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CAPSTONE PROJECT REPORT

COMBAT STORIES MAP: A HISTORICAL REPOSITORY AND AFTER ACTION TOOL FOR CAPTURING, STORING, AND ANALYZING GEOREFERENCED INDIVIDUAL COMBAT NARRATIVES

by

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Despite the proliferation of technology and near-global Internet accessibility, a web-based program incorporating interactive maps to record personal combat experiences does not exist. The Combat Stories Map addresses this deficiency. The Combat Stories Map is a web-based Geographic Information System specifically designed to collect and store U.S. service members' georeferenced combat stories. The stories are immediately available for after action analysis, and they are maintained in an easily searchable database for future research. The Combat Stories Map uses powerful, cloud-based mapping software to provide near-global access and almost infinite expansion while leveraging innate mental characteristics to provide an interface that facilitates easy input and analysis. Its analytical tools enable the comparison of individual narratives to official histories of battles.

This project demonstrated the tool's use by collecting combat experiences from Iraq and Afghanistan for after action purposes. By validating Fallujah veterans' narratives with the official history of the Second Battle of Fallujah, this project illustrated the tool's worth in capturing and maintaining individual combat stories. With further development, the Combat Stories Map could become a valuable system for after action combat analysis, and for historical archiving and research purposes.

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TABLE OF CONTENTS

LIST OF FIGURES

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LIST OF ACRONYMS AND ABBREVIATIONS

3/1	3d Battalion, 1st Marine Regiment
CAC	Common Access Card
DMZ	Demilitarized Zone
DOD	Department of Defense
EDIPI	Electronic Data Interchange Personal Identifier
GIS	Geographic Information System
GPS	Global Positioning System
IED	Improvised Explosive Device
JLLIS	Joint Lessons Learned Information System
JLLP	Joint Lessons Learned Program
MGRS	Military Grid Reference System
NPS	Naval Postgraduate School
SEAL	Sea, Air, and Land
SOF	Special Operations Forces
RON	Remain Overnight

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I. INTRODUCTION

Combat is an intensely personal human experience, yet many official histories of battles ignore the individual component or only include anecdotes from a relatively small number of participants.[1] Additionally, despite the proliferation of technology in the United States, a web-based program incorporating interactive maps to record personal combat experiences does not exist. A previous Naval Postgraduate School capstone project created the Combat Stories Map in response to these deficiencies. The Combat Stories Map is a web-based Geographic Information System (GIS) specifically designed to collect and store individual combat narratives from U.S. service members. The Combat Stories Map also contains analytical tools to facilitate comparison of individual narratives to the official histories of battles.[2]

The Combat Stories Map offers potential as an after action tool due to the ease of use and accessibility. Research shows that maps assist in recalling and organizing geographically linked experiences, yet no other publicly available system allows individuals to quickly correlate combat experiences with geographic coordinates via a web-based interface.[3] The analysis functions of the Combat Stories Map validate individual combat stories against official histories. Additionally, the virtually unlimited and enduring capacity for collection and storage of information broaden its utility in historical research and archiving purposes.[4]

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[1] Trevor Dupuy, *Understanding War: History and Theory of Combat* (New York: Paragon House Publishers, 1987), XXIII; S. L. A. Marshall, *Men Against Fire: The Problem of Battle Command in Future War* (Gloucester, MA: Peter Smith, 1978), 203–204.

[2] Christopher J. Mellon, "Combat Stories: Creating a Web-Based Geospatial Interface to Record Combat Stories for Validation and Other Research Purposes" (master's thesis, Naval Postgraduate School, 2015).

[3] Donna Eisenhower, Nancy A. Mathiowetz, and David Morganstein, "Recall Error: Sources and Bias Reduction Techniques," in *Measurement Errors in Surveys*, ed. Paul P. Biemer et al. (New York: John Wiley & Sons, Inc., 1991), 137; Eric Jensen, *Teaching With the Brain in Mind* (Alexandria, VA: Association for Supervision and Curriculum Development, 2005), 140–141.

[4] The Combat Stories Map is based on ArcGIS Online software by Esri. ArcGIS Online is a cloud-based computing platform and is therefore theoretically infinitely expandable. "ArcGIS Online: Mapping Without Limits," Environmental Systems Research Institute, accessed August 14, 2016, http://www.esri.com/software/arcgis/arcgisonline.

A. PURPOSE AND SCOPE

The primary purpose of this capstone project is to demonstrate the use of the Combat Stories Map as a historical repository and as an after action tool for capturing and georeferencing combat narratives. The information entered into the Combat Stories Map is available not only for immediate validation and report creation, but also in perpetuity for future research, further analysis, and historical archiving purposes. The Combat Stories Map also contains analysis tools for comparing individual combat stories to official histories. This project used these tools to validate a combat narrative with the official history of a battle, demonstrating the value in collecting and maintaining individual combat stories.

Although the vast majority of, if not all, U.S. service members spend far more time in training than in combat, this project, as its title implies, is concerned with capturing and analyzing personal combat experiences. This project used combat stories from U.S. soldiers, sailors, and Marines with experience in either Iraq or Afghanistan to demonstrate the Combat Stories Map as an after action tool. In addition, it used a subset of this group, a Second Battle of Fallujah veteran, to validate the usefulness of individual combat stories by comparing his combat story to the official historical record of the battle.

B. LITERATURE REVIEW

This literature review covers four main areas: the value of personal narratives, the lessons learned process, methods of narrative analysis, and the history of Phantom Fury. Narratives, for the purpose of this report, are defined as "spoken or written text giving an account of an event or series of events, chronologically connected."[5] A review of the body of literature regarding narratives and methods of analysis is necessary to capture the importance of the personal narrative, or storytelling, in human communication, as well as to review techniques and procedures for analyzing such narratives. A review of the lessons learned process, particularly the Joint Lessons Learned Program, demonstrates

[5] Barbara Czarniawska, "The Uses of Narrative in Social Science Research," in *Handbook of Data Analysis*, ed. Melissa A. Hardy and Alan Bryman, 649–666 (Thousand Oaks, CA: SAGE, 2004), 652.

the value of after action reports and sheds light on potential applications of the Combat Stories Map. Finally, a review of the literature covering Phantom Fury provides necessary information to validate individual narratives against the historical record.

1. Value of Personal Narratives

Humankind has used narratives, in the shape of parables, fables, and stories (written and oral), for passing history on to the next generation for most of our existence. The value of the narrative in the social sciences, however, only gained prominence in the past few decades.[6] Social scientists recognize mankind as a "story-telling animal," and narratives as a natural and central means of communication between people.[7] Analysts view narratives as more than just simple personal stories: they are complex accounts combining explanation and interpretation of past and present events in a medium that provides meaning and is readily understood across cultures.[8] Narratives provide a glimpse into the inner-workings of individual thought and social interaction that other means cannot.[9]

Prominent military historians also recognize the value of individual narratives. Combat is viewed as "a very human undertaking," and yet some military historians feel the United States spends too much time delving into the hard science and technology aspects of warfare while ignoring the human component.[10] Others purposely sought out

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[6] Czarniawska, "The Uses of Narrative"; Walter R. Fisher, "Narration as a Human Communication Paradigm: The Case of Public Moral Argument," *Communication Monographs* 51 (March 1984), 1–22; Robin A. Mello, "Collocation Analysis: A Method for Conceptualizing and Understanding Narrative Data," *Qualitative Research* 2, no. 2 (August 2002): 231–243; Hayden White, "The Value of Narrativity in the Representation of Reality," *Critical Inquiry* 7, no. 1 (Autumn 1980): 5–27.

[7] Fisher, "Narration," 1–2; Steph Lawler, "Narrative in Social Research," in *Qualitative Research in Action*, ed. Tim May, 242–258 (London; Thousand Oaks, CA: SAGE Publications, 2002), 242; Sharan Merriam, *Qualitative Research in Practice: Examples for Discussion and Analysis*, San Francisco: Jossey-Bass, 2002, 286; White, "The Value of Narrativity," 5.

[8] Larry J. Griffen, "Narrative, Event-Structure Analysis, and Causal Interpretation in Historical Sociology," *American Journal of Sociology* 90, no. 5 (March 1993): 1094–1133; David Snowden, "Story Telling: An Old Skill in a New Context," *Business Information Review* 16, no. 1 (March 1999): 30–37; White, "The Value of Narrativity," 5–6.

[9] Dominique Robert and Shaul Shenhav, "Fundamental Assumptions in Narrative Analysis: Mapping the Field," The Qualitative Report 19, no. 38, How To Article of the Week no. 22 (September 2014): 4, http://www.nova.edu/ssss/QR/QR19/robert22.pdf.

[10] Dupuy, *Understanding War*, XXIII.

individual narratives from "the fighting line" to gain a more detailed understanding of war from the individuals who experienced it instead of the typical analysis of large formations, national strategy, and industrial capacity.[11]

Until recently, the typical method of capturing narratives was through interviews or individual written accounts. Over the past several years, however, several organizations created websites to record personal narratives or to provide interactive maps to assist in capturing written narratives.[12] Some organizations created websites specifically to record combat experiences but none of the websites compile multiple personal combat narratives into a single story map, and none of the websites compare individual combat narratives to the official historical record.[13]

2. The Lessons Learned Process

The U.S. military, as well as many other organizations, uses the concept of lessons learned to identify past mistakes and successes, incorporating the knowledge gained from these experiences into training and operations to enhance future capabilities and to prevent repeating mistakes.[14] The lessons learned process generally consists of five major sub-processes: collect, verify, store, disseminate, and reuse.[15] The Joint Lessons Learned Program (JLLP) used by the U.S. military refines the generic lessons learned process into five phases. The first phase in JLLP, discovery, involves passive and

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[11] Marshall, *Men against Fire*, 203–204.

[12] Mellon, "Combat Stories," 7–9.

[13] Story maps are interactive maps using "text, multimedia content, and functionalities that enable users to interact with them." Environmental Systems Research Institute, "Using Web Maps to Tell Your Story," *ArcNews* (Summer 2012), accessed August 24, 2015, http://www.esri.com/news/arcnews/summer12articles/using-web-maps-to-tell-your-story.html; Mellon, "Combat Stories," 7–9.

[14] On page GL-4 of CJCSI 3150.25F, the Chairman of the Joint Chiefs of Staff defines a lesson learned as "a resolved issue or best practice that improves military operations or activities at the strategic, operational, or tactical level; results in an internalized change to capability, process, or procedure; is appropriately institutionalized to improve warfighting capabilities." Tanja Buttler and Stephan Lukosch, "On the Implications of Lessons Learned Use for Lessons Learned Content," *Proceedings of the 13th International Conference on Knowledge Management and Knowledge Technologies* (September 4–6, 2013, Graz, Austria); Chairman of the Joint Chiefs of Staff, *Joint Lessons Learned Program*, CJCS Instruction 3150.25F, Washington, DC: Chairman of the Joint Chiefs of Staff, June 26, 2015, A-1; Rosina Weber, David W. Aha, and Irma Becerra-Fernandez, "Intelligent Lessons Learned Systems," *International Journal of Expert Systems Research & Applications* 20, no. 1 (2001): 1.

[15] Weber, Aha, and Becerra-Fernandez, "Intelligent Lessons Learned Systems," 8.

active collection of information which often results in observations requiring more analysis, and is equivalent to the collect sub-process. The next three phases of JLLP, validation, resolution, and evaluation, conduct detailed analysis of observations from the discovery phase, developing, evaluating, and monitoring lessons learned for dissemination; these three phases correlate to the verify sub-process. Internal and external distribution of lessons learned occurs during the dissemination phase of JLLP, which as one may expect is equivalent to the dissemination sub-process. JLLP integrates the store sub-process throughout since the system the U.S. military uses to facilitate the JLLP, the Joint Lessons Learned Information System (JLLIS), provides access to information as soon as it is entered during the discovery phase.[16] The reuse sub-process of the generic lessons learned process depends on the user (who decides whether or not to reuse a lesson learned by another) and is therefore nominally conducted during the dissemination phase of JLLP.[17]

The Chairman of the Joint Chiefs of Staff is responsible for ensuring the United States military has a robust lessons learned program. To this end, he directs the services to conduct lessons learned programs, and that after action reviews "should be conducted after every significant military operation."[18] An after action review is "a guided analysis of an organization's performance, conducted at appropriate times during and at the conclusion of a training event or operation with the objective of improving future performance."[19] In the U.S. military, after action reviews vary between formal and informal, with most formal after action reviews resulting in the publication of a written

[16] Somewhat counter-intuitively, the store sub-process concerns how information in the lessons learned process is represented, formatted, and accessed in addition to how it is catalogued and maintained. CJCS Instruction 3150.25F, A-1 to A-3; "Joint Lessons Learned Information System (JLLIS)," Joint Chiefs of Staff, accessed on April 8, 2016, under "JLLIS On-Line Tutorial," https://www.jllis.mil/tutorial/jllisoverview.html#; Weber, Aha, and Becerra-Fernandez, "Intelligent Lessons Learned Systems," 8–11.

[17] CJCS Instruction 3150.25F, A-2 to A-3; Weber, Aha, and Becerra-Fernandez, "Intelligent Lessons Learned Systems," 12.

[18] Chairman of the Joint Chiefs of Staff, *Joint Lessons Learned Program*, CJCS Manual 3150.25A, Washington, DC: Chairman of the Joint Chiefs of Staff, September 12, 2014, p. 1 and D-A-1; CJCS Instruction 3150.25F, 1 and A-1.

[19] Department of the Army, *Commander and Staff Organization and Operations* (FM 6–0) (Washington, DC: Government Printing Office, 2014), 16–1.

after action report.[20] Disseminating written after action reports for lessons learned purposes might not achieve the results desired, however, since dependence on textual representation of lessons learned does not promote knowledge sharing.[21]

3. Methods of Analysis

Most methods of narrative analysis involve evaluating how the narrative is told, whether the narrative is an approach or the object studied, or how the narrative reflects the teller's relationships, influences, and motivations.[22] These methods, while valuable for gaining insight, are based upon analyzing single narratives and therefore are less useful for analyzing multiple narratives regarding a single subject. Some analytical methods, such as grand narrative analysis, are useful for comparing multiple narratives.

A grand narrative is an overarching story that typically represents an ideal view of the dominant story, often represented as a universal idea such as Marxism or cybernetic systems theory.[23] Grand narratives may mask smaller included narratives; grand narrative analysis involves seeking out and analyzing smaller included narratives, which may reinforce or discredit the grand narrative. If one views official histories as grand or official narratives, one may then analyze them by comparison to included narratives, which in our case are individual combat stories.[24]

The ability of the Combat Stories Map to process individual combat experiences into composite story maps yields other methods for analysis and validation. Official histories and story maps represent and model combat, with official histories serving as the primary model.

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[20] CJCS Manual 3150.25A, GL-6; FM 6–0, 16–1 to 16–9.

[21] Weber, Aha, and Becerra-Fernandez, "Intelligent Lessons Learned Systems," 1 and 7.

[22] Czarniawska, "The Uses of Narrative;" Griffen, "Narrative;" Lawler, "Narrative in Social Research;" Mello, "Collocation Analysis;" Merriam, *Qualitative Research in Practice*; Catherine Kohler Riessman, (2005) "Narrative Analysis," in *Narrative, Memory & Everyday Life*, ed. Nancy Kelly et al., (Huddersfield, UK: University of Huddersfield), Robert and Shenhav, "Fundamental Assumptions in Narrative Analysis."

[23] David M. Boje, *Narrative Methods for Organizational & Communication Research*, (London, Thousand Oaks, New Delhi: SAGE Publications, 2001), 35–37.

[24] Boje, *Narrative Methods*, 38–44.

Of the validation techniques commonly used to test models, two are applicable to this project. One, the *Comparison to Other Models* technique, compares untested models to valid models.[25] Similar to grand narrative analysis, an analyst uses the official history as the valid model or grand narrative. The analyst then compares the aggregated individual combat stories (story maps) to the official history. Points of divergence between the official history and story maps may show inaccuracies in the individual stories, or they may highlight gaps in the official history.

A second method, *Face Validation*, is a subjective technique where a knowledgeable individual examines a model to determine its validity.[26] For the purposes of this project, the situation is combat and the models, as previously mentioned, are story maps. The knowledgeable individual could be a researcher conducting the formal analysis of a battle or a unit leader compiling an after action report. In either case, the analyst uses his in-depth personal knowledge of the combat event to determine the validity of the story maps.

4. The History of Operation Phantom Fury

One cannot discuss Phantom Fury without briefly covering Operation Vigilant Resolve, or the First Battle of Fallujah, and why it occurred. On 31 May 2004, insurgents ambushed and killed four Blackwater contractors while the contractors escorted a supply convoy through Fallujah. A mob of Fallujans surrounded the contractors, set fire to their vehicles, dragged the dead bodies from the burning vehicles, beat them, then hanged two of the corpses from a nearby bridge.[27] A few days later, the U.S. President and Secretary of Defense ordered an assault on Fallujah against the advice of senior Marine Corps and

[25] Robert Sargent, "Verification and Validation of Simulation Models," paper presented at 2011 Winter Simulation Conference, Phoenix, AZ, December 2011, 186.

[26] Petty, "Verification and Validation," 131 and 142–143; Sargent, "Verification and Validation of Simulation Models," 187.

[27] John R. Ballard, *Fighting For Fallujah: A New Dawn for Iraq* (Westport, CT: Praeger Security International, 2006), xi, 1–2; Richard D. Camp, *Operation Phantom Fury: The Assault and Capture of Fallujah, Iraq* (Minneapolis, MN: Zenith Press, 2009), 2–3; Ahmed Mansour, *Inside Fallujah: The Unembedded Story* (Northampton, MA: Olive Branch Books, 2009), 26; Timothy McWilliams, *The Campaign to Secure Fallujah: April – December 2004* (Lexington, KY: Strategian Press, 2015), 1.

Army commanders in Iraq.[28] Initially two, and eventually four, Marine Corps battalions attacked into Fallujah in Vigilant Resolve. After a week of hard fighting, both sides declared an uneasy cease-fire. The Marines later turned the security of Fallujah over to the Fallujah Brigade, which quickly dissolved and left Fallujah in the hands of insurgents.[29] This "victory," along with the departure of the Marines and the collapse of the Fallujah Brigade, emboldened the insurgents in Fallujah and led to Phantom Fury.

Phantom Fury began on 7 November 2004, and differed from Vigilant Resolve in several important ways. The U.S. force for Phantom Fury was much larger, consisting of two Marine Regimental Combat Teams reinforced by two mechanized U.S. Army battalions and eight Iraqi battalions (15 battalions total), a Marine Expeditionary Unit, two U.S. Army Brigade Combat Teams, and other forces. This allowed the coalition to establish a much stronger cordon around Fallujah than during Vigilant Resolve, effectively isolating it. In addition, more than 90 reporters were embedded with U.S. forces during the operation, performing their duties so long as doing so did not impact operational security.[30] The combined force completely cleared Fallujah of insurgents during Phantom Fury, and residents began to return on 23 December 2004.

C. CAPSTONE REPORT STRUCTURE

Chapter II briefly details the operation of the Combat Stories Map by describing the functions available for input and analysis. Chapter III describes the use of the Combat Stories Map as an after action tool for capturing combat narratives from U.S. combat veterans. Chapter IV illustrates the validation capabilities of the Combat Stories Map by comparing an individual combat story from the Second Battle of Fallujah to the official history. Chapter V concludes the report with recommendations for future development of the Combat Stories Map as well as recommendations for implementation of the application as an after action and historical research tool.

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[28] Camp, *Operation Phantom Fury*, 55–58; McWilliams, *The Campaign to Secure Fallujah*, 2–3, 19.

[29] Ballard, *Fighting For Fallujah*, 19–25, 37; Camp, *Operation Phantom Fury*, 89–107, 117; Mansour, *Inside Fallujah*, 280–281, 284–285; McWilliams, *The Campaign to Secure Fallujah*, 32–38.

[30] Ballard, *Fighting For Fallujah*; Camp, *Operation Phantom Fury*; McWilliams, *The Campaign to Secure Fallujah*.

II. OPERATION OF THE COMBAT STORIES MAP

The Combat Stories Map is a web-based, GIS application employing Esri software. It is designed to be globally accessible, easily operated, enduring, and expandable.[31] At its essence, the Combat Stories Map allows users to enter georeferenced combat stories via the Internet and allows analysts, also via the Internet, to access, research, and potentially validate the submitted stories using functions inherent in the application.[32]

The Combat Stories Map uses the JavaScript programming language, providing flexibility of access from most web browsers and Internet capable devices.[33] The application and geodatabase it employs reside on a Naval Postgraduate School (NPS) server located in NPS' perimeter network (also referred to as the DMZ).[34] This allows secure access to the Combat Stories Map without requiring NPS credentials. Some of the individuals who participated in this project tested this by successfully operating the application from outside the NPS architecture, demonstrating the potential global availability of the application.

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[31]Esri, Environmental Systems Research Institute, is a global software company specializing in ArcGIS, "the most powerful mapping software in the world." The Combat Stories Map is based upon ArcGIS Online (AGOL), an online cloud-based version of ArcGIS. "ArcGIS Online: Mapping Without Limits," Environmental Systems Research Institute; "What We Do," Environmental Systems Research Institute, accessed August 20, 2016, http://www.esri.com/about-esri#what-we-do.

[32] This report defines users as those who tell their combat stories via the Combat Stories Map. Due to the original aim of this research project, validation is currently only available for combat stories concerning the Second Battle of Fallujah. Mellon, "Combat Stories."

[33] David Flanagan, *JavaScript: The Definitive Guide*, 5th ed. (Sebastopol, CA: O'Reilly Media, 2006) xv and 1–3. While accessible from most web browsers and Internet-capable devices, the Combat Stories Map is maximized for desktop or laptop computers and the Google Chrome browser. At this time only desktop or laptop computers using Google Chrome provide full functionality.

[34] A geodatabase is "a database or file structure used primarily to store, query, and manipulate spatial data." Michael Law and Amy Collins, *Getting to Know ArcGIS for Desktop, Third Edition* (Redlands, CA: Esri Press, 2013), 279; "A DMZ or demilitarized zone (sometimes referred to as a perimeter network) is a physical or logical subnetwork that contains and exposes an organization's external-facing services to a larger and untrusted network, usually the Internet. The purpose of a DMZ is to add an additional layer of security to an organization's local area network (LAN); an external network node only has direct access to equipment in the DMZ, rather than any other part of the network." *Wikipedia*, s.v. "DMZ (computing)," last modified March 27, 2016, https://en.wikipedia.org/wiki/DMZ_(computing).

The application currently contains four separate functions: *Tell Your Story*, *View Stories*, *Validate Mode 1*, and *Validate Mode 2*. The availability of each function is dependent on one's role as a narrative contributor or as an analyst. The following discussion briefly examines the aspects of the Combat Stories Map as they apply to users and analysts. Appendix A contains a user manual with detailed instructions for the Combat Stories Map.

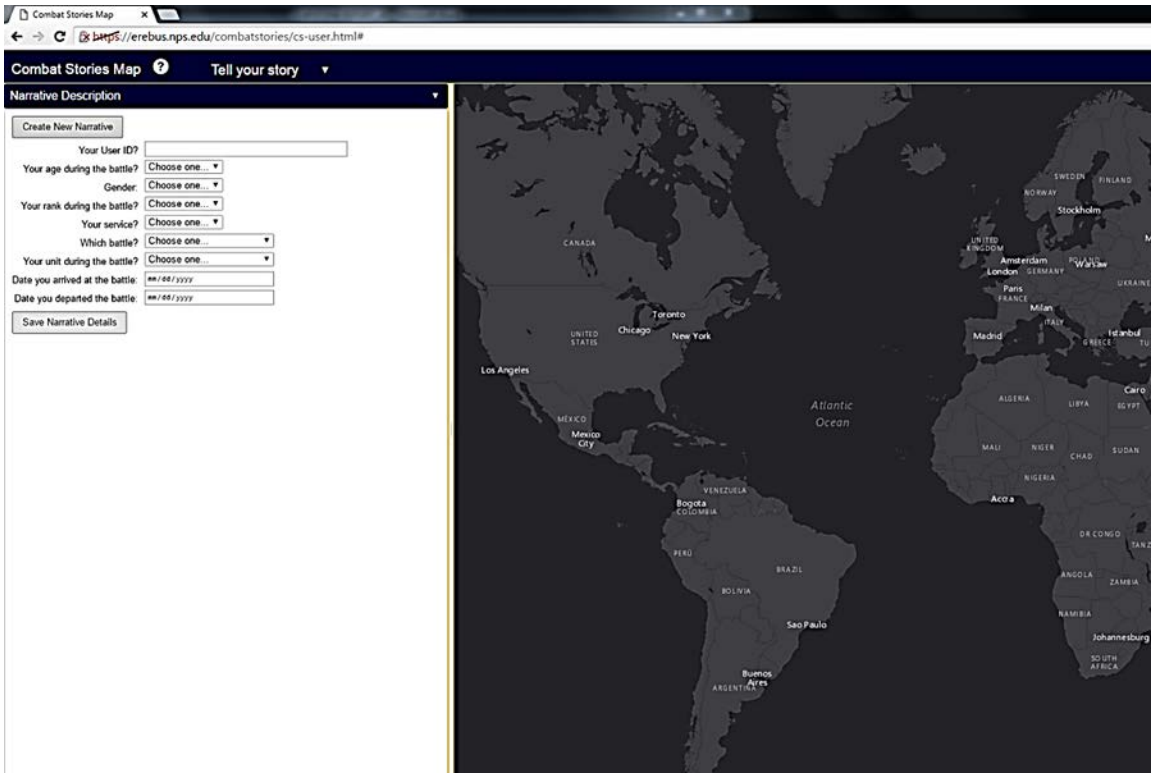
Users enter the Combat Stories Map via a secure website limiting their access to the *Tell Your Story* and *View Stories* functions.[35] Compliance with federal human subjects research regulations required participants in this project to acknowledge research design and implementation information before submitting any data.[36]

After accessing the Combat Stories Map, users then complete a form containing biographical and general information necessary for after action, analysis, and future research purposes. Figure 1 illustrates that the Combat Stories Map employs drop-down menus to the extent possible to ease user input and facilitate recall.[37]

[35] The website for user access is located at https://erebus.nps.edu/combatstories/cs-user.html.

[36] Federal human subjects research regulations requires the protection of human subjects' personally identifiable information as well as notifying the research participants of their rights, potential risks, and the nature and potential benefits of the research. The federal and Department of Defense regulations concerning human subjects research are: Limitation On Use Of Humans As Experimental Subjects, 10 USC 980 (2007); Protection of Human Subjects, 32 CFR 219 (1991); Secretary of the Navy, *Human Research Protection Program*, SECNAV Instruction 3900.39D. Washington, DC: Secretary of the Navy, November 6, 2006; Under Secretary of Defense (AT&L*), Protection of Human Subjects and Adherence to Ethical Standards in DOD-Support Research*, DOD Instruction 3216.02. Washington, DC: Under Secretary of Defense (AT&L), October 20, 2011.

[37] Drop-down menus facilitate user input since it is cognitively easier to "see and choose" than to "recall and type." Users must still recall and type, however, when inputting the details of their personal combat experiences. Jeff Johnson, *Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules* (Boston, MA: Morgan Kaufmann, 2010), 113–114.



Users input biographical and event-specific information into the form to create a narrative. The Combat Stories Map uses drop-down menus as much as possible to facilitate user input.

Figure 1. Combat Stories Map "Create New Narrative" form.

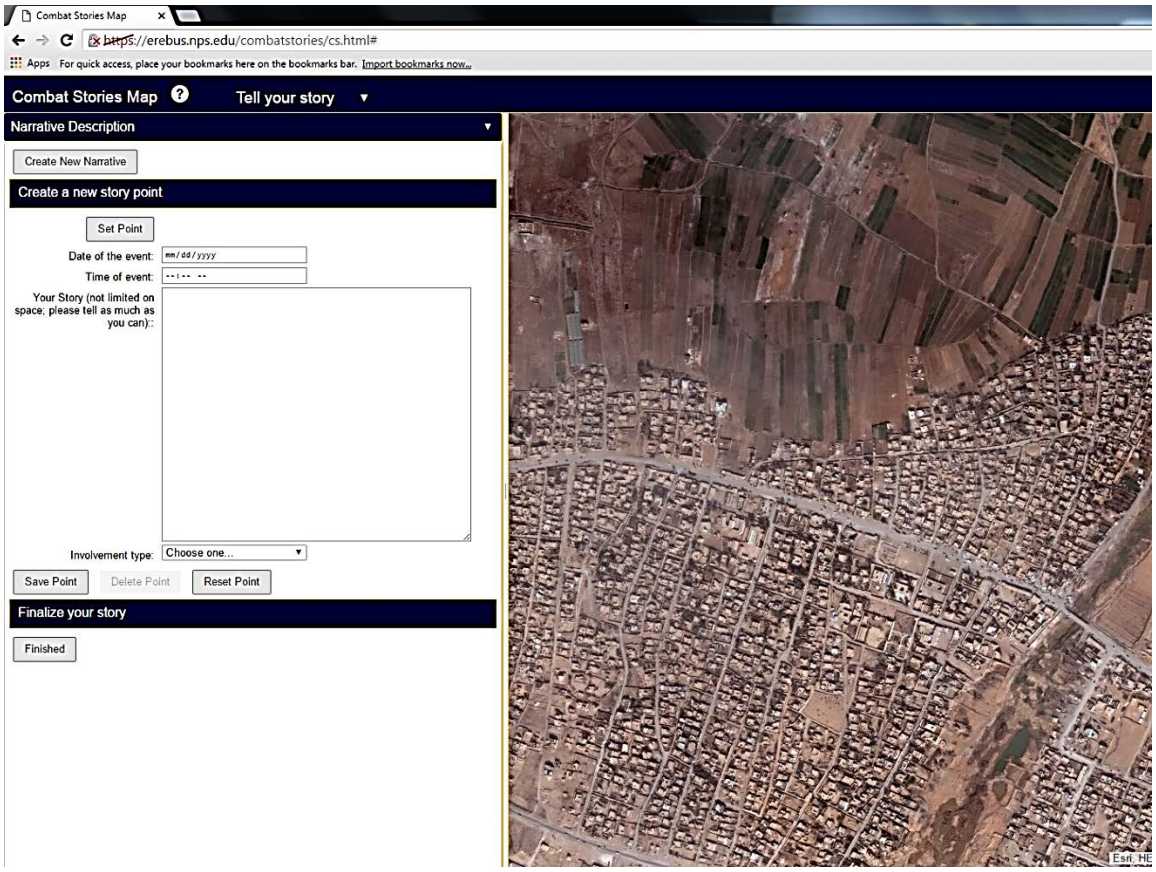
Next, users adjust the map to the area where their combat experience took place by using the mouse or other user interfaces present on their computer.[38] Once users center the general area of their combat experience on the map view, they zoom into specific locations with the scroll wheel on the mouse or by using the + / - symbol located in the top right corner of the map view.[39] Figure 2 demonstrates the level of detail of the basemap in the Combat Stories Map.[40] The zoom function allows users to scan broad areas where they operated and then focus down to street-level to identify specific

[38] Law and Collins, *Getting to Know ArcGIS for Desktop*, 52; "View maps in the map viewer," Environmental Systems Research Institute, accessed on 7 April 2016, under "3. Navigate," http://doc.arcgis.com/en/arcgis-online/use-maps/view-maps.htm.

[39] Law and Collins, *Getting to Know ArcGIS for Desktop*, 50–51; "View maps in the map viewer," Environmental Systems Research Institute.

[40] A basemap is "a map depicting background reference information, such as landforms, roads, landmarks, and political boundaries, onto which other thematic information is placed." Law and Collins, *Getting to Know ArcGIS*, 726.

locations where memorable events occurred. The integration of maps and imagery assists users in recalling and organizing their combat experiences.[41]



The Combat Stories Map allows users to zoom in to street level to identify specific locations where their combat experiences occurred.

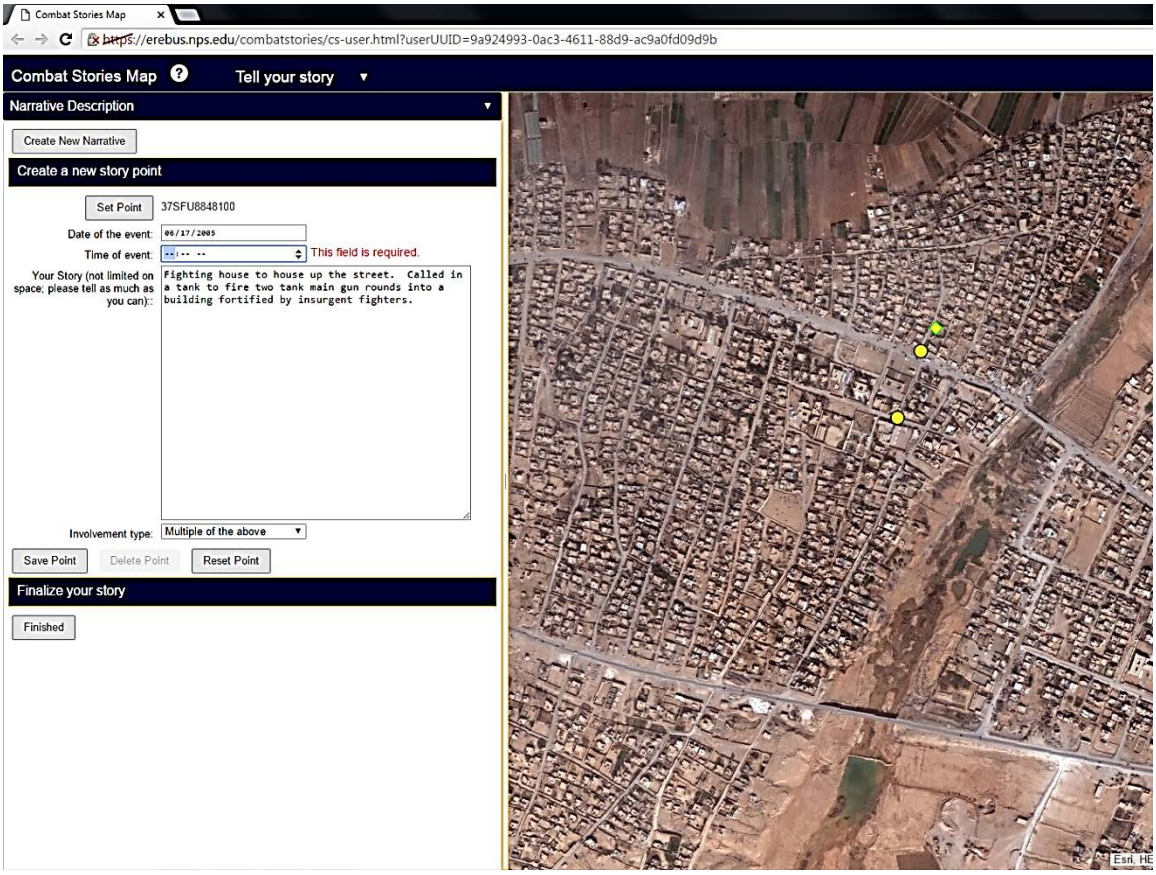
Figure 2. The level of detail available in the Combat Stories Map.

After identifying where their memorable combat events occurred, users record their stories by setting points. A point, for the purpose of the Combat Stories Map, is a georeferenced location and its accompanying story. To set a point, users select "Set Point" and then use the mouse cursor to select the location on the map that corresponds to the event they want to record. They enter the date, time, a short description, and the involvement type of the event. Figure 3 shows that the Combat Stories Map continues to

41 Eisenhower, Mathiowetz, and Morganstein, "Recall Error," 137; Jensen, *Teaching With the Brain in Mind*, 139–141.

use drop-down menus whenever possible to facilitate user input and their recollection of combat events.[42] Once users enter all of their information concerning a location, they select "Save Point" to record the experiences that occurred at that location.

Figure 3 also illustrates that if users neglect to complete a field on the form, they are reminded to do so by "This field is required" or "Please enter details of your story" appearing in red beside the incomplete field. This prevents users from continuing without completing the form, ensuring they fully tell their story regarding that location.



The Combat Stories Map uses maps, imagery, drop-down menus, and visual reminders (demonstrated by the red lettering highlighting an incomplete field) to facilitate user input and recall.

Figure 3. Inputting points in the Combat Stories Map.

[42] Johnson, *Designing with the Mind in Mind*, 113–114.

Users may review and edit the information associated with the georeferenced locations at any time prior to finalizing their combat story. The ability to recall increases when one uses memory aids (such as maps) and spends time thinking about one's experiences.[43] Users will likely remember more of their experiences the longer they interact with the map while telling their combat story, necessitating additions and/or revisions. Users can edit, move, reset, or delete each individual point until they feel their story is complete.

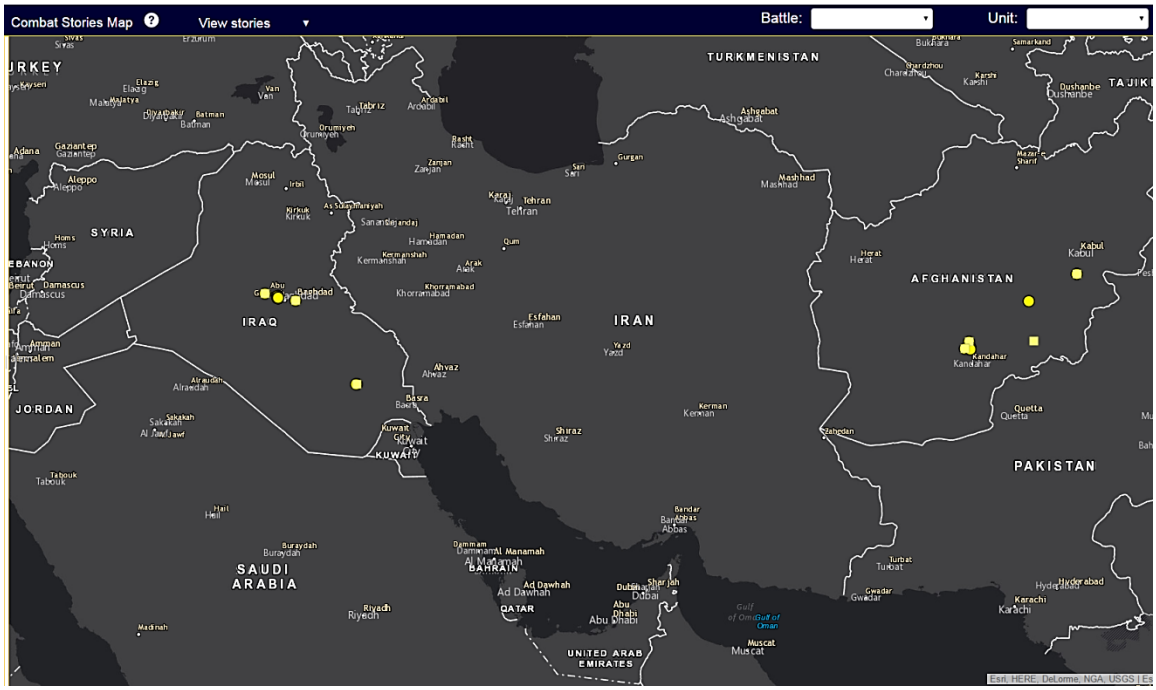
Once users decide to finalize their narrative, a dialogue box appears allowing them to choose between saving or continue telling their narrative, encouraging them to think about their story and ensure they are finished. If finished, the Combat Stories Map next provides users the ability to download and/or print a copy of their narrative and the associated georeferenced locations, allowing them to retain their combat story in an easily readable form.

Logged-in users may also access the *View Stories* function at any time. *View Stories* allows one to see and read other users' combat stories. Figure 4 shows that users and analysts may elect to view the stories from a specific battle and/or unit using drop-down boxes, or focus the map using the mouse to an area of interest. Users who view and read other related combat stories while inputting their own may recall more about their experiences, but the potential for bias or retroactive altering of the user's memory exists.[44] To minimize this risk, the Combat Stories Map only displays the locations input during each session in *Tell Your Story*; when one leaves the *Tell Your Story* function the locations entered during that session are masked from view. For example, if users access *View Stories* from *Tell Your Story* and then return to *Tell Your Story*, the previous points entered will not reappear. The information remains, it is just not visible from *Tell Your Story* (it is visible in *View Stories*). The same occurs if users exit *Tell Your Story* before finishing or return later to record additional events. Users may return and add to their

[43] Eisenhower, Mathiowetz, and Morganstein, "Recall Error," 134–139; Jensen, *Teaching With the Brain in Mind*, 139–141.

[44] Eisenhower, Mathiowetz, and Morganstein, "Recall Error," 132–139; Johnson, *Designing with the Mind in Mind*, 80–81 and 90–91.

narrative, but only the points entered during an individual session in *Tell Your Story* appear on the map.



Yellow circles and squares represent the combat narratives captured by the Combat Stories Map. Users and analysts can select combat narratives from a specific battle and/or unit using drop-down menus, or focus the map to an area of interest to view the stories there.

Figure 4. *View Stories* allows users and analysts to select combat stories for review.

Analysts enter the Combat Stories Map via a secure website that provides them access to all four functions: *Tell Your Story*, *View Stories*, *Validate Mode 1*, and *Validate Mode 2*.[45] Even though they can access *Tell Your Story*, analysts are unlikely to use this function unless they are involved in the event they are analyzing. One example might entail a unit leader capturing his unit's combat stories, including his own, with the Combat Stories Map and then using the application to assist in creating an after action

[45] The website for analysts is located at https://erebus.nps.edu/combatstories/cs.html. A third secure website, located at https://erebus.nps.edu/combatstories/idgen.html, exists for when the anonymity of research participants requires protection. This website generates unique User IDs for research participants, and also creates template emails which contain the User ID and a link to the user version of the Combat Stories Map that pre-loads the User ID into the "Create New Narrative" form.

report. *View Stories*, as previously discussed, provides analysts the same abilities as users, allowing them to view and read the narratives in the Combat Stories Map.

The two validation functions in the Combat Stories Map compare the individual combat stories to official histories. These validation functions use a geoprocessing model created for the Combat Stories Map to display an analysis of individual stories on top of a graphical representation of a selected battle, allowing analysts to conduct quick and easy visual comparisons.[46] The first validation function, *Validate Mode 1*, uses distance as the method of comparison, while the second, *Validate Mode 2*, uses time and proximity.[47]

In *Validate Mode 1*, the geoprocessing model in the Combat Stories Map generates lines connecting individual events in order of entry in each specific combat story, displaying the story as a set of yellow circles connected by a uniquely colored line.[48] Figure 5 illustrates the *Validate Mode 1* view of a battalion. The lines do not depict the actual route of the story's author, but allow an analyst to distinguish one story from another.[49] When displayed over a semi-transparent representation of the historical record, an analyst can determine how closely the individual stories follow the route of their unit. The analyst might then select any outliers or points that diverge from the historical record to determine the potential causes.[50]

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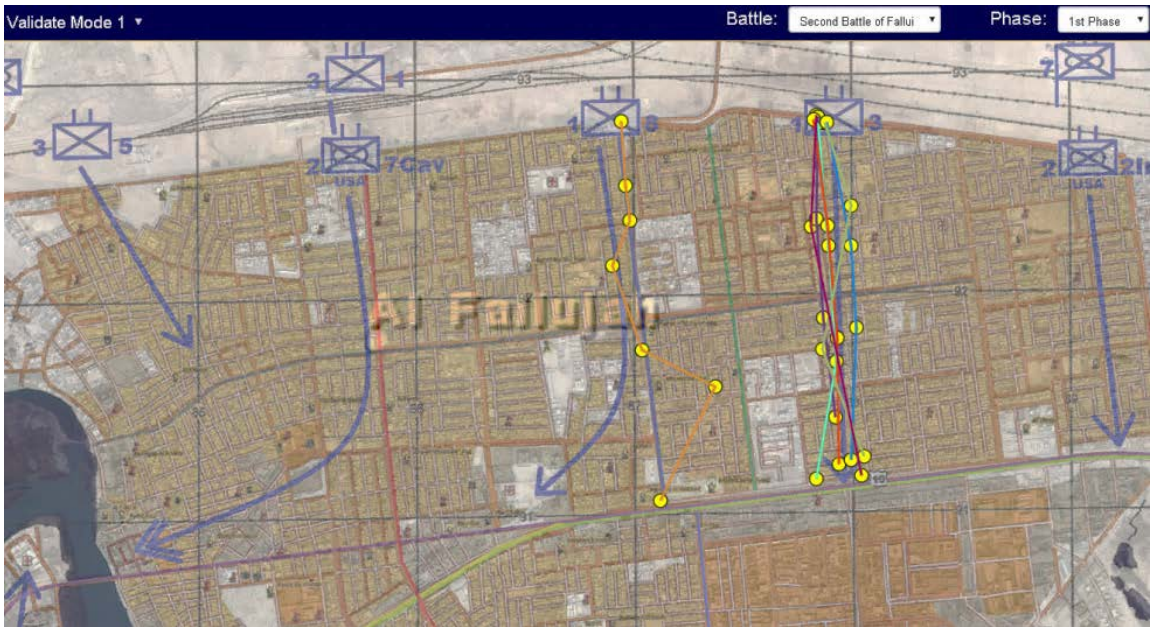
[46] Mellon, "Combat Stories," 36–38.

[47] The validation modes require detailed information of an event or battle, such as dates, times, units, locations, routes of attack, etc., to function. An analyst must create and overlay a semi-transparent representation of the historical record on the basemap to use the validation modes. Of note, at this time the Combat Stories Map only contains the historical record of the Second Battle of Fallujah.

[48] An issue identified during this project is that *Validate Mode 1* connects the locations in the order the user entered them, not in chronological order according to the time and date associated with the location. Chapter V contains further discussion on this topic.

[49] The Combat Stories Map takes advantage of the human brain's inherent recognition of lines and shapes to facilitate analysis. Johnson, *Designing with the Mind in Mind*, 34.

[50] Mellon, "Combat Stories," 39.



The yellow circles connected by different colored lines represent the narratives of different authors. An analyst can easily distinguish that one story, represented by the orange colored line, diverges markedly from the rest of the unit.

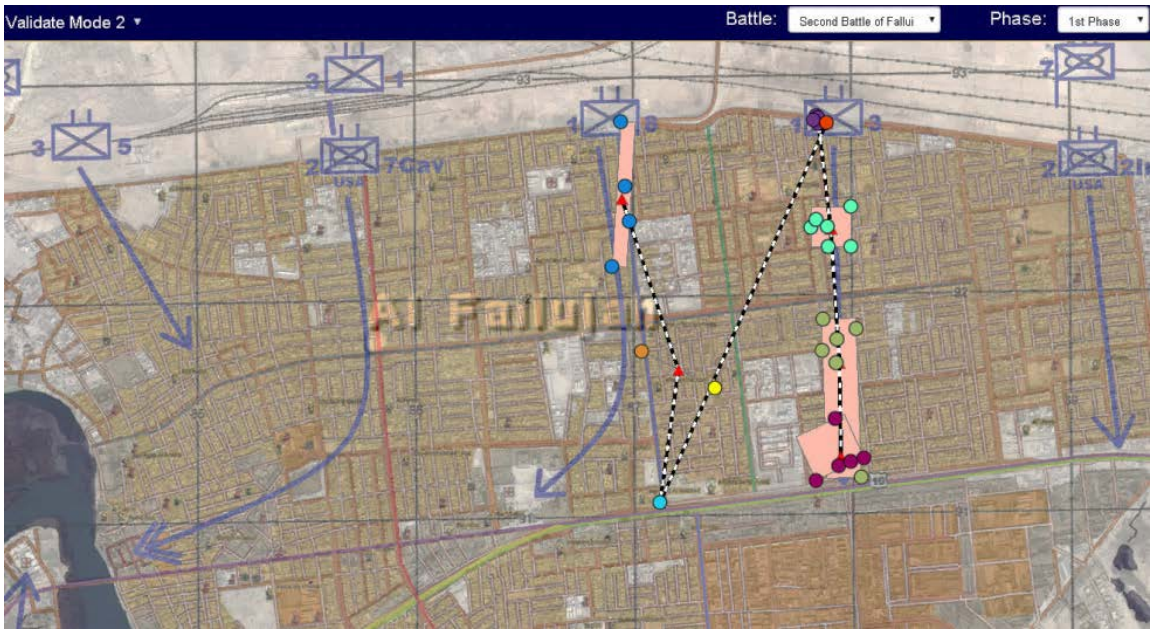
Figure 5. *Validate Mode 1* view of a battalion.

Validate Mode 2 uses time and proximity to compare individual combat stories to official records. In *Validate Mode 2*, the geoprocessing model generates transparent polygons around all points from a specific unit occurring on the same date, also turning those points the same color for instinctive recognition. Figure 6 demonstrates that the shape of the polygon indicates the closeness or divergence of the events. The closer in time and proximity the events occurred, the smaller the representative polygon. When superposed on the historical record, an analyst can easily determine how closely the individual stories occurred to one another in both time and space.[51]

Validate Mode 2 also uses the geoprocessing model to generate an aggregate path of a specific unit for a particular battle. The geoprocessing model calculates the mean of each group of events (by time and proximity), graphically representing the result with a

[51] In addition to the mind's inherent recognition of lines and shapes, the mind also innately perceives items close together and similar in appearance as grouped. The use of polygons, therefore, facilitates analysis while the use of different colored circles allows analysts to distinguish instinctively between sets of events occurring at different times but in close proximity to each other. Johnson, *Designing with the Mind in Mind*, 11–15 and 34.

red triangle. Figure 6 also shows how the geoprocessing model connects the red triangles with a black and white dashed line, allowing an analyst to distinguish intuitively how closely the mean path of the individual stories matches the historical record.[52]



The same colored circles represent stories from the same unit on the same date, the polygons show the closeness and divergence of the stories, and the red triangles connected by black-and-white dashed lines show the aggregate path of the unit. One story diverges from the rest of the unit in both date and location, possibly prompting an analyst to investigate.

Figure 6. *Validate Mode 2* of a battalion.

The Combat Stories Map exploits characteristics of perception and memory inherent in the human mind to facilitate operation by both users and analysts. Users input georeferenced individual combat narratives via a web-based map interface, allowing them to author, review, edit, and retain a copy of their combat story. The use of maps and drop-down menus facilitates recall and eases input, while submission through the Internet provides near-global access for both users and analysts.[53] Analysts can enjoy immediate access to the combat stories as well as the ability to compare the stories to the official

[52] Johnson, *Designing with the Mind in Mind*, 34.

[53] Ibid.

record.[54] The use of graphic representations promotes analysis by providing easily distinguishable visual cues regarding the similarity or divergence of the combat stories, with the stories themselves readily available and easily accessed for research or the creation of after action reports.

[54] As previously mentioned, the only official record currently input in the Combat Stories Map concerns the Second Battle of Fallujah.

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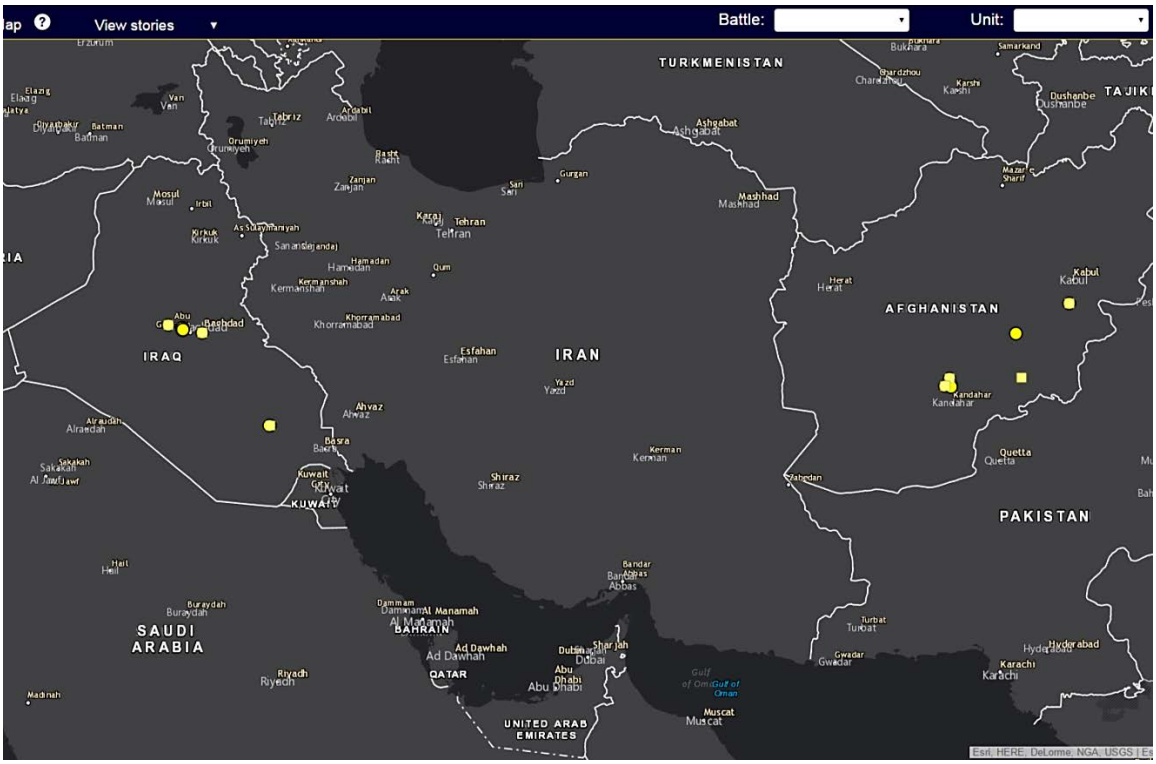
III. CAPTURING GEOREFERENCED COMBAT NARRATIVES FOR AFTER ACTION PURPOSES

This section shows the effectiveness of using the Combat Stories Map as an after action tool and historical repository by capturing georeferenced individual combat narratives from a cross section of U.S. service members. Although experiencing combat is not the exclusive domain of combat arms service members, all of the participants in this project are from U.S. combat arms and/or Special Operations Forces (SOF). The one U.S. Navy participant is a U.S. Navy Sea, Air, and Land (SEAL) team member. All three U.S. Marine Corps participants are infantry. Of the of three U.S. Army participants, two are SOF (one Special Forces and one Civil Affairs) and one is infantry.

The contributed combat narratives covered a broad spectrum of time and locations. The participants submitted stories from both Iraq and Afghanistan covering an 11-year period from 2003 to 2014. Figure 7 displays the locations of the combat narratives submitted.



The yellow circles and squares represent the combat narratives captured by the Combat Stories Map.

Figure 7. The Combat Stories Map captured combat narratives occurring in Iraq and Afghanistan from 2003–2014.

The combat narratives spanned a variety of actions ranging from urban combat to foot and vehicle patrols. Of the eight combat stories submitted, two occurred during major battles and the remainder occurred during other combat operations.[55] The length of the narratives varied from a single day operation encompassing a few hours to a more than three-week ordeal during the Second Battle of Fallujah. Some participants relayed their combat narrative by identifying several locations where their experiences took place and recording the story associated with each location. Other participants identified a

[55] This report considers a major battle as one in which significant forces participated and/or one that received prominent coverage due to its relative importance, outcome, or other factors. Major battles usually receive names, like the two concerned here: the Second Battle of Fallujah and the Battle of Nasiriyah. The Battle of Nasiriyah occurred during the invasion of Iraq from 23 March - 2 April 2003 in the city of An Nasiriyah. During the Battle of Nasiriyah, the 2d Marine Expeditionary Brigade (also called Task Force Tarawa) fought against elements of Iraqi army units and paramilitaries to secure routes over the Euphrates River to enable the march to Baghdad. Rod Andrew Jr., *U.S. Marines in Battle: An-Nasiriyah*, (Washington, DC: U.S. Marine Corps History Division, 2009).

central location and associated their entire narrative with that location. The remainder of this section briefly discusses each narrative captured by the Combat Stories Map.

A. COMBAT STORIES FROM IRAQ

Four of the combat narratives captured took place in Iraq from March 2003 to August 2007, two during major battles and two during other combat operations. Of these four narratives, U.S. Marines authored three of them and a U.S. Army infantry officer authored the remaining narrative.

One of the combat narratives took place during the invasion of Iraq in 2003. The author, a member of the 2d Marine Expeditionary Brigade, fought in the Battle of Nasiriyah. His narrative encompasses his experiences as his unit entered the battle and fought through a portion of Nasiriyah located on the south side of the Euphrates River. Figure 8 illustrates the locations of his combat experiences and one of the associated stories.

The yellow circles represent the locations identified by the U.S. Marine, and the dialogue box displays the story associated with the selected location.

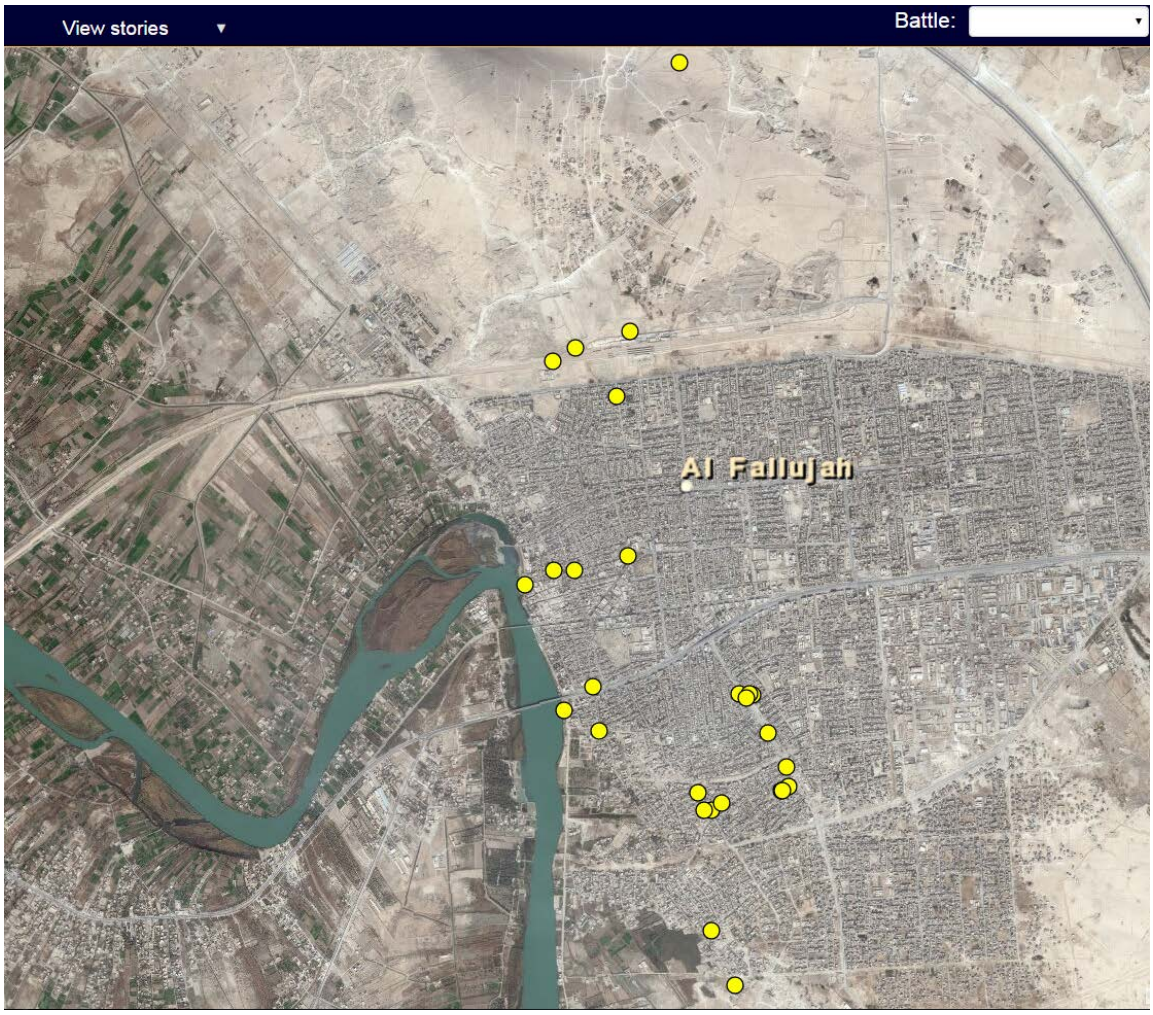
Figure 8. Combat narrative submitted by a U.S. Marine involved in the Battle of Nasiriyah, Iraq in March 2003.

Another combat narrative from Iraq relates the combat experiences a U.S. Marine in Ramadi in early 2004. After a few days of heavy enemy contact, his unit began a cordon-and-search operation to find the enemy leadership. The search operation devolved into an intense, several-hours urban firefight that comprised the last major combat experience of the Marine's deployment. Figure 9 illustrates the one location this author entered and the associated combat story.

The yellow circle signifies the one location this Marine submitted for his combat narrative and the dialogue box displays a portion of his combat story.

Figure 9. Combat narrative recorded by a U.S. Marine involved in combat in Ramadi, Iraq in April 2004.

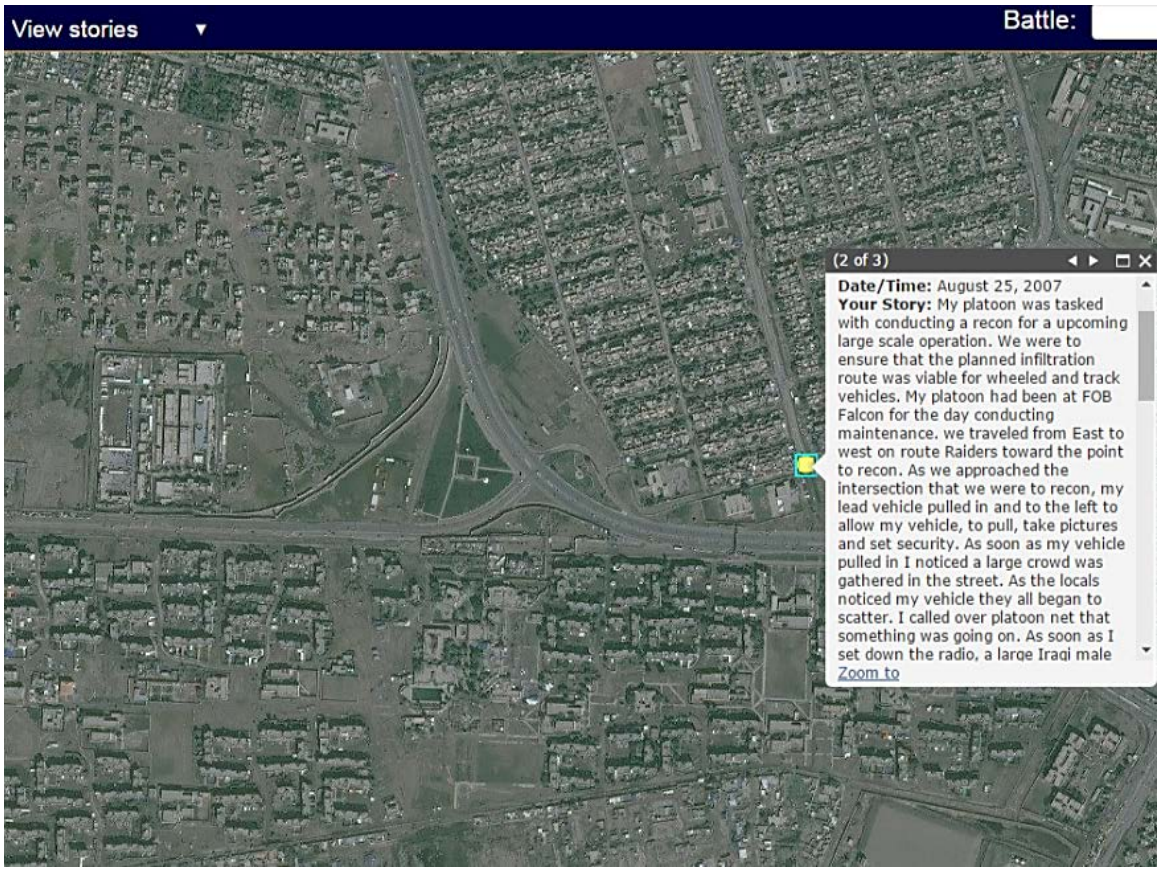
A third combat narrative from Iraq captures a U.S. Marine's experiences during the Second Battle of Fallujah in November 2004. Figure 10 displays an overview of his story map. This project validated this participant's story using functions of the Combat Stories Map; a more detailed discussion of this combat narrative appears in Chapter IV.



The yellow circles identify the locations this U.S. Marine entered while telling his story.

Figure 10. Combat narrative of a U.S. Marine who participated in the Second Battle of Fallujah, Iraq in November 2004.

The fourth combat narrative captured during this project that happened in Iraq is from an Army officer in Baghdad in August 2007. The enemy ambushed his unit while they conducted a reconnaissance mission. His unit fought back, and a Quick Reaction Force arrived to support them until all enemy contact ceased. Since this experience occurred in a relatively small geographic area, he identified and associated his story to a single location. Figure 11 displays this combat narrative.



The yellow circle illustrates the single location submitted by the U.S. Army officer and the dialogue box displays a portion of the narrative associated with that location.

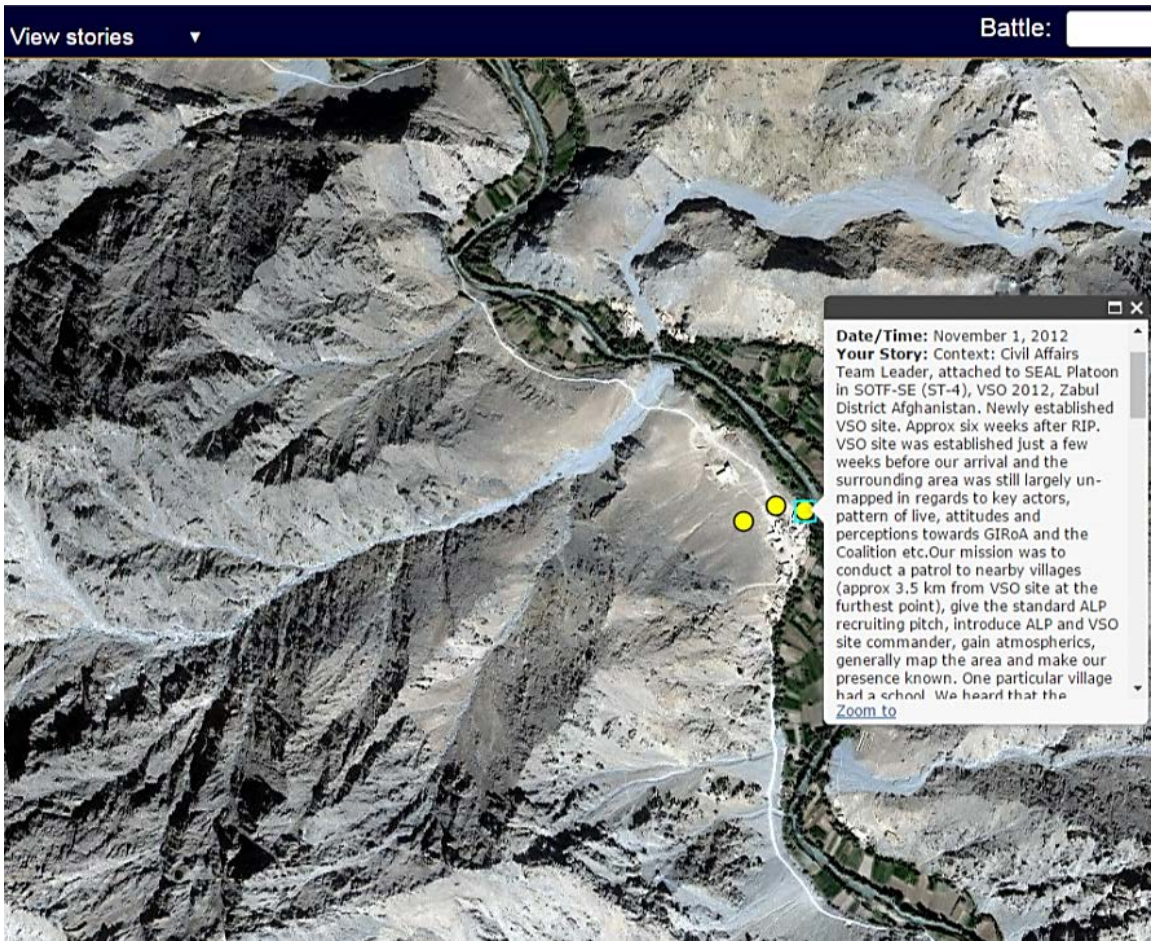
Figure 11. Combat narrative of a U.S. Army officer who experienced combat in Baghdad, Iraq in August 2007.

B. COMBAT STORIES FROM AFGHANISTAN

The remaining four combat narratives captured during this project took place in Afghanistan from January 2012 to June 2014. U.S. Army soldiers authored three of the narratives (one of the U.S. Army soldiers submitted two separate narratives), and a U.S. Navy SEAL authored the other combat narrative.

One combat narrative, authored by a U.S. Army Civil Affairs officer attached to a SEAL team, took place in November 2012 in the Zabul District. The team patrolled on foot to a nearby village to talk to the local leaders. The enemy ambushed the team as they exited the village on their way back to their base. After a brief but intense firefight, the

team drove off the enemy. Figure 12 shows the locations the participant submitted and one of the associated stories.



The yellow circles display the story map the U.S. Army officer submitted and the dialogue box shows a portion of the story associated with this location.

Figure 12. Combat narrative authored by a U.S. Army Civil Affairs officer who experienced combat in Zabul District, Afghanistan in November 2012.

One participant, a U.S. Army Special Forces officer, submitted two separate narratives encompassing his experiences in Kandahar Province, Afghanistan in June 2014. His first narrative involves an operation in which he inserted via helicopter, patrolled through a village, and returned to his base via helicopter. During this patrol, his unit spoke to the villagers, gave out water and other supplies, and did not receive any enemy contact. Figure 13 displays the location and associated story for this narrative.

The yellow circle identifies the one location encompassing the U.S. Army officer's first narrative and the dialogue box portrays a portion of the story associated with that location.

Figure 13. The first combat narrative submitted by a U.S. Army officer who experienced combat in Kandahar Province, Afghanistan in June 2014.

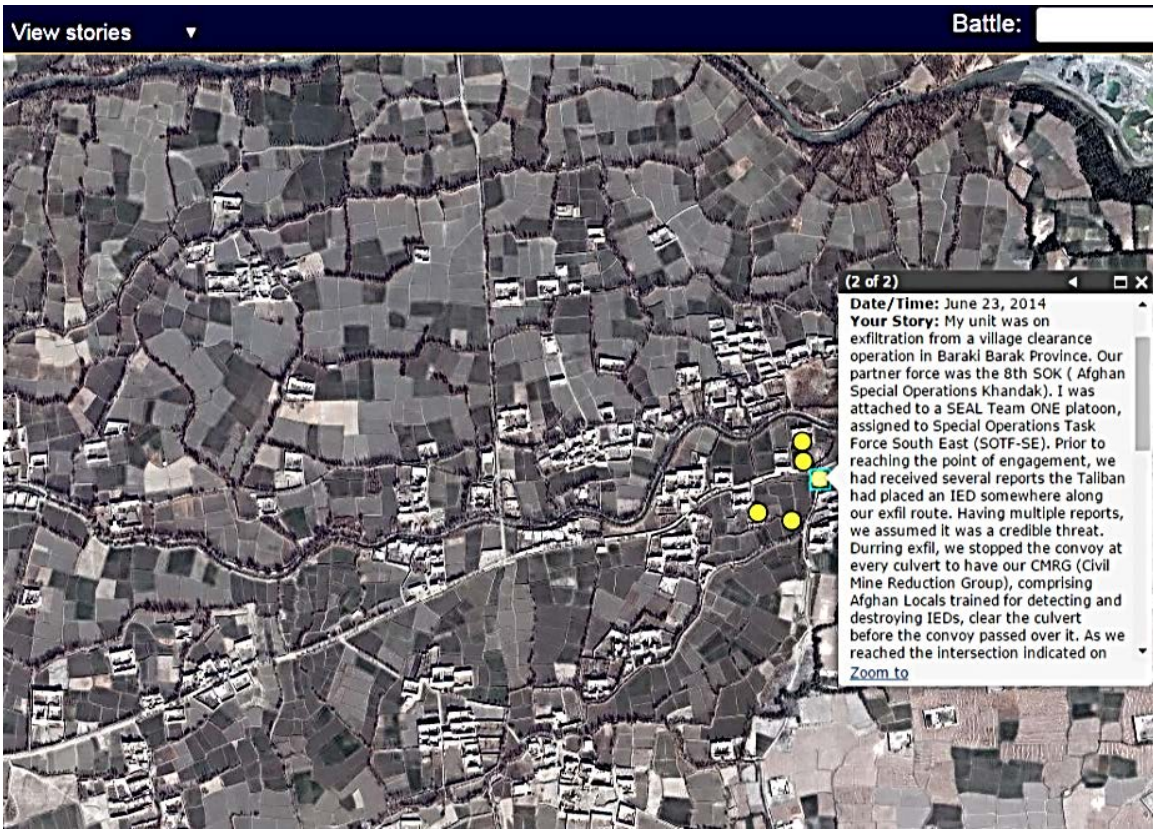
This participant's second set of experiences cover a vehicle patrol to a different village in the same province. His unit and attached Afghan forces intended to conduct a several-day vehicle patrol. The first day went relatively smoothly; they received a minor amount of small arms fire from the enemy but could not locate them, arriving at their Remain Overnight (RON) location without further incident. On the second day, however, the road gave out under one of their vehicles. The vehicle rolled over onto its top in a wadi, and they spent the next three days attempting to recover the vehicle. The enemy did not attack on the first two days, but intercepted radio traffic hinted at an attack. To prevent this, the author of this narrative patrolled on foot with some of his unit toward the location of the radio traffic. The enemy fired a few rounds at them, air support was called, and no further enemy contact occurred. This combat narrative ended with the

author returning to his base via helicopter. Figure 14 shows the locations of this narrative and one of the associated stories.

The yellow circles represent the story map from the U.S. Army officer's second narrative and the dialogue box denotes the story associated with the selected location.

Figure 14. The second narrative entered by a U.S. Army officer who experienced combat in Kandahar Province, Afghanistan in June 2014.

A Navy SEAL authored the final combat narrative from Afghanistan. This narrative took place in the Baraki Barak District in June 2014. The Navy SEAL's unit used vehicles for transport to a village for a clearing operation. The enemy ambushed them as they stopped to investigate a possible improvised explosive device (IED) while returning to base after the operation. A firefight ensued, with the remaining enemy departing after an air strike. The author and part of his unit moved on foot for security as the vehicles continued. The patrol stopped to evacuate their wounded once they determined it was safe, and then returned to their base with no further incident. Figure 15 illustrates the location entered for this narrative and one of the associated stories.



The yellow circles illustrate the story map associated with the U.S. Navy SEAL's combat narrative and the dialogue box displays the story associated with the selected location.

Figure 15. Combat narrative authored by a U.S. Navy SEAL who experienced combat in Baraki Barak District, Afghanistan in June 2014.

C. CONCLUSION

This project demonstrates that the Combat Stories Map is an instinctive and simple tool for capturing combat narratives. The Combat Stories Map allowed participants to record combat experiences through user friendly and universal computer interfaces, automatically attributing the stories to the location where they occurred. The Combat Stories Map demonstrated its broad utility by documenting various types of georeferenced combat experiences occurring in two theaters of operation over an 11-year period from members of the U.S. Army, U.S. Marine Corps, and U.S. Navy.

Further, the operation of the Combat Stories Map allowed this report's author to read and summarize the combat narratives with ease, demonstrating the value of the Combat Stories Map as an after action tool. The Combat Stories Map made the narratives immediately available and easily searchable. The true nature of the Combat Stories Map as a historical repository is not demonstrable without a significant passage of time; however, the fact that combat veterans recorded stories covering a wide range of combat experiences and locations from as long as 13 years ago does demonstrate its potential in this regard.[56]

Over all, the Combat Stories Map provides combat veterans and analysts a tool for rapidly capturing, storing, and reviewing georeferenced combat narratives. There is, however, significant room for improvement. The conclusion of this report, which follows an examination of using the Combat Stories Map to validate an individual combat story, discusses recommendations for improvement.

[56] Compliance with federal human subjects research regulations requires the author to remove and securely store all data from the Combat Stories Map database at the conclusion of this research. Otherwise, the information would be available in perpetuity for historical archive and research purposes.

IV. VALIDATING AN INDIVIDUAL COMBAT STORY

A. CHALLENGES

This project attempted to validate the utility of collecting and storing personal narratives in addition to official histories using the Second Battle of Fallujah, Operation Phantom Fury/Al-Fajr, as the test case.[57] The researcher chose Phantom Fury due to the amount of materials published on the battle as well as the broad scope of potential narratives available due to the number of U.S. service members, predominantly from the U.S. Marine Corps and U.S. Army, involved.[58] Recruitment of veterans who participated in the Second Battle of Fallujah, however, proved more challenging than expected. Despite exploring various means of contacting Fallujah veterans, only one volunteered for the research.[59] The following section first briefly discusses the Second Battle of Fallujah and then describes validating the combat story submitted by the Fallujah veteran using the tools in the Combat Stories Map.

[57] The operation was originally named Phantom Fury by U.S. forces, but the Iraqi Prime Minister changed the name to Al-Fajr (New Dawn) when he approved the operation, desiring an Iraqi name to show the Iraqi people that this fight was a "new dawn" for the Iraqi people. For simplicity, this paper will refer to the operation as it is commonly referred to in the U.S., as Phantom Fury.

[58] Mellon, "Combat Stories," 1–2.

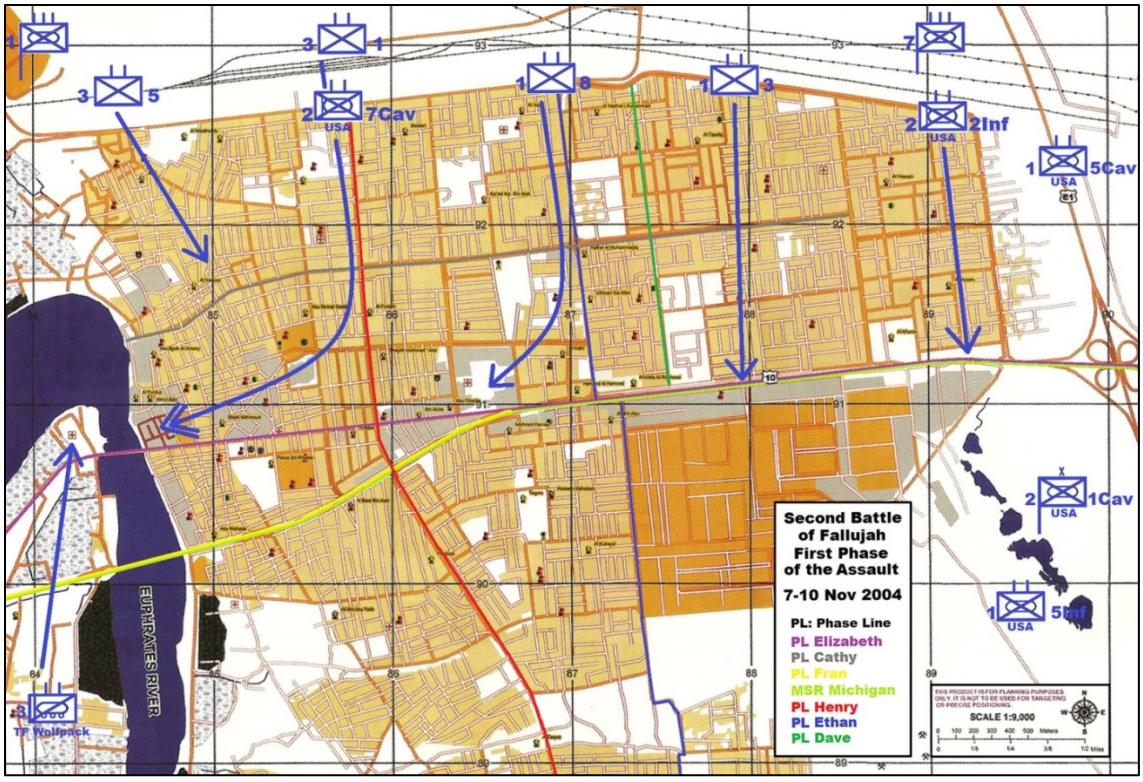
[59] The one Fallujah veteran who volunteered is a Naval Postgraduate School student who is still in contact with members of his Fallujah unit. Several other members of his unit initially said they would participate but later elected not to. An advertisement placed on the Naval Postgraduate School student check-in page received no responses. The author contacted two military-focused social media sites and two Fallujah-focused U.S. Marine Corps Facebook sites for use as recruiting venues. One social media site, RallyPoint (RallyPoint: The Professional Military Network, https://www.rallypoint.com/) and one U.S. Marine Corps Facebook page initially gave the author permission to post advertisements on their pages, but for an unknown reason the U.S. Marine Corps Facebook page administrator ceased contact with the author. The author's post on RallyPoint received more than 7,750 views as of 9 May 2016 but no responses. The other sites contacted did not reply to the author's requests. The author discovered other Fallujah-focused U.S. Marine Corps Facebook pages but they appeared defunct; the most recent posts were more than four years old. Additionally, the author searched for Fallujah-focused U.S. Army social media sites but did not locate any. It is unknown why volunteers proved so difficult to find, but others involved in similar research also found that service members are sometimes reticent to recount personal combat experiences. Douglas Borer (Associate Professor in the Defense Analysis Department at the Naval Postgraduate School), in discussion with the author regarding the Combating Terrorism Archive Project, April 14, 2016.

B. TEST CASE: OPERATION PHANTOM FURY

Operation Phantom Fury occurred in two distinct phases. The first phase of the battle officially took place from 7–10 November 2004, but combat operations began earlier with U.S. forces isolating the city to prevent the ingress of support and the egress of insurgents.[60] Next, six U.S. battalions and attached Iraqi forces cleared Fallujah from the northern edge to Highway 10, a major east-west running road dividing the city roughly in half.[61] Figure 16 shows the routes of the units as recorded in U.S. Marine Corps historical archives.

[60] McWilliams, *The Campaign to Secure Fallujah*, 51–57.

[61] The U.S. Marine Corps definition of clear is "to remove enemy forces and eliminate organized resistance in an assigned zone, area, or location by destroying, capturing or forcing the withdrawal of enemy forces that could interfere with the unit's ability to accomplish its mission." Department of the Navy, *Marine Corps Supplement to the Department of Defense Dictionary of Military and Associated Terms* (MCRP 5–12C) (Washington, DC: Department of the Navy, 2011), Section II-12; McWilliams, *The Campaign to Secure Fallujah*, 66–69.



The blue lines depict the approximate routes the battalion-sized units took during the First Phase of the battle.

Figure 16. U.S. forces' routes of advance during the First Phase of the Second Battle of Fallujah.[62]

The second phase of Phantom Fury occurred from 11–16 November 2004. Four battalions continued clearing south through Fallujah while two battalions remained in the northern part of Fallujah, re-clearing the area to locate and neutralize any remaining insurgent pockets.[63] Figure 17 displays the routes of the units during the second phase of the battle as documented in U.S. Marine Corps historical records. U.S. forces began withdrawing from Fallujah on 20 November, with fighting continuing with varying intensity over the next few weeks as the remaining U.S. forces cornered and eliminated pockets of insurgents. Citizens began returning to Fallujah on 23 December 2004.[64]

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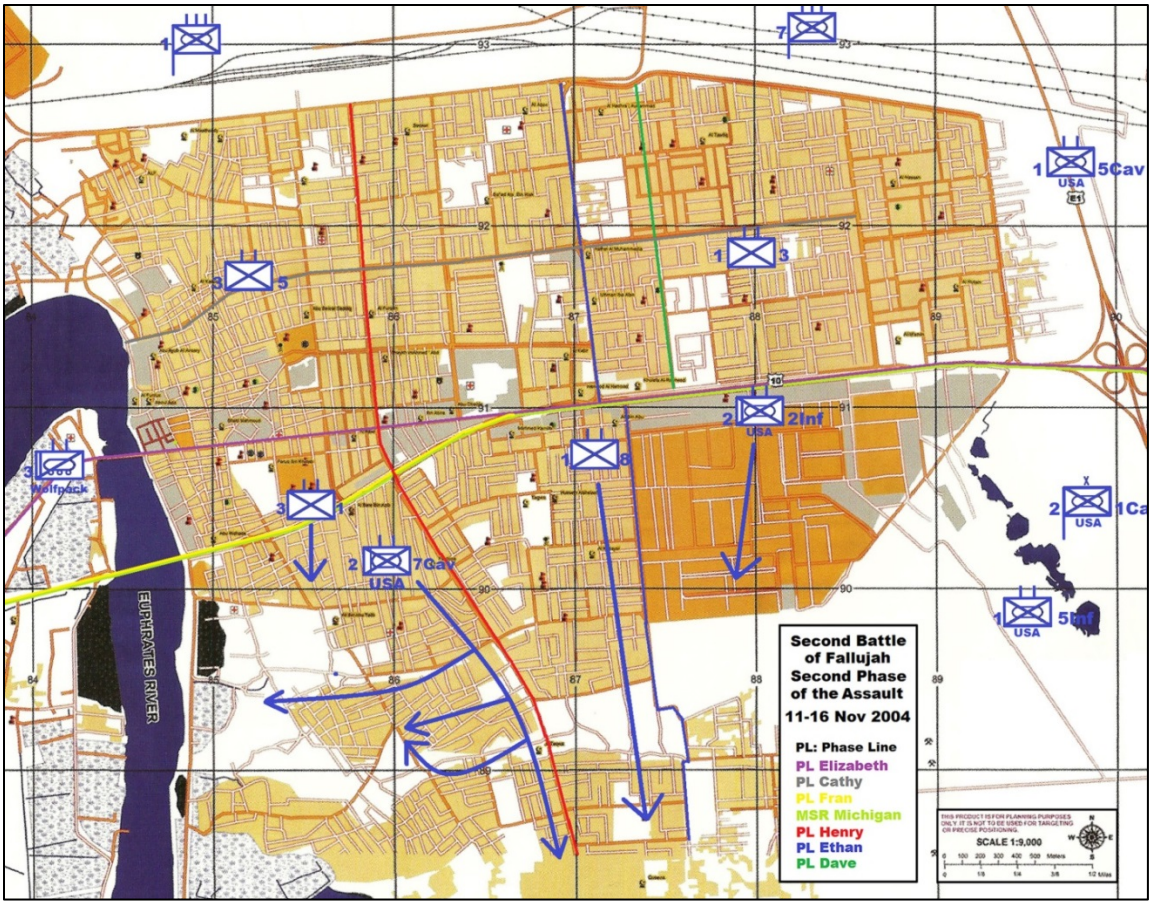
[62] Timothy S. McWilliams with Nicholas J. Schlosser, *U.S. Marines in Battle: Fallujah, November - December 2004* (Washington, DC: U.S. Marine Corps History Division, 2011), 15.

[63] McWilliams, *The Campaign to Secure Fallujah*, 99–100; McWilliams, *U.S. Marines in Battle: Fallujah*, 39.

[64] McWilliams, *The Campaign to Secure Fallujah*.



The blue lines depict the approximate routes the battalion-sized units took during the First Phase of the battle. Unit symbols represent those units that remained in place and re-cleared their zones.

Figure 17. U.S. forces' routes of advance during the Second Phase of the Second Battle of Fallujah.[65]

C. VALIDATION OF FALLUJAHVETERAN1'S COMBAT STORY

The Combat Stories Map analyzes the two phases of Phantom Fury separately. After selecting the Second Battle of Fallujah via a drop-down menu in *Validate Mode 1* or *Validate Mode 2*, analysts choose the phase and battalion validate. Since the one Fallujah veteran who submitted a combat story for this project, FallujahVeteran1, served in 3d Battalion, 1st Marine Regiment (3/1), a comparison of his combat story to the official record of 3/1 follows.[66]

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[65] McWilliams, *U.S. Marines in Battle: Fallujah*, 40.

[66] For ease of reference, and to protect his anonymity, this report refers to the individual who submitted his combat story for the Second Battle of Fallujah as FallujahVeteran1.

1. Validate Mode 1

The author began examining FallujahVeteran1's story during the first phase of the battle with *Validate Mode 1*. Figure 18 displays the locations, represented by yellow circles, which FallujahVeteran1 identified while inputting his combat story.

Figure 18. The yellow circles represent the locations FallujahVeteran1 identified while telling his combat story regarding the Second Battle of Fallujah.

During this part of the battle, 3/1 followed in trace of 2d Battalion, 7th Cavalry.[67] Figure 19 shows how *Validate Mode 1* generated orange (colored white by this author for visibility), purple, and teal lines connecting FallujahVeteran1's stories. FallujahVeteran1 input his story during three separate sessions, resulting in the generation of three different colored lines linking his locations. *Validate Mode 1* displays and analyzes all points that exist for the unit selected, not just the ones occurring during the selected phase of the battle, resulting in a distinguishable but somewhat cluttered picture.

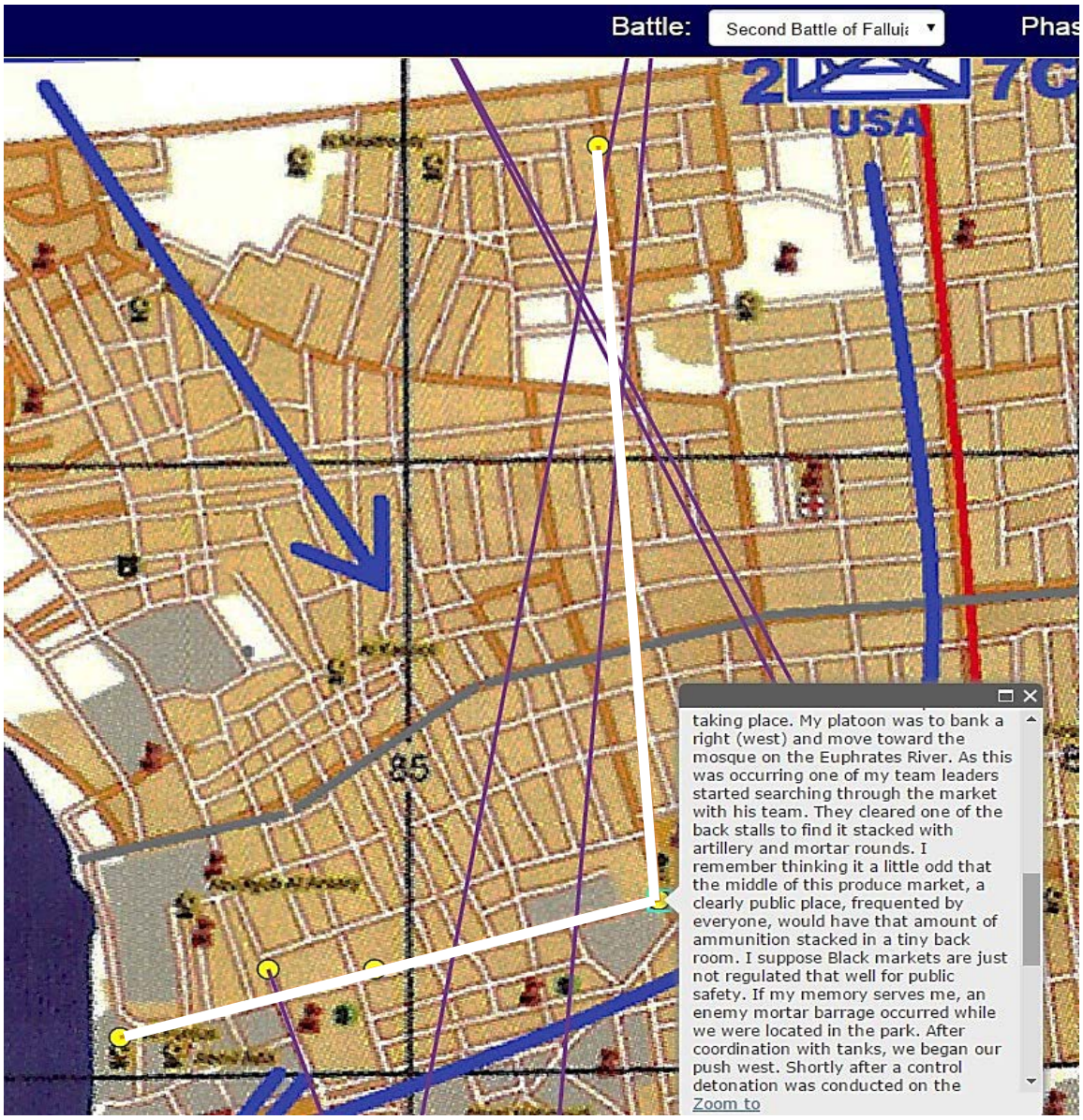
[67] McWilliams, *The Campaign to Secure Fallujah*.

The yellow circles represent FallujahVeteran1's stories, and the white, purple, and teal lines connect FallujahVeteran1's stories in the order he input them.

Figure 19. *Validate Mode 1* results for 3/1 for the First Phase of the Second Battle of Fallujah.

Figure 20 presents an enlarged view of the results of *Validate Mode 1* for 3/1 during the First Phase of the Second Battle of Fallujah. A difficult to see orange line connects FallujahVeteran1's stories for this phase; this report's author superposed a thick white line over the orange one for visibility. The white line does not depict his actual route; it simply links his stories together in order of entry.[68] Even so, the path portrayed by the white line closely parallels the official record of his unit's route, validating this portion of FallujahVeteran1's narrative.

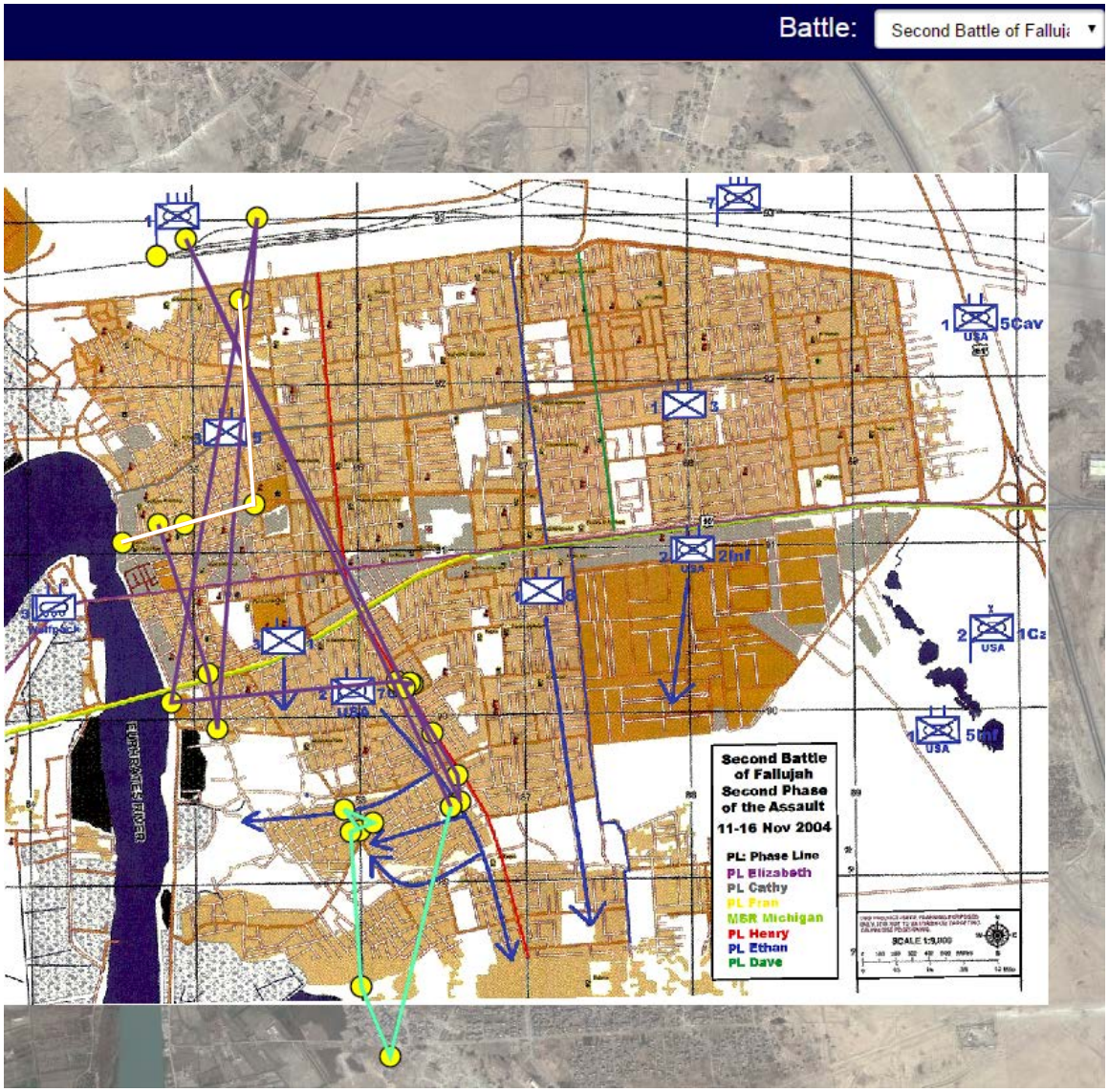
[68] As mentioned in Chapter II, *Validate Mode 1* connects the locations in order of entry, not chronological order.



The curved, thick blue line running from the top right to the bottom left represents 3/1's route and the roughly parallel white line connects the locations of FallujahVeteran1's stories. The dialogue box shows one of FallujahVeteran1's stories as his unit prepared for and began attacking west.

Figure 20. An enlarged view of FallujahVeteran1's stories during the First Phase of the battle.

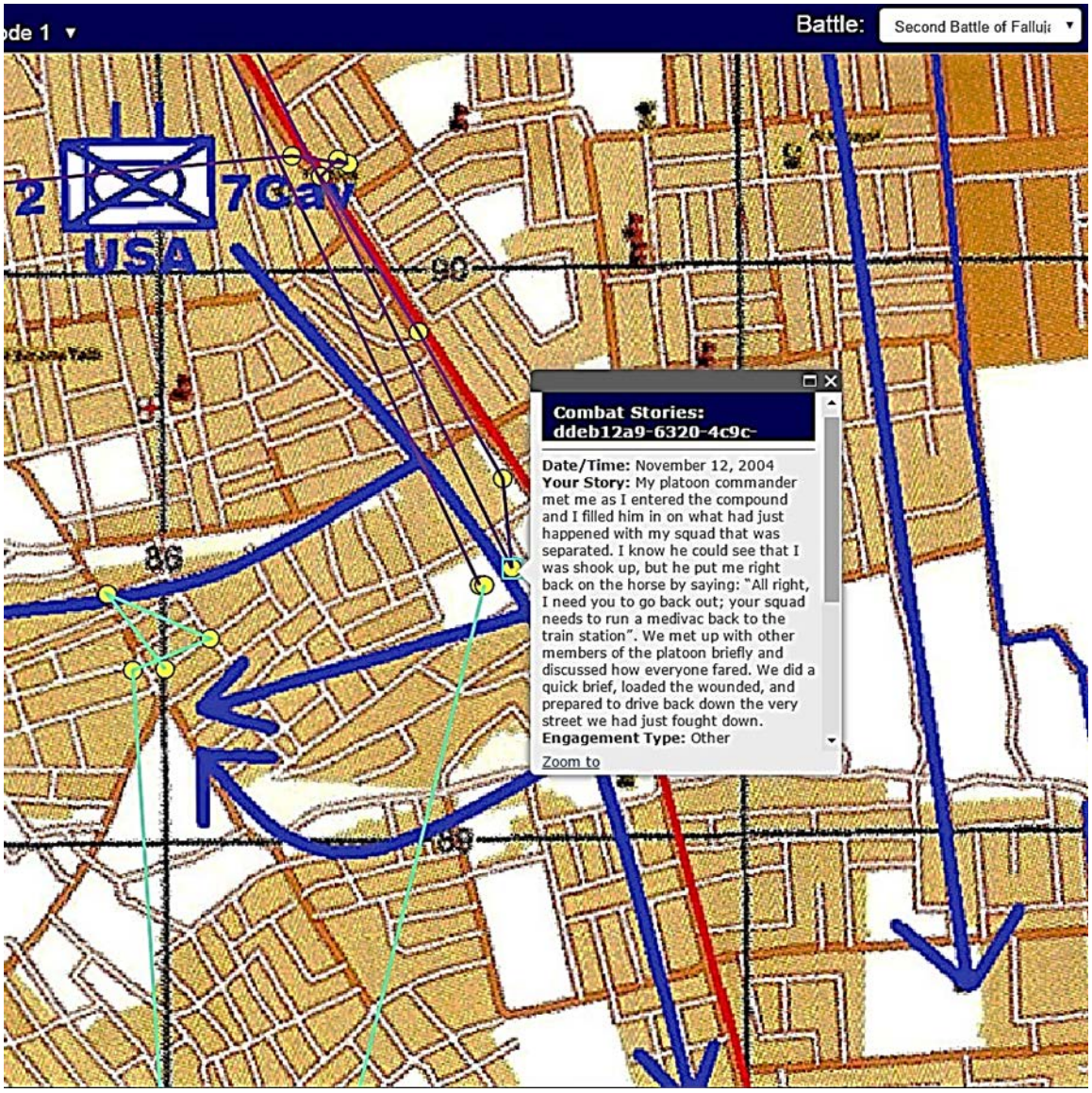
Figure 21 shows that analyzing FallujahVeteran1's narrative for the second phase of the battle with *Validate Mode 1* yields a different perspective. FallujahVeteran1's stories generally follow the route of his unit except for two locations in the north and two locations in the south.



Some of FallujahVeteran1's locations, represented by yellow circles connected by purple and teal lines, differ from the official record of his unit's location during this phase.

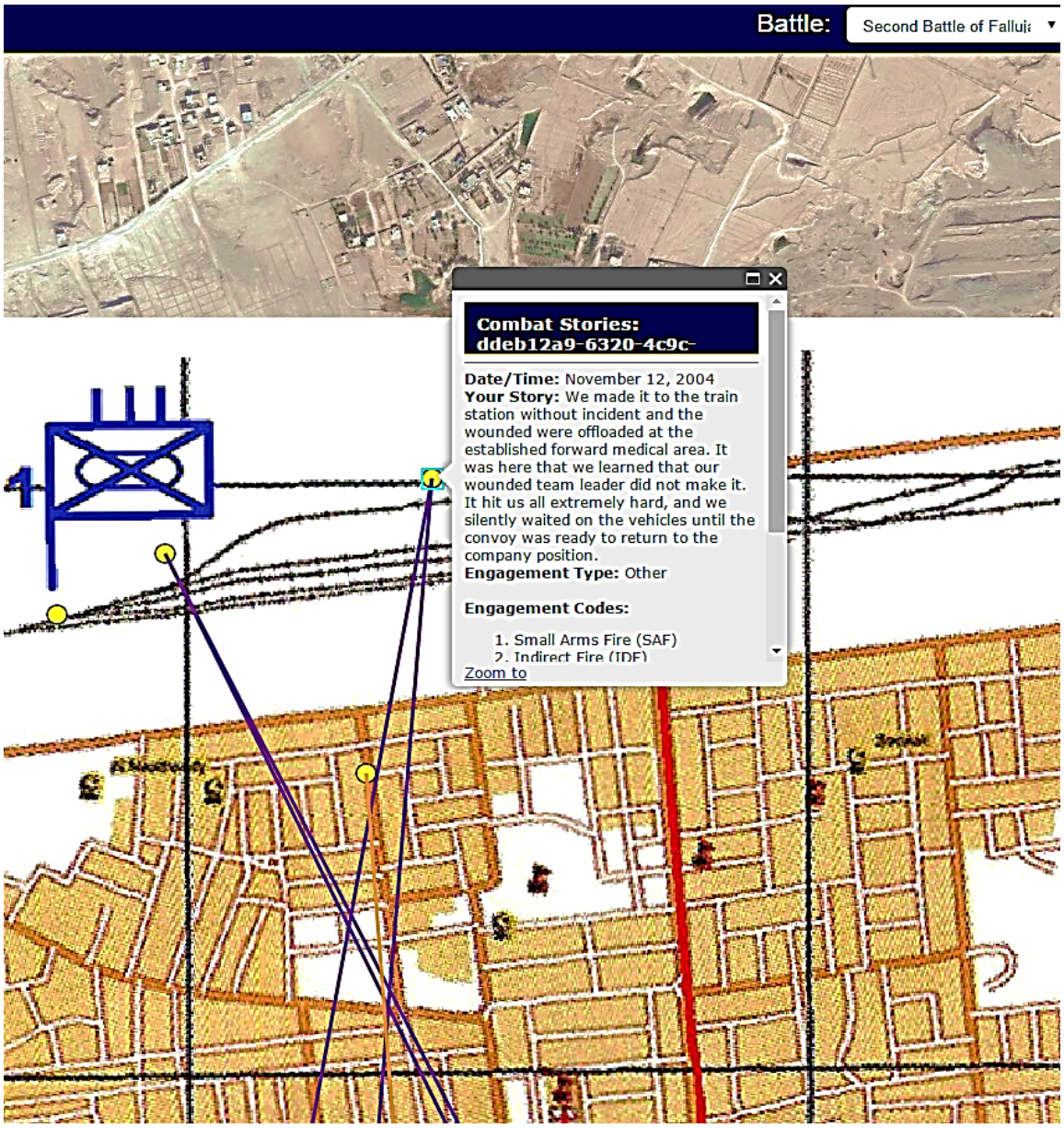
Figure 21. *Validate Mode 1* results for 3/1 for the Second Phase of the Second Battle of Fallujah.

Reading FallujahVeteran1's stories reveal why some of the locations he entered differ from his unit's official history. After intense urban fighting on 12 November 2004, FallujahVeteran1's platoon commander tasked him with evacuating wounded personnel to the train station located to the immediate north of Fallujah. Figures 22 and 23 demonstrate how the analyst used the ability to read individual stories to determine this.



The dialogue box shows that FallujahVeteran1's platoon commander tasked his squad with evacuating wounded personnel.

Figure 22. One of FallujahVeteran1's stories from 12 November 2004.

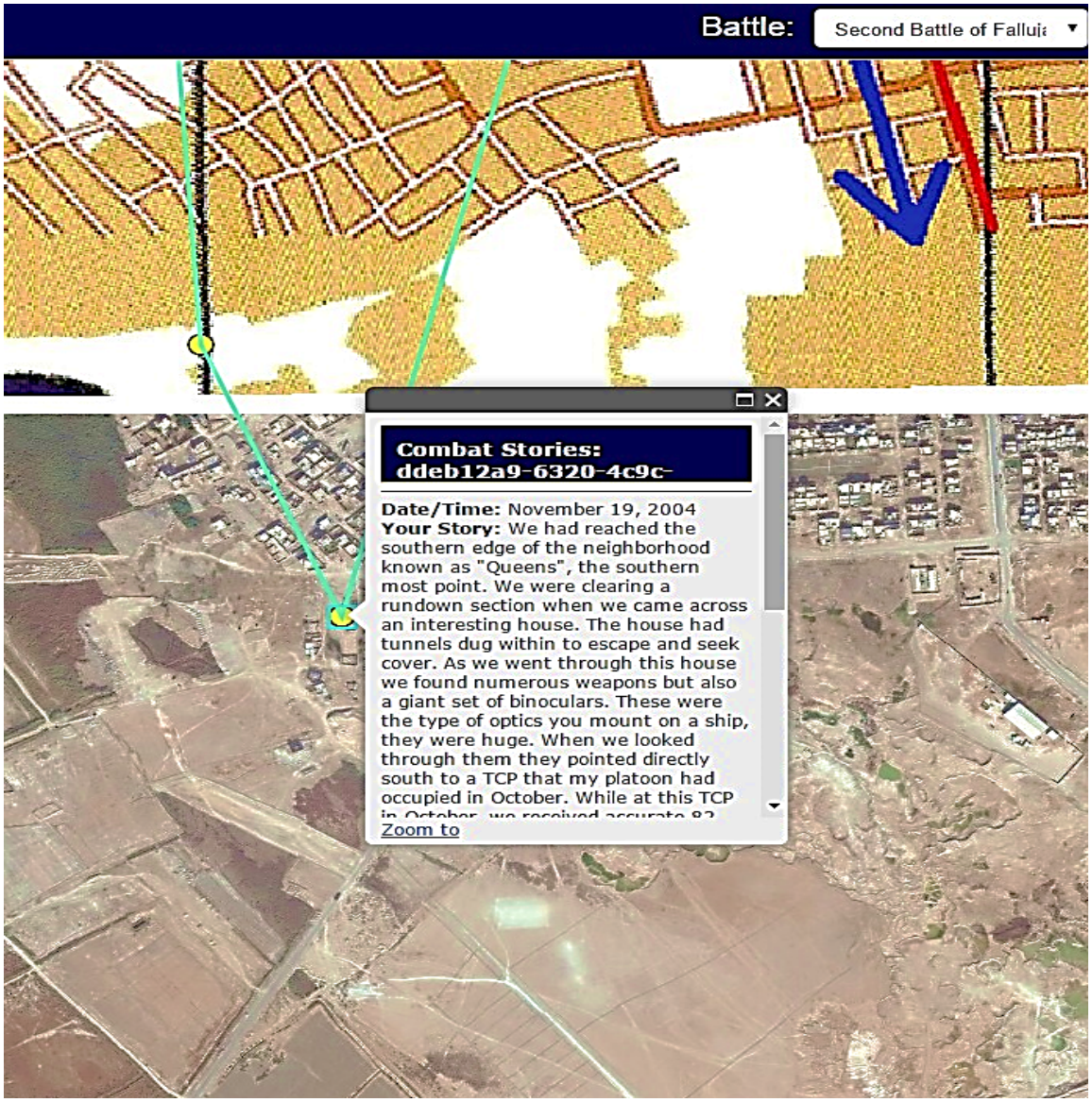


The story in the dialogue box conveys that FallujahVeteran1's squad conducted a medical evacuation to the train station north of Fallujah, explaining why this location is not consistent with the official history.

Figure 23. Another of FallujahVeteran1's stories from 12 November 2004.

Further investigation reveals why there are two locations to the south of the official record. Although U.S. Marine Corps historical documentation ends the second phase on 16 November 2004, U.S. and accompanying Iraqi forces remained active in and around Fallujah throughout the remainder of 2004.[69] Figure 24 reveals that FallujahVeteran1 and the rest of his unit continued fighting in Fallujah past the documented end date of the Second Battle of Fallujah. Therefore, while some of FallujahVeteran1's locations may not match the official graphical representation of the battle they do match the written historical record, validating his story.

[69] McWilliams, *The Campaign to Secure Fallujah*.



The date displayed in the dialogue box shows this event occurred on 19 November 2004, three days after the documented end of the Second Battle of Fallujah on 16 November 2004.

Figure 24. The dialogue box displays a part of FallujahVeteran1's story for the selected location.

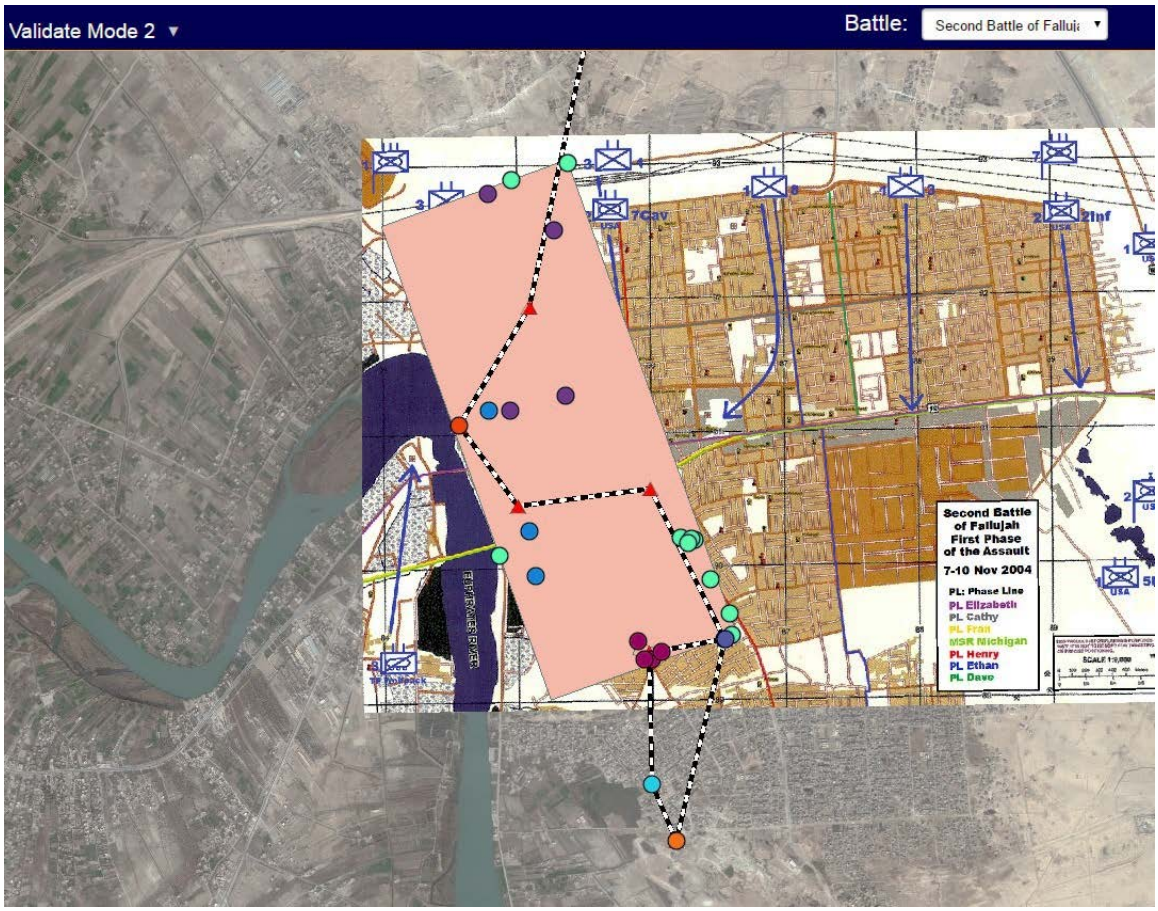
2. Validate Mode 2

The author next analyzed FallujahVeteran1's narrative using *Validate Mode 2*. *Validate Mode 2*, *like Validate Mode 1*, displays and conducts analysis of all points entered for the selected unit, not just those occurring during the timeframe of the selected phase. This resulted in identical graphic representations of the first and second phase of the battle.

Validate Mode 2 generated polygons around all the stories occurring on the same day, tinting the stories an identical color for easy delineation. Figure 25 exhibits how FallujahVeteran1's movements on 12 November 2004 took him almost completely across his unit's zone of operation as well as almost completely across Fallujah from north to south, resulting in a polygon covering nearly one-quarter of Fallujah and obscuring any other generated polygons from view.

Validate Mode 2 also generated a series of red triangles connected by a black and white dashed line illustrating the average path of the submitted stories. Figure 25 illustrates how FallujahVeteran1's average path follows the official record of his unit, excepting locations that cover events occurring before and after the official timeframes for the phases of the battle. FallujahVeteran1's path also shows he returned to an area he cleared after the second phase of the battle officially ended, and the historical record corroborates this.[70]

[70] McWilliams, *The Campaign to Secure Fallujah*, 171–172.



The teal circles represent events occurring on 12 November 2004, revealing why the polygon covers nearly all of FallujahVeteran1's locations. The red triangles connected by black and white lines show the average path of FallujahVeteran1's stories closely follows the official record of his unit except for events occurring before (off the top of the map view) and after (blue and orange circles at the bottom of the map view) the official dates of the phases of the battle.

Figure 25. *Validate Mode 2* results for 3/1 for the First and Second Phase of the Second Battle of Fallujah.

D. CONCLUSION

FallujahVeteran1's combat story closely aligns with the official history, validating his narrative. Although FallujahVeteran1's combat story did not follow the official record exactly, the validation tools in the Combat Stories Map provided the author with instinctively understandable visual cues to use when comparing FallujahVeteran1's combat story to the official history. Despite some display issues resulting from how *Validate Mode 1* and *Validate Mode 2* function, the author easily distinguished where FallujahVeteran1's combat story diverged from the official history and easily determined the reasons why. FallujahVeteran1's combat narrative followed the official story close enough for validation, and diverged in ways interesting for lessons learned purposes.

The analysis of FallujahVeteran1's combat story demonstrated the value in gathering and maintaining individual combat narratives in addition to the official history. FallujahVeteran1's actions on 12 November 2004 alone potentially highlight two important lessons. One, the separation of FallujahVeteran1's unit from the rest of their battalion during the medical evacuation shows the distance a modern military force may cover, especially when integrated with motorized and mechanized vehicles. Two, the reason FallujahVeteran1's platoon commander sent his squad on the medical evacuation may reveal an important leadership lesson. Intense fighting had just injured a key leader in FallujahVeteran1's squad. FallujahVeteran1's comments divulge that both he, as squad leader, and his squad suffered a blow to their morale. His platoon commander may have recognized this, and immediately refocused the squad by tasking them with the medical evacuation, or they may have been to only squad available. Regardless of the reason for the mission, it certainly revitalized FallujahVeteran1. As he states in the dialogue box in Figure 12, it "put me right back on the horse." The squad also received a slight reprieve during the time it took to conduct the medical evacuation, giving them time to reorient on their overall mission.

This author cannot definitively state why the platoon commander tasked FallujahVeteran1's squad with the medical evacuation without hearing the platoon commander's side of the story. In addition, this author cannot prove that the slight rest FallujahVeteran1 and his squad received made any difference in their ability to continue

the fight in Fallujah, especially since during said rest the squad learned their wounded comrade had died. However, the validation of only one individual combat story against the official history does show there is a wealth of information that does not make it into official records. Not only does FallujahVeteran1's story corroborate the official history of the battle, it also demonstrates the potential value the perspective of a squad leader in urban combat has for deriving lessons learned for train future training.

V. CONCLUSION

A. SUMMARY

This project demonstrated the value of the Combat Stories Map as a historical repository and after action tool by capturing eight combat narratives from a cross section of U.S. service members. In addition, this project validated an individual combat narrative with the official history of the Second Battle of Fallujah, showing the value in gathering and maintaining individual combat narratives.

The Combat Stories Map exhibits great potential as a historical repository and after action tool. It is Internet accessible, providing near-global access. U.S. service members can enter georeferenced combat experiences immediately upon completion of a mission or at any time thereafter, returning later if necessary to add more information. The combat narratives are immediately available to unit leaders and analysts, facilitating after action creation and the lessons learned process. The combat narratives are also archived for future analysis, investigation, and historical research purposes.

The Combat Stories Map contains two valuable tools for analyzing and validating individual combat narratives. These validation tools generate graphical comparisons of individual narratives and official histories, allowing analysts to instinctively distinguish how closely individual combat narratives match the official record. Official histories of past and future battles can be added to the Combat Stories Map, facilitating deeper analysis of combat through the comparison of individual stories to official records.

This project also identified areas for improvement for the Combat Stories Map. The following two sections discuss recommendations for further development and implementation of the Combat Stories Map as an after action tool and historical repository.

B. RECOMMENDATIONS FOR FURTHER DEVELOPMENT

As a group, the participants found the Combat Stories Map easy to use; however, they also offered suggestions for improvement.[71] In addition, the author identified items which will make the Combat Stories Map easier to use or more beneficial to analysts and unit leaders. A summary of the recommendations for further development of the Combat Stories Map follows.

1. Combat Stories Map Interface Changes and Additions

The Combat Stories Map currently lists eight commonly experienced combat events, and "other," on the *Involvement Type* drop-down menu in *Tell Your Story*. There are, however, far more than eight categories of common combat experiences. Increasing the menu options for users aids recall, reduces the time needed to input combat experiences, and may attribute to more accurate storytelling.[72] A starting point for additional involvement types are the common tactical tasks found in U.S. Marine Corps and U.S. Army doctrinal publications.[73] Future development should also look at the inclusion of other common experiences like "Vehicle Accident," "Found Cache," or "Friendly Casualty." The *Involvement Type* menu is easily configurable, allowing a program manager to add or delete involvement types as necessary.[74]

Ancillary to the above recommendation is including more options for the involvement types than already exist. Any time a user can "see and choose" instead of "recall and type" promotes recall and lessens the burden on the user.[75] An example is giving a user the ability to enter a number when selecting "Civilian Casualty."

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[71] The participants provided the author feedback via email. The author summarizes the participants' comments and recommendations in this section but does not individually reference the participants to protect their anonymity.

[72] Johnson, *Designing with the Mind in Mind*, 113–114.

[73] Department of the Army, *Offense and Defense* (ADRP 3–90) (Washington, DC: Department of the Army, 2012), 2–3; Department of the Navy, *Marine Corps Operations* (MCDP 1–0) (Washington, DC: Department of the Navy, 2011), C–1 to C–6.

[74] "ArcGIS Online Help," Environmental Systems Research Institute, accessed on 12 May 2016, under "Configure Pops," https://doc.arcgis.com/en/arcgis-online/create-maps/configure-pop-ups.htm.

[75] Johnson, *Designing with the Mind in Mind*, 113–114.

In addition, changing the *Involvement Type* drop-down menu to a checkable list is beneficial for research purposes. Many, if not most, combat experiences involve a multitude of events. A checkable list of involvement types will allow the Combat Stories Map to capture all events, providing researchers more complete data than using the current "Multiple of the above" selection.

The Combat Stories Map currently allows one to select a company-sized unit when creating a narrative and a battalion-sized unit when conducting analysis. This can quickly overcome one's ability to use the Combat Stories Map for after action or research purposes. The combined combat experiences for a company may comprise more than 200 individual narratives in a relatively small geographic space, and a battalion may consist of nearly 1,000. In addition, platoons or squads/SOF teams conduct many combat operations independently, limiting the usefulness of categorizing individual narratives by larger units. When creating a narrative, a user should be able to select their service and then successively select subordinate units until reaching the appropriate unit level. Analysts should be able to select conventional platoons or SOF teams to conduct a more focused validation and analysis than is possible at the battalion level (also discussed in paragraph 4 below).

2. User Ability to Upload Digital Media

The proliferation of digital devices on the modern battlefield yields a source for obtaining high quality media associated with combat experiences. Many combat events, such as IED strikes, are visually significant and pictures would greatly assist documentation and analysis. ArcGIS Online, the base program for the Combat Stories Map, contains functions for uploading digital media to map layers.[76] The Combat Stories Map should be configured to allow users to upload digital media to their georeferenced combat stories, further increasing the value of the Combat Stories Map as an after action tool and historical repository.

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[76] "ArcGIS Online Help," Environmental Systems Research Institute, accessed on 12 May 2016, under "Add Items," https://doc.arcgis.com/en/arcgis-online/share-maps/add-items.htm.

Global Positioning System (GPS) devices are also nearly omnipresent on the modern battlefield, and almost all of these devices can record locations and routes with a high degree of accuracy. The typical file formats used to store GPS locations and routes are compatible with ArcGIS Online, meaning it should be relatively easy to configure the Combat Stories Map to upload GPS location/route data and associate it with a combat story, increasing the accuracy of the narrative.[77]

3. Increased Map Scale and More Accurate Location Identification

The current visibility range of the Combat Stories Map is limited to the *Streets*-level due to the amount of detail contained in the basemaps used.[78] *Streets*-level resolution provides high image quality, but it can be difficult to pinpoint precise locations of combat experiences at this resolution. Freely available basemaps exist that allows one to zoom in to the *Building*-level (or closer), but the basemap imagery is usually blurry and less distinct at this resolution. In addition, free or low cost maps that provide clarity at the *Building*-level are not available for all parts of the globe. Despite these issues, this author recommends increasing the visibility range of the Combat Stories Map to the maximum currently accessible: the *Buildings*- or *Building*-level (geographic area dependent). While the basemaps in use by the Combat Stories Map are not especially distinct at the *Building(s)*-level resolution, they are clear enough to determine relatively precise locations of combat events. This may affect the ability to distinguish the locations

[77] "ArcGIS Online Help," Environmental Systems Research Institute, accessed on 12 May 2016, under "Add Layers," https://doc.arcgis.com/en/arcgis-online/create-maps/add-layers.htm.

[78] Electronic basemaps are made of layers of map data with varying degrees of detail. As one zooms in or out, each successively layer displays greater or less detail depending on the scale of the layer. The ArcGIS Online basemaps used by the Combat Stories Map zoom in and out at preset scales depending on what one can clearly discern at that scale. Hence, one can clearly distinguish streets at the *Streets*-level (approximately 1:10,000), buildings at the *Buildings*-level (approximately 1: 2,500), and an individual building at the *Building*-level (approximately 1:1,250). One of the basemaps used, titled "Dark Gray Canvas" does not contain details below the *Streets*-level and therefore restricts visibility to that level. Other basemaps used by the Combat Stories Map, such as "Open Street Map" and "World Imagery," do provide details to the *Buildings*- and *Building*-level, although the image becomes blurry as one zooms in past the *Streets*-level. "ArcGIS Online Help," Environmental Systems Research Institute, accessed on 10 May 2016, under "Web Maps," http://doc.arcgis.com/en/arcgis-online/reference/what-is-web-map.htm; Law and Collins, *Getting to Know ArcGIS for Desktop*, 11–12; "View maps in the map viewer," Environmental Systems Research Institute.

of narratives in *View Stories*, but users will benefit by the increased ability to indicate more precisely where their combat experiences occurred.[79]

In addition, the Combat Stories Map currently records each location entered as a six-digit Military Grid Reference System (MGRS) coordinate that is accurate to approximately 100 meters.[80] Since many combat events occur well within 100 meters of each other, this can impede accurate documentation of combat narratives. In conjunction with uploading GPS locations/routes and allowing users to zoom in to the extent of the basemap, users should be able to record locations as an eight-digit MGRS grid. Users may not truly remember where their combat experiences occurred to 10-meter accuracy, but they will be able to record multiple combat events happening within 100 meters of each other.

4. Validating Combat Stories Not Associated with a Major Battle

The validation functions in the Combat Stories Map work by filtering combat narratives associated with major battles and then comparing those individual narratives to the official record. Analysts initiate validation by selecting a battle and battalion-sized unit (and phase, if applicable) via drop-down menus. The Combat Stories Map currently only contains the official record of the Second Battle of Fallujah, but the application is easily configurable to add the information necessary to validate combat narratives associated with other major battles. The official records of major battles should be added to the Combat Stories Map to enhance its use as a historic repository and analysis tool.

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[79] The Combat Stories Map uses "Dark Gray Canvas" since this basemap provides a dark gray background at smaller scales, such a full view of the Earth, making it easy to distinguish the yellow circles and squares used to represent captured combat narratives. If "Dark Gray Canvas" is disabled, the Combat Stories Map uses the "World Imagery" basemap at smaller scales, displaying the yellow circles and squares representing combat narratives over imagery of the Earth and potentially making them harder to distinguish.

[80] MGRS is a grid cell location system used by the U.S. and North Atlantic Treaty Organization countries. MGRS divides the earth into 100,000-meter square cells represented by a unique alphanumeric code. MGRS uses pairs of integers to designate locations inside each cell, each pair further dividing the remaining area by a factor of ten. U.S. military members using MGRS usually informally refer to locations by the number of integers used to designate them followed by the word "grid." Therefore, a 4-digit grid refers to a 1,000-meter by 1,000-meter area, a 6-digit grid to a 100-meter by 100-meter area, and an 8-digit grid to a 10-meter by 10-meter area. A. Jon Kimerling et al., *Map Use: Reading and Analysis, Sixth Edition* (Redlands, CA: ESRI Press Academic, 2009), 75–76.

An issue, however, is that a significant portion, if not most, combat experiences do not occur during major battles.

The Combat Stories Map should be updated to allow analysts to use the validation functions on combat narratives that occur outside of major battles. Additional fields should be added to allow analysts to select the date range and geospatial extent for a unit to initiate validation. In addition, the unit drop-down menu should be updated to include units as small as conventional platoons and SOF teams to allow for analysis down to this level. These updates will greatly increase the utility of the Combat Stories Map as an after action and analytical tool, but will also, according to the primary programmer of the Combat Stories Map, require significant design changes.[81]

5. Tracking Narratives in the Combat Stories Map by User ID

The Combat Stories Map currently tracks the locations and associated information users enter by a unique identifier created each time one accesses the application to input combat experiences. Therefore, every time a user enters the application to record their combat experiences, the Combat Stories Map creates a new narrative with a new unique identifier. As seen in Chapter IV, this can result in an individual submitting multiple narratives regarding the same series of combat experiences. In addition, this feature prevents a user from returning and revising his inputs after saving the narrative and exiting the application. To facilitate capturing and validating the most accurate combat narratives possible, the Combat Stories Map should track combat narratives by User ID (or other unique identifiers as discussed below). In the likely occurrence that the same user may submit multiple combat narratives regarding different combat experiences, a user should be able to choose between editing a previously submitted narrative or creating a new narrative when accessing the Combat Stories Map.

[81] Patricio Cruz (Esri employee), in email conversation with Professor Kristen Tsolis and the author, April 13, 2016.

C. RECOMMENDATIONS FOR IMPLEMENTATION

A previous capstone project created the Combat Stories Map specifically for research purposes. This project made several changes to the Combat Stories Map in order to comply with federal human subjects research requirements. To prepare the Combat Stories Map for implementation as an after action tool and historical repository, this project recommends the following:

1. CAC Access and Replacing User ID with EDIPI

The original configuration of the Combat Stories Map recorded user's names when creating a narrative. Federal privacy requirements for human subjects research necessitated anonymizing user inputs, hence the use of a unique User ID. Implementing the Combat Stories Map as an after action tool and historical repository, however, obviates the need to maintain the anonymity of those inputting their combat experiences. This author expects a certain amount of anonymity is still required, especially if the individual combat experiences of U.S. service members are made available for research outside the Department of Defense (DOD). This author recommends that the Combat Stories Map be modified to accept the DOD Common Access Card (CAC) for access and tracking. This will accomplish two things. One, allowing access to the Combat Stories Map via the CAC removes the requirement to provide users with ArcGIS Online log in credentials. Two, all active duty U.S. service members already possess a unique Electronic Data Interchange Personal Identifier (EDIPI) associated with their CAC. Using an EDIPI instead of a User ID to track combat narratives in the Combat Stories Map allows DOD personnel to associate combat narratives with individual service members as required while retaining some anonymity for those submitting combat narratives.

The possibility does exist to use the Combat Stories Map to capture combat narratives from those who are no longer active duty service members. In this instance, the submitter's name can be used to track his or her combat narrative, or a unique User ID can be generated and issued to the submitter. The analyst conducting the research

involving these veterans will have to provide them access to the Combat Stories Map via a group user name and password or other method.

2. Analyst Ability to Print/Download Narratives

The Combat Stories Map allows users to print and/or save a copy of their combat narrative, but analysts or unit leaders must select each location individually to read the associated story. This could be a cumbersome enterprise for analysts, especially if the combat event in question involves many participants or includes a significant number of locations. Analysts and unit leaders should have the ability to print or to download each individual narrative or sets of narratives grouped by battle, unit, and/or location in order to facilitate analysis and after action creation.

3. Standalone Version

U.S. service members on the modern battlefield enjoy near-universal access to the Internet, but they still sometimes find themselves in situations where they do not have Internet access. A likely scenario is that a unit has Internet access but there is limited bandwidth and/or the bandwidth is needed for official communication. To compensate for these situations, a deployable version of the Combat Stories Map should be created. As long as the basemaps are downloaded and accessible, the Combat Stories Map does not require the Internet to work. The deployable version of the Combat Stories Map could still be used for after action creation and analysis in the field for informal lessons learned, while storing the data for upload to a primary database once Internet connectively is achieved. This provides all the functions of the Combat Stories Map, except access to the primary database, to units without Internet access and still allows these units to capture and upload their combat experiences.

APPENDIX. COMBAT STORIES MAP USER MANUAL

This user manual demonstrates the functions of the Combat Stories Map for users and analysts. Users, in this context, are those who record their personal combat narratives via the Combat Stories Map, and analysts are those who use the Combat Stories Map for creating after action reports, validating individual combat narratives, or other research purposes. This manual begins by briefly describing how to access the Combat Stories Map, followed by how the application functions for users and then analysts.

A. ACCESSING THE APPLICATION

The Combat Stories Map is accessed via secure Internet connections, requiring a Naval Postgraduate School ArcGIS Online username and password. Users who participate in Combat Stories Map research project receive a group user name and password from the student researcher. Analysts wishing to use the Combat Stories Map need to contact Professor Kristen Tsolis for access. Figure 26 shows the log in screen for the Combat Stories Map.

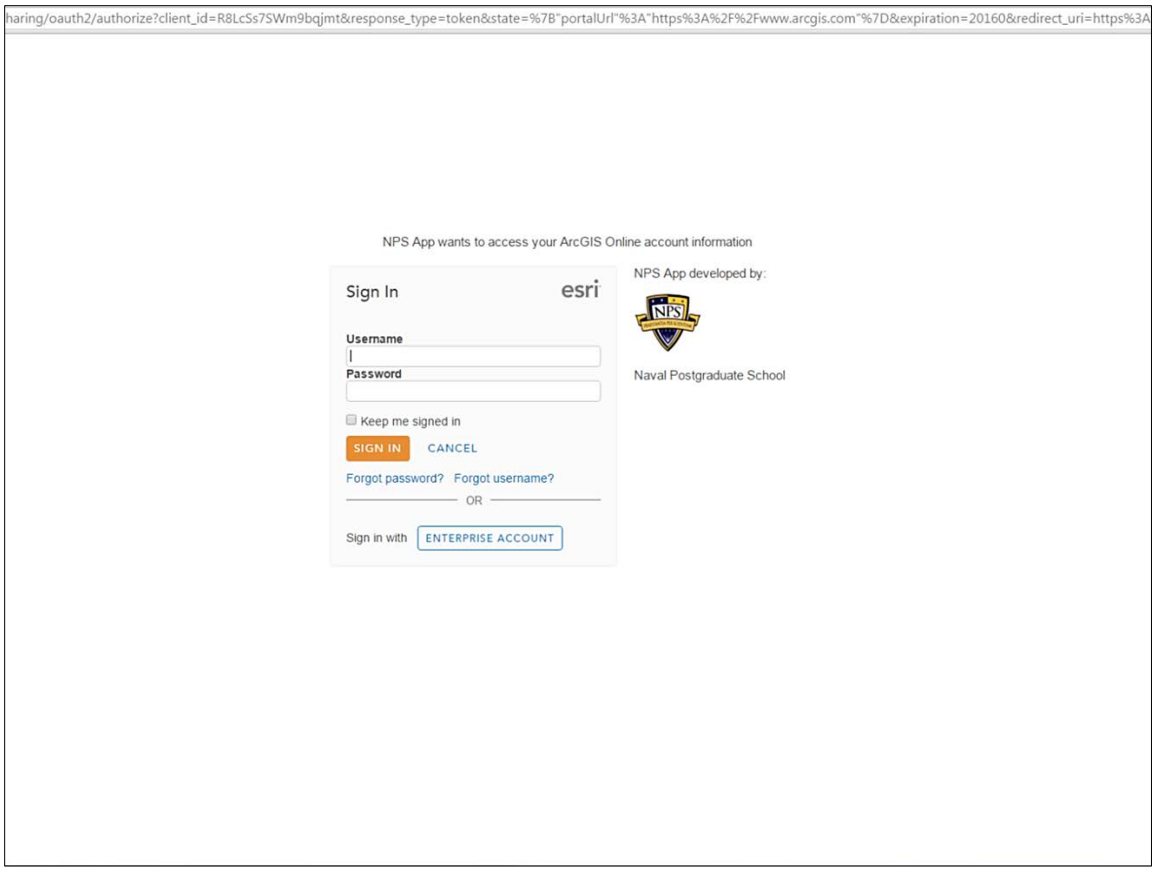


Figure 26. Users and analysts access the Combat Stories Map via encrypted Internet connections, requiring valid usernames and passwords.

B. USER ASPECTS OF THE COMBAT STORIES MAP

If you are a user, you enter the Combat Stories Map via https://erebus.nps.edu/combatstories/cs-user.html. This website limits your access to the *Tell Your Story* and *View Stories* functions. Figure 27 depicts the screen which first appears when you log in. This screen contains research design and implementation information in compliance with federal human subjects research regulations as well as basic instructions on creating a narrative and setting points. You must read and acknowledge consent to continue.

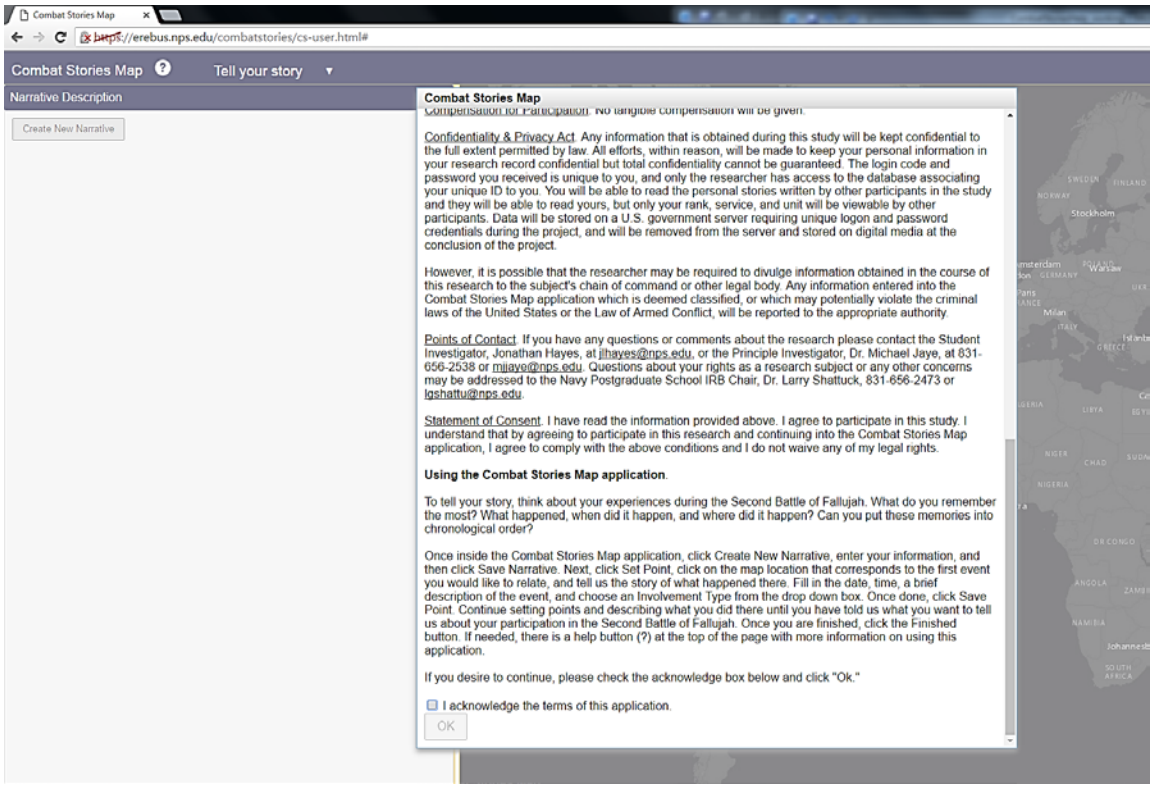
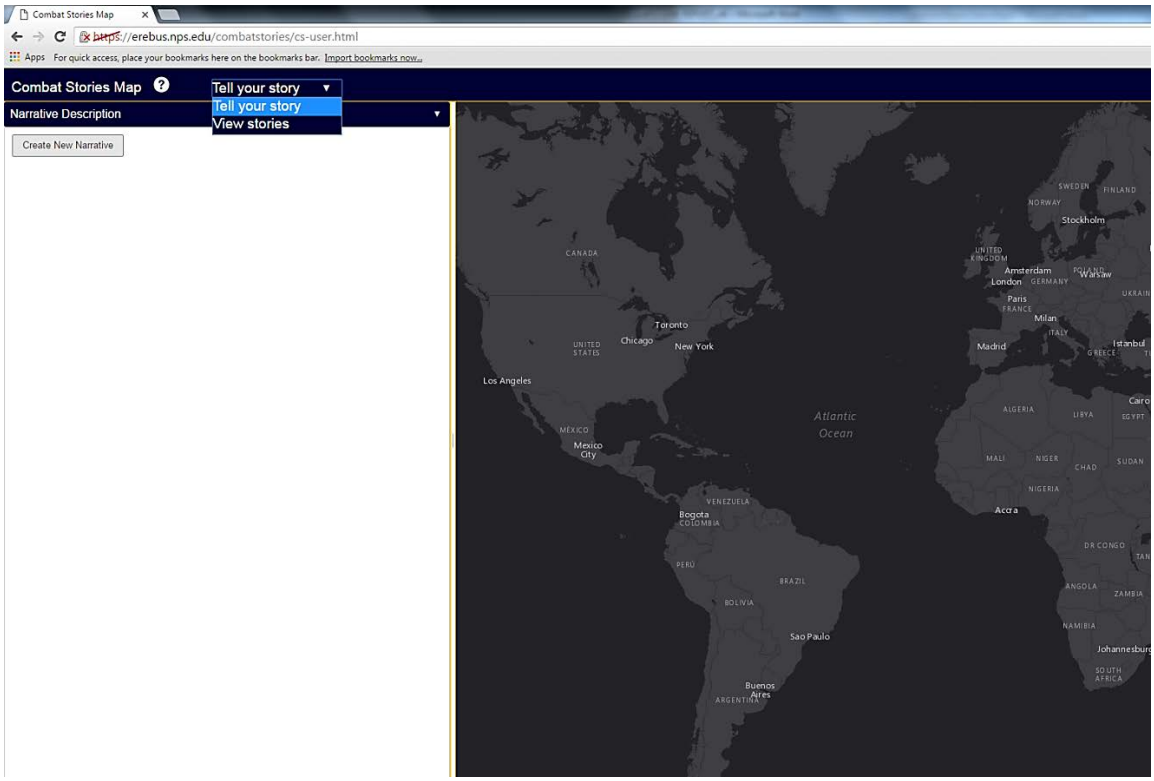


Figure 27. After logging in, a screen first appears displaying information you must read and acknowledge consent to.

1. Creating a Narrative

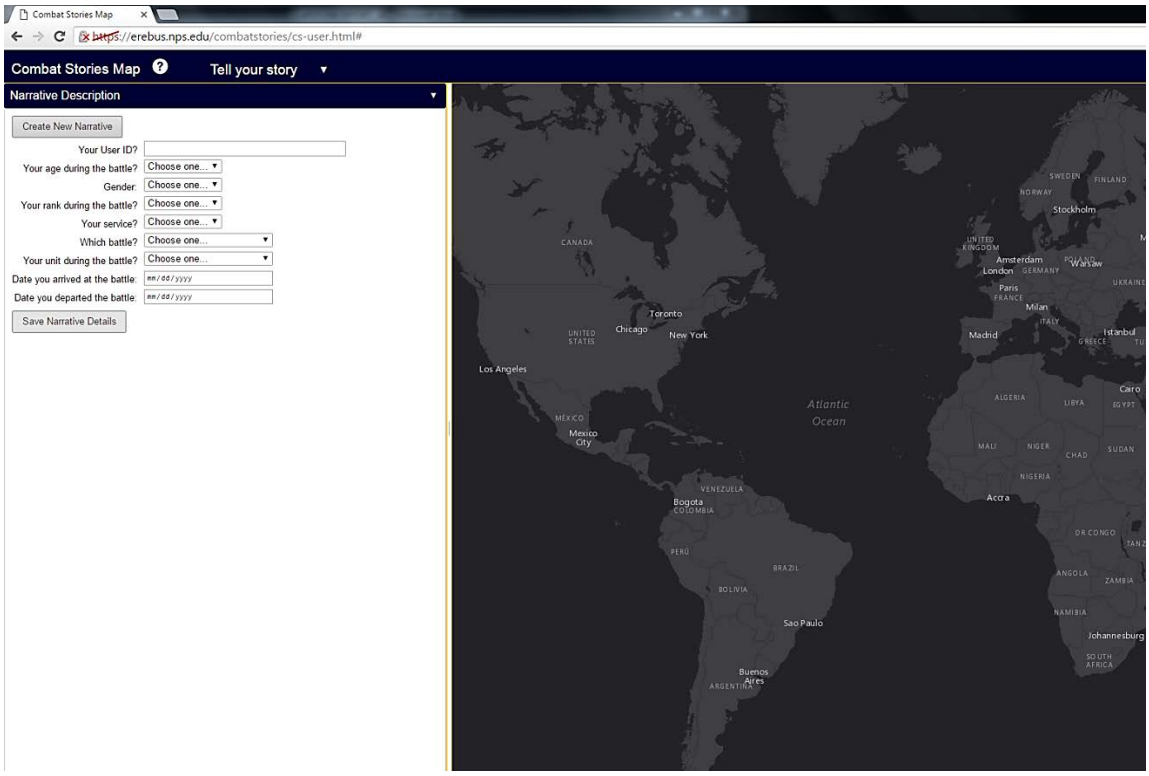
The application next defaults to the *Tell Your Story* function, shown in Figure 28. You may create a new narrative, enter *View Stories*, or open the help page.



You can create a new narrative, open the help page by selecting "(?)," or, as shown by the drop-down menu, enter *View Stories.*

Figure 28. The Combat Stories Map defaults to *Tell Your Story*.

In order to tell your combat story, select "Create New Narrative." Figure 29 represents the form that appears along with a map view of the Earth. The form contains both biographical information (User ID, age, gender, rank and service) and general information (battle, unit, and dates) with drop-down menus available for each field except User ID and date (choosing the date fields brings up a calendar).[82] This information provides data necessary for after action, analysis, and future research purposes. You cannot continue without completing every block on the form; attempting to save a narrative without completely populating the form results in red lettering stating "This field is required" appearing beside the unfilled items. Once all fields are completed, select "Save Narrative Details" and begin telling your combat story.



You must input biographical and event-specific information into the form on the left to create a narrative. The form contains drop-down menus as much as possible to facilitate input.

Figure 29. Creating a new narrative.

[82] User ID is a unique individual identifier required by federal human research regulations to maintain research participant anonymity. The User ID protects your anonymity while allowing the Combat Stories Map to generate linked narratives from the individual, georeferenced stories you enter.

2. Setting Points

Figure 30 shows the fillable form that replaces the narrative form.[83] You can adjust the map to the area where your combat experience took place by using the mouse or other interfaces, such as touch screen, present on your computer.[84] Once you center the general area of your combat experience on the map view, zoom into specific locations with the scroll wheel on the mouse or by using the + / - symbol located in the top right corner of the map view.[85]

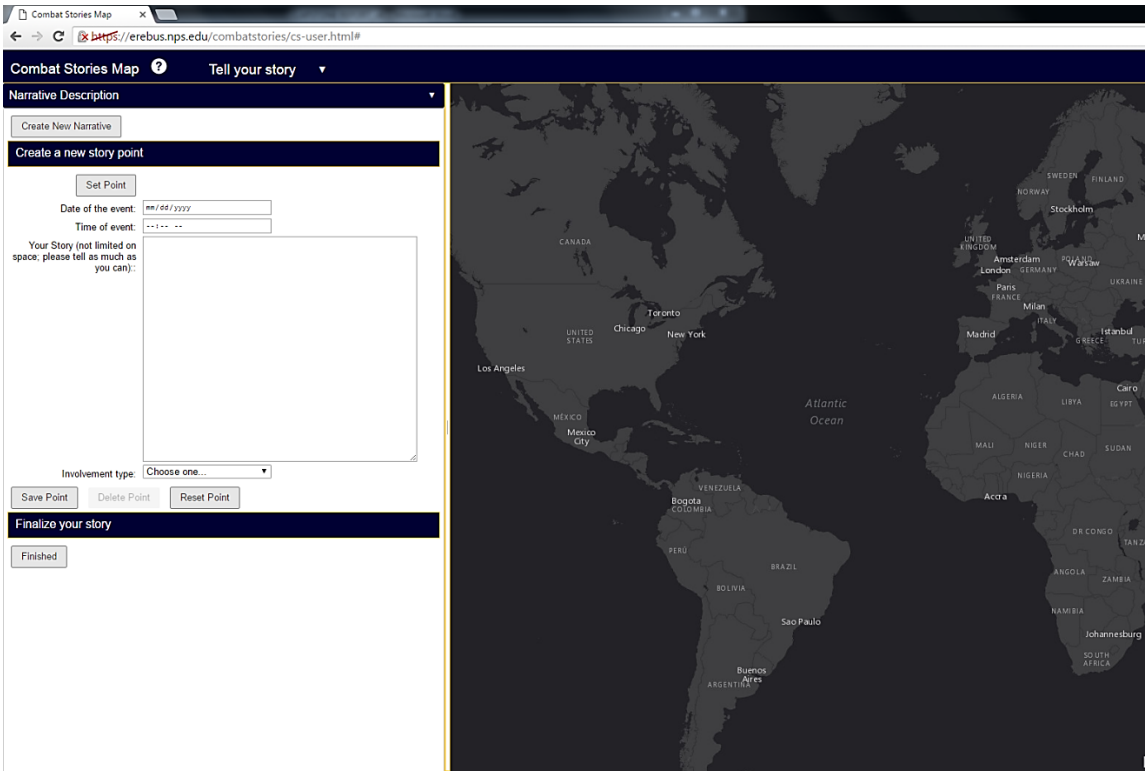


Figure 30. After you create a new narrative, a fillable form replaces the "Create New Narrative" form on the left side of the screen.

83 If you choose the Second Battle of Fallujah when creating your narrative, the map automatically focuses in on the city of Fallujah, Iraq.

84 Law and Collins, *Getting to Know ArcGIS for Desktop*, 52; "View maps in the map viewer," Environmental Systems Research Institute.

85 Law and Amy Collins, *Getting to Know ArcGIS for Desktop*, 50–51; "View maps in the map viewer," Environmental Systems Research Institute.

Figure 31 demonstrates the resolution of the basemap in the Combat Stories Map.[86] The zoom function allows you to scan broad areas where you operated and then focus down to street level to identify specific locations where memorable events occurred.

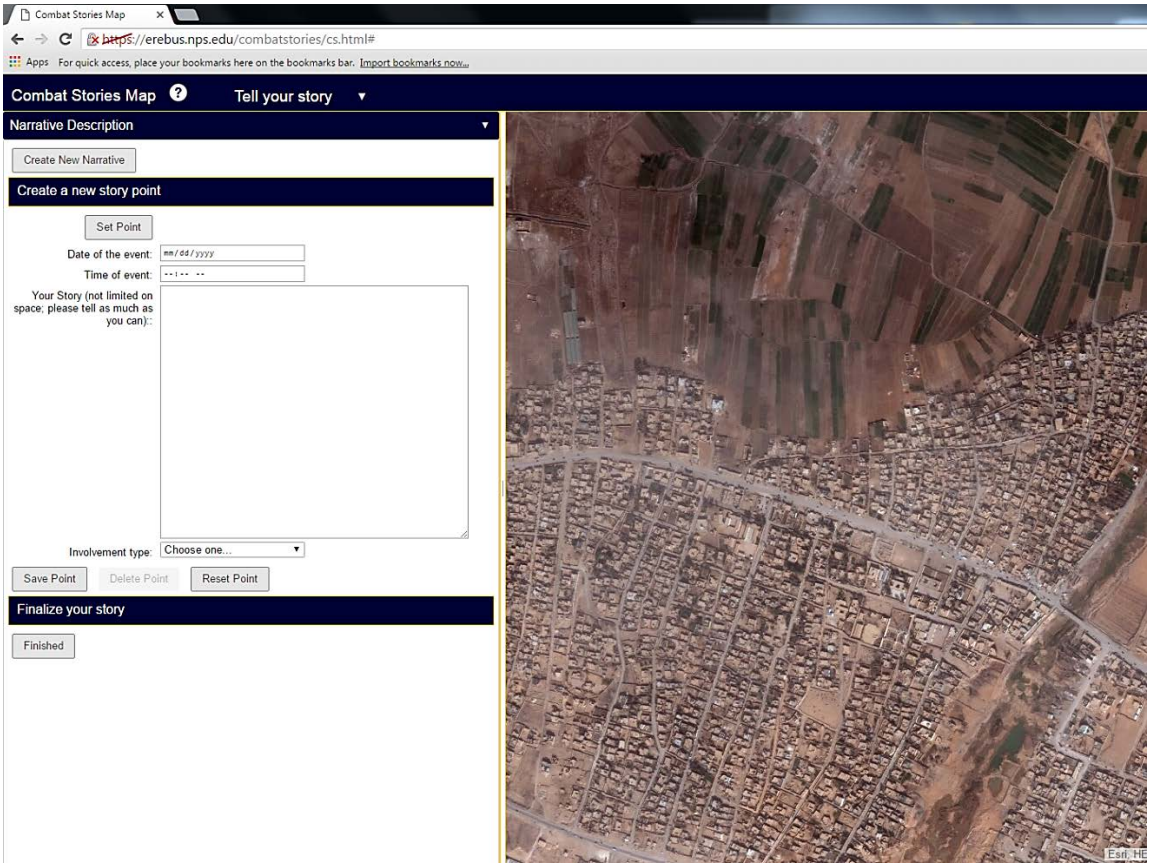


Figure 31. You can zoom in to street level to identify specific locations where your combat experiences occurred.

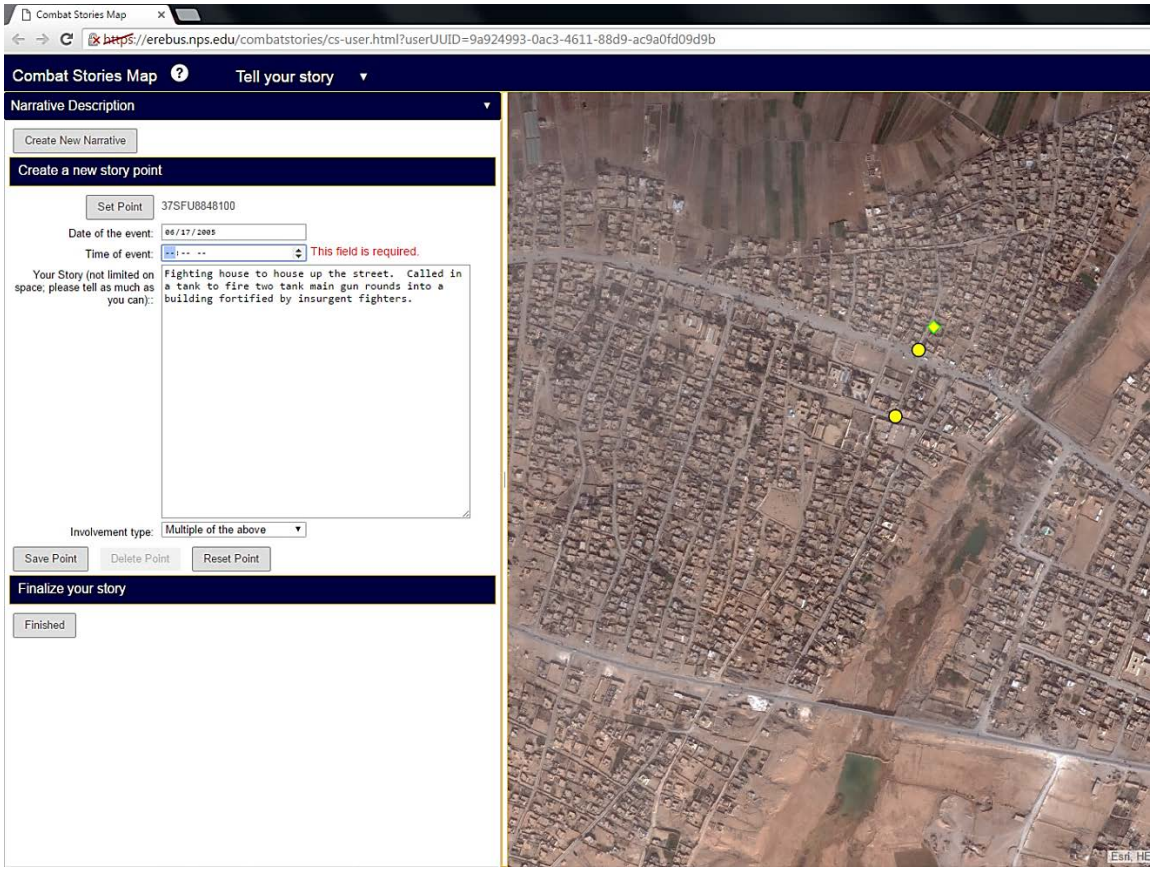
Once you identify a location on the map where a memorable event occurred, begin entering locations and stories by setting points.[87] To set a point, select "Set Point" and then use the mouse cursor to select the location on the map which corresponds to the

[86] A basemap is "a map depicting background reference information, such as landforms, roads, landmarks, and political boundaries, onto which other thematic information is placed." Law and Collins, *Getting to Know ArcGIS*, 726.

[87] A "point," represented by a yellow circle on the map, is a user entered georeferenced location and the accompanying story.

event you want to record. Next, enter the date, time, a short description, and the involvement type of the event.

The form to input data appears once enter *Tell Your Story*. You may enter information either before or after selecting "Set Point," but must complete the form before selecting "Save Point." Otherwise, red lettering stating "This field is required" or "Please enter details of your story" highlights the unfilled items. Once you enter all the information you desire concerning a location, select "Save Point" to record that point. Continue setting and saving points until you finish telling your narrative. Figure 32 represents a user inputting their third point.

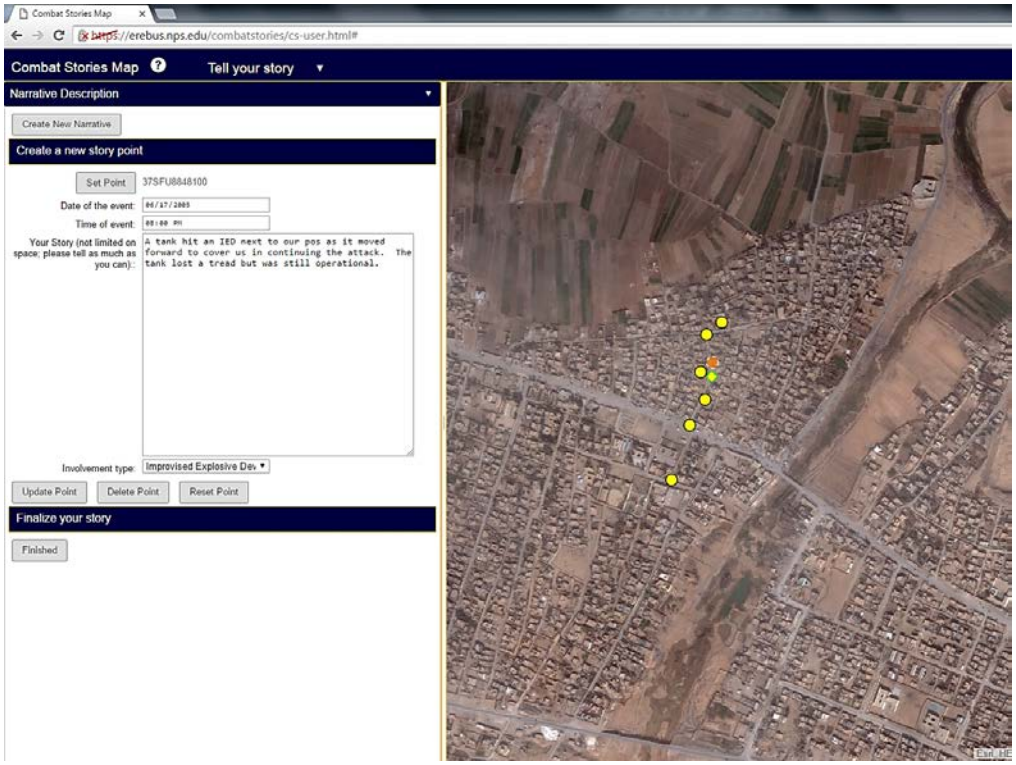


A user attempting to input a point, represented by a yellow diamond outlined in green. This user did not enter a date before attempting to save this point, resulting in "This field is required." appearing in red by the date field. Yellow circles represent two points he already entered and saved.

Figure 32. Inputting points.

3. Reviewing and Editing a Narrative

You may review and edit the information associated with your georeferenced locations at any time prior to finalizing your combat story. Figure 33 represents a user reviewing and editing his narrative. You can edit, move, reset, or delete each individual point. Selecting a point turns the point orange, causes the same form used to originally input information about that location to reappear, and allows you to edit the story associated with that location. You may edit all the information in the form, selecting "Update Point" to save any changes. Selecting "Reset Point" deletes all information previously input into the form about that location. You can relocate a point by selecting it, choosing "Set Point," identifying the new location on the map with the mouse cursor, and then selecting "Update Point." Selecting "Delete Point" removes the selected point and its information completely from the map.

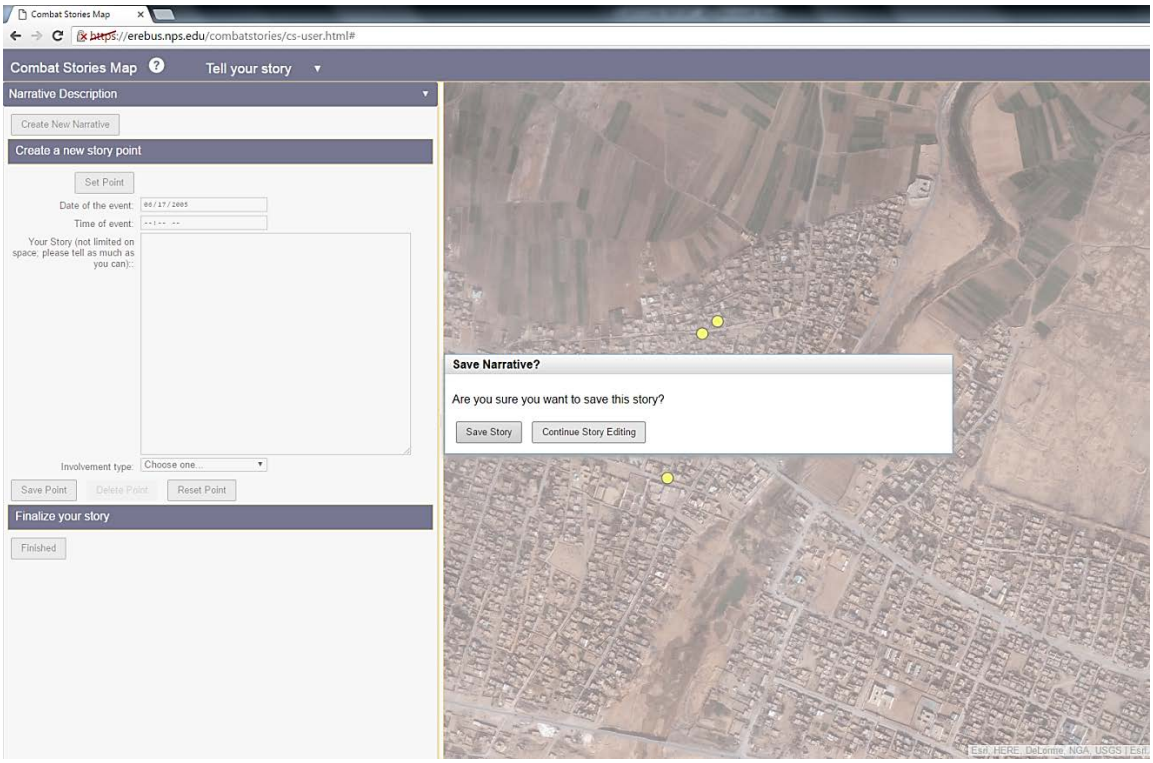


You can review, update, delete, reset, or move each point. The user represented in this image is repositioning a point. The orange circle represents the original, selected point, and the yellow diamond outlined in green represents the new location.

Figure 33. Editing points.

4. Finalizing a Narrative

When you complete telling your combat story, select the "Finished" button located at the bottom left of the screen. Figure 34 shows the dialogue box which appears, allowing you to choose between saving or continue telling your narrative. If you select "Continue Story Editing," you can return to *Tell Your Story* and continue reviewing, editing, and adding points.



After selecting "Finished," you may choose between saving your narrative or returning to *Tell Your Story* to continue reviewing, editing, and/or adding to your narrative.

Figure 34. Finalizing your narrative.

If you choose “Save Story,” another dialogue box appears, shown in Figure 35, asking if you want a copy of your combat story. The Combat Stories Map provides you the ability to retain a copy of your narrative and the associated georeferenced locations. Selecting “Save Copy of Story” brings up a separate webpage allowing you to save and/or print a copy of the map with your points identified as well as a text copy of the story you entered for each location. Selecting “End Story Editing” returns you to the original *Tell Your Story* page.

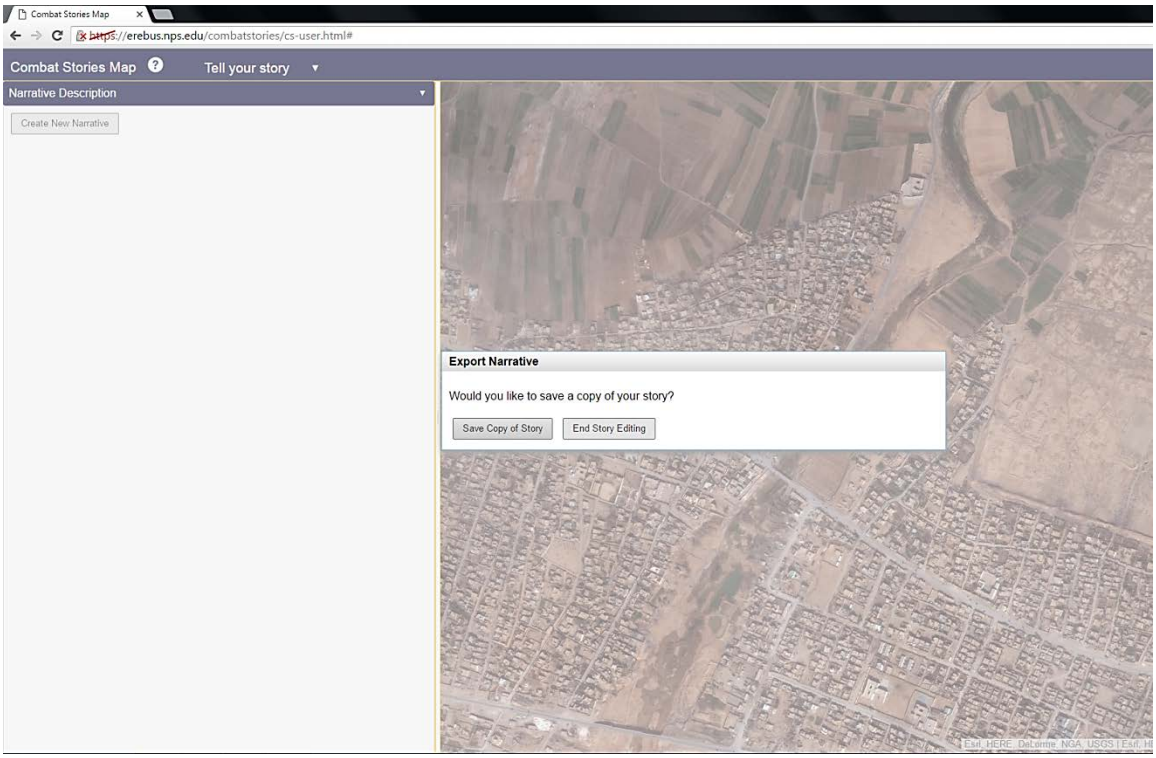
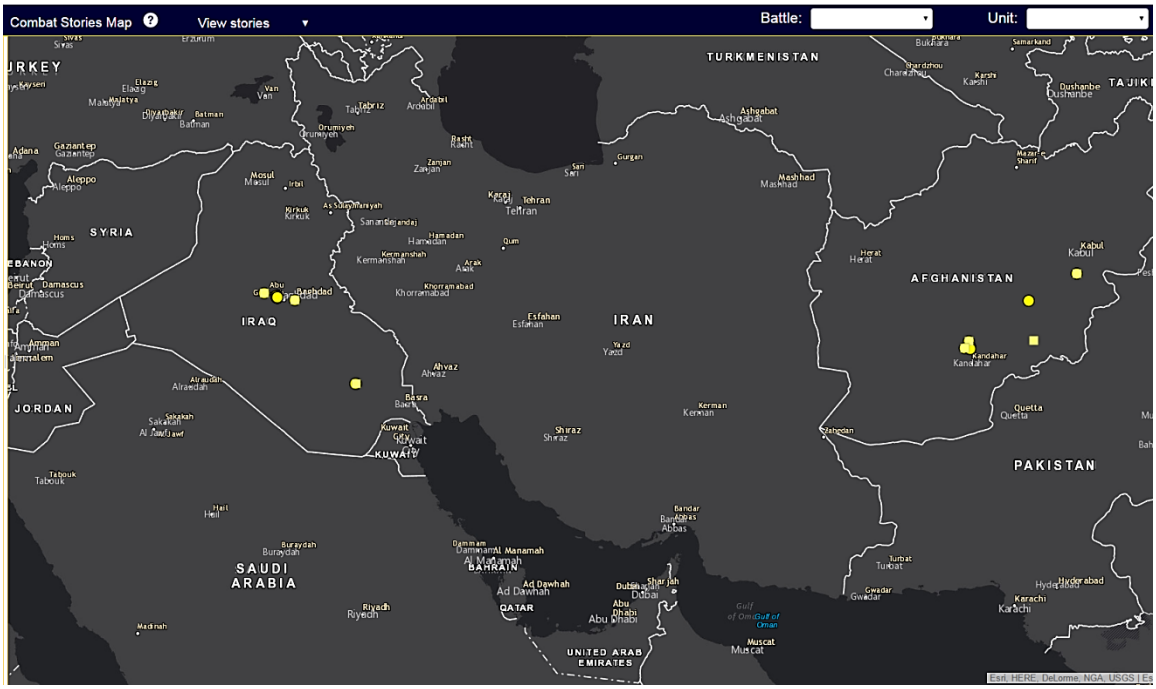


Figure 35. You can choose to save/print a copy of your narrative or exit out of narrative editing.

5. View Stories

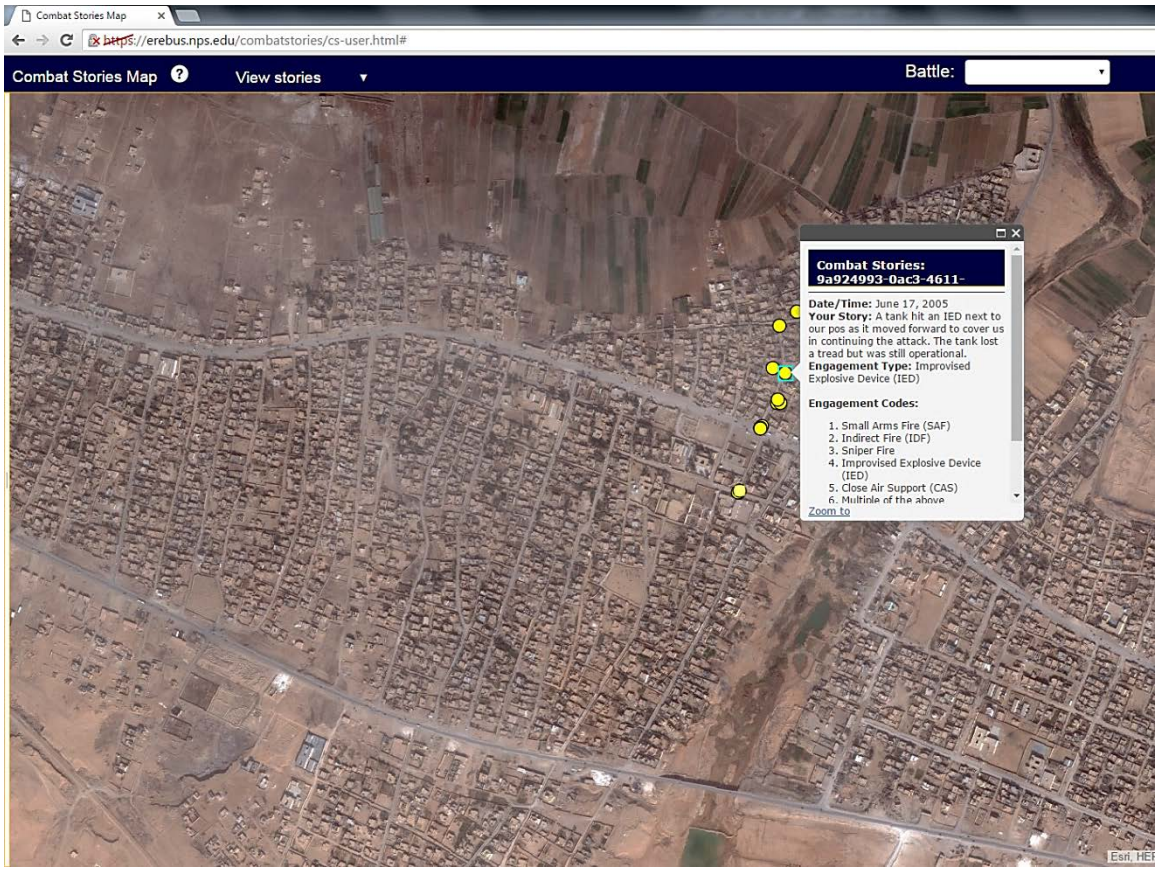
Figure 36 displays the second function available to you, *View Stories*. *View Stories* allows you to see and read other users' combat stories. You enter *View Stories* by selecting it from the drop-down menu located at the top of the page. *View Stories* initially displays a full view of the earth with all narratives represented by yellow squares and yellow circles. You can search for narratives relating to specific battles, units, or time frames with the filters located at the top right of the page, or you can narrow your search by focusing the map on an area of interest.



Yellow squares represent index points, the first location entered for a combat story, and yellow circles represent all other points.

Figure 36. The initial *View Stories* page displays all narratives contained in the Combat Stories Map.

Figure 37 represents the map focused in to display a single narrative. The first location (the index point) entered for a specific story appears as a yellow square, and all other subsequent locations appear as yellow circles. You read stories by selecting points with the mouse cursor; this brings up a dialogue box listing date, engagement type, and any text entered by the story's author regarding that location. If you select an index point, all other points not associated with that story disappear from the screen. Selecting any other point brings up the dialogue box associated with that location.



You can focus the map to an area of interest to read the narratives. The yellow circles represent the points of this combat narrative. Selecting a point, represented by an aqua square around a yellow circle, displays a dialogue box with the date, story, and engagement type linked to that location

Figure 37. Reading narratives in *View Stories*.

You may access the *View Stories* function at any time. If you do so before you finish recording your combat narrative, however, the points you entered during *Tell Your Stories* will no longer appear on the screen. Viewing and reading other related combat stories while inputting your own narrative may help you recall more about your experiences, but the potential for biasing or retroactive altering of your memories exists.[88] To decrease this potential for bias, when you access *View Stories* from *Tell Your Story* and then return to *Tell Your Story*, the previous points you entered do not reappear. The information remains, it is just not visible from *Tell Your Story* (it is visible in *View Stories*). The same occurs if you exit *Tell Your Story* before finishing your narrative or return later to record additional events. You may return and add to your narrative as long as you enter the same User ID, but only the points you input during an individual session in *Tell Your Story* appear on the map.

C. ANALYST ASPECTS OF THE COMBAT STORIES MAP

If you are an analyst, you enter the Combat Stories Map via https://erebus.nps.edu/combatstories/cs-user.html. As an analyst, you have access to all four functions of the Combat Stories Map: *Tell Your Story*, *View Stories*, *Validate Mode 1*, and *Validate Mode 2*.[89] *View Stories* provides you the same ability as users, allowing you to view and read the narratives in the Combat Stories Map.

The two validation functions in the Combat Stories Map compare the individual combat stories to official histories. These validation functions use a geoprocessing model created for the Combat Stories Map to display an analysis of individual stories on top of a graphical representation of a selected battle, allowing you to conduct quick and easy

[88] Eisenhower, Mathiowetz, and Morganstein, "Recall Error," 132–139; Johnson, *Designing with the Mind in Mind*, 80–81 and 90–91.

[89] A third secure website, located at https://erebus.nps.edu/combatstories/idgen.html, exists for researchers/analysts when the anonymity of research participants requires protection. This website generates unique User IDs for research participants, and also creates template emails which contain the User ID and a link to the user version of the Combat Stories Map that pre-loads the User ID into the "Create New Narrative" form.

visual comparisons.[90] The first validation function, *Validate Mode 1*, uses distance as the method of comparison, while the second, *Validate Mode 2*, uses time and proximity.[91]

1. Validate Mode 1

Validate Mode 1, shown in Figure 38, uses distance to compare individual stories to historical records. The geoprocessing model in the Combat Stories Map generates lines connecting the individual events in order of entry in each specific combat story, displaying the story as a set of yellow circles connected by a uniquely colored line. The lines do not depict the actual route of the story's author, but allows you to easily distinguish one story from another.[92] When displayed over a semi-transparent representation of the historical record, you can easily determine how closely the individual stories follow the route of their unit. You can then select any outliers or points which diverge from the historical record to determine the cause.[93]

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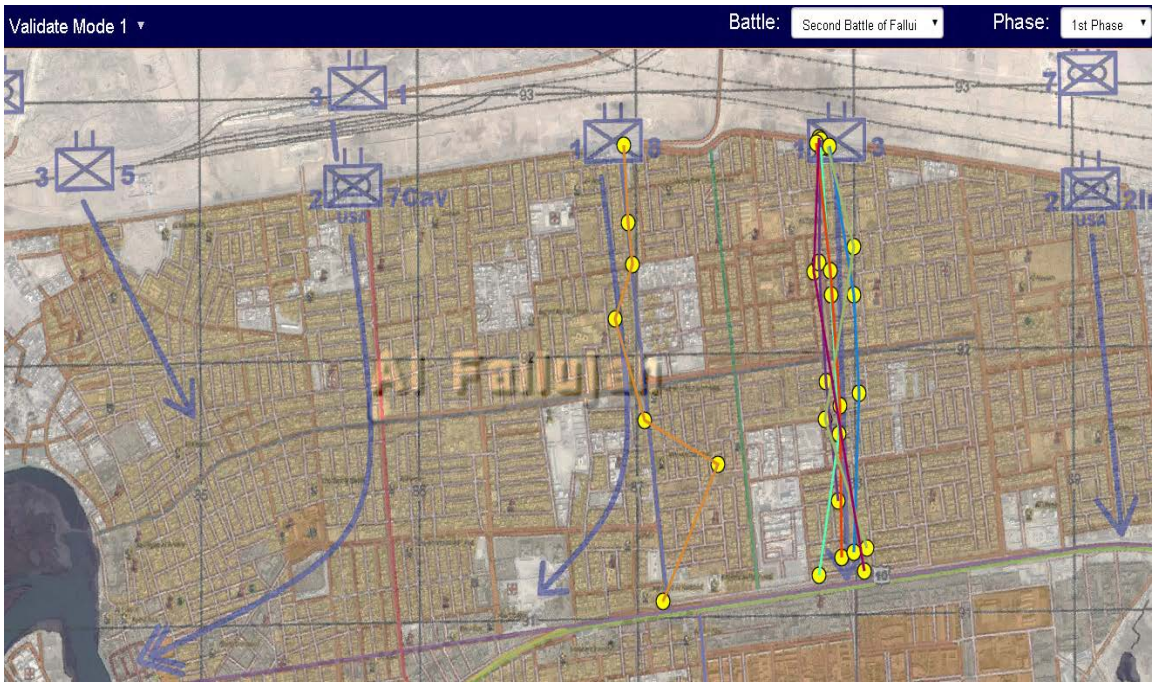
[90] Mellon, "Combat Stories," 36–38.

[91] The validation modes require detailed information of an event or battle, such as dates, times, units, locations, routes of attack, etc., to function. An analyst must create a semi-transparent representation of the historical record of a battle on the basemap to use the validation modes. Of note, at this time the Combat Stories Map only contains the historical record of the Second Battle of Fallujah.

[92] The Combat Stories Map takes advantage of the human brain's inherent recognition of lines and shapes to facilitate analysis. Johnson, *Designing with the Mind in Mind*, 34.

[93] Mellon, "Combat Stories," 39.



The yellow circles connected by different colored lines represent the narratives of different authors. An analyst can easily distinguish that one narrative, represented by the orange colored line, diverges markedly from the rest of the unit.

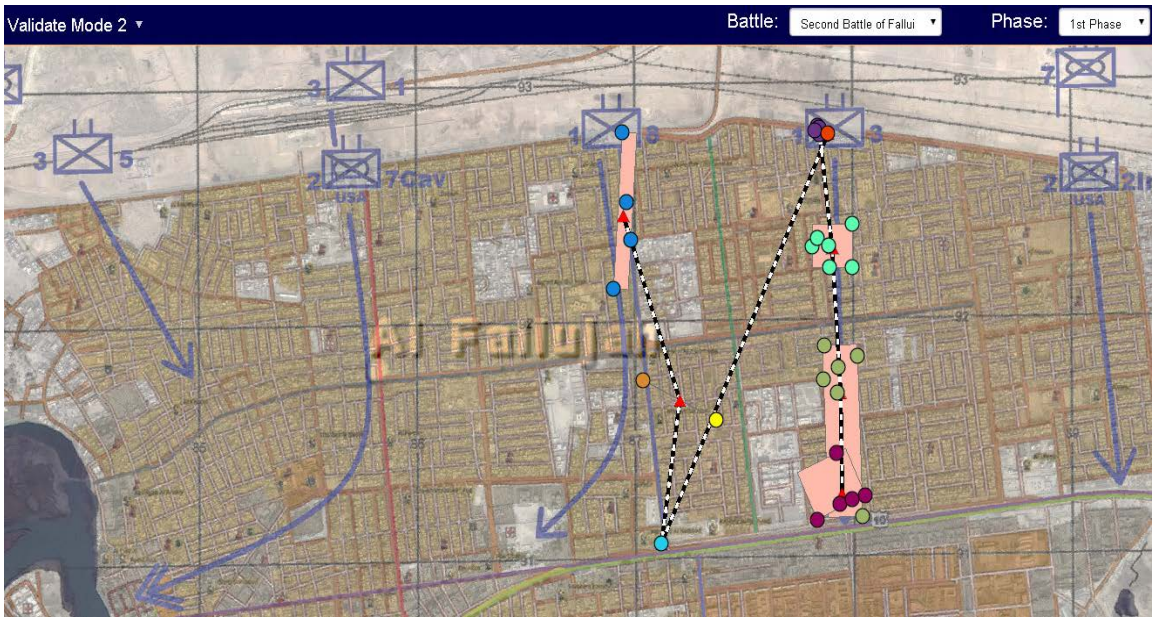
Figure 38. *Validate Mode 1* view of a battalion.

2. Validate Mode 2

Validate Mode 2 uses time and proximity to compare individual combat stories to official records. Figure 39 displays how the geoprocessing model generates transparent polygons around all points from a specific unit occurring on the same date, also turning those points the same color for instinctive recognition. The shape of the polygon indicates the closeness or divergence of the events. The closer in time and proximity the events occurred, the smaller the representative polygon. When superposed on the historical record, you can easily determine how closely the individual stories occurred to one another in both time and space.[94]

[94] In addition to the mind's inherent recognition of lines and shapes, the mind also innately perceives items close together and similar in appearance as grouped. The use of polygons, therefore, facilitates analysis while the use of different colored circles allows analysts to instinctively distinguish between sets of events occurring at different times but in close proximity to each other. Johnson, *Designing with the Mind in Mind*, 11–15 and 34.

Validate Mode 2 also uses the geoprocessing model to generate an aggregate path of a specific unit for a particular battle. The geoprocessing model calculates the mean of each group of events (by time and proximity), graphically representing the result with a red triangle. Figure 39 shows how the geoprocessing model connects the red triangles with a black and white dashed line, allowing you to intuitively distinguish how closely the mean path of the individual stories matches the historical record.[95]



The same colored circles represent stories from the same unit on the same date. The polygons show the closeness and divergence of the stories. The red triangles connected by black and white dashed lines show the average path of the unit. The close proximity of the stories represented by the dark blue, teal, olive, and purple circles masks the red triangles signifying their average. One story diverges from the rest of the unit in both date and location, possibly prompting an analyst to attempt to determine why.

Figure 39. *Validate Mode 2* view of a battalion.

[95] Johnson, *Designing with the Mind in Mind*, 34.

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