gardener creativity and dynamism. In those cases, they created a general guide without too many rules and regulations on what should and should not be done. Contrasted to this is another garden, with a more structured, hierarchical culture that developed a very extensive document that includes all aspects of managing the garden. Both plans work for the individual gardens but were created with a different set of priorities, based on what works for the garden’s culture.

At least three gardens noted both gardeners and garden management need to be on board to enable the creation of the landscape management plan. Without gardener contribution and willingness to update and use the plan, there is little point in creating one. At least three gardens appointed one person to develop the landscape management plan who was then responsible for writing and encouraging other gardeners to record their knowledge. One garden used that person as a filter to ensure information going into the plan was accurate, relevant, complete and useful.

Two gardens began creating the landscape management plan by talking to the most experienced gardeners, generally ones who also had the most longevity. These gardeners are the ones that intimately know the plants in their sections and can speak authoritatively about the particular needs of the zone. One garden gathered workers together to create monthly pruning and work schedules, and provided paid work time to complete the task. When people are in groups, more useful information may be gathered than if individuals were working on their own (Carley 1992). Giving gardeners paid time to record knowledge shows that the management deems the landscape management plan a priority. If knowledge development and use is going to be a priority then management is responsible for making it a priority.

Knowledge is constantly changing, and three gardens noted that the landscape management plan needs to be changeable, flexible, and updateable. One garden stores their plan in Microsoft Word for easy access and editing. Another revisits theirs completely every two to three years. With each edition updates become less extensive as more knowledge is added to the document and fewer changes are made. This particular garden has an expectation that their gardeners are updating the landscape management plan, though there do not seem to be repercussions if they do not. If the entire document is treated as sacrosanct, gardeners may be less likely to update it if new information is discovered, undermining the dynamic nature of the document. Although one garden is planning to develop their landscape management plan into a

hardcopy book, most other gardens kept theirs in an easily revisable format to encouraging updates and editions.

If possible, it can be helpful to have the designer of the garden assist in the development of the landscape management plan. They will be able to communicate their design intent which can guide daily routines. When one garden developed a new addition, they had the donor put money aside to have the designer return periodically to confer with the gardeners about how the design intent was being followed and expressed. Other gardens included historic information, design intent, yearly, monthly or seasonal schedules of garden tasks, or a pruning calendars within the landscape management plan.

Lessons Learned from the Interviews

Though many gardens are trying to make the connection between mission and design intent, the next step of disseminating that knowledge to gardeners was generally not present. It was made available in some gardens, but was only assumed to be known in others. As was assumed by the author, most gardens are organized as hierarchies. While having some benefits to memory management, hierarchies are, in general, less conducive to transferring knowledge and accessing organizational memory. If public gardens are to fully manage their memory, they will have to realize this point and adjust their management plans accordingly. Garden size does not seem to have much of an effect on whether or not gardens manage their organizational memory. One of the largest and one of the smallest gardens gave the impression of being the best of the interviewed gardens at managing employee wellbeing and personal growth, and balancing that with good recordkeeping practices.

Forming teams to share workload happens regularly in public gardens. In this way, tacit knowledge can be transferred, even if it is not being recorded. Most gardens acknowledged that garden management is responsible for creating and developing a culture conducive for

organizational memory development, including building trust among gardeners and management, and also with the larger community.

Cultivating trust and sharing are closely related. Interviewed gardens do not seem to be sharing as much information about design intent as they could be. The more information that can be shared could empower gardeners to build on their existing knowledge to add more knowledge to the organizational memory. Asking questions leads to sharing, which leads to discussion and feedback, which can lead to forming more knowledge.

Sharing leads to learning, and learning leads to knowledge development. As knowledge is added to the 'bins' of organizational memory, gardens have a larger reservoir to draw from when creating new knowledge. This stored knowledge could help a garden establish itself as a knowledge center in their community. Gardens have trained and knowledgeable staff that could be used to help educate the public about horticulture and plants, contributing to fulfilling the mission and using gardener knowledge concurrently. Knowledge and thinking should be developed within gardens; this will help make the garden more relevant and useful to the general public.

Encouraging learning also means providing educational opportunities for gardeners to improve their skills. Few of the interviewed gardens have any specific classes or instruction available specifically for gardeners to use to build on their existing knowledge. Gardeners are required to seek out educational opportunities, often on their own time. Interviewed gardens also do not seem to be utilizing their gardeners as much as they could be to teach classes, write papers, or present at conferences. The author is assuming that not all gardeners want to develop knowledge in this way, but it could be an underutilized way for gardens to capitalize on the knowledge assets of their gardeners.

Recording explicit knowledge is less time consuming than recording tacit knowledge, and has been generally accepted by gardeners in the interviewed gardens as a part of their routine.

There are limited repercussions for neglecting record keeping, and not a lot of oversight to ensure it is done properly and within a reasonable length of time. If gardeners want to improve their recordkeeping, they could make it required for all gardeners, both explicit and tacit information. There is no standardized process for recordkeeping across all ten gardens, each had a different method and were recording slightly different information.

Though there are multiple ways for the public to access information and learn, knowledge dissemination among gardeners appears to largely consist of meetings and word-of-mouth communication. While sometimes effective for disseminating knowledge, for long-term management of organizational memory this knowledge tends to be ephemeral and reliant on the memory of individuals. Mentoring programs are generally not used in public gardens, a missed opportunity for building trust among gardeners and disseminating tacit knowledge. Additionally, few gardens overlap gardeners before they leave, another missed opportunity for tacit knowledge transfer.

Most gardens have created a collections policy, though fewer gardens have created collection or interpretive plans. All gardens stated they completed landscape management plans, though only one garden has made it available to the public, a missed opportunity for sharing between gardens. Landscape management plans and interpretive plans both use gardener knowledge to create, though it was determined through the interviews that landscape management plans focused much more on the gardener's everyday activities than the interpretive plan and was more commonly developed.

CHAPTER 7

PROTOCOL FOR MANAGING ORGANIZATIONAL MEMORY

The purpose of this thesis is to develop a protocol for managing organizational memory in public gardens, with a specific focus on how gardener knowledge and experience can be better cultivated, recorded, disseminated, and used. In order to avoid a prescriptive approach, and to make it useful to gardens of various sizes and resources levels, the protocol takes the form of a series of questions. The questions are designed to initiate and stimulate conversation about managing organizational memory throughout the garden. The questions relate directly to the graphic presented at the end of Chapter 2, repeated now as Figure 7.1

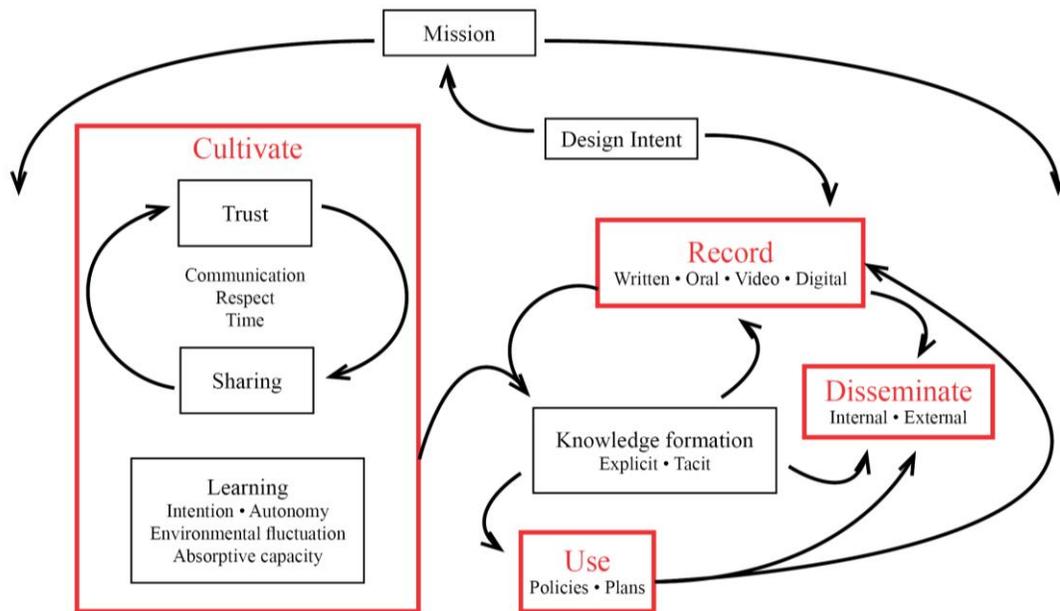


Figure 7.1: Managing Organizational Memory in Public Gardens

Using Figure 7.1, gardens can examine where they need to adjust and further develop organizational memory in their organization. All of the knowledge and information contained within the graphic can be found in one of the ‘storage bins’ identified by Walsh and Ungson

(1991). Identifying where the knowledge is stored is essential to beginning to manage organizational memory. The questions in the protocol were developed to assist in locating the knowledge in the ‘storage bins.’ The questions are arranged following the four themes, and relate directly back to research developed in this thesis.

Questions are introduced with paragraphs explaining their importance in developing organizational memory in public gardens, and are then divided into two sections, Organization-wide and Management. Organization-wide deals with larger issues that may improve organizational memory development if examined and dealt with in ways that better manage organizational memory. Management is smaller scale, and asks questions to managers about how employees interact with one another. A resulting discussion among garden management and gardeners may create new knowledge about the importance of managing the garden’s intellectual assets as well as its horticultural assets.

In order to begin discussing the protocol it is recommended the garden form a team of participants to work through the questions in the sections deemed necessary for organizational memory management within the garden. Ten to twenty people is recommended as an effective size, and the team should include gardeners, management, and other associated departments. New hires and experienced people should participate, as well as a diversity of age ranges and backgrounds, and multiple levels within the organizational hierarchy. In this way the organization will have a diversity of experiences, viewpoints, and knowledge to draw from during the discussion.

Building Trust Among Staff

If the gardeners do not trust one another they may be unwilling to share knowledge amongst themselves or to further the development of the garden’s mission. It is management’s job to cultivate an atmosphere of trust among gardeners. If gardeners trust one another they are more likely to stay with the garden longer and increase the potential for building organizational

memory. When new employees are hired there can be tension between them and existing gardeners. Realizing this, and encouraging interactions so everyone can get to know one another, builds trust within the organization.

Organization-wide:

1. Why is organizational memory important to your garden?
 - a. How is gardener experience considered when making decisions?
2. How many years does a typical gardener remain at the garden?
 - a. How do you encourage gardeners to remain with the garden for a long time?
 - b. What role does experience play when promoting gardeners?
 - c. How are gardeners evaluated?
3. How are new employees integrated into the workforce?
 - a. What qualifications are sought when hiring new gardeners?
 - b. How are job descriptions written to include the organizational mission?
 - c. How are work expectations made clear to employees?
 - d. How are organizational goals (mission and design intent) explained to new employees?
4. How much interaction is there between new hires and existing staff?
 - a. How is this interaction facilitated?
 - b. How are employees rotated through the garden?
 - c. How does the garden decide which experienced workers to pair with newer ones?

Managers:

5. How do gardeners interact with one another inside the organization?
 - a. What actions demonstrate that gardeners trust one another?
6. How often do gardeners work with others in the organization?
 - a. How much is collaboration valued vs individual achievement?
 - b. How are teams used to accomplish projects or tasks?
 - c. How are gardeners consulted on design or implementation projects within the garden?
7. How do gardeners interact with garden management inside the organization?

Creating a Culture of Sharing

While trust is being built between staff, garden managers can encourage employees to share their knowledge with one another. This can start with managers explaining what design intent is and how it relates to the mission of the garden. Sharing this information widely may empower gardeners to take ownership of the landscapes they manage. When employees understand how the mission and the design intent fit into their jobs, they may be more willing to assist in the development of organizational goals. Many gardens have a hierarchical structure which tends to discourage organizational memory development and sharing. This can be

mitigated through making a concentrated effort to explain organization mission, design intent, culture, goals, and expectations to new employees. A culture of openness is encouraged by freely exchanging dialogue through feedback between management and workers. Encouraging employees to get to know one another increases the likelihood of knowledge being shared, and builds trust across the organization. Sharing can also happen with sister organizations outside the garden, sharing knowledge into the wider world.

Organization-wide:

1. How are employees told about the garden's mission?
 - a. When are employees given time to read and understand the mission?
2. How does the design intent of the garden relate to the mission?
 - a. How is this communicated to gardeners?
3. What do managers know about design intent in the garden?
 - a. From what sources is design intent determined?
 - b. How are managers communicating design intent to gardeners?
4. Is the organizational structure arranged as a team or hierarchy?
 - a. What opportunities are available for gardeners to get to know one another?
 - b. What kinds of decisions do the gardeners make?
5. How is feedback transferred between hierarchical levels?
6. How does the organization maintain contacts with its past employees?
7. How are employees encouraged to network with other gardens or organizations?

Managers:

8. How are gardeners encouraged to voluntarily share information with one another?
 - a. How does management encourage employees sharing with one another?
9. Where are the spaces, or opportunities, for employees to share knowledge?
 - a. When teams are formed between departments, how is it determined who will comprise the team?

Cultivating a Learning Organization

Trust builds a positive culture for sharing, encouraging employees to share information and learn from one another. Learning begins with asking questions and providing space for gardeners to figure out the answers to problems on their own. Solving problems relies on the memories and experience of the gardener to develop an answer. Continuing to solve problems requires new challenges to arise, but not so many that the gardener cannot process all the information that is coming in. Encouraging gardeners to learn develops knowledge, increases the organizational memory, and pushes the garden to try new or innovative solutions to solve

problems as they arise. Lastly, training is critical to development of knowledgeable gardeners.

This point is where many of the interviewed gardens appear to be lacking: opportunities for gardeners to build on their skills and increase the overall knowledge of the garden. If a culture of trust and sharing has already been developed in the organization, new knowledge can be willingly recorded and disseminated to other gardeners in the organization, solidifying the knowledge into the organization memory of the garden, rather than just in the individual.

Organization-wide:

1. What is the process for answering employee questions?
 - a. How are questions encouraged?
 - b. How is individual learning and personal growth encouraged?
 - c. How are skills that need to be developed determined?
2. How much autonomy do gardeners have to make their own decisions?
 - a. How are job descriptions written to promote gardener growth?
 - i. How specialized is the work in the garden?
 - b. How much control are gardeners given to make planting choices and decisions?
3. How often do new challenges arise or different tasks given?
 - a. How does past success influence future organizational direction?

Managers:

4. How much information can your gardeners absorb and process?
 - a. How does the garden provide opportunities for training?
 - b. How is technology used and taught at the garden?

Recording Knowledge from Gardeners

The directive to gather and record data has to come from garden management; if not it is very unlikely to move past the initial stages. Recording can functionally be broken down into who, what, when, where and why. Asking why is a key question; context is necessary to develop new knowledge from existing information. If it is known why something was done the process can be evaluated to see if it should continue to be done that way. The garden will have to decide what information they are looking to collect and how they want to manage it. These decisions are based largely on how much time and resources the garden can devote to the project. Technology is allowing recording to be completed more efficiently, but it is also making it more likely

information will be lost or become obsolete as technology changes. Good recordkeeping programs consider this point in their development process.

Organization-wide:

1. What are management's opinions on the need for recordkeeping?
2. What are the existing knowledge resources, tangible and intangible, in the garden?
 - a. Where are they stored (storage bins)?
 - b. How are they accessed?
 - c. Where are external sources of knowledge kept?
3. What is the purpose behind recording knowledge?
 - a. How will recording the knowledge advance the mission?
4. What knowledge is necessary to record to achieve the purpose?
 - a. Who decides what is necessary to record?
5. How are past organizational problems, or mistakes, integrated into the learning process?
6. What kind of knowledge management system is necessary to record what the garden wants to know?
 - a. What resources (budget, time, etc.) does the garden have to devote to recording?
7. How is explicit knowledge recorded?
8. How is tacit knowledge recorded?
 - a. How is the garden interviewing gardeners to get their horticultural knowledge?
9. How is design intent being recorded?
10. What will the garden do with the recorded information?
11. What will the system look like, conceptually and physically?
 - a. How will garden mapping be integrated into the system?
 - b. How will historic material be included?

Manager:

12. How will the data/information/knowledge be managed across the system?
 - a. How will the information be recorded and stored, both now and into the future?
 - b. When will the information be recorded?
 - c. Who will record the information?
 - i. How will the garden ensure recording is happening on a timely basis?
 - ii. How is information edited in the system?
 1. Who decides what information is good information?

Disseminating Knowledge in the Garden

Recorded information does not develop into new knowledge unless people are able to access and process it. Finding answers and answering questions builds new knowledge, as does teaching classes and publishing articles. This disseminates knowledge not only amongst garden staff but to other gardens in order to build on the collective knowledge of the industry. Often, though, tacit knowledge is difficult to record but easy to transfer through physically doing an activity. This learning-through-doing is how much of horticulture is learned, and why internships

and apprenticeships to build job skills are critical. Implementing mentoring or coaching programs can connect new hires to more experienced gardeners. More organizational knowledge can be transferred this way, making learning curves less steep.

Organization wide:

1. Who has access to the knowledge/information?
 - a. How do they get access?
2. How are gardeners being trained to answer questions from the public?
3. How does the garden encourage gardeners to teach classes/present papers/write articles?
4. What programs are available for overlapping employees before they leave the garden?
5. How are employees chosen to participate in a mentoring program?
6. How employees chosen to participate job coaching/shadowing programs at the garden?
7. Does the garden offer apprenticeships or internships?

Using Organizational Memory

Creating a culture that actively manages its organizational memory lays the ground work for using the memory for future horticultural planning. Knowledge can be used to further planning in the garden in many ways. One way is through the development of a landscape management plan. Creating the landscape management plan involves getting gardeners together in order to share knowledge. Garden management, rather than individual gardeners, are able to allocate time out of a gardener's schedule for this to occur. Dividing the garden into zones is an effective way to create a structure for the landscape management plan, ensuring the whole garden is covered within it. Gardens will have to decide how much information to put in the plan and determine how much flexibility the individual gardeners have to change or adapt the area they work in. The final product can be a flexible, readable, updatable document gardeners are willing to use and add their knowledge to. If it is not being used then the time and energy that went into the document is wasted.

Organization wide:

1. What policies or plans has the garden created that use gardener knowledge and experience to produce?
 - a. Have gardeners been informed of the benefits?
 - b. How has the mission been incorporated into the plans?
2. Has the landscape been divided into zones?
3. What gardener knowledge is necessary to write the particular plan?

- a. How is managing design intent incorporated to the document?
 - b. Who determines what knowledge to include?
- 4. How involved are the gardeners in the development of the plan?
 - a. Do gardeners get time during the work day to work on these documents?
- 5. How prescriptive should the document be?
- 6. How often will it be updated?
 - a. Who is responsible for updating it?
- 7. What form will the finished document take?

Manager

- 8. What is management's opinion of creating policies and plans?
 - a. Does management see the need for a landscape management plan or other documents?

Where Do We Go from Here?

Organizational memory is concerned with using the past to inform the present and the future. The point of organizational memory is not to use it as a crutch to support outdated or inefficient policies, but to examine existing garden practices, in combination with the past memories and experience, to determine ways to grow the organization based on the mission and the design intent. The organizational memory of the garden is a valuable resource that may be used to improve the standards of horticulture at the garden. Contained within the organizational memory is the knowledge and experience of individual gardeners, a resource that can be tapped if the garden chooses to do so. Interviewed gardens do not seem to be taking full advantage of the intellectual assets of their gardeners. Developing these assets may set them apart from other gardens, should they choose to develop the resource.

A major point this research found was a lack of training opportunities within the interviewed public gardens. This does not bode well for the future of public horticulture if gardens are not providing opportunities for their employees to become more knowledgeable in the field. Another point the research showed was a lack of mentoring programs with public gardens. Research has shown mentoring programs to be an effective way to transfer tacit knowledge and build a conducive atmosphere for organizational memory development.

All portions of this protocol can be developed simultaneously. Some of these questions are difficult to answer and may require rethinking how the garden manages the interaction between gardeners and between gardeners and management. However, the act of asking the questions, and evaluating the answers, develops knowledge in the garden, can assist managers in making choices that favor organizational memory development, and helps to make tacit knowledge explicit. While answers are being determined and implemented, gardens can work on portions of the protocol one at a time, adding knowledge about the garden to the organizational memory as they move through the questions. Developing a culture of trust, sharing and learning is not a fast or easy fix and probably will not change overnight. Organizational culture develops over time and is remembered by long term employees and passed to new hires. It is unlikely that everyone in the organization will see the organizational benefits of managing organizational memory. Sometimes this may involve waiting for obstinate holdouts to retire before changes can be made to better manage memories.

Recordkeeping is one component of organizational memory, but the tacit memories of the gardening staff are a latent resource that can disappear when gardeners retire or leave the organization. As budgets get tighter, gardens will have to evaluate how their resources, including the intangible assets contained in the minds of their employees, are cultivated, recorded, disseminated and used. Cultivating a culture of trust, sharing and learning facilitates the development of gardener skills and encourages learning, creating knowledge that can be recorded and disseminated to all the employees thus increasing the overall organizational memory.

This protocol is a starting point for research in developing knowledge systems within public gardens. Though developed specifically for public gardens, the ideas behind the research are drawn from across a variety of fields and may be applicable to a broader range of organizational types. While working on this thesis, different avenues for expanding research into organizational memory in public gardens came to light:

- 1) How does the interaction between gardeners and management affect organizational memory?
- 2) How often do gardens utilize designers to help them understand the design intent of their landscape?
- 3) How do garden managers implement design intent in their gardens?
- 4) How much does design thinking enter into management planning at public gardens?
- 5) How are gardens keeping, and managing, their planting records?
- 6) What are they using the plant records for?
- 7) How often do staff access information about the garden when it is made available, either at work or on their own time?
- 8) How are gardens managing their photographic archives?
- 9) How are public gardens utilizing mentoring programs?
- 10) How much additional training are gardens giving their gardeners?

Researchers interested in public garden management could use these research questions to further explore how organizational memory can be developed and used in public gardens. The next step for the protocol is to test it out on a variety of public gardens to see how it works in an actual public garden. This real world example would provide valuable feedback for further researchers on which questions were the most helpful for managers to answer to better develop their organizational memory.

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APPENDIX A

LANDSCAPE ARCHITECTS: SURVEY QUESTIONS

Firm name

Most recent CLR produced

For which types of landscapes have you written a CLR?

- Ethnographic
- Vernacular
- Historic site
- Historic designed

Which type of designed landscape?

- Public
- Private

Which section(s) of the CLR have you written?

- Part 1
- Part 2
- Part 3

What is your definition of design intent, as relates to landscape creation?

Which historic sources do you use to determine changes in landscape design intent?

- Planting records
- Photographs
- Plans
- Written primary sources
- Other

What additional sources?

Do you conduct interviews to determine and document design intent?

- Yes
- No

When interviewing, which are your best sources of information on maintaining landscape design intent over time? Please rank the following on a scale of 1-5 (1 being least informative, 5 being most informative).

	1	2	3	4	5	N/A
Site owners	<input checked="" type="radio"/>					
Owner's family	<input checked="" type="radio"/>					
Previous tenants	<input checked="" type="radio"/>					
Site director	<input checked="" type="radio"/>					
Site archivist	<input checked="" type="radio"/>					
Site historian	<input checked="" type="radio"/>					
Landscape managers	<input checked="" type="radio"/>					
Current staff (landscape)	<input checked="" type="radio"/>					
Retired staff (landscape)	<input checked="" type="radio"/>					
Current staff (general)	<input checked="" type="radio"/>					
Retired staff (general)	<input checked="" type="radio"/>					
Board members	<input checked="" type="radio"/>					
Other	<input checked="" type="radio"/>					

What other methods do you use to capture memories to determine how design intent has changed over time?

- Oral histories
- Surveys
- Phone interviews
- Videography
- Art
- Photography
- Other

Do you have any additional comments about determining changes in landscape design intent over time?

APPENDIX B

LANDSCAPE ARCHITECTS: INTERVIEW QUESTIONS

1. What firm or organization are you currently working for?
2. In the survey you said you wrote the CLR for _____ (site). Approximately how many other sites have you worked on?
3. Have any of the CLRs been published?
4. On your survey you defined design intent as “_____” and the best historic sources of design intent to be _____ (of the options given). Why are these the best sources?
5. If there is no primary source documentation how do you determine design intent?
6. What is the distinction between oral histories and interviews?
7. How much of your information about design intent comes from oral histories or interviews?
8. What information are you looking for when conducting interviews?
9. With limited time and money, how do you determine whom at the site to interview?
10. Do you interview gardeners/landscape management staff?
11. Do you find gardeners to be good holders of design intent?
12. When you do interview gardeners, do you get the information you are looking for?
13. Can you give an example of a site where design intent was passed from one person to another?

14. What can be done in the training or instruction of gardeners to better help them preserve the design intent?

15. How did you educate yourself/learn about determining design intent?

16. Do you have any final comments about the connection between designers and gardeners?

APPENDIX C

PUBLIC GARDEN PROFESSIONALS: SURVEY QUESTIONS

Garden name

Your Position

What horticultural records are maintained at the garden?

- Plant records
- Mowing schedules
- Irrigation schedules and maintenance
- Pesticide use
- Fertilizer use
- Soil testing
- Pruning schedules
- Garden maps
- Other

What types of records are kept, and how are they stored?

How are pruning calendars created?

What mapping software is used to produce garden maps, or are they produced by hand?

How long have you worked at the garden?

- Less than 1 year
- 2-5 years
- 5-10 years
- 10-20 years
- More than 20 years

How long has the longest serving, full time member of the horticultural staff been at the garden?

- Less than 1 year
- 2-5 years
- 5-10 years
- 10-20 years
- More than 20 years

What documentation has the garden produced, or has had produced?

- Cultural Landscape Report (CLR) Oral histories
- Historic Structures Report (HSR) Video interviews
- Preservation Maintenance Plan Annual Reports
- Historic Landscape Report Other
- Landscape Management Plan

What person or firm produced the CLR?

What kinds of additional documentation?

Is 'design intent' used to inform horticultural maintenance planning decisions in the garden?

- Yes
- No
- I am not familiar with this term

Are there any additional comments you would like to make about record storage and use at the garden?

APPENDIX D

PUBLIC GARDEN PROFESSIONALS: INTERVIEW QUESTIONS

1. To begin, what is the mission of _____ (garden)?
2. How does the design or use of the garden help fulfill the mission?
3. Are the staff aware of the garden design intent?
4. How is your organizational structure arranged?
5. You mentioned in the survey that you collect _____ types of horticultural information. Who decides what information is recorded?
6. How amenable are staff to collecting the information?
7. What is the process of recording the collected horticultural data?
8. How would you change the process to make the collected data easier to collect or use?
9. You mentioned on the survey your planting records are stored through _____. How did you choose this program or process?
10. How are planting records accessed?
11. Do all staff have access to the records?
12. You said in your survey that the garden records oral histories or videography. What are you recording?

13. Do you capture work experiences from garden staff? How is this done?
14. How do you capture staff experience before they leave the organization?
15. Do garden staff/managers publish articles in magazine or journals, or in your newsletter?
16. I saw in the survey that your garden has produced a landscape management plan. How was this developed?
17. Has the landscape management plan been published?
18. Does the garden produce other publications about horticultural management?
19. How is horticultural information transferred between staff?
20. Would the garden staff be willing to participate in formal information transfer programs?
21. Do you share horticultural information between gardens?
22. Do you have any final comments about how information is captured, recorded and disseminated at the garden?

APPENDIX E

FIELDS MANAGING ORGANIZATIONAL MEMORY

Advertising:

Moorman, Christine, and Anne S. Miner. 1997. "The Impact of Organizational Memory on New Product Performance and Creativity." *Journal of Marketing Research (JMR)* 34 (1):91-106.

Aeronautical Engineering and Aviation:

Coffey, John W., and Robert R. Hoffman. 2003. "Knowledge Modeling for the Preservation of Institutional Memory." *Journal of Knowledge Management* 7 (3):38-52.

De Long, D. W., and T. Davenport. 2003. "Better Practices for Retaining Organizational Knowledge: Lessons from the Leading Edge." *Employment Relations Today* 30:51-64.

Ebrahimi, Mehran, Anne-Laure Saives, and W. David Holford. 2008. "Qualified Ageing Workers in the Knowledge Management Process of High-tech Businesses." *Journal of Knowledge Management* 12 (2):124-140.

Architecture and Construction:

Berente, Nicholas, Ryan Baxter, and Kalle Lyytinen. 2010. "Dynamics of Inter-organizational Knowledge Creation and Information Technology Use Across Object Worlds: the Case of an Innovative Construction Project." *Construction Management & Economics* 28 (6):569-588.

Ekambaram, Anandasivakumar, Jan Alexander Langlo, and Agnar Johansen. 2010. "Knowledge Transfer - A Study on Construction Projects in a Norwegian Public Sector Organisation." *Proceedings of the European Conference on Knowledge Management*:345-353.

Liyanage, Champika, Tabarak Ballal, and Taha Elhag. 2009. "Assessing the Process of Knowledge Transfer — An Empirical Study." *Journal of Information & Knowledge Management* 8 (3):251-265.

Biotechnology:

De Long, D. W., and T. Davenport. 2003. "Better Practices for Retaining Organizational Knowledge: Lessons from the Leading Edge." *Employment Relations Today* 30:51-64.

Ebrahimi, Mehran, Anne-Laure Saives, and W. David Holford. 2008. "Qualified Ageing Workers in the Knowledge Management Process of High-tech Businesses." *Journal*

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Computers and Technology:

Brown, John Seely, and Paul Duguid. 2000. "Balancing Act: How to Capture Knowledge Without Killing It." *Harvard Business Review* 78 (3):73-80.

Hansen, Morten T., Nitin Nohria, and Thomas Tierney. 1999. "What's your Strategy for Managing Knowledge?" *Harvard Business Review* 77 (2):106-116.

Consulting:

Hansen, Morten T., Nitin Nohria, and Thomas Tierney. 1999. "What's your Strategy for Managing Knowledge?" *Harvard Business Review* 77 (2):106-116.

Markus, M. Lynne. 2001. "Toward a Theory of Knowledge Reuse: Types of Knowledge Reuse Situations and Factors in Reuse Success." *Journal of Management Information Systems* 18 (1):57-93.

Stein, Eric W. , and Vladimir Zwass. 1995. "Actualizing Organizational Memory with Information Systems." *Information Systems Research* 6 (2):85-117.

Yongsun, Paik, and David Y. Choi. 2005. "The Shortcomings of a Standardized Global Knowledge Management System: The Case Study of Accenture." *Academy of Management Executive* 19 (2):81-84.

Education:

Fincher, Cameron. 1987. "AIR Between Forums: Improving Institutional Memory." *Research in Higher Education* (4):431.

Kruse, Sharon D. 2003. "Remembering as Organizational Memory." *Journal of Educational Administration* 41 (4):332-347.

Electrical Engineering:

Ackerman, Mark S. 1998. "Augmenting Organizational Memory: A Field Study of Answer Garden." *ACM Transactions on Information Systems* 16 (3):203.

De Long, D. W., and T. Davenport. 2003. "Better Practices for Retaining Organizational Knowledge: Lessons from the Leading Edge." *Employment Relations Today* 30:51-64.

Film Industry:

Ebbers, Joris J., and Nachoem M. Wijnberg. 2009. "Organizational Memory: From Expectations Memory to Procedural Memory." *British Journal of Management* 20 (4):478-490.

Franchise Management:

Nonaka, Ikujiro, Ryoko Toyama, and Noboru Konno. 2000. "SECI, Ba and Leadership: a Unified Model of Dynamic Knowledge Creation." *Long Range Planning* 33 (1):5-34.

Government:

- Boardman, John, and Karel Vandaele. 2010. "Soil Erosion, Muddy Floods and the Need for Institutional Memory." *Area* (4):502.
- Pollitt, Christopher. 2000. "Institutional Amnesia: A Paradox of the 'Information Age'?" *Prometheus* 18 (1):5-16.

Human Resources:

- Bhardwaj, Meeta, and John Monin. 2006. "Tacit to Explicit: An Interplay Shaping Organization Knowledge." *Journal of Knowledge Management* 10 (3):72-85.

Insurance:

- Wijnhoven, Fons. 1999. "Development Scenarios for Organizational Memory Information Systems." *Journal of Management Information Systems* 16 (1):121-146.

Manufacturing or Product Development:

- Fiedler, Marina, and Isabell Welp. 2010. "How do Organizations Remember? The Influence of Organizational Structure on Organizational Memory." *Organization Studies* 31 (4):381-407.
- Wijnhoven, Fons. 1999. "Development Scenarios for Organizational Memory Information Systems." *Journal of Management Information Systems* 16 (1):121-146.

Nursing:

- Hansen, Morten T., Nitin Nohria, and Thomas Tierney. 1999. "What's your Strategy for Managing Knowledge?" *Harvard Business Review* 77 (2):106-116.
- Harvey, J. F. 2012. "Managing Organizational Memory with Intergenerational Knowledge Transfer." *Journal of Knowledge Management* 16 (3):400-417.

Power plants or Semi-conductors:

- De Long, D. W., and T. Davenport. 2003. "Better Practices for Retaining Organizational Knowledge: Lessons from the Leading Edge." *Employment Relations Today* 30:51-64.
- Jennex, Murray E., and Lorne Olfman. 2004. "Organizational Memory." *Handbook on Knowledge Management 1: Knowledge Matters*:207-234.
- Stein, Eric W. , and Vladimir Zwass. 1995. "Actualizing Organizational Memory with Information Systems." *Information Systems Research* 6 (2):85-117.

Religion:

- Haynes, Wesley. 1989. "Preserving Institutional Memory: the Contents of a Property Archive." *Common bond* 5 (2):5-7.

APPENDIX F

KNOWLEDGE MANAGEMENT SYSTEMS

Ackerman, Mark S. 1998. "Augmenting Organizational Memory: A Field Study of Answer Garden." *ACM Transactions on Information Systems* 16 (3):203.

Ackerman discusses a study of Answer Garden, a searchable computer database program that contains answers to commonly asked questions. This program can be customized for different work place environments, and also can contain a feature that connects employees to "knowledge experts" so they can ask questions anonymously. Through asking questions anonymously, they avoid potentially being embarrassed by admitting to their superior that they don't know the answer to a question. Though the article is dated, the ideas are still current and applicable. This system would probably not be practical for a smaller garden as there wouldn't be enough people to make the system practical. I believe a form of Answer Garden still exists and is available here: <http://answergarden.ch/> (accessed January 8, 2015)

Brown, John Seely, and Paul Duguid. 2000. "Balancing Act: How to Capture Knowledge Without Killing It." *Harvard Business Review* 78 (3):73-80.

Brown and Duguid profile the knowledge management system Xerox developed for its copier management technicians, called 'Eureka.' They found that the best ways

for fixing machines was not through step by step manuals, but through informal communication amongst technicians that was then turned into the Eureka system. This collected the knowledge from many of the technicians and was vetted by experienced technicians to make sure any information entering the system was correct and useful. The system works well because it draws from a large pool of potential knowledge and experience, though it is not clear how useful the system is outside the copier industry, aside from serving as a model for other companies.

Coffey, John W., and Robert R. Hoffman. 2003. "Knowledge Modeling for the Preservation of Institutional Memory." *Journal of Knowledge Management* 7 (3):38-52.

The National Aeronautics and Space Administration (NASA) was looking to collect and record the memories and experiences of some of their senior engineers before they retire. To do this, they created a system called PreSERVe, (PREpare, Scope, Elicit, Render, and VErify) that went through the entirety of the knowledge gathering process from interviewing to actual use. The end result was a searchable web application that could be used by engineers to answer questions. This was a hugely time consuming process, but it was determined that the memories and experiences of the engineers were critical to have. In addition to the program, plans and drawings were created and archived, and multiple people were brought together to share their experiences and memories. The program was based on a now outdated internet provider, so it is unclear how accessible the information currently is.

De Long, D. W., and T. Davenport. 2003. "Better Practices for Retaining Organizational Knowledge: Lessons from the Leading Edge." *Employment Relations Today* 30:51-

64.

This article examples how many different large companies attempt to manage their organizational memories. They detail many different processes, but specifically discuss a system called Quaker Business Intelligence that provides a searchable database of what knowledge is located in which part of a very large company. Additionally, the authors discuss a software application called PHRED that uses a questions based approach to solving problems. As I understand it, the idea is to initiate and facilitate discussion among workers in order to jog memories while stimulating knowledge generation. PHRED provides a framework for questions, and a process to work through in order to find a solution. The company website is available here: <http://www.phredsolutions.com/> (accessed January 8, 2015)

Olivera, Fernando. 2000. "Memory Systems in Organizations: an Empirical Investigation of Mechanisms for Knowledge Collection, Storage and Access." *Journal of Management Studies* 37 (6):811-832.

The author compiles a list of different technologies that can be used to collect, store, and access organizational memory. Using interviews from six companies, the article examines technologies the companies use to manage their organizational memory. Olivera groups the systems into four categories: Social networks, Knowledge intranets, Electronic bulletin boards, and Knowledge centers. Many of the different systems might be out of reach for any but the largest of gardens, but could be practical on a regional scale, if a garden were willing to host. The article is dated from a technology standpoint, but the concepts behind managing memory still hold.

Rusaw, A. Carol. 2005. "How Downsizing Affects Organizational Memory in Government: Some Implications for Professional and Organizational Development." *Public Administration Quarterly* 28 (4):482-500.

Rusaw presents a synopsis of how various government agencies are using technology to manage their organizational memory. She mentioned the NASA program detailed in Coffey's article, as well as programs in the Federal Emergency Management Program, Department of Defense, General Services Agency. There is a large diversity of programs within the different departments, but it is not clear if any of the various departments have coordinated their systems together to manage memories on a government-wide scale, rather than just department-wide.

Stein, Eric W. , and Vladimir Zwass. 1995. "Actualizing Organizational Memory with Information Systems." *Information Systems Research* 6 (2):85-117.

Though outdated, this article provides an extensive listing of companies that are using technology, including knowledge management systems, to manage their organizational memory. Without researching each individual company it is not certain whether any of them are still practicing organizational memory management, but it provides a source for a researcher to start from.

Wijnhoven, Fons. 1999. "Development Scenarios for Organizational Memory Information Systems." *Journal of Management Information Systems* 16 (1):121-146.

Wijnhoven presented three cases studies of Dutch companies that were managing their organizational memory through technology, an insurance company, broadcasting company, and a consulting firm. The consulting firm, in particular was interesting as it had an entire division of knowledge management professions whose job was to manage the intellectual assets of the company. These three companies were managing on a much larger scale, than most gardens would be able to, but provide an interesting perspective on how intellectual assets can be harnessed to drive progress within the organization.