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## The story map of Evandro case – development and creation of an interactive cartographic narrative

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**Abstract:** *The Story Map Of Evandro Case - Development And Creation Of An Interactive Cartographic Narrative*

Story maps allow us to present new perspectives on stories, providing a broader understanding of the events and places involved. This approach allows users to navigate time and space, connecting emotionally with the narrative. This paper presents an innovative approach to designing and developing interactive story maps, drawing on agile methodologies widely used in software development and adapting them for map projects. The study examines the process of creating an interactive Story Map for the 'Evandro Case', a famous criminal case in Brazil, as a central narrative theme. The methodology employed combines traditional cartographic principles with modern storytelling techniques. This approach enhances maps' informational value and establishes a more profound emotional resonance with users. The paper highlights the importance of user immersion, advocating for future studies to include user testing and statistical analysis to validate usability and effectiveness. Through the case study of the Evandro Case, the paper demonstrates how story maps can transcend conventional map design, offering fresh insights into narratives. It argues that story maps are a versatile tool applicable to various themes beyond criminal cases. The study concludes that the fusion of spatial representation with narrative elements can create compelling and informative visual narratives, making complex stories accessible and engaging to a wide audience.

**Keywords:** Story map; storytelling; map design; visual narrative; agile methods.

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## 1. Introduction

In a time before time... a map took shape! Ever since humans first etched words on stone, we have honed the art of storytelling. Different societies worldwide and throughout history have employed tales, fables and epic sagas to shape their citizens' moral and cultural identities. With the advancement of scientific methodologies, scholars such as the renowned anthropologist Joseph Campbell have undertaken in-depth studies of narrative structures spanning various cultures and epochs. Campbell's concept of the 'Monomyth' or 'Hero's Journey' has left a significant imprint on countless researchers, writers and storytelling. Despite its formal documentation only in the 20th century, many authors have used this structure in their works.

This narrative framework also found its place in cartography. Narrative and mapmaking have always been intertwined. Many historical and archaic maps owe their effectiveness not to accuracy or completeness but to their attunement to oral traditions and cultural narratives—a less tangible but integral aspect of cartography (Roth, 2020; Wood, 1987). The myriad of narratives – individual and collective, fictional and factual, mythical and documentary – must be considered when examining the interplay between narrative and spatial representation. This perspective seeks to explore the unique aspects of a place (Caquard & Dimitrovas, 2017; Maher, 2014). As such, the study of cartographic narratives is crucial to designing maps that not only convey valuable information but also establish an emotional connection with the user. Isolated non-spatial elements, such as photos, drawings, videos, audio and reports, can generate user connections. However, combining this information with the spatial vision of events makes it possible to generate connections and feelings of recognition and identification with history (Carter, 2022). Furthermore, spatial vision can present new perspectives and a broader view of places and events.

One application of these principles is the creation of visual narratives or story maps. These allow for documentation, explanation, communication and sharing perspectives on a specific worldview. Story maps can be realised in various ways, making interactive maps popular. Cartographic narratives have received considerable attention in recent years thanks to technological innovations. Various tools and technologies have been employed to develop and present geospatial data (Caquard, 2013; Roth, 2021). Although they share similarities with conventional interactive maps, designing and creating a story map involves specific challenges, especially when aiming to evoke an emotional response from the end user.

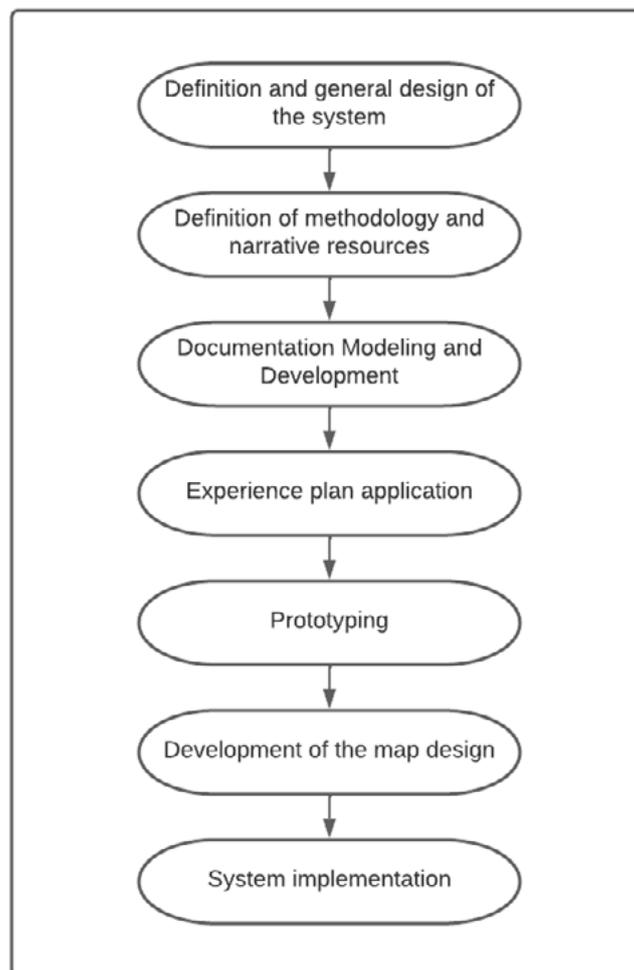
Not only does this require careful consideration of the presentation of information (i.e. map design), but it also requires detailed analysis of the narrative techniques used to ensure engaging delivery (Roth, 2021). Notable researchers, such as Roth (2021) and Caquard (2013), have published comprehensive studies on the design and application of narrative techniques in cartographic products. The potential applications of storytelling through maps are vast, with scientists, journalists, cartographers and other professionals taking advantage of this method to communicate their discoveries to the public in an accessible way. According to Cope et al. (2018), communication with non-specialised audiences can be improved by building a map with storytelling elements. Furthermore, introducing storytelling elements can facilitate cartographic communication since one of the objectives of storytelling is to make knowledge easily accessible to the receiver and understandable to the public (Pulizzi, 2012). Its design is also particularly attractive, as its visualisation and language can effectively present complex ideas and large amounts of information in an organised and user-friendly interface aimed at the general public. Works by Antoniou et al. (2020) and Caquard and Dimitrovas (2017) exemplify the integration of storytelling techniques and cartographic methods in various visualisations, demonstrating the versatility of this approach across different scenarios and periods.

However, despite the literature highlighting the benefits of merging map design with narrative techniques, there is a notable gap in methodological frameworks that adapt traditional cartographic procedures to the structured creation of story maps. To address this gap, our research question focuses on how can traditional cartographic methods be adapted to story map design to support narrative understanding and user immersion. To answer this question, this paper aims to present a methodology that bridges this gap. Our approach emphasises integrating

spatial aspects, routes, paths and spaces within the story, enriched with multimedia elements such as videos, photos and documents to reinforce user understanding. We advocate incorporating relevant storytelling techniques and Agile methodologies to complement traditional cartographic processes. To illustrate our methodology, we present the development of a story map based on the 'Evandro Case' documented by Mizanzuk (2021). The documentation of our design choices aims to provide a replicable framework for future projects, enhancing user engagement by highlighting the role of place in the narrative and offering a dynamic, insightful exploration of the geographical context. As such, our study not only fills a critical research gap, but also offers practical insights for cartographers and storytellers alike, contributing to the evolving field of narrative cartography.

## 2. Methodology

How does one construct the most compelling story map? Similar to the multitude of ways a story can unfold, a story map can also be crafted through several methodologies. Technological advancements have facilitated the creation of immersive, interactive visual narratives, exemplified by the story map designed by Caquard and Dimitrovas (2017), which vividly traced the journey of a Rwandan refugee. Figure 1 illustrates the sequence of steps employed in creating the 'Evandro Case' Story Map. This flow encompasses the initial conceptualisation of the system, its distinctive characteristics, the methodologies adopted, the map design, and finally, its web-based implementation.



**Figure 1:** Methodological flowchart used in the development of the Evandro Case Story Map.

## 2.1 Implementing Agile Methods in Story Map Development

Throughout the narrative's development, we incorporated Agile Methods (Abbas et al., 2008), commonly employed in the software industry, into our narrative techniques for developing story maps. Although Agile methodologies may initially appear as a distinct path from User-Centered Design/User Experience (UCD/UX), there is a potential for a symbiotic relationship between these design paradigms. Whereas traditional UCD aims to collect project requirements in advance for subsequent development, the advent of Agile methods promotes user involvement in concise production cycles and encourages validation of intermediate stages.

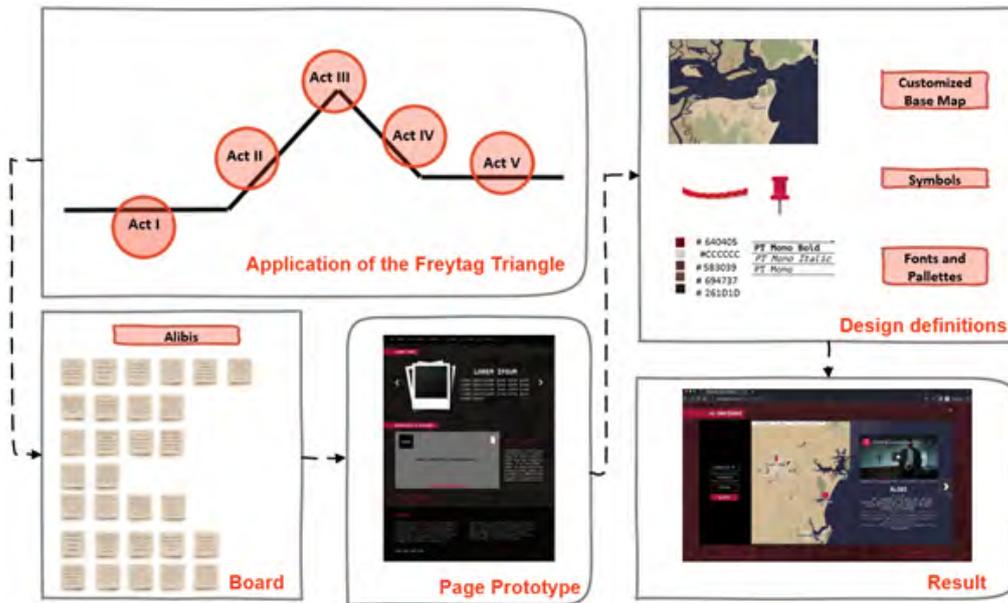
Agile methodologies such as 'Design Thinking', 'Participatory Design', 'Scrum', and 'Project Model Canvas' can offer insights for shaping narratives and defining critical developmental aspects. Employing these agile methodologies to design and create story maps can enhance spatial and non-spatial data organisation, allowing for customised map design. Furthermore, when merged with well-established storytelling techniques like the quinary schema (known as Freytag's Pyramid) or the 'Hero's Journey' (Ciğerci and Mesut, 2023), these methodologies can facilitate the development of linear narratives that resonate emotionally with users.

In the case of the 'Evandro Case' Story Map, we elected a hybrid approach, merging elements of Project Model Canvas and Design Thinking with storytelling techniques, such as the Freytag Triangle, to organise the narrative into 'Acts'. Each act is guided by specific objectives that converge towards one goal: to present the narrative clearly considering its spatial dimension. Agile methods facilitated the organisation of relevant events to enhance the user experience. Furthermore, the input from these methodologies and tools aided in designing and implementing the interactive system.

We employed interface design tools, particularly Garrett's User Experience Plan (2002), to prototype the pages, transforming abstract concepts into concrete results. Once the narrative was solidly structured, we focused on crafting the cartographic design. This process involved careful consideration of the narrative's intricacies, visual identity, and the integration of graphical elements, as Roth (2021) detailed.

The planning and organisation process was conducted cyclically, allowing for continual improvements during the story map's development. This approach facilitated the implementation of the project using text markup languages (HTML and CSS) and programming languages (JavaScript and PHP). Specialised tools, such as the Knight Lab – Story Map (<https://storymap.knightlab.com/>) JavaScript library for story maps, were used, ensuring the previously defined objectives for each narrative stage remained the focus.

Utilising this approach, we created the 'Evandro Case' Story Map, developed to immerse the user in the story while introducing the spatial perspective. Figure 2 demonstrates the application of Agile methodologies and narrative techniques in developing the 'Evandro Case' Story Map.



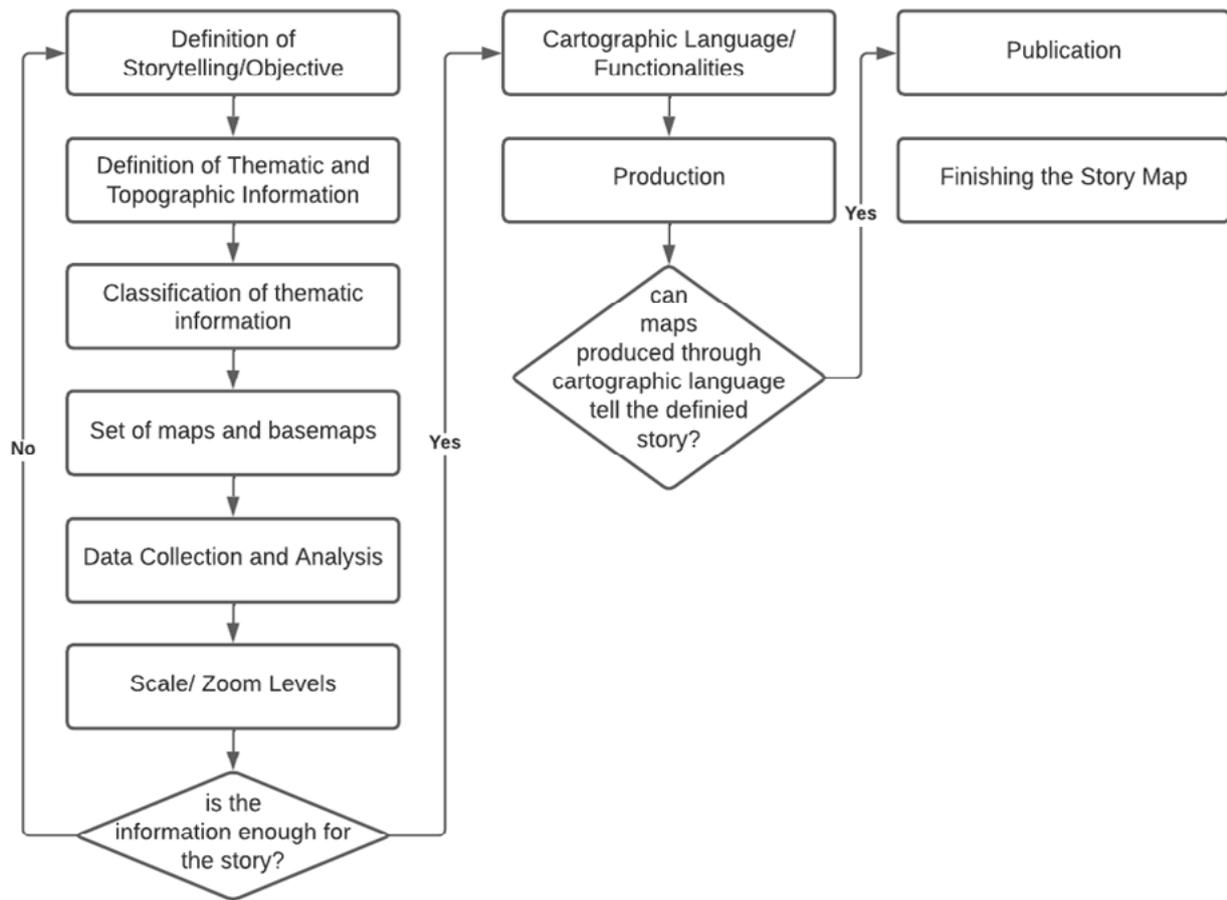
**Figure 2:** How Agile and Storytelling methods were applied in the “O Caso Evandro” story map.

## 2.2 Creating a Story Map Design

The application of Agile methodologies in this process proved advantageous in organising, designing, and developing the overarching narrative. However, a crucial part of the process involved creating the cartographic design. Map Design plays a vital role in Cartography (Sluter, 2008) and continues to be an area of development and refinement over the years. However, when approaching the creation of a story map, it is essential to incorporate certain specific peculiarities into the design process. Unlike conventional maps, the story map seeks to go beyond the mere presentation of geographical information, aiming to engage and emotionally captivate the user through a meaningful narrative. In this context, adding to the process of choosing narrative techniques to support the story’s communication is essential.

Interactivity and emotional connection with the target audience become central elements in this endeavour, emphasising the importance of the thoughtful conception of this particular type of project. In addition to deciding on the data source, map’s interactive features, basemap, symbology, and scale range, among other relevant decisions, it is also necessary to determine how each element, whether spatial or not (e.g., figures, texts, video), will interact with the narrative’s intended purpose, making it as compelling as possible (Roth, 2021).

Agile methodologies proved invaluable for more efficient management concerning how each map’s components would contribute to the narrative’s storytelling aspect. The flowchart in Figure 3 illustrates the general steps taken to develop each map. This flowchart follows the Araujo (2019) proposal, in which the author adapted the Sluter 2008 method into a user-centred design for a web map. Further modifications to the steps specific to developing interactive Story Maps have been proposed as part of the present research.

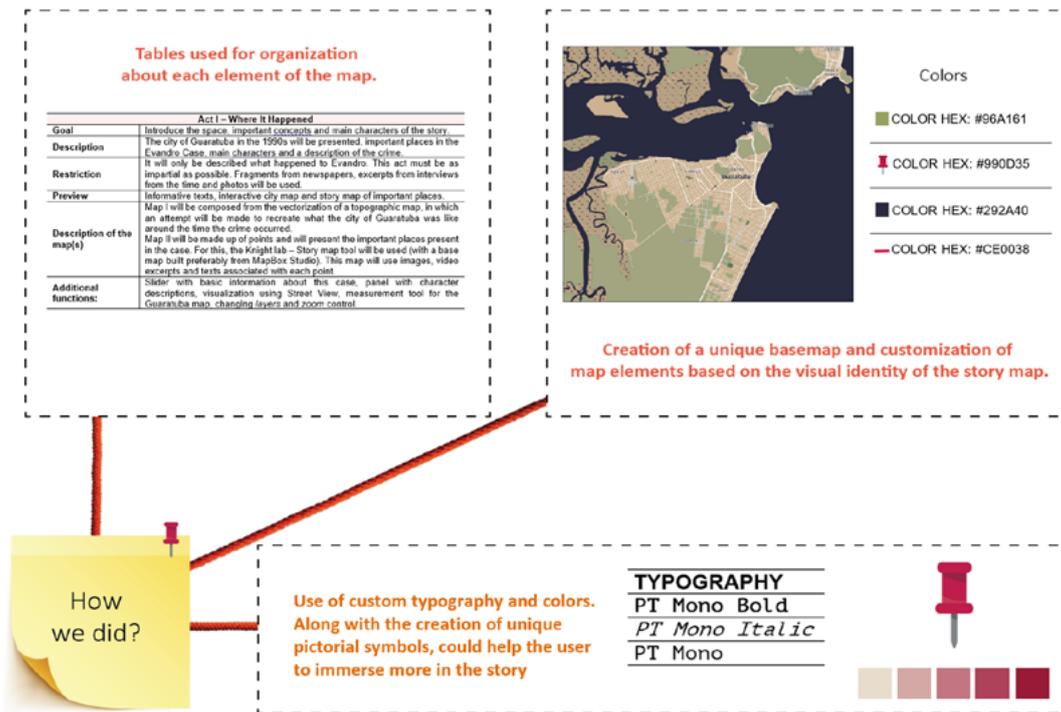


Source: Adapted from Sluter (2008) and Araujo et al. (2019).

**Figure 3:** Cartographic Design flowchart applied to Story Maps.

Throughout this flow, we employed “Design Thinking” techniques to keep the process interactive, performing multiple validations during the development stage to ensure the result aligned with the established storytelling goal.

The ‘Evandro Case’ has gained notable popularity in the ‘True Crime’ genre, a facet of pop culture encompassing films, series, podcasts, books, and other media focusing on real-life crimes, as discussed by Moreira and Bonafé (2022). In developing the project’s visual identity, it was crucial to adhere to this genre’s thematic elements consistently. The design elements previously established for the web pages and visual identity were instrumental in shaping the maps. We created a custom base map, incorporated themed pictorial symbols, selected a colour palette dominated by dark tones to convey mystery, and enhanced choropleth maps with gradient colours. Additionally, careful typography selection ensured that each map resonated with the narrative’s central theme. Figure 4 showcases the customised basemap and other significant features of the visual identity in the maps.



**Figure 4:** Personalization of the Map Design Applied to the True Crime Theme.

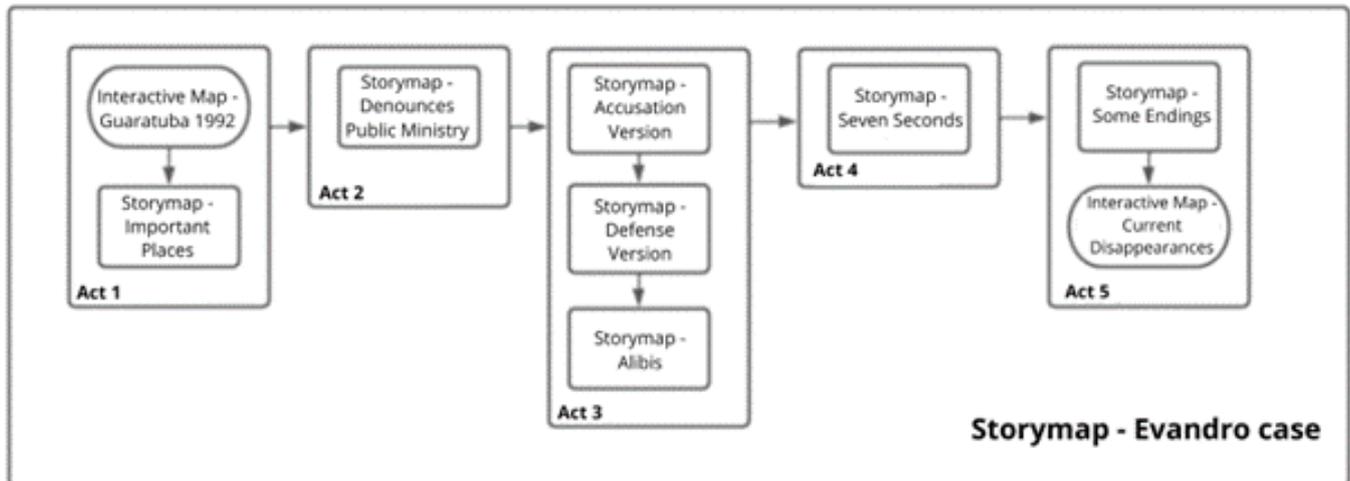
Developing interactive maps for storytelling presented unique challenges, as all elements had to be aligned with a specific narrative sequence. Unlike conventional maps, story maps necessitate meticulous planning to ensure the orderly representation of elements in line with the narrative timeline. The design of the map must not only present information but also serve the story's purpose. Integrating interactive features, 3D visuals, sensory components, and audiovisual and literary elements requires strategic planning. This approach not only delivers information at the right time, but also manages the user's cognitive load, increasing engagement with the narrative. Story maps create a connection with the characters, illustrate their interaction with the environment and immerse the user in the story. The design process for story maps transcends spatial representation; it involves the curation, organisation and presentation of information to weave a comprehensive tale with a clear beginning, middle and end, creating an immersive experience for the target audience.

These elements can be effectively organised and managed through collaboration tools such as Miro ([www.miro.com](http://www.miro.com)), a Design and Prototyping Tool, and Figma ([www.figma.com](http://www.figma.com)), an Online Collaborative Whiteboard Platform. These tools enable the team to collectively document key aspects of map design, including scale selection, cartographic language, and base map choices.

A critical aspect of these projects is addressing the temporal perception of the narrative. Firstly, it is essential to ensure that the temporal accuracy of the maps conforms to the story's timeline. Furthermore, user progression throughout the narrative must be considered. Therefore, it was imperative to determine the order of presentation of the resources in the story and anticipate the possible emotional responses that users may have with each map. A key thematic feature of the map is the line connecting various places, representing the narrative's timeline. This linear pattern, reminiscent of a red thread, was deliberately chosen to evoke imagery typical in classic detective stories. Such stories often depict boards with elements interconnected by threads, like evidence and maps. This design choice not only aligns with the criminal theme but also adds an element of intrigue and connectivity, mirroring the complex interplay of events in the narrative.

Figure 5 represents the interaction of each map with one another and the different acts. This figure shows how each map is incorporated into the various "acts" previously defined by applying Agile methodologies and

Freytag's Pyramid. Each map contains unique elements that play a critical role in the story, striving to establish an emotional connection with the user and provoke a range of feelings throughout the narrative.



**Figure 5:** Integration of Maps in the Proposed Narrative.

### 3. Results

The primary outcome of the proposed methodology, which integrated storytelling techniques with agile methods to develop the map design, resulted in a functional web system. This goal was achieved using programming and markup languages like HTML, CSS and Javascript. The system aims to immerse the user in the narrative of the Evandro case from a cartographic perspective. Various resources, including maps, historical aerial photographs, videos, images, newspaper reports, and custom pictographic symbols, were used to facilitate the user's connection with the maps. All external visual and spatial resources used have been appropriately attributed.

The True Crime theme, established at the beginning of the process, guided all decisions about the cartographic elements. From the choice of colour palette and typography to the arrangement of elements and the selection of user tools, this theme acted as a central guiding principle for all these decisions.

Equally important was the integration of storytelling techniques into the map design. It became clear that indiscriminate presentation of information to the user could detract from their experience and emotional engagement with the unfolding narrative. With its intricate web of twists and mysteries, the Evandro case presented a formidable challenge regarding the logical arrangement of content. Linking events to specific locations provided a novel perspective for telling the story. It also offered users the opportunity to virtually traverse the city, navigating its streets and understanding the different perspectives through a spatial perspective lens, thereby enhancing their experience. Figure 6 shows how elements of Freytag's pyramid were used to structure the acts of the story, and compares the standard version of the cartographic design with the customised version imbued with the True Crime theme.

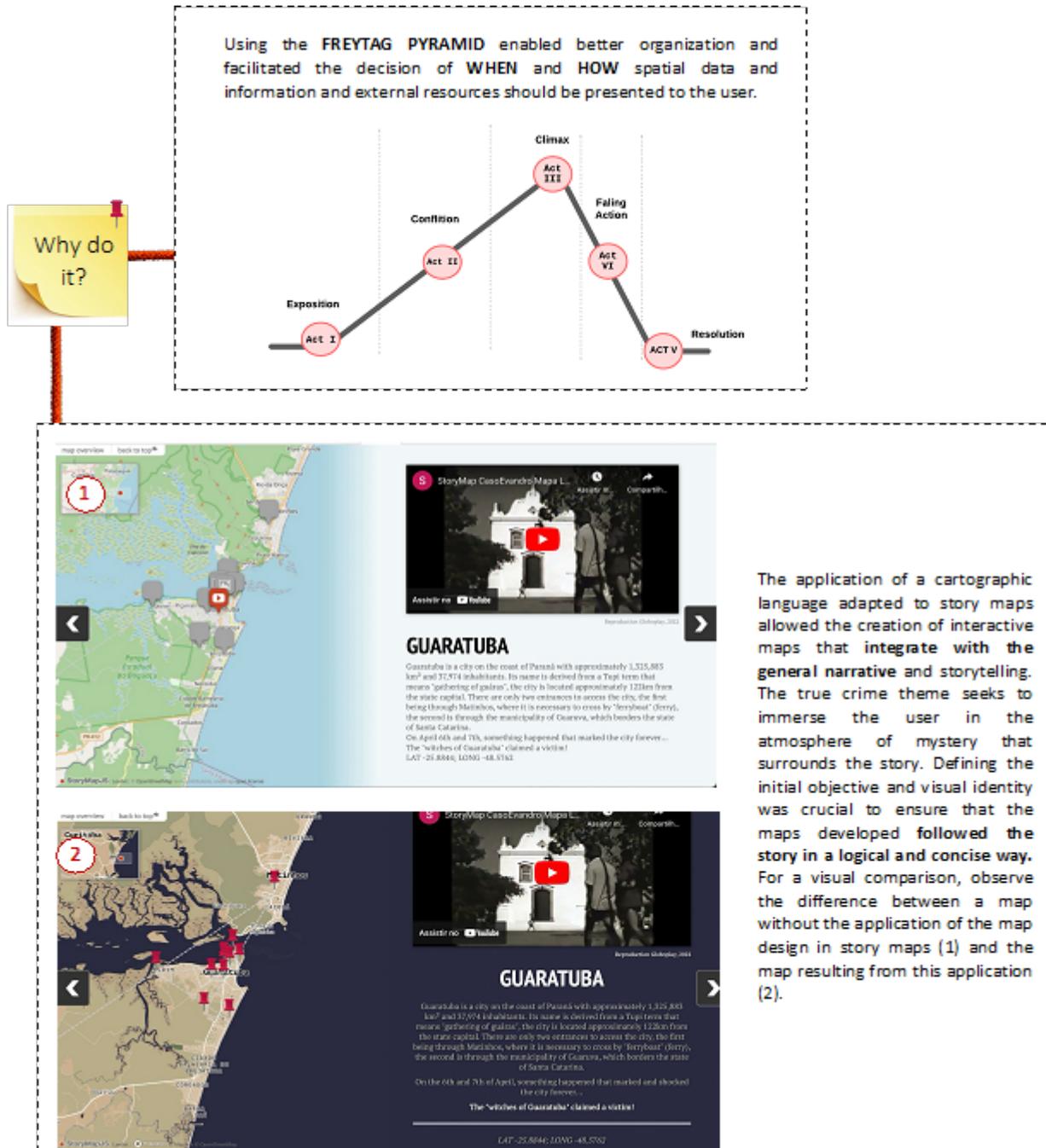


Figure 6: The application of the Map Design elements following the story narrative

Figure 7 summarises the main results, which include a total of sixteen interactive maps. Early on, the user is immersed in the atmosphere and overview of Caso Evandro, presenting a series of facts, characters and essential information for navigating the narrative. In addition, an interactive map is available with the main places surrounding this case, including historical orthoimages of the city at the time the crime occurred. Measurement and interaction tools are also offered so the user can feel free to investigate and draw their own conclusions. After the detailed introduction of the case, the user can explore different versions of the narrative, being informed about the contradictions and instigating facts involving the case. Using videos, photos, podcasts, custom maps, and elements of the true crime genre was a way to enhance the user’s narrative experience further, providing a unique spatial perspective on this crime.



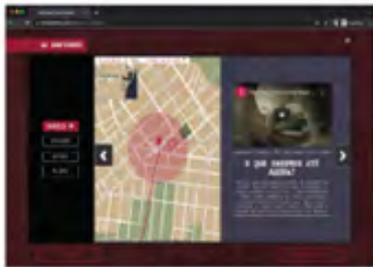
**Figure 7:** Main results of the Evandro Case Story Map.

Figure 8 shows the developed maps and their distribution in individual acts. In all, sixteen interactive maps were developed, and this figure reveals how each one of them was inserted into the narrative in a structured and coherent way. Each map is composed of unique graphic elements that collectively tell the complex and intriguing story of the Evandro Case, providing an immersive experience for the user to explore and understand the key events and the various perspectives involved in the case. The user is enabled to navigate through the places where the story unfolded, visualising and comprehending its elements, guided by a red line serving as a visual metaphor for these routes. With this thoughtful approach, users can immersively engage with the story's details and gain a comprehensive view of the events and scenarios involved in the case.

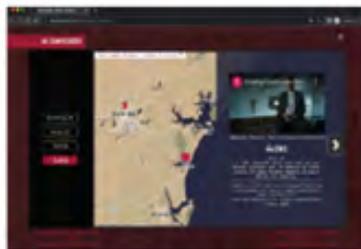
### THE STORY MAP OF EVANDRO CASE



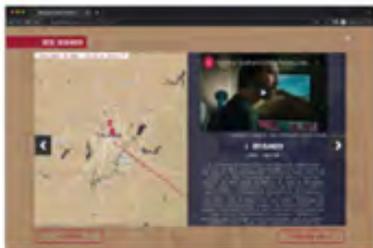
Introduce the Case - Act 1



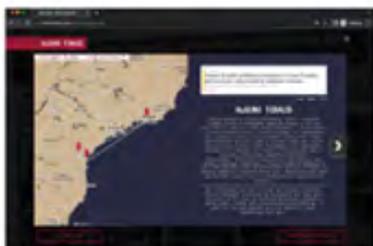
The hypothesis - Act 2



Different versions - Act 3



The truth (?) - Act 4



Some endings - Act 5

Figure 8: Outcome Maps grouped by Act.

The complete Story Map and its code, stored in a web repository (Github), can be accessed using the QR codes below (Figure 9).



Access the Evandro Case Story Map at:  
[bit.ly/github\\_storymap\\_casoevandro](https://bit.ly/github_storymap_casoevandro)



Access the Evandro Case Story Map at:  
[bit.ly/bgs\\_casoevandro](https://bit.ly/bgs_casoevandro)

**Figure 9:** QR codes and URLs for Repository Access (Left) and Online Access (Right).

## 4. Conclusions and Recommendations

Based on a podcast and corresponding books, creating this story map demonstrates the potential of the intersection of Storytelling Methods and Cartography. Spatial visualisations allow the user to traverse time and space, exploring the locations where the narrative unfolds, thereby understanding its elements more deeply. Furthermore, using story maps provides a unique opportunity to offer fresh perspectives on well-known and unfamiliar stories. This technique differentiates from other narrative practices, as spatial visualisation allows for a more comprehensive view of the events and places involved, whether real or imagined (Roth, 2021; Caquard, 2013). Finally, the amalgamation of storytelling processes and agile methodologies has shown promise in expanding cartographic communication, enhancing the potential for interactive dialogue with the user, and creating compelling visual narratives.

The assessment of user immersion is critical to the development and application of our methodology. Notable precedents, such as the study by Cope et al. (2018), have highlighted this by incorporating user testing to evaluate the narrative engagement of their Story Maps. Such evaluations are essential to ascertain whether the story map is achieving its intended goals. Going forward, it will be imperative to implement user testing and statistical analysis. These tools will quantify the level of user immersion and emotional connection with the story. Conducting these evaluations is not only important for improving the user experience but also for validating the overall usability of the product.

It is also worth noting the essential role of traditional cartographic methods in creating story maps. While the digital age has expanded the tools and methods available to us, the basic principles continue to serve as the foundation for these innovative approaches. Adapting these methods to create story maps is not only a technical change but also a conceptual one. Combining the time-honoured practice of mapmaking with the art of storytelling allows for a unique narrative experience rooted in geographic awareness and understanding.

Historically, maps have always held a storytelling role, painting pictures of unknown lands, illustrating the journeys of explorers, or charting the progression of wars and conflicts. They act as silent narrators of our collective past, capturing snapshots of the world as it once was. Today's story maps perpetuate this tradition, guiding readers through narratives enriched by visualisation. The Evandro Case Story Map exemplifies this, bridging history with the

present and opening avenues for future exploration and understanding.

The work developed aimed to illustrate the development of a story map, as presented throughout the article. Although it shares similarities with conventional interactive maps, this type of map has particularities that make it a non-trivial challenge. This is because, in addition to demanding a detailed study of how the information will be presented (i.e., the map design itself), it is also necessary to define which storytelling techniques will be applied to ensure that this information is presented in the most effective and captivating way possible (Roth, 2015).

It is important to highlight that creating visual cartographic stories is not restricted to criminal themes. Any story and theme can be adapted into a story map if the appropriate peculiarities are considered. In addition to the basic concepts common in map design, such as cartographic symbols, target audience, data source, minimum and maximum scales, and layout, story maps also require incorporating narrative concepts in their creation. This is because these maps provide information and contextualise the theme within its physical space and in relation to the other elements of the narrative (Caquard, 2013; Harris, 2015).

Furthermore, these maps directly relate to the characters and demonstrate how they interact with space. Cartographers must consider not only the visual layout but also the narrative's organisation and presentation from both cartographic and storytelling perspectives. This involves balancing visual aesthetics with narrative flow, ensuring an engaging and meaningful user experience.

## AUTHOR'S CONTRIBUTION

All authors contributed equally.

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