1.INTRODUTION :

1.1 Project Overview :

"Heritage Treasures: An In-Depth Analysis of UNESCO World Heritage Sites in Tableau" is a data visualization project that aims to explore, analyze, and showcase the global distribution and characteristics of UNESCO World Heritage Sites. Using Tableau as the primary tool, the project transforms raw heritage data into interactive and insightful dashboards, helping users understand patterns, trends, and threats related to these culturally and historically significant locations.

The project focuses on key aspects such as:

- The geographical spread of heritage sites by region and country.

- Site categorization by cultural, natural, and mixed types.

- Identification of endangered sites and their causes.

- Temporal analysis of heritage site inscriptions.

- Area-based comparisons and visual storytelling.

By leveraging Tableau's powerful visualization capabilities, the project offers a user-friendly interface for students, researchers, and heritage enthusiasts to explore the richness of global heritage and the challenges it faces.

1.2 Purpose of the Project:

- To analyze and visualize global UNESCO World Heritage data for better understanding of their distribution, type, and historical value.
- To identify patterns and trends in heritage site inscriptions, such as growth over time or regional dominance.
- To raise awareness about endangered heritage sites and promote cultural preservation through data-driven insights.

2.IDEATION PHASE :

2.1 Problem Statement :

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.
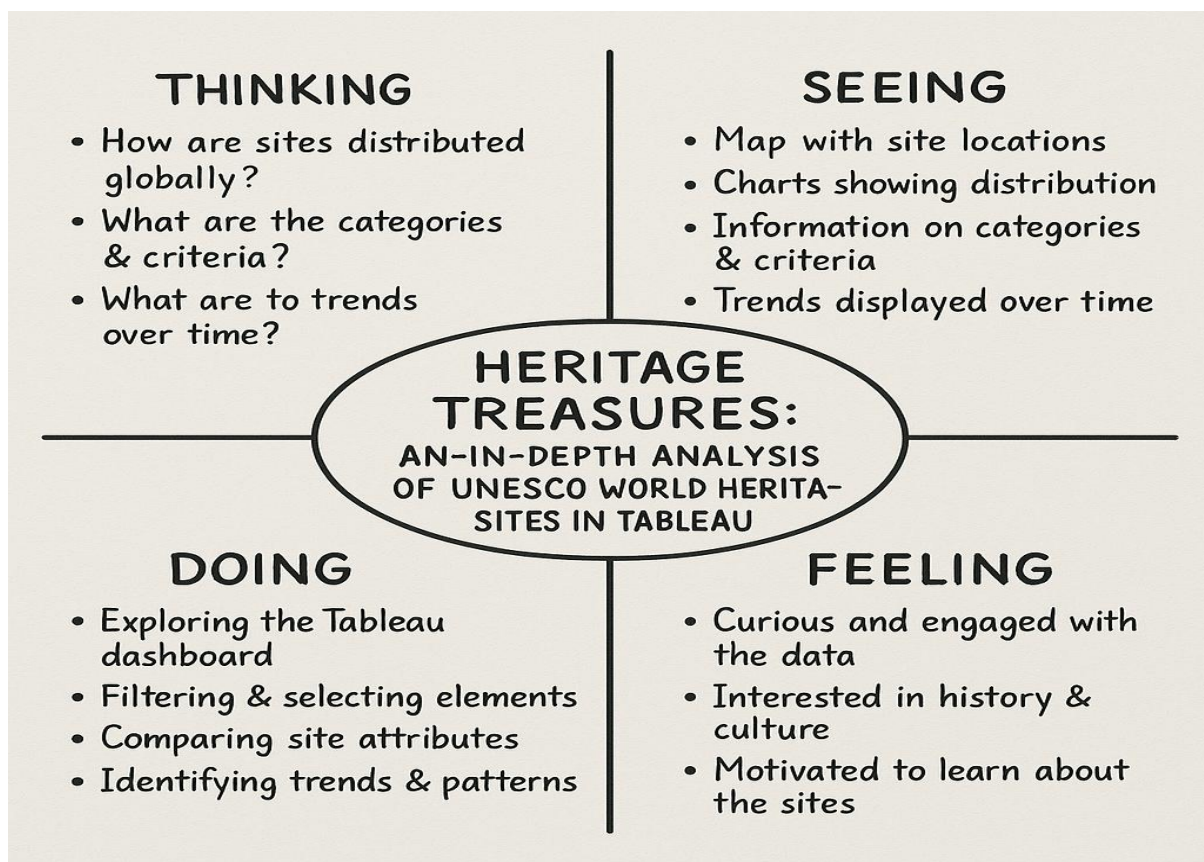
A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able

to empathize with your customers, which helps you better understand how they perceive your product or service.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Data analyst	How global heritage trends	Data isn't visually engaging	it's in basic tabular form	limited when presenting insights
PS-2	Heritage researcher	identify endangered sites	raw data is hard to analyse	it lacks clear visualization tools	Unsure about site risks

2.2 Empathy map Canvas :

This project explores global UNESCO World Heritage Sites using data visualization. It identifies endangered sites and analyzes patterns by region, type, and area. The goal is to support informed preservation strategies through insights. Stakeholders include conservationists, policymakers, and cultural organizations. Tableau dashboards present interactive views of heritage site trends. This empowers better planning to protect humanity's cultural and natural treasures.

THINKING
- How are sites distributed globally?
- What are the categories & criteria?
- What are to trends over time?

SEEING
- Map with site locations
- Charts showing distribution
- Information on categories & criteria
- Trends displayed over time

HERITAGE TREASURES:
AN-IN-DEPTH ANALYSIS OF UNESCO WORLD HERITA- SITES IN TABLEAU

DOING
- Exploring the Tableau dashboard
- Filtering & selecting elements
- Comparing site attributes
- Identifying trends & patterns

FEELING
- Curious and engaged with the data
- Interested in history & culture
- Motivated to learn about the sites

2.3 Brainstorming :

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Step-1: Team Gathering, Collaboration and Select the Problem Statement

Our team collaborated virtually and reviewed the WHC Sites 2019 dataset. After thorough discussion, we selected the problem statement:
"To analyze and visualize the global distribution, area, and danger status of UNESCO World Heritage Sites using Tableau for insightful storytelling."

Step-2: Brainstorm, Idea Listing and Grouping

We brainstormed several ideas based on the columns and data in the WHC dataset:

- Visualizing number of heritage sites by region and country.
- Identifying top 10 largest sites by area.
- Pie chart showing distribution of site types (Cultural, Natural, Mixed).
- Danger status analysis: total and by region.
- Year-wise growth or trends of site registrations.
- Highlighting endangered sites with high area or cultural value.
- Mapping sites geographically using Tableau.

We grouped these ideas into:
- Distribution Analysis (Region, Country, Type)
- Risk/Danger Status Analysis
- Temporal Analysis (Years)
- Geospatial Mapping

Step-3: Idea Prioritization

We prioritized the following ideas for implementation:

1. Top 10 Regions by Area – High impact, good visual story, easy using Tableau.

2. Danger Sites Analysis – Relevant to UNESCO's conservation goals.

3. Site Type Distribution Pie Chart – Useful summary for cultural/natural/mixed.

4. Year-wise Forecasting of Sites – Adds a time-based analysis angle.

These ideas were selected based on their ability to convey meaningful insights and ease of visualization within Tableau.

3.REQUIREMENT ANALYSIS :

3.1 Customer Journey Map :
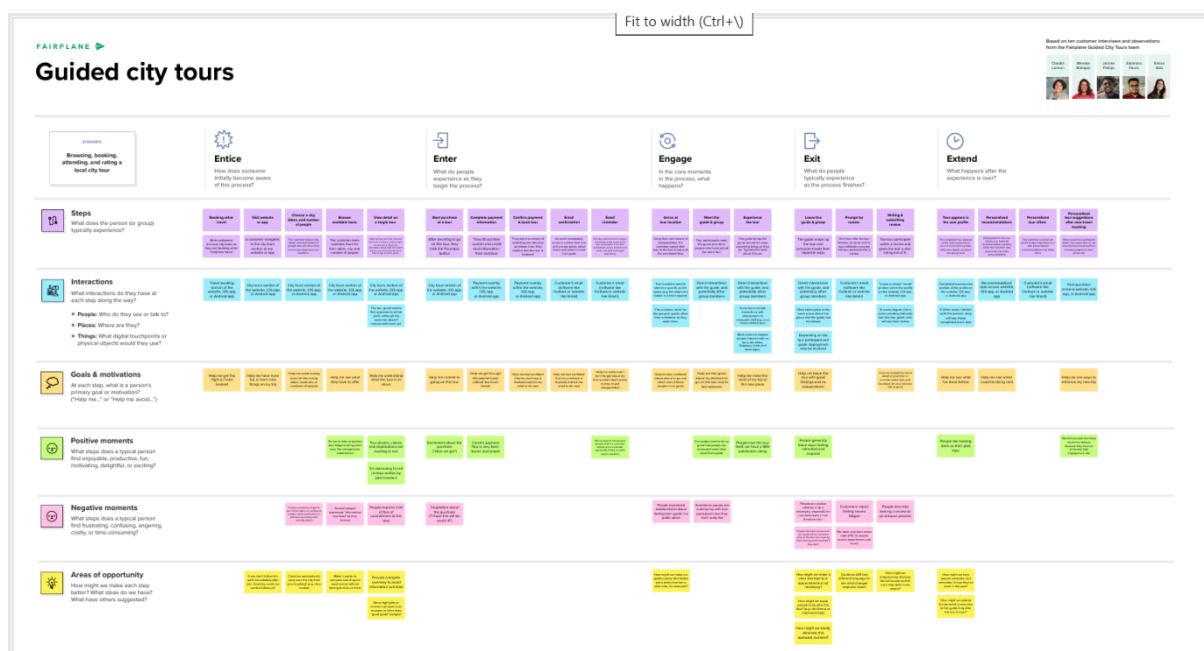
3.2 Solution Requirement :

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Acquisition & Integration	The solution must be able to connect to and ingest data related to UNESCO World Heritage Sites.
FR-2	Interactive Visualizations	An interactive world map displaying the location of all UNESCO World Heritage Sites.
FR-3	Drill-down and Drill-through Capabilities	Users should be able to click on summary visualizations (e.g., a bar representing a country) to see the underlying sites.

| FR-4	Exporting and Sharing	Users should be able to export visualizations and data (e.g., to PDF, image, CSV).

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	• Intuitive and easy-to-navigate interface. • Clear and concise labels, titles, and legends.
NFR-2	**Security**	• If hosted on a server, appropriate user authentication and authorization mechanisms should be in place. • Data privacy considerations should be addressed.
NFR-3	**Reliability**	• The dashboards should be stable and free from crashes or errors. • Data connections should be robust.
NFR-4	**Performance**	• Dashboards and visualizations should load within 5 seconds for typical user interactions. • Filters and sorting operations should respond within 2-3 seconds.
NFR-5	**Availability**	• Intuitive and easy-to-navigate interface. • Clear and concise labels, titles, and legends.
NFR-6	**Scalability**	• The solution should be able to handle potential growth in the number of UNESCO sites and associated data without significant performance degradation.

3.3 Data Flow Diagram :

The "Heritage Treasures" project aims to provide an in-depth analysis of UNESCO World Heritage Sites using Tableau. It involves a project planning phase covering product backlog, sprint planning, user stories, and story points. The project also includes tracking velocity and creating burndown charts to monitor progress. Data acquisition, cleaning, and visualization are key processes, leading to an interactive Tableau dashboard for users. The project follows an agile approach, utilizing sprints to manage development.
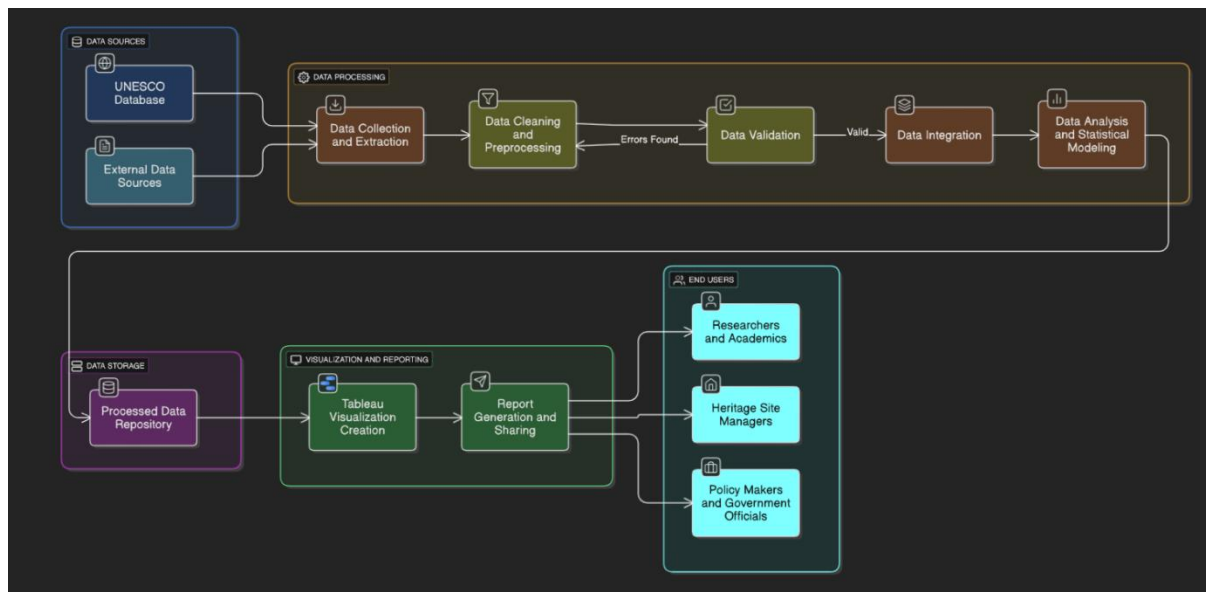
3.4 Technology Stack :

The project leverages a modern data visualization and analytics stack tailored for geographic and cultural data exploration. At its core, Tableau Public is used as the primary visualization platform, enabling the creation of dynamic dashboards and interactive charts that provide deep insights into global UNESCO World Heritage Sites. Microsoft Excel and Google Sheets serve as data preprocessing tools, facilitating data cleaning, filtering, and formatting before importing into Tableau.

To ensure accurate and updated heritage information, data is sourced from UNESCO's official datasets in CSV and JSON formats. OpenRefine or Power Query may be employed for more advanced data wrangling and transformation tasks. The project also uses Geo-spatial mapping features in Tableau, allowing rich geographic visualizations such as maps categorized by region, country, or heritage type.

Python (with libraries like Pandas and Matplotlib) can be optionally integrated for deeper data analysis or to generate additional statistical insights. Additionally, Canva or Figma might be used to design supporting visuals or infographic elements for storytelling purposes. The project is published and shared via Tableau Public Gallery, ensuring accessibility and

interactivity for global users. Overall, the stack supports an end-to-end data storytelling pipeline—from data collection to impactful visualization.

4. PROJECT DESIGN :

4.1 Problem Solution Fit :

Despite the global recognition of UNESCO World Heritage Sites, there is a lack of accessible, visually engaging platforms for analyzing and understanding their distribution, types, regional statistics, and current threats such as endangerment or degradation. Raw datasets can be overwhelming and uninformative to the average user or policy-maker.

This project leverages Tableau to transform complex UNESCO heritage site data into interactive, visually compelling dashboards. It provides clear insights into trends, categories, regional distributions, danger zones, and area analytics, making the information easy to explore and understand for educators, students, travellers, and heritage conservationists.

Purpose:

- To create interactive Tableau visuals of UNESCO World Heritage Site data.
- To raise awareness about cultural and natural heritage.
- To support heritage protection through data insights.

Template:

1. CUSTOMER SEGMENT(S) — CS	6. CUSTOMER CONSTRAINTS — CC	5. AVAILABLE SOLUTIONS — AS	Explore AS, differentiate
Who is your customer? i.e. working parents of 0-5 y.o. kids. Students, educators, researchers, heritage conservationists, data analysts, and cultural organizations interested in heritage data.	What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. • Limited data literacy or Tableau skills. • Restricted internet access in some regions. • Budget and resource constraints for advanced tools.	Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking • Static UNESCO website reports or Excel sheets (hard to interpret). • Limited online maps (basic filters, not interactive). • Some general-purpose dashboards (not focused on heritage).	
2. JOBS-TO-BE-DONE / PROBLEMS — J&P	9. PROBLEM ROOT CAUSE — RC	7. BEHAVIOUR — BE	Focus on J&P, tap into BE, understand RC
Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides. • Need to explore UNESCO World Heritage data for research or awareness. • Difficulty in understanding raw heritage trends data • Lack of visual tools for comparative and regional analysis.	What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. Heritage data is often presented in static formats without visual aids, making it hard for non-experts to understand and use it effectively.	What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace). • Searching UNESCO site or reports. • Using Excel or online infographics. • Referencing news or cultural articles for basic insights.	
3. TRIGGERS — TR	10. YOUR SOLUTION — SL	8. CHANNELS of BEHAVIOUR — CH	Extract online & offline CH of BE
• Academic or school projects requiring heritage data. • News about endangered heritage sites.	An interactive Tableau-based dashboard that transforms complex UNESCO heritage data into user-friendly, engaging visual insights—helping people explore site distribution, categories, endangered locations, and area trends.	• Google search, UNESCO website, Tableau Public, YouTube for	
4. EMOTIONS: BEFORE / AFTER — EM		8.2 OFFLINE • Discussions in classrooms or heritage clubs. • Visits to heritage sites or museums.	
• Before: Overwhelmed, confused by raw data. • After: Informed, curious, engaged, visually satisfied.			

References:

1. https://www.ideahackers.network/problem-solution-fit-canvas/
https://medium.com/@epicantus/problem-solution-fit-canvas-aa3dd59cb4fe

4.2 Proposed Solution :

The proposed solution aims to create an interactive, user-friendly data visualization dashboard in **Tableau** that provides in-depth insights into UNESCO World Heritage Sites across the globe. By gathering data from reliable sources such as the **UNESCO World Heritage Centre**, the project will preprocess and clean the data to ensure accuracy and usability.

This data will then be transformed into a series of engaging visualizations—including **maps**, **bar charts**, **pie charts**, and **trend lines**—to represent various attributes such as **site categories (cultural, natural, mixed)**, **geographical distribution**, **threat level (endangered sites)**, **area size**, and **year of inscription**. The dashboard will allow users to filter and explore the data by **region**, **country**, **site type**, and **threat level**, making it a powerful tool for researchers, students, travellers, and policymakers.

By presenting complex heritage data in a visually intuitive way, this solution promotes awareness, supports cultural preservation efforts, and encourages deeper exploration of the world's most treasured historical and natural landmarks.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	There's a lack of accessible, interactive data visualization for UNESCO World Heritage Sites. This hinders researchers, tourists, educators, and policymakers from efficiently exploring trends, distribution, or conservation status. Current information is scattered, lacking a unified, dynamic interface for insights.
2.	Idea / Solution description	The solution is "Heritage Treasures," an interactive Tableau dashboard for comprehensive analysis of UNESCO World Heritage Sites. It involves collecting and structuring data (location, type, threats, etc.). The dashboard offers dynamic views for geographical distribution, temporal trends, and categorization, allowing users to filter and explore data.
3.	Novelty / Uniqueness	"Heritage Treasures" is unique due to its integrated, highly interactive Tableau-based approach to heritage site analysis. It offers dynamic filtering and cross-dataset analysis, unlike static reports. The user-friendly interface empowers non-technical

		users to derive complex insights from multi-dimensional heritage data.
4.	Social Impact / Customer Satisfaction	This solution will significantly increase public awareness and understanding of global heritage, serving as an invaluable educational tool. It fosters appreciation for conservation and promotes responsible tourism, contributing to site preservation. Customer satisfaction will stem from the dashboard's ease of use, deep insights, and visual appeal.
5.	Business Model (Revenue Model)	Initially a free educational tool, future revenue could come from premium features or subscriptions for advanced analytics. Other avenues include consulting services for organizations, partnerships with heritage/tourism bodies, or API access to structured data.
6.	Scalability of the Solution	"Heritage Treasures" is highly scalable, with Tableau supporting large datasets and regular updates as new sites are inscribed. The framework can expand to include more granular details or integrate additional datasets. The web-based platform ensures broad accessibility and handles increased users efficiently.

4.3 Solution Architecture :

The solution architecture of *"Heritage Treasures: An In-Depth Analysis of UNESCO World Heritage Sites in Tableau"* involves a streamlined data analytics workflow. The raw UNESCO heritage dataset is first collected and cleaned using Excel or Python for accuracy and consistency. This refined data is then imported into Tableau, where interactive dashboards are built. These dashboards visualize key insights such as regional site distribution, heritage classifications (cultural/natural), endangered sites, and time-based trends, enabling users to explore and interpret global heritage patterns efficiently. Its goals are to:

- To visualize the global distribution of UNESCO World Heritage Sites by region, type, and country.
- To identify and highlight endangered heritage sites and analyze the threats they face.
- To explore trends over time, including the yearly addition of heritage sites.
- To raise awareness about the cultural and natural significance of heritage locations.
- To create an interactive dashboard that supports user-driven exploration and storytelling.
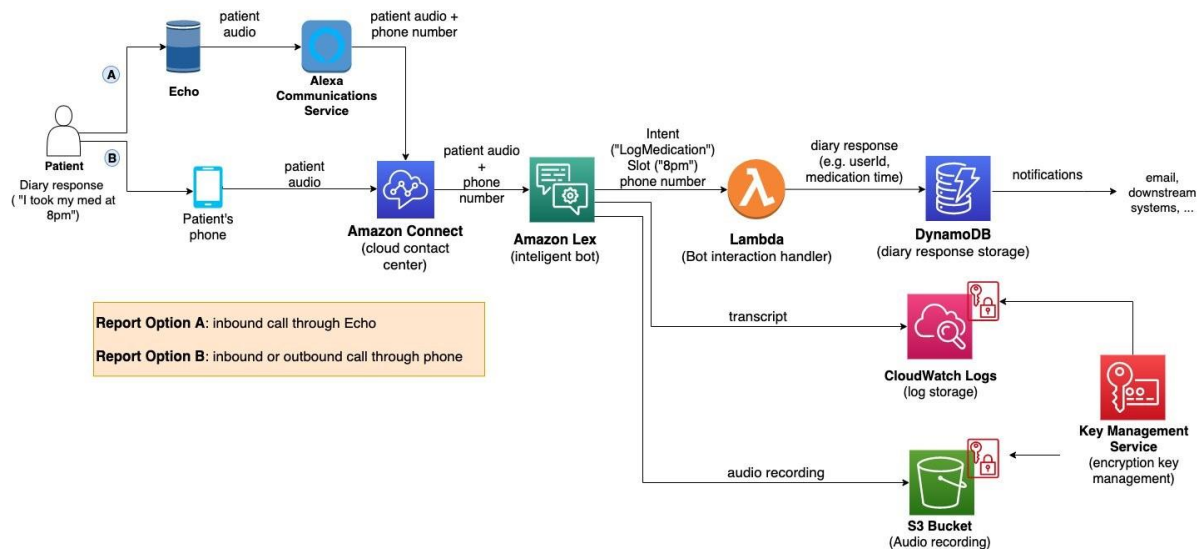
Example - Solution Architecture Diagram:

Figure 1: Architecture and data flow of the voice patient diary sample application

Reference: https://aws.amazon.com/blogs/industries/voice-applications-in-clinical-research-powered-by-ai-on-aws-part-1-architecture-and-design-considerations/

5. PROJECT PLANNING & SCHEDULING :

5.1 Project Planning :

5.1.1 Planning Logic :

Project Title: Heritage Treasures: An In-Depth Analysis of UNESCO World Heritage Sites in Tableau

Epic: An In-Depth Analysis of UNESCO World Heritage Sites in Tableau

This epic is too large to complete in one sprint and will be broken down into smaller tasks over multiple sprints.

Sprint 1: Data Acquisition & Preparation (5 Days)

- Story: Data Collection

  - Collecting UNESCO World Heritage Site data: 2 Story Points (Very Easy task)

  - Loading data into a suitable format: 1 Story Point (Very Easy task)

- Story: Data Preprocessing

  - Handling missing values in the dataset: 3 Story Points (Moderate task)

  - Handling categorical values (e.g., criteria, types): 2 Story Points (Easy task)

Sprint 2: Tableau Development & Deployment (5 Days)

- Story: Dashboard Building

    o Designing and building interactive Tableau dashboards: 5 Story Points (Difficult task)

    o Testing and refining dashboard functionality: 3 Story Points (Moderate task)

- Story: Deployment & Presentation

    o Preparing Tableau workbook for sharing/embedding: 3 Story Points (Moderate task)

    o Documenting insights and findings for presentation: 5 Story Points (Difficult task)

Velocity Calculation:

- Total Story Points (Sprint 1): 2 + 1 + 3 + 2 = 8 Story Points

- Total Story Points (Sprint 2): 5 + 3 + 3 + 5 = 16 Story Points

- Total Story Points Completed: 8 + 16 = 24 Story Points

- Number of Sprints: 2

- Velocity: Total Story Points Completed / Number of Sprints = 24 / 2 = 12 Story Points per Sprint

Your team's velocity is 12 Story Points per Sprint.

5.1.2 Project Planning Template :

The project planning for *"Heritage Treasures: An In-Depth Analysis of UNESCO World Heritage Sites in Tableau"* follows a structured approach divided into clear phases to ensure timely and efficient completion. It begins with the problem identification and goal definition phase, where the project's purpose—promoting awareness and understanding of World Heritage Sites—is outlined.

Next, in the data collection phase, relevant datasets are sourced from authentic sources such as UNESCO's official website. During the data preprocessing stage, tools like Excel and OpenRefine are used to clean, standardize, and filter the data for accuracy and consistency.

Once the data is ready, the visualization design phase begins, where the dashboard layout, key metrics, and chart types are planned. The development phase involves building interactive dashboards in Tableau using maps, bar charts, pie charts, and filters for an engaging user experience.

The testing and review phase follows to ensure accuracy, functionality, and usability of the dashboard. Finally, the project is published on Tableau Public for sharing and feedback. Throughout the process, regular milestones, timelines, and checkpoints are set to track progress and ensure alignment with the project's objectives.

6.FUNCTIONAL AND PERFORMANCE TESTING :

6.1 Performance Testing :

Performance testing for *"Heritage Treasures: An In-Depth Analysis of UNESCO World Heritage Sites in Tableau"* focuses on ensuring that the Tableau dashboards load efficiently, respond quickly to user interactions, and maintain reliability under varying levels of user activity and data volume.

The first step involves **load time testing**, where the dashboard is tested for initial load speed across different devices and internet conditions. A target load time of under 5 seconds is ideal to maintain user engagement. Following that, **filter responsiveness** is tested by applying various filters and parameters (e.g., by region, category, threat level) to ensure quick response without lag.

Next, **data scalability testing** is performed by increasing dataset size (e.g., simulating future data additions or extended heritage records) to assess if the dashboard still performs smoothly without crashes or slowdowns. **Stress testing** is also conducted by simulating multiple users accessing the dashboard simultaneously to verify Tableau Public's ability to handle concurrent users without performance degradation.

Browser compatibility testing ensures consistent performance across Chrome, Edge, Firefox, and Safari. Lastly, **visual integrity checks** confirm that all charts, maps, and filters render correctly and are not affected by performance optimizations.

Any performance bottlenecks identified during testing are addressed by optimizing calculated fields, reducing unused data, using extract-based data sources instead of live connections, and simplifying complex visualizations where necessary.

7. RESULTS :

7.1 Output Screenshots :
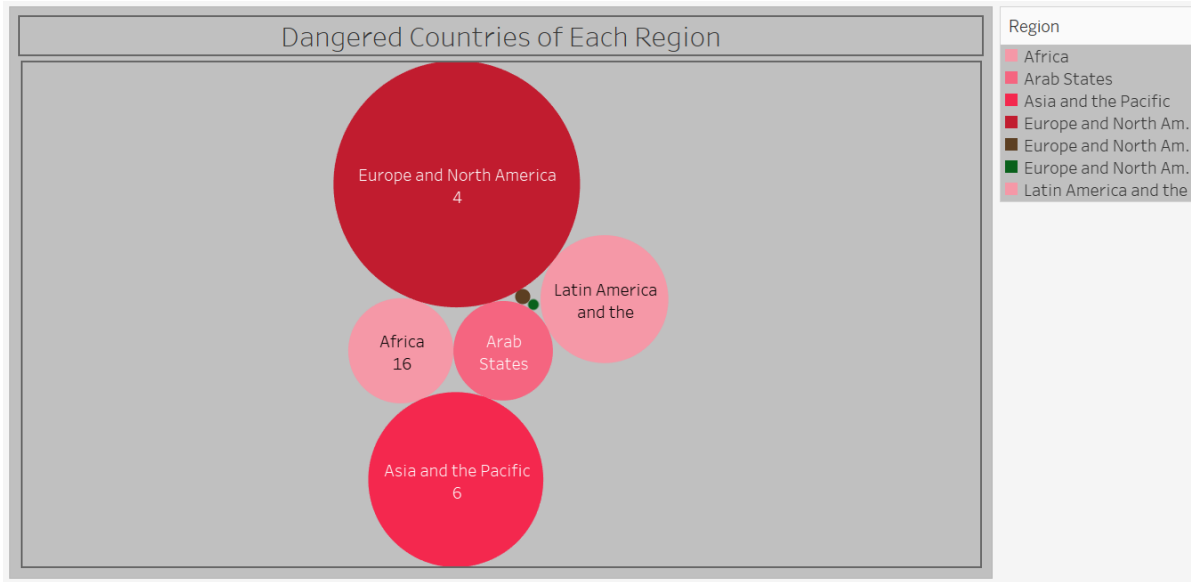
Fig 1 : Dangered Countries of Each Region

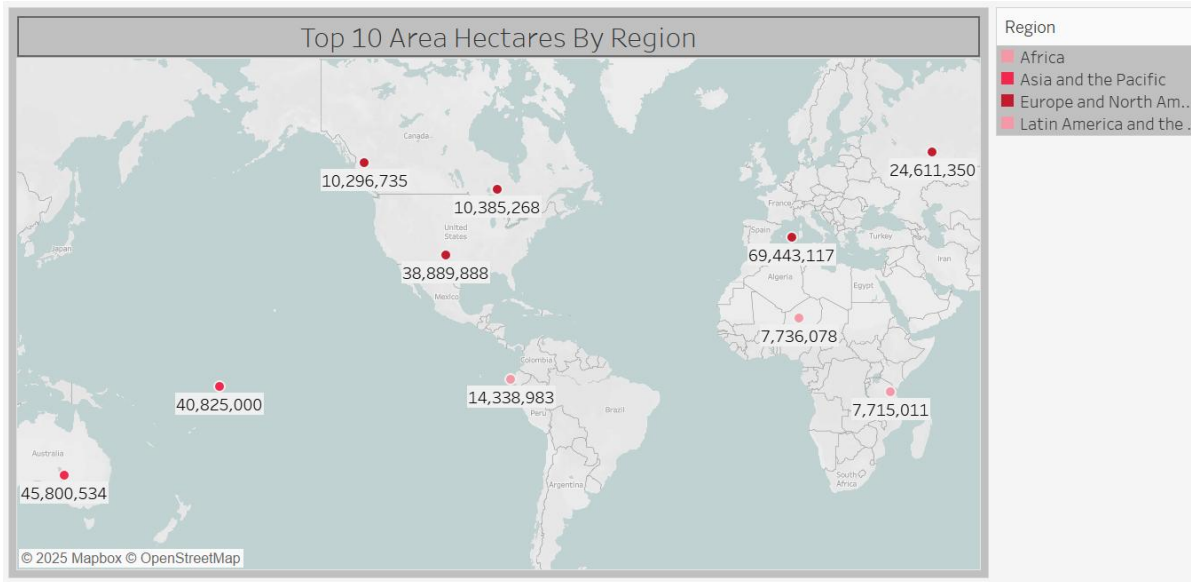**Fig 2 : Top 10 Area Hectares By Region**

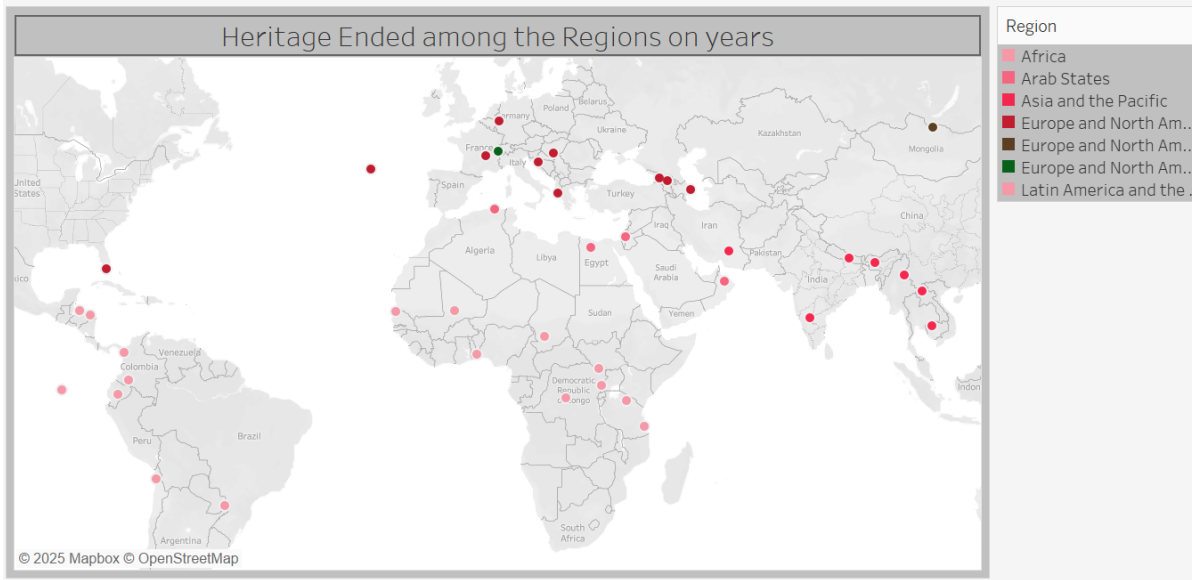**Fig 3 : Heritage Ended among the Regions on years**
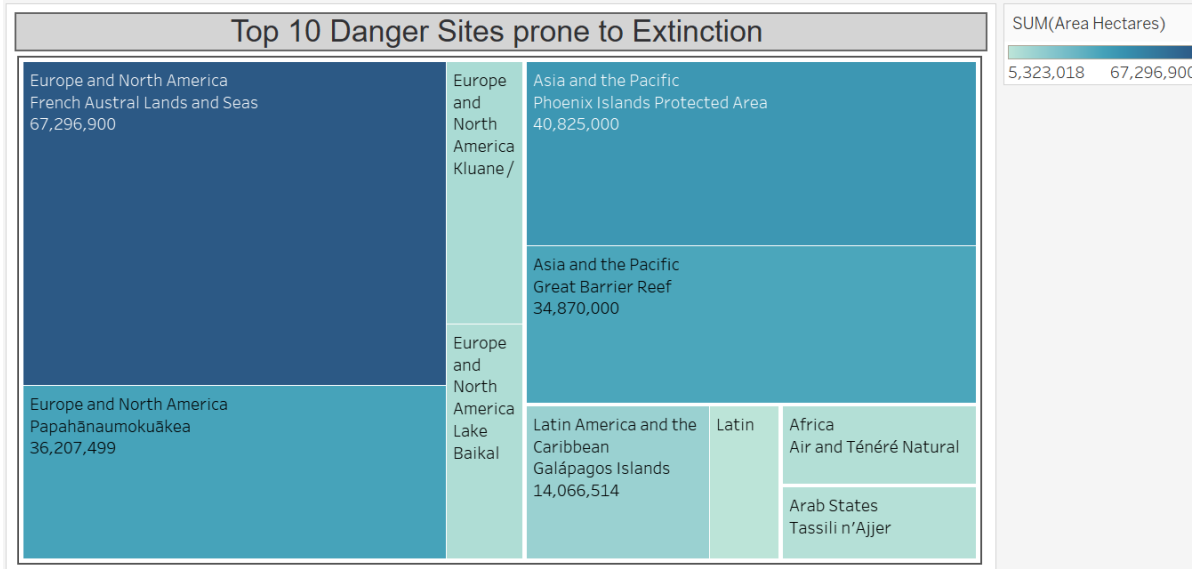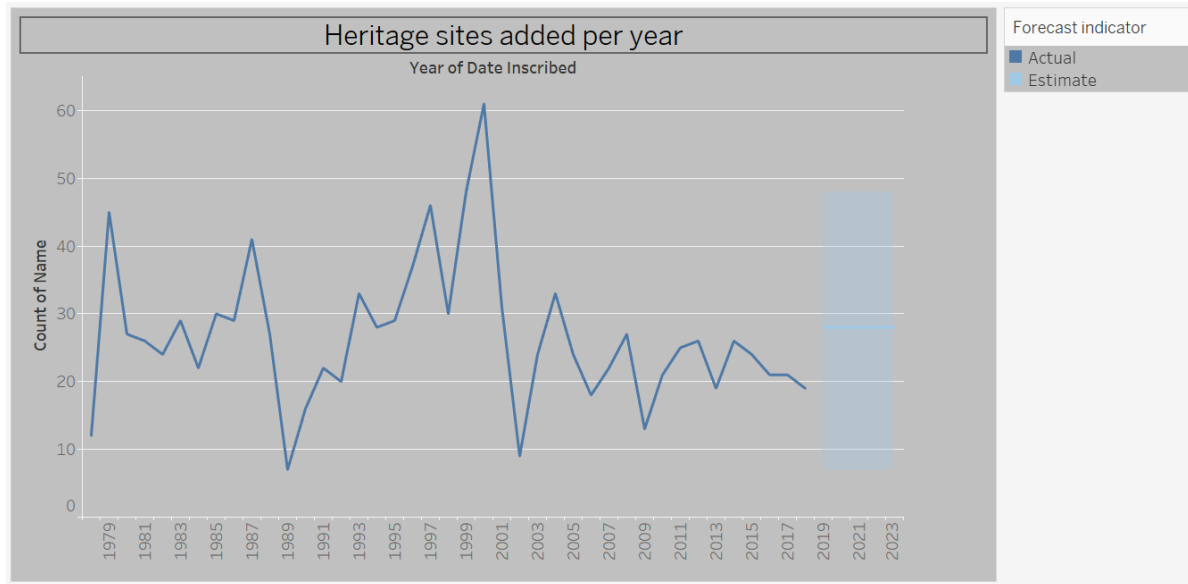

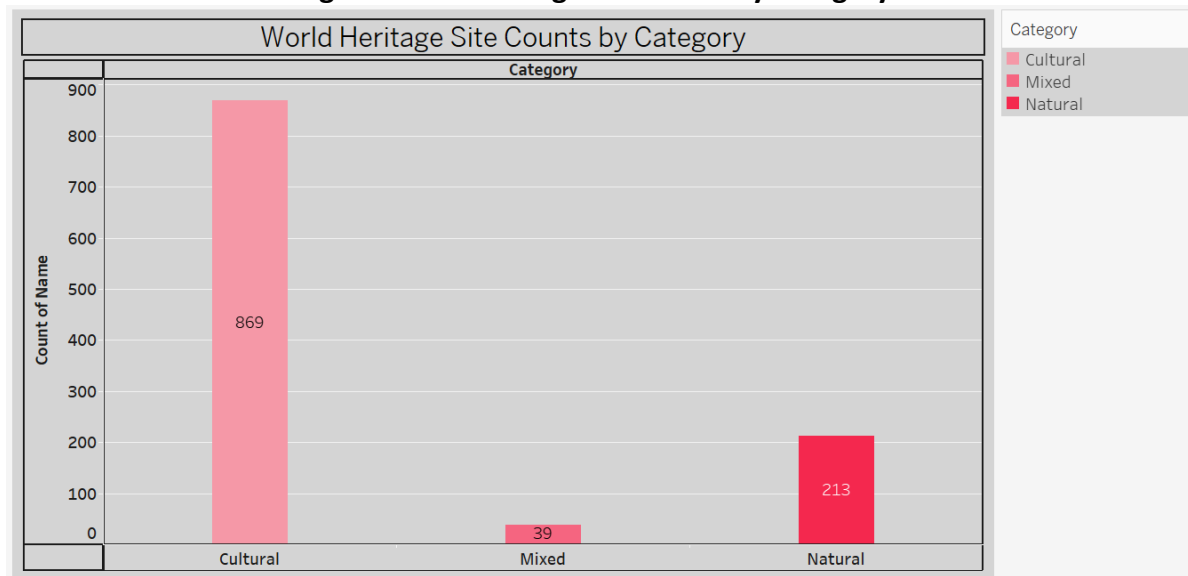**Fig 4 : Top 10 Danger Sites prone to Extinction**

Fig 5 : Heritage sites added per year
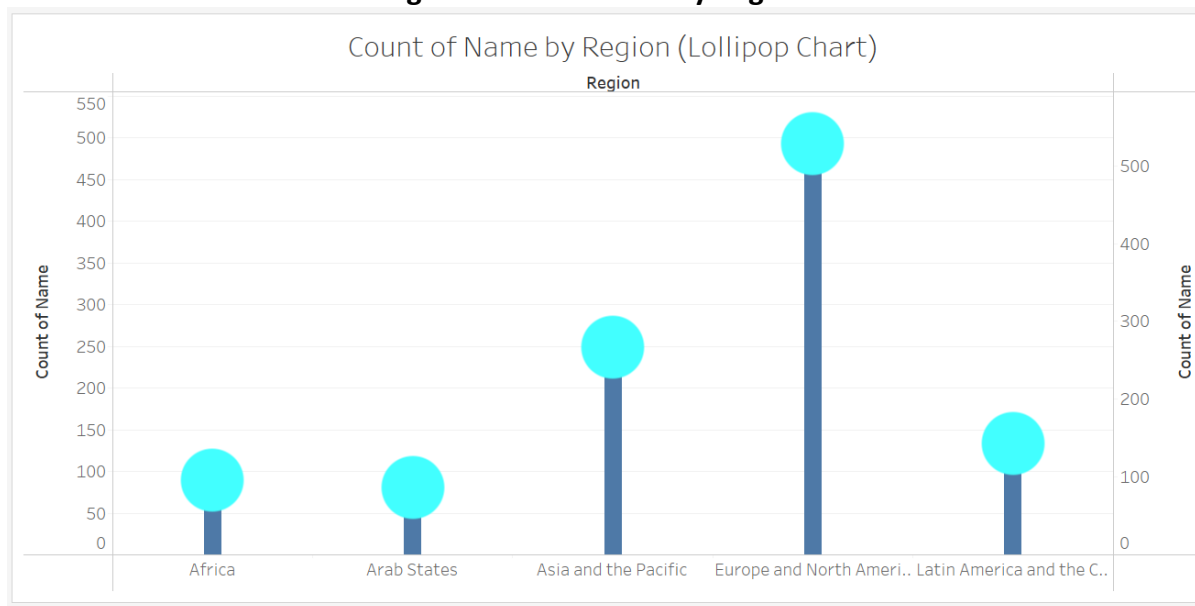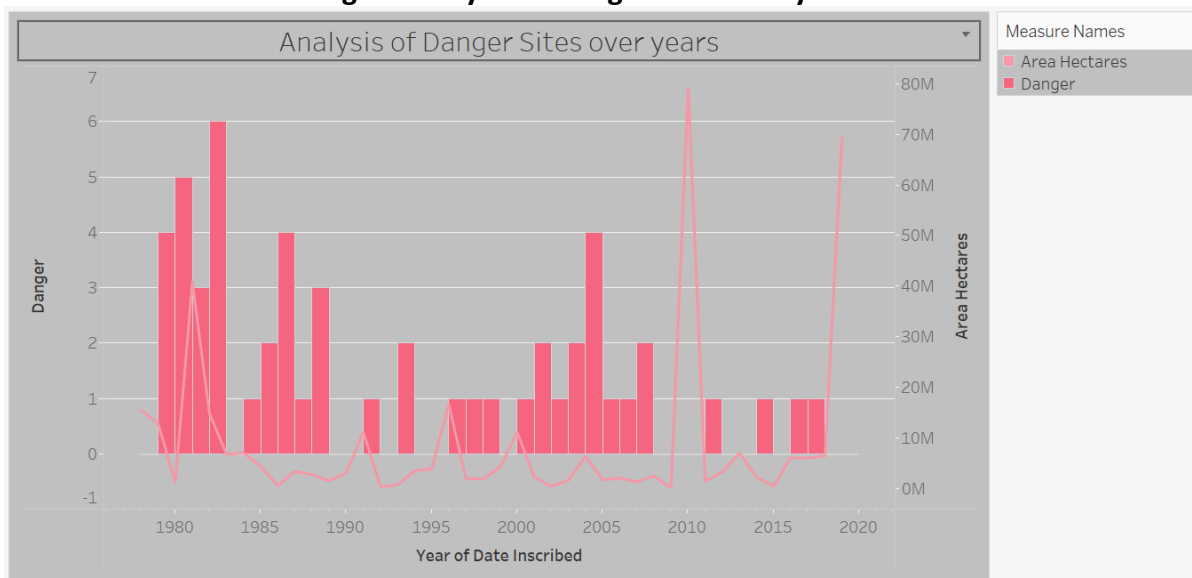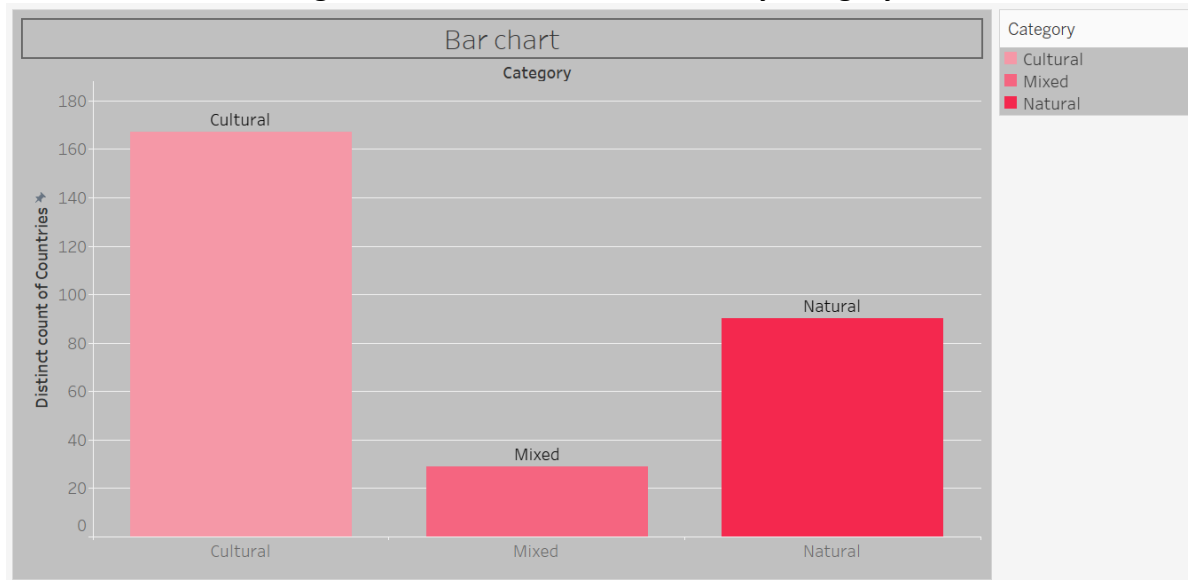

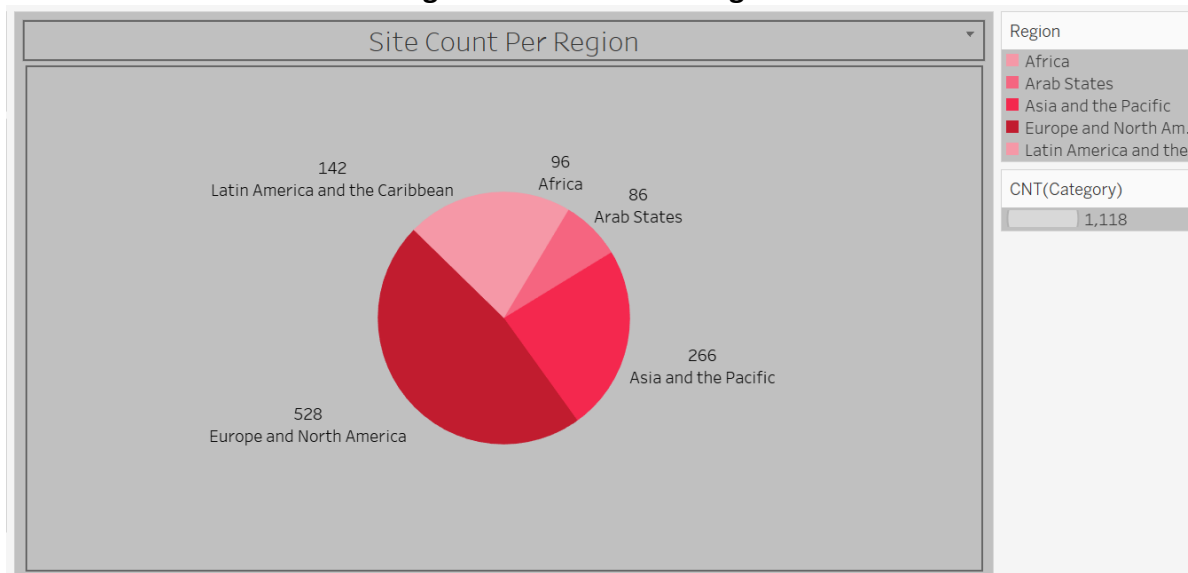**Fig 6 : World Heritage Site Count by Category**

Fig 7 : Count of Name by Region

Count of Name by Region (Lollipop Chart)

Fig 8 : Analysis of Danger Sites over years
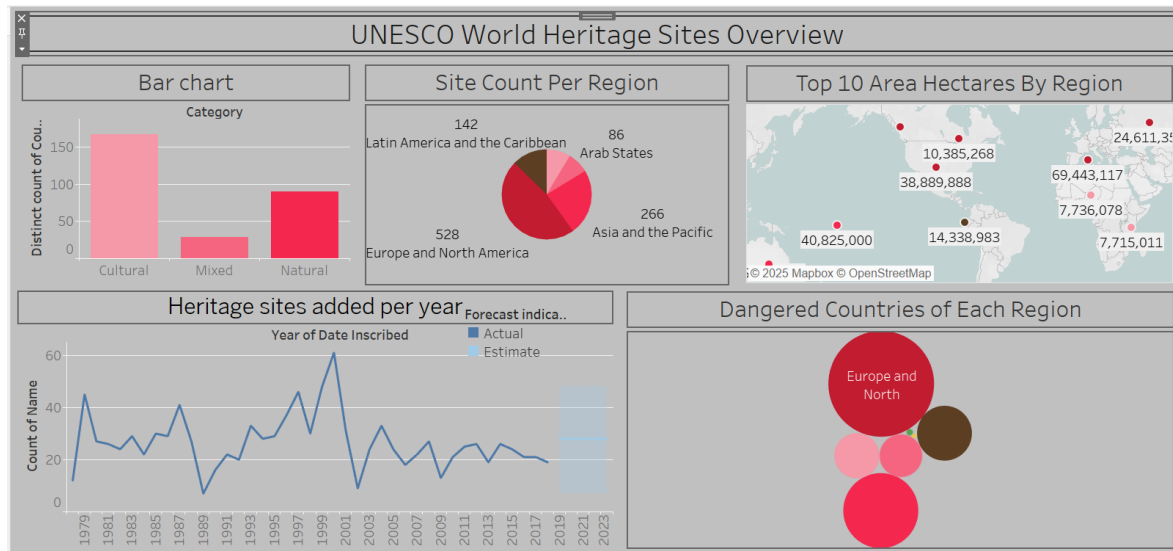

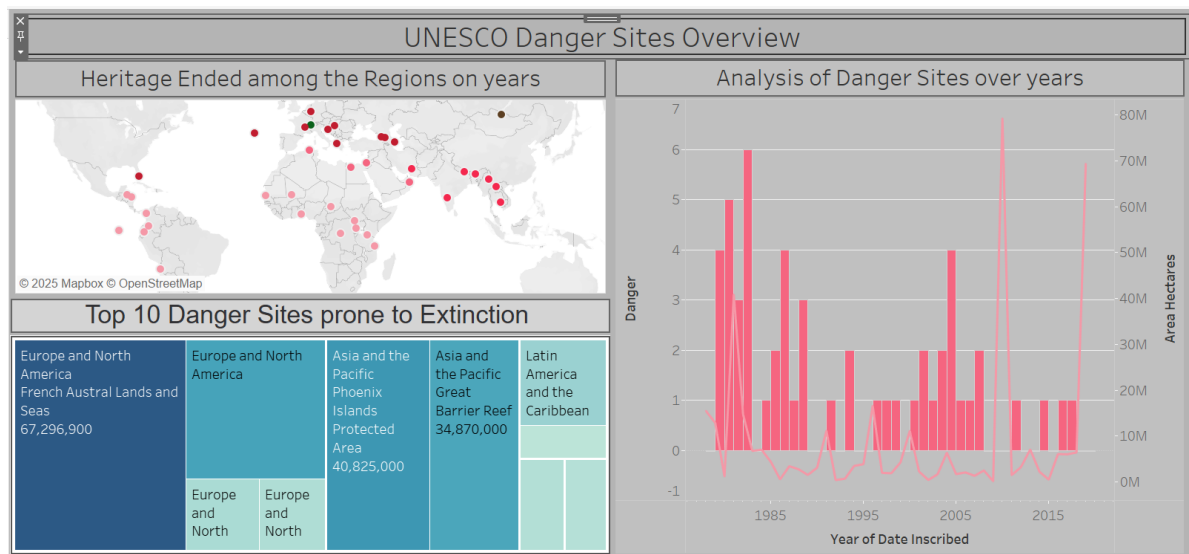Analysis of Danger Sites over years

Fig 9 : Distinct Count of Countries by Category

Fig 10 : Site Count Per Region

7.2 Dashboard Screenshots :

Dashboard 1

Dashboard 2

8.Advantages and Disadvantages :

Advantages :

- Interactive Visualization
  Tableau provides powerful dashboards that allow users to explore heritage site data by region, category, danger status, and year interactively.

- Data-Driven Insights
  Helps identify patterns, such as the most endangered heritage regions or trends in yearly site additions.

- User-Friendly Presentation
  Makes complex datasets understandable to non-technical stakeholders through clear visuals like maps, bar charts, and filters.

- Supports Conservation Awareness
  Raises awareness about at-risk sites and encourages support for heritage preservation efforts.

- Global and Historical Coverage
  Allows users to analyze heritage data across different countries and historical timelines.

- Custom Filtering and Drill-down
  Users can filter by country, region, or danger status and drill down for specific site information.

- Educational Value
  Useful for students, researchers, and tourists interested in culture, history, and geography.

- Time Series Analysis
  Can show how the number of UNESCO sites has grown or changed over the years.

Disadvantages :

- Data Quality Issues
  If the source data is outdated, inconsistent, or incomplete, the visual insights may be misleading.

- Geographical Limitations
  Some sites may not have precise coordinates, affecting map visualizations.

- Requires Tableau Skills
  Creating and modifying dashboards requires basic proficiency in Tableau, which may not be accessible to all users.

- Internet Dependency
  Tableau Public dashboards require an internet connection to access online visualizations.

- Static Data
  If the dataset isn't refreshed regularly, insights can become irrelevant over time.

- Limited Context
  Visualizations focus on metrics and trends but may not provide deep historical or cultural context for each site.

- Over-Simplification Risk
  Complex heritage issues may be oversimplified when shown only through visual summaries.

- Device Compatibility
  Some Tableau visualizations may not render well on small-screen devices without optimization.

9.Conclusion :

The project titled *"Heritage Treasures: An In-Depth Analysis of UNESCO World Heritage Sites in Tableau"* aimed to explore and analyze global heritage data through compelling visual storytelling. By utilizing Tableau, we transformed a vast and complex dataset into an interactive dashboard that enables users to examine heritage sites based on region, country, category (Cultural, Natural, Mixed), inscription year, and danger status.

This visualization brings clarity to the geographical and categorical distribution of heritage sites, making it easier to identify trends and areas that require urgent attention—particularly endangered sites. It supports data-driven insights into how heritage preservation has evolved over time and highlights regions with high cultural significance.

The project offers educational value, especially for students, researchers, conservationists, and tourism planners. It also aids in raising awareness about the global importance of safeguarding cultural and natural heritage. Despite a few limitations such as data completeness and technical prerequisites, the interactive nature of Tableau enhances user engagement and understanding.

Overall, this project showcases how data visualization can turn raw information into actionable insights, promoting informed discussions and collaborative efforts for global heritage conservation.

10.Future Scope :

The project *"Heritage Treasures: An In-Depth Analysis of UNESCO World Heritage Sites in Tableau"* has significant potential for future development and impact. As heritage conservation is a continuous global effort, the visualization platform can evolve in the following ways:

1. Real-Time Data Integration
   Incorporating live or regularly updated data from UNESCO and other cultural organizations can ensure that the dashboard remains current and relevant.

2. Incorporation of Multimedia Elements
   Enhancing the dashboard with images, videos, or 3D models of heritage sites can improve user engagement and provide a richer learning experience.

3. Detailed Country-Level Insights
   Expanding the analysis to include country-specific dashboards can help national authorities and researchers focus on local conservation efforts.

4. Predictive Analysis Using Machine Learning
   Integrating predictive analytics could help forecast which heritage sites are most at risk, based on factors like climate change, political instability, or urban expansion.

5. Public Engagement Features
   Adding interactive features like quizzes, feedback forms, or storytelling walkthroughs could increase awareness and participation from the general public.

6. Mobile and Multi-Device Optimization
   Optimizing the dashboard for smartphones and tablets will allow broader access for users on the go, especially travelers, students, and field researchers.

7. Partnership with NGOs and Governments
   The tool can be extended to support decision-making for NGOs, UNESCO, and governmental bodies working on site management and cultural preservation.

8. Tourism and Education Integration
   Linking the dashboard to tourism platforms or educational portals can support heritage tourism planning and curriculum development.

11.Appendix :

Dataset Link :- whc-sites-2019 - Copy.xls

Git Hub Link :- https://github.com/Pavankalyan-12395/Heritage-Treasures.git

Tableau File Link :-
https://public.tableau.com/views/Projectfile_17511154605450/Story1?:language=en-US&publish=yes&:sid=&:redirect=auth&:display_count=n&:origin=viz_share_link

Team ID   :   LTVIP2025TMID49827

Team Leader   :   Esambadi Pavan Kalyan

Team member   :   F Thasmiya

Team member   :   G Jayasree

Team member   :   G Kalyani