To the three most important people in my life: My Mom, My Sister and My Amazing Partner.
ACKNOWLEDGMENTS

I want to thank all the participants of the interviews.
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Abstract of Thesis Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Master of Urban and Regional Planning

PLANNING AND STORYTELLING: UTILIZING ESRI STORY MAPS
AS A VEHICLE FOR PLANNING

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August 2017

Chair: Paul Zwick
Cochair: Ruth Steiner
Major: Urban and Regional Planning

In the planning profession we spend a great deal of time on collecting data, performing
analysis and creating plans, but how that information is communicated to the public is sometimes
an afterthought. Yet in many cases it could be the very execution of that communication that
determines whether a plan results in success or not. So what are the vehicles for planning
products? How, as planners, do we begin to take their painstakingly crafted plans to the public
and beyond? Often we present plans to the public and the respective community boards in the
form of slide shows or posters, which must be conducted and facilitated by the planners. This
process can often limit both the time for critical discussion as well as the number of participants
who are able to review the plans. By fusing together Web GIS and storytelling with ESRI Story
Maps, plans can be infused with qualitative rhetoric and storytelling without losing their
scientific truth, thus creating and facilitating a connection with the audience and engaging the
community in dialog. This can enrich the scientific and technical work and, in the end, create a
readable, relatable, and enjoyable plan for everyone. Unlike other presentation styles such as
PowerPoint and Prezi, ESRI Story Maps can stand alone without an interpreter while remaining
just as, if not more, versatile and shareable. In fact, with the additional ESRI applications and
mapping capability, the interface stands alone in its own unique category as a highly effective planning tool.

In this project, we utilized case study of the Cabot-Koppers as the subject for implementing the ESRI Story Maps application. Although much of time spent on the project was data collection and the creation of the Story Map application, the focus of this paper demonstrates how the use of storytelling and GIS Web maps can facilitate a better community engagement and represent plans in an accessible and unique way. The project concludes with the notion that ESRI Story Maps provide a simple way to create an engaging environment while facilitating a methodology that encourages community engagement.
CHAPTER 1
INTRODUCTION

The purpose of this thesis is to begin to understand the importance of storytelling in the planning profession. When stories are combined with web mapping through ESRI Story Maps, they form the perfect application for actively engaging and informing a community. The methodology for creating a successful Story Map is demonstrated through the complex situation of the Cabot-Koppers site located in Gainesville, FL, a United States Environmental Protection Agency (USEPA) Superfund sites. In this case study the Koppers portion of the Cabot-Koppers Superfund site serves as a way to understand how storytelling and web mapping technology can be used to facilitate community engagement.

EPA Superfund Sites can host some of the most complex interactions between government and public, scientist and community, and private (potential responsible party or PRP) and community. As a federal agency, the “EPA’s Superfund program is responsible for cleaning up some of the nation’s most contaminated land and responding to environmental emergencies” (United States Environmental Protection Agency 2017). Some of the most complicated sites like Love Canal are hosts to multiple private parties who are potential at fault, i.e. PRP, multiple levels of government (Federal, State, County, and City) and thousands of affected community members that may or may not be completely uninformed about the ongoing process prior to contamination. Communities are in general already socio-economically divided by class and race (e.g. Blum 2008). These divisions are only exacerbated by an outside health risk like a hazardous waste. In the case of the Love Canal, the division was triggered when the community organized a push back against the PRP and the EPA to come up with a solution. Differences in class, race and gender were highlighted as factors that divided the community on what constituted an actual solution to the issues (Blum 2008). These same divisions are often
why there is so much distrust and tension associated with the causes and potential cleanup strategies for these sites, leading to a disjointed communication and application of any solution for the problem. Utilizing ESRI Story Maps would enable the EPA as well as the City and County to actively and accurately communicate to the public in an engaging manner that could help form a consensus for the best solution.

Because of the history and risk surrounding these hazardous sites, it can be a daunting task for planners to try to understand and communicate with the public about Superfund sites during the planning process. Yet it is vital for planners to be able to inform and communicate with the public, as well as to actively involve them in the process in order to gain the trustful and cooperative relationship that is usually required to successfully remediate these superfund sites. Storytelling is a powerful way to begin this reconnection with the community.

Storytelling is used around the world as a meaningful way to communicate and pass down “cultural values, traditions, beliefs and history to future generations” (Hardy 1978 as cited by Marta and Osso 2015, 61). Although storytelling may be perceived as an ancient tradition that has been long lost, it has recently gained greater attention in both commercial and academic fields (Sandercock 2003). Since narratives often follow a certain structure, one of “cause and effect relationships between events that take place over a particular time period that impact characters,” they can and do exist within most communicational media (Dahlstrom 2013, 13,624). “Storytelling is not simply a list of events but an employment of the past in such a way that they form a coherent whole” (van Hulst 2012, 300).

Combining storytelling within a Web GIS environment not only grounds the story in a place and time, but also transforms it into a viable planning tool that allows the planner to connect with the community and engage in a productive dialog. This in turn empowers an
informed community and may further invigorate the planning process by creating a common and accessible space for interaction between the planner and their community. Storytelling and web mapping are effective at engaging the community. Integrating these within a web environment through Web GIS provides a familiar interface that allows the community greater access to the planning process. This thesis explores why and how these are crucial to planning. The previous literature related to storytelling, mapping, GIS and Web mapping are described in the literature review. Then the methods used to develop Story Maps for the Cabot-Koppers Superfund site in Gainesville, FL. Next is a Results sections that reviews the final product with images of the Story Map. Finally the paper concludes with a discussion of the overall research and its conclusions.
CHAPTER 2
LITERATURE REVIEW

Storytelling and Planning

The profession of urban and regional planning is at the center of a highly technical and academic realm on the one hand, and a practice that relies on communicating that information in a simple and understandable way on the other. In doing so, planners hope to achieve not only a sustainable plan but also one that is accepted as such by the public. As Throgmorton states, “many contemporary planners tell themselves that they must think scientifically but act politically… in order to increase public rationality [awareness]” (1996, 4). Planners are immersed in a politically driven environment where they often find their “advice being ignored by decision makers… and the ignorant masses [public interest groups] carry[ing] the day… defeat[ing] the scientific planners’ efforts to make cities and related public policies more rational” (Throgmorton 1996, 4). It is in this environment that planners find themselves striving to redefine planning in terms of bargaining, negotiating and mediating among the various competing interests in order to survive and achieve some level of success and public trustworthiness (Throgmorton 1996). Therefore, Throgmorton and scholars like him (Sandercock 2003, van Hulst 2012) argue that the planning profession “should embrace the idea that planning is scientific and political, technical and persuasive, and the tools planners use act as tropes in these stories” (1996, 5). It is this notion that allows one to begin to understand the power of stories in the planning profession or even the greater academic world.

However, it is often the case that when attempting to gather community data—such as historical experience, changes to the city, and the city’s current economic and social conditions—it revolves around quantitative data collection in which the planner’s role is
confined to that of a “technical problem solver who applies scientific principles to manage the direction, pace and scope of change” (Bridger 1997, 67). Unfortunately, this heavy use of more scientific and value neutral methods can contribute to a delegitimization of “other ways of knowing and often serves as a vehicle through which power is exercised on behalf of elites” (Bridger 1997, 68). But as Rydin points out, “Scientific insights are not necessarily more valuable than experiential knowledge and have a form that is very different from insights related to local experience” (Rydin 2007, as cited by Geertman and van der Heijden 2015, 641). And as she reminds us these different forms of knowledge claims do not have to compete but “can coexist and that there is no a priori hierarchy of knowledge claims” (2015, 641).

Geertman and van der Heijden extend this narrative by noting that even though “combining lay or experiential knowledge with systematized or scientific knowledge is traditionally problematic… the advantage of a storytelling approach is that it aims not for a truth claim at a certain point in time, but to develop a cohesive story about how the spatial future might unfold as a result of both planning interventions and autonomous trends” (2015, 8). Corburn further argues that professional science too often focuses on when local knowledge hypothesizes relationships between two things, like a hazardous exposure and illness, rather than the more general claim identifying an issue (i.e. “people in the neighborhood are sick”) (2003, 426). This idea is in some way contradictory to planning in that it is often the art of planning to apply these general claims and concepts in a specific context. It should be noted that neither storytelling nor local knowledge are replacements for professional science, as Corburn refers to it, but tools to be included to enhance the effectiveness of decisions (429). It is here that storytelling becomes crucial to the planning process.
Corburn brings local knowledge into the discussion with a focus on improving urban planning for communities at risk. Although he brings in several definitions of local knowledge, Geertz’ definition seems to be more topical in that he defines it as “practical, collective and strongly rooted in a particular place [that creates an] organized body of thought based on immediacy of experience” (Geertz 1983, 75). More plainly, he writes, “to-know-a-city-is-to-know-its-streets” (1983, 167). This local knowledge is steeped in a given community’s culture, narratives, and other media, which in turn drive tradition, but it is not without critique. As Polletta writes, “we worry that stories are easily manipulable… that the emotional identification that stories produce may compel moral action but… undermine rational action” (2006, 2). She continues by worrying that “in the end, stories may be just stories… untrue: fiction masquerading as fact… or true but fleeting in their impact… trumped by considerations of economic efficiency or political expediency” (2006, 2). And yet the notion that local knowledge does not undergo any legitimacy test is misguided because as Polletta noted, “The authenticity of storytelling makes the form trustworthy – sometimes more [so] than the complex facts and figures offered by certified experts” (2006, 27).

Building on this notion, Corburn notes, “critical [informational] insights [can] also come from time-tested experiences, community maps, and narratives” (2003, 427-428). Corburn further stresses that “[f]or community members, local knowledge is rarely a hunch or spontaneous intuition but rather evidence of one’s eyes tested through years if not generations of experiences” (2003, 421). Bridger continues the argument stating that heritage narratives “are consequential in different ways… to different degrees for different interest groups” in that they often are the basis of “local interpretation and the lines of action that flow from [them]” (1997,
Ignoring such knowledge could be the difference between understanding conflict within a community and not.

Further as Sandercock discovers, “Stories can also help to imagine the ultimately unrepresentable space, life and languages of the city, to make them legible” (2003, 12). Byrne and Uprichard point out that in attempting to gain a better understanding of “patterns of change in cities and urban regions, it is important… to describe those changes” as well as their causes and effects as they interact through time and space (2005, 674). Narratives are a device that can be utilized here to “capture links between the local micro-, meso-, and macrolevels of social interaction” (Byrne and Uprichard 2005, 666). Planning, like storytelling, does not just exist in the present. It thus relies on past and present events to focus on the future planning goals for a given community. Storytelling has the ability to reinforce this focus by not just talking about what is, but what ought to be (Rein and Schon, 1996).

Stories, both individual and shared, tell of one’s path and destination, as all stories move through time. Further, as Byrne and Uprichard explain, “People never tell just the story of their own life; nor do they project simply in terms of themselves” (2005, 668). Even if there is a main or core narrative in the given community, alternative narratives still exist and often they are held by minority and under-privileged members of that community. Like cities and urban systems, stories and narratives are more an interweaving of complex systems than simple description of a single system or event. In such systems, it is often assumed that people are “always (potentially powerful agentic) components of those systems” (Byrne and Uprichard 2005, 674). When planners represent them, these ideals should be reflected, as well as the “relationships between individuals, collectivities and organized institutional power theory” (Byrne and Uprichard 2005, 674). The telling or representation of even a single story then lends enormous insight into the
most complex situations, as it is not only one piece of the puzzle but a connection to all the other pieces.

With any story, there comes immense power connected to who is telling it, the events it accounts for and those it does not, and where the story is told. Further, there is a “need to understand the work that stories do, or rather that we ask them to do, in deploying them, and to recognize the moral ordering involved in the conscious and unconscious use of certain plots and character types” (Sandercock 2003, 12). As planners, it is important to serve the people while remaining as unbiased as possible, but planners are people too. They hold their own unique social positions that are accompanied by dispositions while listening and narrating stories (Bourdieu 1993). Generally, those who are engaged in the planning profession “are members of the dominant culture, and therefore less likely to recognize, let alone question, dominant cultural norms and practices” (Sandercock 2003, 19). This understanding presents a potential risk that planners who only listen to others’ stories with the intention of applying them to their own grander narrative risk not hearing them at all (Eckstein 2003, 16). Therefore, it is crucial to examine the dominant stories and question “who wants this story to be true or come true, and why” (Sandercock 2003, 22)?

Further it can be understood that “the language we use does not simply describe an objective reality, it also constructs reality,” and in an environment that is as complex and politically active as planning, competing interest groups “with different interpretations of change” also play a role in constructing that reality (Bridger 1997, 68). Therefore, it is critical that planners, being ethically obligated to be conscious of underrepresented minority groups within their communities and to the best of their ability ensure that they are represented, critically assess narratives “to prevent some stories from dominating over others” (Knopf,
Pstross and Talmage 2014, 5). Additionally, by not omitting groups from the practice of storytelling the planner can help insure an inclusive environment (Young 2000). In some cases, it is necessary for the planner to be more active to build consensus and take the plan that they shaped from the story back to community and simply ask “Did we understand you correctly?” (Sandercock 2003, 16).

Turning a community’s story into an actual plan and one the community trusts only gets more complicated as the issues that surround the story increase. Most people do not want to feel like their city and community shaping decisions take place in some “room where it happens” or that they are disconnected from the very process that shapes the place they live. One of the best ways to incorporate people “methodologically and theoretically” into those representations are through stories/narratives (Byrne and Uprichard 2005, 674). Although it may not always be clear how collected stories will be used in the subsequent process, it is important for everybody to have a chance to speak and have their stories heard (Sandercock 2003). Davidoff comments on citizen “inclusion,” stating, “it means not only permitting citizens to be heard… [but] also allowing them to become well informed about the underlying reasons for planning proposals, and to respond to these in technical language of professional planners” (2012, 192). Providing such a space can be time consuming and costly, but it can allow the community to become more aware of their surroundings. Sandercock writes that often “When people are immersed in local battles, they are so locally focused that they have no idea what’s happening elsewhere” (2003, 18). She goes on to say that “it was often the case that one neighborhood had no idea that another neighborhood was fighting… the very same battle and had come up with creative ways of doing this” (2003, 18). Providing the space for storytelling and common understanding can create a galvanizing event for any plan.
As the author or at least contributor there will always be inherent bias, and it is on the planner to reflect on and challenge that bias to fairly and equally represent the community. For example, “such neutral sounding criteria as ‘economic efficiency’ are never neutral and when applied frequently benefit the wealthy and powerful at the expense of the larger community” (Bridger 1997, 68). As Young states, “People differently positioned in social structures have differing experiences and understandings of social relationships and operations of society because of their structural situation” (2012, 328). Therefore, portraying the story as a single narrative can leave key members of the community out and cause mistrust and animosity within the community or project. Therefore, “as… politicians, planners and citizens involved in planning, we should always ask for more than a single story” (Sandercock 2003, 22). Further, these several stories tend to compete for attention, which creates further tension. According to Eckstein, it is within a storyteller’s “ability to make a narrative and physical space in which to juxtapose multiple, traditional stories so that they enrich, re-narrate, and transform that space rather than compete for ultimate control of a single, linear, temporal history of an impermeably bounded geopolitical space” (2003, 24).

It is important that planners learn to engage in critical storytelling, because to be a good planner and storyteller alike, one does not just need to understand how to tell a story but how to engage critically with its process. Storytelling can play a crucial role in facilitating the representation of the community and its many diverse members by making space for both the planner’s stories as well as the community’s. In higher conflict scenarios like Superfund sites, letting the community’s stories be heard can be even more important. To create such a space, planners are encouraged to make it comfortable and casual to help people from different cultures
and classes speak out in greater confidence about the process, as opposed to meetings using such highbrow formal rules like Robert’s Rules (Sandercock 2003).

**Storytelling and Mapping**

Although there seems to be some reluctance for planners to engage in storytelling, they utilize maps, often in the form of technical tools like GIS maps and models on a daily basis. Ironically, maps have been telling stories for centuries; whether for navigation or exploration, maps have been used to narrate epic journeys and recount grand tales, but mostly to bring context and destination to real events by transporting the reader/listener to the very place (Kerski 2013). Further, maps have great educational appeal, providing far more than just a sense of location by “enabl[ing] students to investigate the ‘whys of where’ – the essence of scientific and geographic inquiry” (Kerski 2013, 11).

Although maps are largely held to serve solely as reference documents, “maps can be a doorway to discovery about the physical and cultural world and local communities in which we live” (Kerski 2015, 20). Historically maps have “used stories from travelers and explorers to fill in the blanks on their maps” (Caquard and Cartwright 2014, 102). Further, journalists, scholars, and activists alike have utilized the narrative power of maps to support their projects and to aid in constructing compelling dialog about places (Caquard and Cartwright 2014). In the past historical and contemporary maps formed the basis to “reconstruct alternative forms of politically charged maps, supporting novel…cartographic expressions to provide alternative ways of thinking about landscapes, territories and planning” (Corner 1999, as cited by Cartwright and Caquard 2014, 104). “In other words, the potential of maps to both decipher and tell stories is virtually unlimited” (Caquard and Cartwright 2014, 101).
Caquard and Fiset’s mapping narrative requirements form the core elements for mapping stories: the physical locations, the relationships between those locations and the understanding of the time in which the story or event is located (2013). Caquard and Cartwright go on to say that “the simple location of the events alone is not sufficient to grasp the meaning associated with place” and that to completely understand their spatial meaning the ordering of those events must be examined (2014, 103). Caquard and Fiset expand this notion in that, “Mapping narratives requires representing not only the different geographic locations of a story, but the geometry that exists between these locations” and the element of time that is connected to storytelling (2013, 19).

On a more individual level, mapping can be seen as a sort of healing or therapeutic activity (Coulis 2010), especially when representing more tragic events, “while at a collective level, maps can contribute to leaving cartographic traces, making these experiences more visible and more tangible” (Cartwright and Caqard 2014, 102). Cartwright and Caquard (2014) explain that there are two major clusters of maps. The first are internal maps, often seen in film or novels, which “can help to ground the action in a defined location, to increase the realistic dimension of the story and to ensure that the reader is totally aware of the geographical realities” (104). Further, these maps can act as a sort of guide or spatial metaphor aiding the reader to follow the journey of a character. Secondly, maps have the ability to “stimulate and support the narrative process” in that they have been exploited “to reveal all ranges of invisible geographic structures and patterns” (104). The mapping of stories can take many artistic forms and represent more personal aspects connected to an individual or group’s journey, such as sketch maps of itineraries (e.g. Goby, 2012; del Biaggio, 2013), artistic representations of more personal and
emotional dimensions associated with tragic journeys (Fischer et al., 2013), and online collaborative maps depicting a personal geography of warfare (Cartwright and Caquard 2014).

One’s location is not as simple as where one currently resides but includes the relationship to what is around them. By observing spatial and temporal relationships we navigate through obstacles to arrive at our destination. One might see it as simply two points with a line connecting, but if we look a little deeper we can see that each spatial location has a meaning and a history, and these may change depending on not only who is interpreting but how and why they got there. For example, Disney is often seen as a tourist attraction, but it is also a place where people work, a place for innovative thinking, a place that is known simultaneously as the happiest place on earth for some and a living nightmare for others. It is in this notion that we start to understand that not only are there relationships between locations but within each individual location. Palagiano further stresses that through maps, storytelling was crucial “in the past when the journeys of famous leaders were turned into fictional stories… built to impress the reader with wonderful and fantastic facts” (Palagiano 2007, as cited by Marta and Osso 2015, 62). With the rise of the internet, “the potential of map-based stories increases” (Cartwright and Caquard 2014, 104).

**Importance of Web Mapping and Digital Storytelling**

It is greatly important to establish both equity and access in the planning process in order to gain a wider acceptance and more democratic decision making while providing “greater opportunities for sustainable solutions” (Balram and Dragicevic 2004, 134). GIS can be seen as a barrier between the public and the technicians who utilize it. Both the time to acquire the skills needed as well as the budget required are restrictive not only for the professional use of GIS but especially for the public. However, there has been a recent push to try and make GIS more
financially and technically accessible in an effort to make the planning profession more approachable, transparent and trustworthy. It is no coincidence that this push aligns with the current trend revolving around the idea of how people are consuming their information and the rate at which they expect it.

New media is significant because “once out of formal schooling, non-expert audiences get the majority of their scientific information from mass media content” (Dahlstrom 2014, 13614). These audiences are unique in that they are privileged with greater power to “seek, select, and share information that interests them most” (Dahlstrom 2014, 13614). Science generally occurs outside of lived experience, creating a dependency on alternative outlets to help access and understand it (Dahlstrom 2014). A 2012 report revealed that the main sources Americans utilize to retrieve their information about science and technology is first and foremost the Internet (35%) closely followed by television (34%), with print media falling far behind (18%). The Internet remains the primary source when seeking information about a particular science or technology topic (59%), “with over half (52%) of the online content derived from traditional journalistic sources” (Dahlstrom 2014, 13615). Many media sources like CNN or Fox News try to fulfill the interpreter role, but few can overcome the sheer ubiquity of mass media. The purveyors of this new media content have to compete for the attention of their audiences; to do this they often rely on storytelling formats to get through the information clutter and connect with audiences (Dahlstrom 2014).

Along with this, people want their news and other content immediately as it is happening, or at the very least the most current information possible. By utilizing Web GIS tools, we can provide a place not only for the public to observe the planning process but also to comment on it. Those results are then recorded in real time, “eliminating the need for re-interpretation
afterwards” and providing instant accountability, as those comments are stored and viewable via an online web map viewer (Balram and Dragicevic 2004, 148). Further, people are using web maps every day and it is readily becoming a format in which they search for information and leave comments (e.g. Google Maps, Yelp, Zomato and Trip Advisor). Allowing audiences to comment on the planning process in this manner provides them with a familiar format that allows them to pinpoint the exact location of a problem they wish to report on a map, rather than explaining this verbally or in written form. This also provides greater accuracy for the review of comments by the planners without having to interpret the location from written form (Kingston 2007, 140). Further, by utilizing web maps as the basis for the planning process, any and all updates to the plans can be made available instantly for viewing and comment, providing the public with access to real time information.

Planners generally define increasing public participation as increasing the number of people involved in the planning process. Although any growth in participation can serve to strengthen trustworthiness and accountability, as planners we should not forget the importance of also “increasing the diversity of participants and widening participation to include different sections of the community that may be disenfranchised by current practices” (Berry, Higgs, Fry and Langford, 2011). Web GIS can bolster the pursuit for diverse public participation by enabling users with unique ideas and values, in various segments of the same or numerous positions, “or in different locations at the same or different time to collaborate using shared data, deliberations, and negotiations towards agreements… using the internet as the interaction medium” (Balram and Dragicevic 2004, 135). However, participation is more than just putting more people in seats; it is also about engaging and educating those participants in a way that creates a well-informed community, thereby increasing the quality of the planning process.
through “better-informed decision making” (Schmid 2001; Berry, Higgs, Fry and Langford 2011). The web map also acts as a cognitive structure that organizes planning information on the website using data visualizations and scenarios to improve understanding of the planning goals while making the system more attractive and trustworthy to residents (Balram and Dragicevic 2004). “Web GIS technologies provide the capability to integrate data from disparate sources and to make these available before, during and after the planning process” (Balram and Dragicevic 2004, 135).

In a study on web-based GIS technology and community planning, Kheir Al-Kodmany utilized a web-based survey to learn about the public’s preferences that eventually would guide the creation and re-creation of a potential neighborhood design (Al-Kodmany 2000). Utilizing aerial photography, an animated tour, and point-and-click capabilities within a Web GIS environment to conduct surveys allowed increased savings in time and money by cutting back on hours need to perform traditional in-person surveys as well as the need for data entry (Al-Kodmany 2000). The survey process was enhanced as well by providing the participants with numerous advantages like increased privacy, complete freedom of when to take the survey, unlimited time to complete the survey. Perhaps most importantly, it removed the interviewer influence on how the questions were asked (Al-Kodmany 2000). Finally, the major strength of the study’s design was the ability to provide contextual information and visualization in the form of videos and pictures “that helped participants offer a more precise assessment of their community” (Al-Kodmany 2000, 19). However the utilization of the web does not come without its disadvantages.

One the most important criticisms and obstacles of web or computer based planning is that it assumes all relevant participants have access to the internet and a computer (Balram and
Dragicevic 2004; Al-Kodmany 2000). By using a web based platform there is a greater potential to further alienate already vulnerable and underrepresented lower-income communities (Al-Kodmany 2000). Further, according to Hurst and Clough, many experts prefer paper maps to digital, as they typically offer higher-resolution, large-scale information requiring zero power conception (2013, 50). The authors go on to state, “To their detriment, digital and mobile mapping formats often make the collaborative working difficult and the electronic nature of digital maps make product tangibility almost non-existent” (Hurst and Clough 2013, 50). But with recent and continuing improvements to digital and web technology, Web GIS has allowed maps to increase their resolution and scale while retaining the dynamic, personalized and up-to-date content abilities (2013, 50). Finally, with the new and increasingly popular ways of consuming and delivering learning and information, as well as a greater number of people utilizing public and private communications technology, Web GIS is becoming more and more relevant.

Digital storytelling has recently emerged as a new and interesting way to tell stories, thanks to the support of new media and technologies. The idea is to use a set of multimedia, such as text, graphics, images, audio and videos, to narrate a wide range of tales from historical events to scientific topics, current events and personal life, typically with a strong emotional component. “A very interesting and successful way to build digital stories is to incorporate maps in storytelling. Storytelling with maps can be used across many topics, for literature, history, geography, politics, environment, science” (Marta and Osso 2015, 62). Further, “these stories can be created by people everywhere, on any subject, and easily shared all over the world through the web. Indeed, the power of storytelling to involve the audience is strengthened by the
support of multimedia that involves the emotional side of people even more” (Marta and Osso 2015, 62).

In one example, Marta and Osso (2015) found that digital stories available on the web can be helpfully used by teachers to deal with topics that are difficult to address through traditional methods.

Teachers can use digital stories as an opportunity for students to build their own stories, exploiting the [technological] confidence of the new generation to create digital content and sharing it online. Digital stories can be beneficial for students, allowing them to take a linear series of events and turn them into a multidimensional experience, through the combination of voice, text, images, audio and video. It encourages them to communicate, collaborate, research and gain a deeper understanding of history as they explore the most effective way to retell it. (Marta and Osso 2015, 62)

In a more active role, digital storytelling can empower “community engagement projects with the opportunity to digitally narrate personal tales with expert guidance, as an interesting and visually stimulating extension of an oral history” (Foth, Hearn and Klaebe 2007, 12). Further, the narrative nature forms the basis for “various methods that may be useful in community engagement, as well as various new media tools (e.g., storytelling, scenario development) that may prove valuable in the community engagement process” (Foth, Klaebe and Hearn 2007, 4). For example, the use of narrative in new media design initiatives may be one way to overcome some of the difficulties in attempting to initiate projects whose goals did not represent the community’s by delivering a superior comprehensive approach (Foth, Klaebe and Hearn 2007).

**ESRI Story Maps**

ESRI Story Maps bring together the best parts of storytelling, mapping and planning, facilitating those mechanisms through a digital online interface to create a powerful tool for anyone who has a story to tell. Prior to the popularity of ESRI Story Maps, a study on using geotagged online photos identified and compared the main trajectories followed by
photographers—both local and tourist—and found these paths represented the potential primary ways of navigating the city, as well as how it is portrayed through photographs as a way of “reconstructing collective narratives about the city,” and how it can be framed in different media, both digital and print (Cartwright and Caquard 2014, 104).

Due to the technology being relatively new, there are few studies on actual application of ESRI Story Maps. Two of these studies focus heavily on their application as teaching tools for classroom use (Mitchell and Strachan 2014; Marta and Osso 2015). While Mitchell and Strachan (2014) focus mostly on application in the hands of the teachers, Marta and Osso (2015) branched out to include students into the Story Map making process. It is worth noting that age can play a role in the perception of new technology and its user friendliness. For example, Mitchell and Strachan found that “The 51 and older age group were the least comfortable with learning this innovative educational technology,” while others seem to grasp it quite well and would be willing to continue to apply Story Maps in future exercises (2014, 211). Other difficulties seemed to stem from an accessibility framework, in that some teachers felt that they would not have the time to be able to continue to learn and apply the Story Maps due a need for training and a lack of funding (Mitchell and Strachan 2014). These claims are not without merit, as often the updates or additions to the application can almost come overnight. However, if one hosts their story map on the ESRI server their application will seamlessly be updated along with it. Staying up to date with what is new with the application can be as easy as following ESRI on their multiple social media outlets or their web page, where they often post a “what’s new with story maps?” page whenever big updates or applications are launched (ESRI 2017). Overall, though, the findings on the effectiveness and usefulness of the story mapping application were a
resounding success with 99% stating that Story Maps were engaging and interactive (Mitchell and Strachan 2014).

Other story mapping applications are available; in particular Knight Lab’s StoryMap (js) by Northwestern University could be used. While I believe this could be a viable option for creating story maps, I often found that creating a new story map was too cumbersome and rough compared to ESRI’s application, which will walk the user through the initial setup of the application, as well as supplies the user with multiple ESRI blogs and tip sites so that one does not have to go far to find a solution to any problem. These help sites also often provide great inspiration for different applications and add-ons to further enhance the storytelling experience. This most likely stems from the vast user base that ESRI already maintains and is fully dedicated to facilitating an easy user experience. Without web coding experience, Knight Lab’s StoryMap (js) seems to only be a one note application, only offering a single format for storytelling much like that of PowerPoint. In contrast, ESRI has full teams of researchers and developers constantly improving their applications. It is hard to truly see a downside to ESRI Story Maps, which contain multiple formats for multiple kinds of storytelling and presenting. Finally, from personal GIS user experience, I found Knight Lab’s Story Map to be lacking in the ability to include more unique and effective mapping techniques. The user is constrained to using Bing or Google base maps without the ability to add supplementary data. ESRI Story Mapping uses ArcGIS Online, which not only feels comfortable, as most GIS professionals and planning are already familiar with its interface, but it also allows the author to inject real spatial analysis and data into the story. This helps to ground the story in fact and bolsters the context to allow the reader to associate the scientific spatial data with a setting where they can begin to place themselves in the story.
Integrating storytelling and GIS within a web based environment does not come easy and is accompanied by all the technical aspects that surround hosting web based content. For example, the performance of the GIS web application is dependent on key infrastructure elements: “the internet connection, the traffic intensity, the data efficiency, and the capacity of the client and server machines” (Kraak 2004, 89). Further it is expected that a web page’s performance be highly responsive and interactive with point-and-click features working at a fast pace. These requirements and expectations of the web environment can often come at a great expense to those trying to implement them. Although companies like ESRI offer to host these applications for organizations, which depending on the organization’s size and needs can often be the more beneficial route, it can still be a great burden on the organization if it does not already have the technical support to implement web based GIS. However, it is the view of this paper and many others that the internet is quickly becoming the main stage for GIS and that its role will only expand as technology continues to improve (Kraak 2004; Al-Kodmany 2000).

Each part of the literature comes together to form a cohesive unit with each section building on the other to form an understanding of the benefits of ESRI Story Maps. Storytelling in itself can be a powerful planning tool in that it provides a method and a format for collecting and distributing information. Maps being heavily connected to storytelling provide a method to enhance storytelling by providing additional context i.e. understanding the place. GIS software facilitates the use of the maps for storytelling by enabling advance creating and editing of data. Finally, the integration of Web technology allows for the sharing of data, information and technology of otherwise generally proprietary software thereby increasing the accessibility to more and more people.
CHAPTER 3
METHODS

To begin to understand the Cabot-Koppers superfund site I needed to understand the story of the site and the community that surrounds it. I conducted a series of 9 interviews of neighborhood residents and policy makers identified through snowball sampling. These provided community input to inform the creation of the storyline theme and the map and multi-media materials for the ESRI Story Map. The process was fundamentally a researcher-led project where the interviews and community input were combined with technical information to produce a method for creating a powerful platform for community engagement and feedback through ESRI Story Maps. An Institutional Review Board (IRB) expedited protocol was provided for the interview process and use in this project.

This chapter provides a description of how my research process formed the basis for the application of the Web GIS used within ESRI Story Map to enhance the overall narrative. Because there is so much information surrounding Superfund Sites, the interviews were very much a grounding point for the information, providing a focal point when the story became too convoluted. Thus the story map was revised to reflect the interviews to better connect the story back to the community. As this project is more of a demonstration and methodology for the utilization of the ESRI Story Map application, more emphasis was placed on working through the application to produce the ideal platform content for the narrative.

Data Acquisition and Utilization

Even though the Cabot-Koppers site was not established as an EPA Superfund Site until 1980s, the actual timeline extends back to the its opening in the 1910’s. The data can be divided into three types: technical documents about the site, GIS data, and the information gathered from
the interviews. Much of the technical information is provided via multiple websites representing the multiple levels of government (i.e; City (City of Gainesville 2017), County (Alachua County 2017) and Federal (EPA 2017). While all three of these websites provide the basic information and hold unique information based on its governmental origin, the Alachua County website delivers a more comprehensive page with more frequent site updates as well as hosting the Cabot-Koppers Superfund Document Library, which contains 1774 archived documents dating back to 1989, serving as primary web page for the site. As such this site was used as the main source of technical information.

There was a significant lack of GIS information readily available surrounding the Cabot-Koppers site. I made several attempts to try and contact those who would have GIS used in the projects or analysis of the site, including both public and private individuals and organizations, but I either received no reply or I was referred back to the Alachua County website. Most of the GIS information had to be created for this project from geo-referenced PDF maps that were provided in various presentations and technical documents. Even spatial data like testing locations and site plans had to all be digitally mapped in GIS so that they could be brought into the ArcGIS Online platform. Because of the extensive timeline in which this project takes place, historical imagery taken from the UF Map and Imagery Library as well as property parcel data provided by the FGDL data portal were crucial to show how the site has changed over time. Other GIS data had to be created from the site history itself, which I pulled directly from interviews and site visits to create the spatial journey through the project.

I conducted a total of 9 semi-structured interviews that ranged from thirty minutes to two hours in length. The interviewees ranged from everyday citizens who were actively campaigning or protesting for a proper cleanup and solution to the superfund site to current and previous
governmental position holders. The interview process itself revealed much about the risk and distrust that surrounds the site. To help mitigate the risk, distrust and vulnerability that resonates with these sites, I set up the IRB request in such a way that the interviews were used as a way to inform and guide the Story Map without using any information that could potentially identify them but were recorded for accuracy reasons. Even with this protection in place, there were many individuals who turned down interviews either because of lingering emotional distress or a lack of trust over what would be done with the information. Further, some of the interviewees often asked to go off record to feel more comfortable disclosing certain information or points of view. These reactions were very revealing in that they made the feelings of distrust and vulnerability apparent.

**Community Involvement and Project Description**

The initial contact with the community that surrounds the Cabot-Koppers Superfund site was initiated via a class presentation to the community regarding a rapid Health Impact Assessment on the Superfund Site and the community. Because of the sensitivity of the topic that is created by the risk and distrust that can surround Superfund sites, I established contact through known active members of the community who were previously involved in the site. From these initial meetings, I was provided with contacts of other potential interviewees who would be willing to talk about their experiences regarding the Cabot-Koppers superfund site. The diversity of interviews, with respect to both governmental and non-governmental interview participants, allowed me to gain insight into multiple key perspectives that surround the site, bringing to life the residents’ struggle to gain the site proper recognition in hopes of reclaiming their community from the fear and risk brought on by the presence of this hazardous site.
Each interview participant seemed to bring in not only additional information on the site but also their own insight to story surrounding the superfund site. These stories help build upon the existing “official” or “core” story and technical information about the Cabot- Koppers site and, according to Ramirez-Andreotta et al. (2014), can help create trust and transparency for any communicated results of the research. I do not assert that either the community’s stories or the technical information that come from the EPA are more correct, but the stories bring life and humanity to a generally overwhelmingly technical and complex discussion topic.

A key part of the interview process was dialog about how each individual as well as the community obtained and commented on information about both the site in general and the overall superfund process. The interviews revealed that from 2009, when the Cabot-Koppers site was finally closed, to the present day, the EPA and other stakeholders have justly attempted to inform the community and gather their input. For example, many of the interviewees discussed a meeting that took place at Stephen Foster Elementary School in which the EPA was meant to come, inform and take comment from the public. However, there was a point at which the EPA was going to leave because they had fulfilled their obligated time in which to take comments, even though all the members of the public had not yet spoken. The EPA and community compromised and agreed to come up with the money to pay the meeting’s transcriber so that the public comments could continue. This example shows the importance of the public commentary on the process and emboldens the idea that every step to improve this process is a step toward a more comprehensive and transparent process.

This willingness to engage and include the public was not without struggle and pushback from the community. A major part of successfully informing the community of the technical superfund process in an easily digestible way was the hiring of a “Technical Assistant” via the
EPA Technical Assistant Grant (TAG). This grant was applied for by the incorporated non-profit Protect Gainesville Citizens, which was formed by the Gainesville residents concerned about the health and safety of the community that was corrupted by the presence of the Cabot-Koppers site. With the EPA’s limited resources and without the ever-present pressure of the active Gainesville community, the level of engagement may have been more lackluster. As planners, we must be aware that such activism is not always the norm. To ensure a successful, transparent and comprehensive plan that benefits the community requires a better process to inform and engage the citizenry in a way that is both effective and efficient.

One of the primary forms of communication between the community, EPA and PRP were newsletters that attempted to divulge the remediation process and answer questions the community might have. In this particular case, the community was very proactive. As a group, they applied for the Superfund TAG and used this to hire a community liaison whose job it was to talk with the EPA and PRP and report back information to the public in an easily consumable format. With this information, the community felt more secure about the information they were receiving. As the superfund process has continued to drag on, funding for the TAG has run out and the newsletters have become less frequent; there is now a sense of unease over what is to come. Although the site is no longer active, the remediation for cleaning up the site has only recently begun, and residents have many questions about how this will affect the overall community. Interview participants were uneasy about the remediation plan and were anxiously waiting to see how remediation will work; they pray that no more contamination is unearth or unleashed on the community.
Creating a Story Map Platform

ESRI Story Maps allow for inclusion of the very technical information provided by the EPA while providing a significant access point for the community through an accessible online platform. “ESRI Story Maps let you combine authoritative maps with narrative text, images, and multimedia content … make it easy to harness the power of maps and geography to tell your story” (ESRI 2017). ESRI gives some simple steps to help beginners tell their stories… “Connect with your audience, Lure people in, Chose the best user experience, Make easy-to-read maps, and Strive for simplicity” (ESRI 2017). I found throughout my process making the story map that these are often good rules to stick to, as stories can often become convoluted and overwhelming the more one digs into them. Therefore, to make the story engaging and comprehensible to everyone simplicity is key.

ESRI Story Maps come in many different templates. The applications are divided into: story map tour, story map journal, cascade, series, crowd source, short list, swipe, spyglass, basic, and custom. Each format caters to different stories. Story Map Tours “Present a set of photos or videos along with captions, linked to an interactive map. It's ideal for walking tours or any sequence of places you’d like users to follow in order” (ESRI 2017). The Story Map Series on the other hand “Present a series of maps via a set of tabs. There's an optional description panel for presenting text and other content associated with each map” (ESRI 2017). This format provides a great platform for telling bigger stories or those that require clear distinctions between sections. The Story Map Series even allows one to embed other story maps templates and web apps without coding into it, allowing the author to fully utilize the applications that ESRI offers. It is worth noting that embedding or adding too many applications can severely slow the loading speeds, hindering the storytelling experience. For this project, I selected the ESRI Story Map
Series as the base application for a couple of reasons: its ability to easily support the other Story Map applications and a design that resembles a standard webpage, which I thought would add familiarity to the application.

Once a layout is selected there are some cosmetic decisions that need to be made like one’s layout theme and an engaging title. Going for a tabbed theme within the Story Map Series format is a great way to clearly divide up your story into distinct sections as well as give the application more of a website appeal. The title needs to both inform one’s audience about the story map but also grab the attention of would be readers while maintaining the simplicity that was previously mentioned. Finally, the Story Map can exist or be shared in three different spaces: Private, which only allows the creator to view and make edits; Organization, which allows only those within your organization, with a user name and password, to view the story map with the original author retaining editing rights; and Public, which allows anyone with the link to view the Story Map with the original author retaining editing rights. Now the Story Map can be switched between these modes at any time and can be edited while in any mode.

Generally, it is best to create the Story Map either in private or shared to the organization and only made public when the final product is ready, but being able to edit while it is shared with the public does allow to the author to make any additional edits after it is launched without having to necessarily take the Story Map offline. Further, making the application public requires the author at the very least to make all the web maps and layers in those maps to be made public as well. ESRI provides a quick way to do this through an interactive dialog that lets the author know how their map is functioning, but that will be touched on later in this process.

There are two main modes or views that the author will interact with throughout the creation process: an Edit mode and a View mode. The editing mode allows the author to create
and delete tabs, edit existing tabs and alter the overall appearance of the Story Map. The View mode allows the author to preview the story as if being viewed from the public. This is a very important mode because it allows the author to continually check in to ensure that project is functioning properly (e.g. the proper map extent, etc.) thus preventing having to go back and change every extent at the end of the project. One unique feature of the ESRI Story Map application is that it provides messages on how your Story Map is functioning. For example, once the application is made public there will often be a message warning the author that there are features within the application that are not public and need to be changed to be viewed. By clicking on this message in the application one can directly change the status of the maps and layers to public without having to exit the application editor. From here, the creativity of the author can take over in the use of text, photos, videos, and interactive maps to make the experience as immersive as they choose.

The interactive map allows the user to actively engage in the storytelling process by giving them access to explore, change, click and comment on data as little or as much as they desire. The user can do this by enabling the side with clickable text or “buttons” that allow them to change anything from the layers, the base map, creating pop ups and even replacing the map with a completely different one. As one changes the map they can explore each new iteration of the map, zooming in or out and clicking on features for even more information. If an ESRI application is placed in the main stage of the Story Map it would allow for commenting on data like plans for a potential development.

The real technical work comes when it is time to create and edit maps to fit the creator’s or story’s needs. Any interactive maps that one wishes to add to the story map need to be created in ArcGIS online. None of the work in creating the Story Map requires one to have a paid for or
“organizational” ArcGIS online account, but one will need to sign up for a free account. However, any a public or free account does not have the ability to create or store data to be used in an application. Public ESRI accounts may only use data that already exists within the ArcGIS Online data library/ open data to create applications. Now once you have access to ArcGIS online you can start creating content like maps and other applications for the Story Map.

It is important to remember that if you need to create any geographic files from scratch with any heavy editing like selecting out sections of larger layers like property parcels, you will need to publish the layers directly from ArcMap, which does require an ESRI license. The different layers may also be able to be brought into ArcGIS Online by adding in a compressed version of the shapefile via the contents page. As the layers are brought in it is important to make sure they both look correct in a map viewer and have retained all the associated information, then make any edits that need to be made to the layer here. Finally, because I wanted to make this Story Map public in the end but wanted to continue editing the layer behind the scenes, it is crucial to create a “view” of this layer. By doing this it makes the view layer public and not editable, and yet it will receive any edits made to the original editable layer. Once all the layers needed are acquired the maps need to be set up. This step is as easy as opening the map tab in ArcGIS online and adding one’s content but there are some crucial aesthetic features that should be considered. For example, what base map should you select to display underneath your data?

The base map is a general layer that usually contains features like streets, boundaries and natural features. This information is important because a great base map complements and adds to the context of the overlying data, but a poor base map can confuse and misconstrue the data’s meaning. For example, using aerial imagery beyond a certain distance becomes muddled and can distract the viewer from what they are supposed to be focusing on rather than adding a locational
component for the viewer to connect with. Instead, a more general base map like ESRI topographic map can provide broad state boundaries, some water features and transportation routes, providing the viewer with clear landmarks to get their bearings and further spatially connecting them to the story. This base map can be changed at any time, even while in the story map application, so the map can adapt as the creation process unfolds.

Once a base map is set the various layers can be added into the map. Now one can technically add as many layers as one wants to a map with the idea being that once in the Story Map different layers can be turned on and off. As a general rule, however, I created maps based on the function, such as a map to show zoning, another to display time enabled property values and one for contamination sites or testing values. In my experience this allows the maps to function a more efficiently when drawing and making layer changes. Finally, while it is a good idea to select how you wish to display your data via its symbology while completing your initial map making process, changes are often required as these maps are brought into the Story Map application with the most common being symbol size and color. Once the basic maps have been created the building of the Story Map can begin.

For this project’s Story Map Series the sections were chosen to represent different chapters of the story. These are not chronological but instead represent different parts of the overall story—Introduction, Community Activism, Remediation and Redevelopment. Each section is designed uniquely to engage the reader in the topic. This is accomplished by applying captivating media and interactives that reinforce and enhance each topic.

Knowing and understanding what kind of media that is going to be used is crucial to setting up and organizing the Story Map application. ESRI has been improving the ability to support various media types throughout the course of this project, continually adding support for
adding your own media directly from your desktop or from websites such as YouTube or Flickr. This media can be added in several places depending on how the author wishes to serve the story. First the media can be placed directly on the main stage of the story map where it would be displayed prominently directly with the text in the side bar. It can also be placed in the sidebar in the form of a hyperlinked word or phrase, where one would click and be taken to a different web page to view or have the media displayed “as is” among the text. Finally, the author can change the main stage via linked text in the sidebar. This allows the reader/user to further interact with the story by altering the display as they work their way through the story. Each one of these methods can be useful given the situation, allowing the author to tailor each to better achieve the purpose of the story.

It is important to note the size and resolution of the media that you wish to include in your Story Map. For example, in this project since I utilized three different templates of Story Maps there were different recommend sizes for media. ESRI recommends in Story Map Tours that the pictures are 1000 by 750 pixels. Unfortunately for this project many of the photos and videos were collected second hand thereby limiting the amount of control over the image size and resolution but the goal here is to make the application as appealing and efficient as possible so that people are drawn in and experience the media without seriously long loading times.

As part of the introduction section in the Story Map, historical aerial images of the site from 2005 and 2013 were needed to bring added context to how the site appeared while it was still operating compared to how it exists in present day. However, to actively compare these images with ESRI’s swipe application, the aerial images needed to be brought in as georeferenced imagery layers which would have required more work on the backend to create an image service in ArcMap and potentially cost more ESRI credits as imagery can be a large file to
store. To avoid this complication, I used an online tool called juxtapose(js) by Knight Lab, which allowed me to easily pull the two aerial images in and set up a comparison slider. The provided script for the comparison slider was then copied over and placed in the Story Map as a clickable option in the sidebar text. This clickable under the Koppers description section allows the user to change the main screen from the general boundary map to the comparison slider.

A similar issue arose when trying to create an interactive and simple way to display a timeline of the Cabot-Koppers site’s history. In this case, another Knight Lab product was used called Timeline. The creation process was fairly simple in that it involved copying over a google spreadsheet from their web page, entering in dates, text and media links appropriately, publishing the file to the Web, copying that link to a text box back on their site and finally copying the output link or embed code into the Story Map as a main stage option. This application not only was easily and quickly created but also provided a great multimedia timeline that fit perfectly with the Story Map structure.

To display the levels of contamination on and immediately around the site a simple contamination web map was created. This, along with the various other contaminates type were displayed on the sided bar with clickable links to proper descriptions of the contaminates created an introduction to the extent of the severity of the contamination on site. Further description was provided via a YouTube video of a local scientist discussing the contamination and addressing public concern for further spreading of the toxins. Finally a link was created to the source documentation for the contamination map.

In order to add more spatial context to the extent of how far and effective the community activism was for the Cabot-Koppers Superfund site, a Story Map Tour was constructed using mainly the points where the Cabot-Koppers superfund art tour and or crucial places in the Cabot-
Koppers superfund process, as well as a separate tour that I attended to as a part of a city commissioner board review of the current condition of the Koppers portion of the site. This tour was primarily created by geo-referenced photos taken from an iPhone then loaded into a Flickr account for hosting on the web, with the Story Map tour application taking care of the rest. The tour application allows one to bring in their geo-referenced photos into the tour format, automatically creating an online map and a layer for the photo information to be stored. The tour was then edited by adding description to each point and picture and making sure the pictures are organized in the same spatial order of the actual tour. This allows those who were not available to take the tour to experience the site in its current condition.

Remediation Section of the Story Map was established mainly to try to break down some of the more complex problems and solutions at the Superfund site. With this understanding a simple ESRI Map Tools web application was built to give the user a little more GIS/Map control to explore some of the contamination data. This was accomplished by sharing one of the previously constructed web maps as an application, selecting the Map Tools application and then configuring the application appropriately. The result is a fully interactive map in which the user is allowed to turn feature layers on and off, change base maps and use the measure tool. The following parts of the remediation section are created in a way to show relevant media as the user scrolls or clicks through the story. This media is activated by either clicking on highlighted text or by simply scrolling down to continue the story.

When displaying the off-site creek contamination however, pop-ups and graphics were utilized to show the testing results for each point. This was done by having the link to the photo’s location in Flickr as an attribute in a field within the data. Then I configured the pop-up to pull the photo location from that field creating a unique pop-up for each point. Further, more general
photos of the creek remediation were placed in the side bar. This section is a good example of how the side bar and main stage can work together to paint a complete and cohesive picture.

Finally, an overview of the potential remedial zones was created using a basic web map that was enabled with clickable text in the side bar to focus on the individual zones. This was accomplished by highlight the text desired to perform the action while in an editing session, then selecting the “Main Stage content”. Once the appropriate map is selected the content of the map and its extent can all be adjusted to focus on certain spatial feature within the map. After it is saved this clickable text now allows any users even with no prior mapping experience to manipulate the maps content.

Story Maps also provide a great way to view and review potential development plans, which was a crucial for this project because of the importance that is often placed on the redevelopment of this hazardous site. For this project, plans were taken from a previously presented project surrounding the Cabot-Koppers superfund site. The layers of the map were enabled via the sidebar links to change depending on what phase or section of the project the user selected. This not only allows for the users to easily recognize each phase of a project but experience how each phase interacts with the other to form a cohesive plan. The ability to utilize the sidebar as a sort of remote control for the Story Map gives the user the power to explore the story as they see fit. This tactic was employed throughout the development section to enable the user to examine different parts of the development process (e.g. adding current land use, contours, and so on).

ESRI web applications can also be placed into the Story Map. These can be any of the pre-arranged templates or custom made ESRI web applications. The “Crowdsource Polling” which “provides the ability to collect feedback and assess public sentiment on a series of
proposals, plans, or events” allows the user to vote on different development processes and any individual elements (ESRI 2017). This is a great advantage to the community members as it allows the community member to directly comment on features of the project, which potentially avoids the confusion of someone having to accurately describe the object they are commenting on as well as allows them to comment from anywhere, at any time, as long as there is an internet connection. Further, this provides the planner and other supervisors with seemingly instant feedback that is simultaneously recorded and can be produced in a complementary app “Crowdsource Manager”. The app “provides the ability to review crowd sourced information and update attributes such as status, assignment, etc.,” letting the planner communicate directly with the community and address each comment as it pertains to the plans (ESRI 2017).

Finally, the Crowdsourse Story Map application was added to the end of the project as a way to gather feedback on the story as a whole or have people share their experiences with the site. This application gathers data by users inputting a picture with a comment and general location. These comments can be viewed and approved by the author of the application then are displayed back on a map within the application allowing users to see each other’s pictures and comments. Although there is a setting to have comments not be reviewed before being published, I find that it is better err on the side of caution when working within a web environment.
CHAPTER 4
RESULTS

As seen in Figure 4-1, the result of the opening page is a Tabbed Story Map Series with each tab containing an imbedded Story Map Journal or Tour. The application opens with the main title and graphic displaying giving a clear vision of what the story is about. The side panel contains brief descriptions of the sites as well as clickable links to introduce simple maps of the site boundaries. Further down the side bar the story introduces the historical aerial imagery slider in Figure 4-2 comparing how the site’s appearance compared between 2005 and 2013. Following the site descriptions, a timeline is provided via the Knight Lab web applications (Figure 4-3) and gives a run-through of the site’s major events like major EPA decisions and studies. A map reviewing the contamination can be seen in Figure 4-4 along with further description of the other contaminates on site as well as a YouTube video. Finally, a time series web map application shows how the site might be affecting the property values of the surrounding residents (Figure 4-5). The introduction section concludes with basic information on ground water, storm water and soil, accompanied only by a photo taken from the site.

In the following section the community activism is represented through the Story Map Tour (Figure 4-6). The tour is set up in a way that the user can navigate the story either by clicking the arrow on the main picture, by selecting the thumbnails photos below or by clicking the points on the map. Further, the extent of the map changes from one that encompasses all the points at the beginning to zooming into an extent that only displays the selected point and remains here for the following points but the extent can always be adjusted by the user. There are slight changes one can make to the organization of the points for example Figure 4-7 shows the Story Map Tour used for the onsite visit. This configuration of the application uses a sort of
splash screen in the form of a randomly placed point that is then removed so the photo can stand alone as an overall introduction.

The Remediation Section is designed to go into depth on the contamination and clean-up efforts by the EPA and PRP. The opening map application gives the user far more capabilities than previously introduced maps, it gives the user the ability to turn layers on and off as well as measure, share and even print the map (Figure 4-8). The application can be further enabled to allow editing of the data if desired. The sections that follow contain some of the more complex remediation information that are accompanied by diagrams that help explain the information further in the main stage but the text is also enabled to change the stage to display maps that coincide with the described spatial features i.e. lagoons (Figure 4-9 and 4-10). Custom map pop-ups can be configured for the data as seen in Figure 4-11, they can contain custom text, pictures or links that can turn any data set into an engaging story telling tool. Finally, Figure 4-13 demonstrates a perfect way to represent remedial designs as the initial map view shows the design in its entirety but is broken down in the side bar into distinct sections with clickable text enabled to change the map as to only show the data that is relevant to that section.

Similar to the Remediation section, the Redevelopment section mainly utilizes web maps as the primary media source to represent its process (Figure 4-14 and 4-15). One unique web map application in this section is the ESRI compare analysis application that allows multiple maps displaying various data layers to be viewed at once. Further the user can select a primary map to explore which activates all the other maps to move and zoom to the exact extent as the primary map (Figure 4-16). This application is ideal for viewing things like census data which has a lot of different attributes that need to be compared or represented. The Redevelopment section also represents a good example of using clickable text in the side bar to empower the user.
choose which data they want to focus or explore more like specific redevelopment goals (Figure 4-18). Finally, all the redevelopment scenarios were configured in such a way as to break each scenario into zones in an attempt to help show the benefits, reasons, and potential behind them (Figure 4-19).

The progress update section was constructed to as sort of comprehensive gateway to the primary sources of information and site updates for the project. Further this section serves as a great example of how other organizations web pages can be incorporated into your own Story Map (Figure 4-20). It is worth noting that in general it is best to use more stable and regularly maintained web pages like government sites as sites that are not as reliable often can be prone to breaking and there by leaving your application without content. This practice is crucial because the reliability of your own site is important to attracting and maintain engagement.

The final section in the Story Map application is the Community Feedback page that’s goal is to collect, map and display users feedback (Figure 4-21). The application allows the user to add a photo, specify a location and leave a description. A key attribute of this application is that it allows the user to choose the level of geographical detail that is applied to their location i.e. State, City, or Address. All responses are then either immediately mapped for public view or sent through a reviewing process by the application creator if specified. Further, these responses can then be analyzed as all the response are stored in a map within your ArcGIS Online account. Thus, creating the potential for understanding how the community is reacting to project overall and whether location plays a role in their responses.
FIGURES

Figure 4-1. Introductory Page.
The Koppers Corporation (Koppers) site is a former wood-treating facility located on the same immediately west of the former Cabot property. The facility operated from 1955 and burned wood waste, initially using measures for the processing of wood utility poles and tunnels. PentaCresyl-Phenol (PCP) and other chrome-copper-arsenic (CCA) processes were later added, with CCA used exclusively after 1957. Two onsite impoundments were used to manage discharge of process wastes.

Investigations performed by Koppers in the early 1970s showed ground and groundwater contamination occurred. In March 1974, Brower, Inc. (Brower) purchased the property from Koppers to facilitate Superfund remediation. Koppers plant was decontaminated, buildings and waste disposal areas were removed. Groundwater investigation including the CCA tanks and associated equipment, and extensive soil and water control measures were performed.

**Figure 4-2. Historical Aerials**

**Figure 4-3. Cabot-Koppers Timeline**
Figure 4-4. Contamination Map

Figure 4-5. Time Series Map.
Figure 4-6. Community Activism Story Map Tour

Figure 4-7. Onsite Story Map Tour
Figure 4-8. Remediation Web Map.

Figure 4-9. Remediation Diagrams.
Figure 4-10. Remediation Diagrams.

Figure 4-11. Remediation Offsite Contamination Map.
Figure 4-12. Remediation Photos.

Figure 4-13. Remedial Zones Map.
Figure 4-14. Redevelopment Surrounding Land Use Map.

Figure 4-15. Redevelopment Land Use Map Clickable.
Figure 4-16. Comparison Analysis

Figure 4-17. Bus Routing Map
Figure 4-18. Redevelopment Goals.

Figure 4-19. Redevelopment Scenarios.
Figure 4-20. Progress Updates

Figure 4-21. Community Feedback.
Figure 4-22. Community Feedback Map.
CHAPTER 5
DISCUSSION

In many ways planners are storytellers. By utilizing the ESRI Story Map application and its ability to provide an environment that is easy to set up, update and share stories, the information about the Cabot Koppers Superfund site can inform the discussion about the future of the site. Further by providing the ability to integrate GIS, photos, video and seemingly endless web functions seamlessly into the Story Map application enable users, like planners, to create a living document that can be as unique as the story it represents, allowing it to be completely tailored to each individual story. This integration of new media technology, GIS and storytelling is also what enables planner to maintain a scientific while incorporating critical local knowledge in the form of community stories and other qualitative rhetoric to bolster the more scientific data. Further the incorporation of community stories and storytelling can provide a better understanding for the community of situations making them more aware of current projects to better inform need for future planning.

Access and equity are crucial in the planning process and can help create a more democratic decision-making process (Balram and Dragicevic 2004). The increased access that the Story Map application provides not only can increase transparency of the planning process but also help curtail the effect of authorship in that opens the plan to greater community input and critique. Basically, by allowing and including community input via stories and feedback there is a greater potential to share the authorship of the story hopefully diffusing the power of influence of anyone group creating a true plan for the community.

Further with the influence of new media and todays need to have the most accurate information instantly. The idea of the living document is important because it allows for much easier dissemination of the information it that once an individual has the link to the Story Map
application that link is permanent even if edits or alterations are made to the Story Map’s contents. This prevents the hassle of having to re-distribute the information. It also allows for the inclusion of live data so the community will be viewing the most up to date data at any point in time.

For the Cabot-Koppers Superfund site in particular the Story Map application becomes particularly useful because this project has been under public discussion for almost forty years. Further, the Cabot-Koppers Superfund project is highly complex and difficult for the public to understand, containing thousands of documents and multiple competing interests public and private attempting to act on this information. Story Maps can provide an inactive environment in which to summarize the complex parts of the Superfund project while also providing information on the sources of that information for people who are interested in making their own opinion. Finally, by fully integrating the project into an ArcGIS environment the project would benefit from community feedback and comment section that would allow people voice’s be heard and address in a more accessible and efficient manner.

In terms of applying the application to other projects both planning and non, ESRI Story Maps are the perfect solution whether the project is smaller i.e. sidewalk replacement or extension or massive a redevelopment of a city center. It can alas be easily applied to more straight forward projects like city wide road resurfacing projects or much more complex cases like the Cabot-Koppers Superfund project. This adaptability of the application is in part due to the fact that ESRI provides serval readymade templates for numerous application and situations that can be altered without any coding as well as an environment that is 100% configurable to any project. Further, in many cases GIS or Spatial data is already being collected for these projects and with little effort can be brought in ArcGIS Online and into a Story Map application.
For those projects without or with limited spatial data, it can always be created adding time and money to a project but the final result is an engaging product that is easily shared and accessible to all.

**Limitations:** As the Story Map application is web based, there remains a barrier between this outreach and engagement tool and the public, in particular those in lower income situations without internet access. Yet as the internet becomes more and more of a basic necessity, the access and diversity of users grow wider and capture larger portions of the population. ESRI has committed themselves to making the technology more and more mobile with the Story Map application in particular being available on multiple devices like tablets and smart phones with screen size being the limiting factor. Even without the utilization of a mobile device or personal computer there are also many public institutions like libraries that offer public access to resources like computers with internet access. Further, this is an issue that planners struggle with their current methods of providing access to planning project and so the addition of the Story Map application widen the range of access.

The story collection process can be time consuming and can create complications in telling a singular core story if there are multiple conflicting stories. Authorship can be taxing and can become burdensome to planning by adding considerable time and effort to an already long and arduous process. It can grow even more cumbersome as stories not only often have two sides, but the more complex a situation becomes—for example, adding the health risks of future contamination into the mix—the more fractured the storylines can become, and the more distrust within the community may be revealed or generated. Further, as more sensitive issues were raised in the case study the harder it became to gather valuable community information as people seemed less likely to share due to residual emotional pain from the site or view the subject as
taboo. Nonetheless, it is exceedingly important to capture the many different sides of stories that people have to tell, despite the difficulties of telling them. Understanding both the core and minority stories can aid in beginning to heal those wounds and re-earn the trust of the community.

Setting up the infrastructure and applications behind the Story Map can require a dedicated GIS professional. Although seemingly anyone can begin to use Story Maps, once beyond simple stages of constructing the basic Story Map it takes a dedication and understanding of the maps, applications and data behind that primary Story Map application to effectively and efficiently implement them. Some of the more engaging applications that allow for community involvement do require a more custom application to be built often requiring program coding.

Story Maps can be as simple or as complicated as the author wants to make it but there are barriers to accessing this technology. Although having an ArcGIS Online account is free, as are a generous amount of the web application templates, often the data and analysis behind applications can require either having an ArcGIS Desktop license, an ArcGIS Online organizational license or using (paid for) credits to use what ESRI calls premium content or to run functions like geocoding or buffering. In fact, to utilize data that is not currently on ArcGIS Online an Organizational license is required. Once ArcMap or ArcGIS for Desktop is brought into the equation, not only does money become a barrier but also time and experience in utilizing the program to be able to effectively create, edit and run analysis on data. Further, some of the more complex and data driven options for the Story Map applications are only available by downloading the application and hosting it on your own server, which on one hand puts the creator in complete control (regarding the functionality of the server, etc.), but on the other hand, any updates or bug fixes developed by ESRI would not apply.
The more one starts to get into and play with Story Maps the more one realizes just how much power the author has to tailor them to any project. Even without any coding experience you can embed web sites, pictures, videos and interactive maps, while creating “active text” to change between any of these features throughout the story. With little experience and some time, one can begin to turn these active texts into “buttons” with some simple CSS coding that can be simply accessed while in the editing mode of the Story Map. Further, ESRI provides great resources via “this page” that basically allows one to copy and paste the code into the Story Map with minimal effort and almost no experience with coding and it is these small touches to a story map that makes it stand out and make it truly interactive. For full creative ability ESRI allows you to physically download the java script code, enabling the author to alter every aspect of the application. One of the main advantages to this being the ability to have what is called “active text… look this up” which allows the choice text in the narrative to be linked directly to a live or changing data stream thereby automatically updating accordingly whenever the corresponding data changes. This is ideal for having a self-sustaining or low maintenance Story Map but as previously mentioned this would bar the Story Map from receiving ESRI updates. The ability to be able to go as deep as one wishes to go into the Story Maps application opens the door to having multiple users from different backgrounds with various needs applying the application in unique and creative ways.

With the platform being hosted on the internet comes all the issues that it usually brings: not only technical issues such as connection and performance speed, but also a disconnect between less fortunate classes and those more privileged to have constant or even occasional access to the internet. It can be easy to forget that not everyone has a phone attached to their ear or a computer screen to access, but it is often those without this privilege that are left unnoticed.
and forgotten. This application is in no way a replacement for traditional information dissemination but a supplemental application through with more people could become more effectively engaged and informed. Further, this technology could be adapted to work with mobile technology to enhance face-to-face interactions by directly inputting information into a GIS database as it is collected, thereby letting the two methods of outreach and data collection work together to provide the most up to date data informing the planning process and the public simultaneously and transparently. Further a basic part of planning is to accurately represent their community and by employing Story Maps, not only can cities and counties become more transparent with plans but they can enable more accessible community feedback to help ensure a plan better reflects the needs of the community.

One of the biggest issues that I had with the overall Story Map performance was settings changing depending on the computer or tablet one is accessing the Story Map from. This is a critical issue because it can affect the overall appearance and look of the final Story Map to the point where text can become illegible and the images obscured. This can be a major hindrance as one of the main purposes of the story map is to engage people which can be difficult with limited functioning application.

One key component of utilizing ESRI Story Maps is the ability to set up a group within an ArcGIS Online organization in which the author can allow others in the group to participate in its creation. This concept allows for the separation of work by, for example, letting one person focus on the creation of maps and data behind the scene of the story map, while another individual creates and organizes the story and the Story Map interface simultaneously. This process is crucial to a planning workflow as it is often not just a single person constructing a plan but a team working to put together the entire story in order to provide a successful product.
However, through other experience working with Story Maps I discovered that there is a need for care when working on the application side of the Story Map. There were cases when multiple people working on the application simultaneously could overwrite others’ work and the application was only based off whatever the last save made by either individual. Although this can present major problems, with proper coordination the process can work efficiently to create a space that can shared and edited by many.

**Future:** Perhaps the greatest potential of ESRI Story Maps is the ability to be continually updated by ESRI without a need for a new license or version of software. By consolidating this information in a well laid out comprehensive manner it has the potential to become the base of any planning project. Future studies should include focus groups instead of interviews, as these would provide a greater deal of feedback for the actual construction of the Story Map as well as reinforce the ideals of community engagement set forth by this paper. Further it remains a leading way to introduce and get the public using and viewing GIS data as such subsequent studies should look at implementing and testing the effects of using the many web map applications for community feedback as a way to test the overall community’s comfort level with using web map applications. Finally, as Al-kodmany (2002) predicted computer-based tools have become more widely used as they have become more and more interactive, therefore it is crucial that not only future studies but the planning practice as whole to continue to utilize these powerful Web applications.
CHAPTER 6
CONCLUSION

This case study was designed to explore the utilization of a storytelling methodology as a planning tool while using the ESRI Story Map application as the environment to host and deploy this method to the public. Storytelling can provide a framework that allows for the inclusion of the community in a way that can both create an environment of engagement and trust. However, like any process it needs direction, in this case from planners who are storytellers, who understand the construction of stories, and who understand the implications these stories have in a community. It is my belief that ESRI Story Maps provide a framework that allows community input while providing an advanced platform to host GIS and planning information that not only clearly articulates the plan but engages the community in its process by providing interactive maps and feedback loops.

Learning and understanding storytelling is vital to the planning practice. As the author, the planner has a voice and platform from which to speak that defines the storyline for the community. With that platform, planners can extend their voice to narrate the future of our cities. It is this that bestows the duty upon the planner to speak for those who do not have a voice by understanding stories and storytelling on such a level as to be able to identify and pull together a core story that represents the community as a whole, while recognizing its diversity to truly support it.

Finally, by utilizing the method of storytelling within the ESRI Story Maps application, planners can begin to transform the planning process to become more transparent by incorporating more community input and feedback on planning projects in a highly accessible format making the process more accountable to the public at large.
LIST OF REFERENCES


BIOGRAPHICAL SKETCH

Joel’s major is urban and regional planning and has divided time between planning and GIS courses respectively. While earning his Degree of Master of Urban and Regional Planning, he worked as a graduate assistant for the University of Florida GeoPlan Center. Joel is currently employed as a GIS Analyst II for the Suwannee River Water Management District.