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Obra Graphia Art4Cause: Web-based Art Exhibit Management System with Data Visualization

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ABSTRACT

The Obra Graphia project developed a web-based platform designed to exhibit student artworks while advancing a socially-driven mission—providing financial assistance to underprivileged scholars. This system addresses key challenges faced by traditional art galleries, such as limited audience reach, spatial constraints, and resource management, by incorporating modern web technologies for intuitive navigation, personalized recommendations, and efficient inventory control. All submissions undergo administrative review prior to exhibition, ensuring quality and relevance. The system was developed using the Agile methodology, with testing results indicating high reliability—achieving an average of 95.5% in functional tests and 85% in non-functional evaluations. The project exemplifies how art and digital innovation can converge to drive meaningful social change and broaden access to local creative expression.

Key words: Web-based system, Art-for-a-cause, Digital gallery, Data visualization, Online art exhibit, Student artists, Social innovation

1. INTRODUCTION

Obra Graphia is a newly established art club at Saint Columban College, driven by a profound commitment to effecting positive change through the transformative power of art. Comprising a diverse group of student-artists, the club has set forth a mission to support financially challenged students in the community by leveraging artistic expression as a means of philanthropy. Through this initiative, Obra Graphia aims to identify scholars facing financial hardships and offer them support, enabling them to pursue their education without economic barriers. In doing so, the club not only fosters creativity and self-expression but also contributes to building a more equitable and inclusive academic environment. This endeavor aligns with the college's core values—wisdom, charity, and justice—heralding a transformative impact on both students and employees within the institution.

In the global context, the evolution of art curation and presentation is evident, as exemplified by institutions like the Art Gallery of New South Wales in Sydney, Australia. Here, exhibitions are increasingly shifting from traditional forms to contemporary expressions, challenging the spatial and conceptual boundaries of physical gallery spaces [1]. This transition demands new curatorial approaches that can embrace the diversity and dynamism of modern art forms, especially those from underrepresented regions such as Asia. Moreover, the COVID-19 pandemic has compelled galleries worldwide to reimagine their engagement strategies, with digital platforms emerging as vital tools for marketing, communication, and sales [2].

While the future of online art markets remains uncertain, their growth potential is undeniable. Platforms such as Artsy utilize algorithm-based recommendations to connect users with emerging artists and previously unfamiliar artworks, thereby enhancing art discovery and engagement. Although such platforms may not fully replicate the immersive experience of physical galleries, especially in establishing trust for high-value purchases—they significantly broaden access to art across geographic and socioeconomic boundaries [3]. In response, leading institutions are exploring digital exhibitions as inclusive and accessible alternatives, promoting cultural participation among a wider audience.

Within the Philippines, similar initiatives reflecting the ethos of Obra Graphia have gained traction, particularly in projects that blend art with advocacy. These initiatives celebrate the country's rich cultural heritage while fostering economic empowerment and community engagement. Government agencies such as the National Commission for Culture and the Arts (NCCA) and the Department of Tourism (DOT) have recognized the socio-economic and cultural value of such undertakings, advocating support for programs that nurture Filipino artistic talent and preserve cultural identity [4]. These efforts demonstrate the potential of art-based philanthropy to contribute meaningfully to national development and social cohesion.

Locally, Saint Columban College in Pagadian City faces distinct challenges in promoting arts education and appreciation. As a relatively small city, Pagadian lacks the infrastructure and institutional focus necessary to fully cultivate the visual arts. This has led to a gap in opportunities and recognition for aspiring artists, both within the college and the broader community. Financial constraints further hinder efforts to establish dedicated spaces for artistic activities, limiting the impact and growth of clubs such as Obra Graphia despite their passion and commitment.

In response to these challenges, the Obra Graphia Art Shop was conceptualized as a web-based platform designed to showcase and sell artworks created by student-artists. Far from being a conventional e-commerce site, the system intelligently manages sales distribution—automating the allocation of funds among artists, scholarship support, and operational needs. This virtual gallery enables contemporary artworks to flourish without the spatial limitations of physical venues, providing a seamless, user-centric experience for browsing and purchasing. By offering a diverse range of styles, the platform ensures that users can connect with artworks that resonate with their individual preferences [5].

Studies show that online channels play a crucial role in the awareness and information phase of art engagement, and are increasingly favored—particularly among New Generation Collectors (NGCs)—for written communication over in-person interactions during inquiry and purchasing stages [6]. The rise of digital platforms such as Saatchi Art illustrates how technology can democratize access to the arts, offering a user-friendly interface that alleviates geographical barriers and dispels the intimidation often associated with traditional galleries. These platforms encourage new collectors to explore and appreciate art in a comfortable, accessible manner—an approach mirrored by the goals of the Obra Graphia Art Shop [7]. Moreover, incorporating data visualization within the platform allows for real-time monitoring of engagement, sales trends, and donation flows, enabling data-driven decision-making that supports both artistic and social objectives [8].

This study aims to design, develop, and deploy the Obra Graphia Online Art Gallery—a web-based exhibit and e-commerce platform tailored to the needs of the Saint Columban College community. Artworks featured on the site will be exclusively contributed by student-artists, showcasing their talent while supporting a socially meaningful cause. The platform will integrate modern web technologies, a secure payment system, user-friendly navigation, and inventory management features. A distinctive functionality includes its built-in donation mechanism, allocating a percentage of each sale to a scholarship fund managed by Obra Graphia. With the support of social media integration and targeted digital marketing, the platform is poised to create a lasting online presence—promoting the creativity of local artists while advancing the values of social justice and inclusive education.
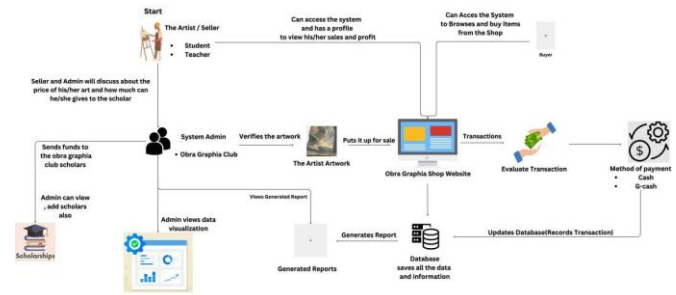
Figure 1: Product Perspective

Figure 1 presents the product perspective of a comprehensive system that aims to enable artists in the school community to exhibit and sell their works while also making it easier for customers to purchase artwork. The three tiers of the system's operation are artists, administrators, and customers. Within the system, artists affiliated with the school are provided with a platform to submit their artwork for review. These submissions are assessed by an administrative function to make sure they are suitable for sale and of high quality. Customers can purchase the artwork via the system's interface once they have been approved. Also, the system includes a charitable component by distributing a portion of the sales proceeds to the students and artists in the school. The system creates a comprehensive report detailing the financial distribution automatically after a sale. This report supports the dual goals of the system—to support both artistic endeavors and educational initiatives within the school by outlining the revenue allocated to both the artist who created the artwork and the scholars who benefit from the proceeds. This ensures transparency and accountability.

2. METHODOLOGY

The team has decided to use the Agile process model as a guide in developing the online art gallery. This decision is based on Agile's iterative and flexible approach, which allows for continuous feedback and improvements throughout the development cycle. The Agile model is particularly suited to the project as it enables adaptation to changing requirements and client feedback, ensuring the final product meets all user needs effectively. By using Agile, the project can be broken down into manageable sprints, allowing for regular assessment and realignment of priorities, thus ensuring a high-quality, user-friendly system. This approach is essential for delivering a robust, dynamic, and responsive online art gallery.

3. RESULTS

Defining clear and comprehensive requirements played a crucial role in developing the Obra Graphia platform. Its design and development was completed by implementing the phases of the Agile process model, each of which is outlined and discussed below:

3.1 Requirements Specification

During this phase, the team documented functional and non-functional requirements through meetings and consultations with key stakeholders, including artists and buyers. Additional insights were gathered from the adviser and officers responsible for overseeing transactions and scholarship fund allocations. This phase ensured that the platform's features aligned with user needs, artwork documentation, approval workflows, and financial monitoring.

3.2 Planning

The planning phase was instrumental in ensuring the success of the Obra Graphia platform, an online art gallery dedicated to promoting art for a cause. This stage established a strong foundation by defining the project's objectives, requirements, and resources, providing the team with a structured roadmap for development.

Commencing on April 15, 2024, and concluding on April 26, 2024, the planning phase spanned two weeks. Throughout this period, the team held regular meetings to align their goals, conceptualize platform features, and develop a shared understanding of its purpose and scope. These discussions resulted in the creation of a Work Breakdown Structure (WBS), segmenting the project into smaller, manageable tasks to ensure every aspect of development was addressed.

During this phase, the team compiled detailed project documentation, including the project summary, scope, objectives, and potential constraints that could influence progress. To facilitate efficient resource allocation, they formulated a schedule and budget plan, ensuring the project remained within its limits. These documents served as a strategic guide, helping the team navigate each milestone effectively.

To maintain a seamless workflow, team members were assigned specific roles and responsibilities. Additionally, strategies for risk management, requirement control, and quality assurance were put in place. Given the platform's complexity—incorporating features such as artwork sales, user registration for buyers and artists, scholarship fund tracking, financial reporting, and interactive components like comments and likes—contingency plans were established to accommodate potential changes. Regular reviews and assessments were scheduled to allow for iterative refinements and improvements.

This planning phase provided the team with clear direction and purpose, ensuring well-structured task management, effective resource allocation, and proactive risk mitigation. By laying strong groundwork, the team was well-equipped to transition smoothly into the design, development, and testing phases, bringing Obra Graphia's vision to life while supporting scholars through its art-driven mission.

3.3 Designing

a. Technical Specification

The Obra Graphia platform comprises several key components. First is the website portal, where users can browse, upload, and purchase artworks. The necessary hardware includes devices such as PCs, laptops, or smartphones to ensure accessibility. Artists serve as content creators, uploading and managing their artworks, while buyers interact with the platform to explore and purchase pieces. Advisers and officers are responsible for overseeing transactions and scholarship fund allocations, ensuring financial transparency. Finally, the administrative team manages the platform's overall operations, including user registrations and content moderation.

The following technologies serve as the foundation of the platform:
• HTML
• CSS
• Firebase
• Typescript

b. Use Case Diagram

A use case diagram illustrates the functional requirements and user interactions with a system from the perspective of its end users. Its primary aim is to provide a straightforward, high-level summary of how users interact with the system.
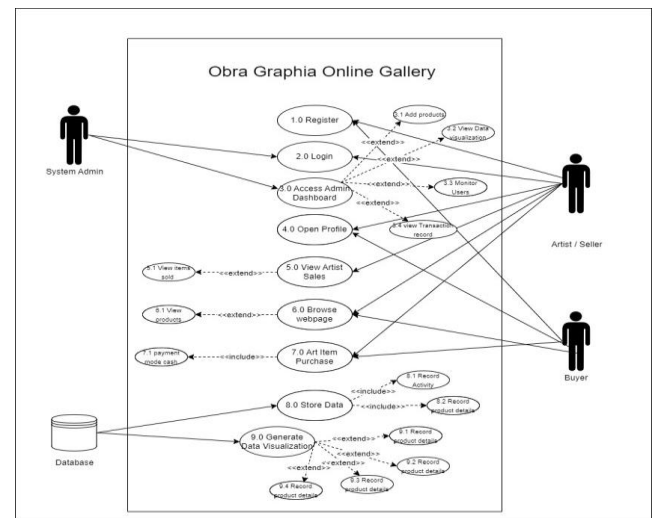

Figure 2: Use Case Diagram

Figure 2 shows the use case diagram that presents the interactions within the Obra Graphia Online Gallery, involving the System Admin, Artists/Sellers, Buyers, and the platform's database. Users begin by registering and logging in. Artists can upload artwork and manage sales, while buyers browse, purchase, and update their profiles. The System Admin handles user management and data oversight. The database logs transactions, product details, and user activity,

ensuring data integrity and supporting the platform's workflow.

c. Interface Design

Interface design is a key aspect of developing the Obra Graphia online art shop. It involves organizing visual elements such as buttons, input fields, and navigation menus to streamline user interaction and enhance the overall experience. The primary aim of the interface design is to ensure a smooth, intuitive, and visually appealing experience by creating a layout that is easy to navigate. This design refers to the graphical user interface (GUI) that users engage with to explore artworks, make purchases, manage their accounts, and utilize the platform's features.
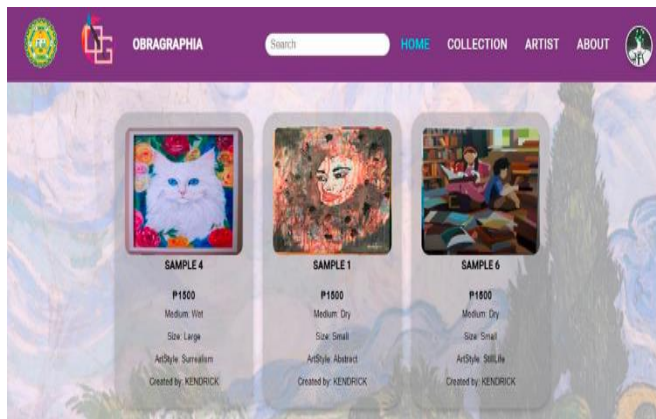

Figure 3: System Homepage

Figure 3 shows the System Homepage which is the gateway to the extensive collection of paintings. Here, you can browse through a collection of artworks and high-quality tools designed for artists of all levels. With easy navigation, you'll find featured products, new arrivals, and special offers right at your fingertips. Dive into our vibrant marketplace and discover everything you need to inspire and enhance your artistic endeavors.
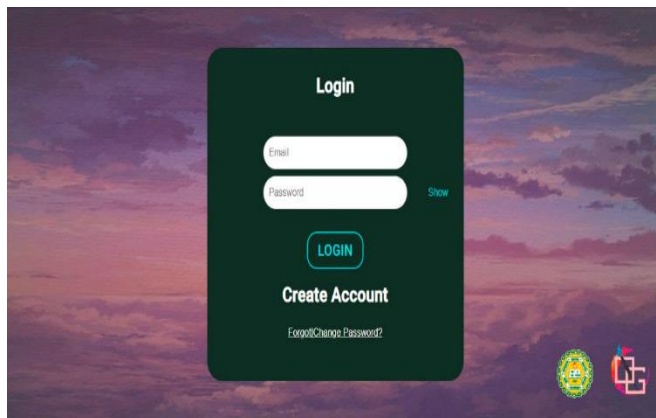
Figure 4: Account Creation and Login

Figure 4 shows the Login Page which serves as the gateway to the Obra Graphia Art4Cause community, providing secure access to your personalized account. Whether you're an artist, organizer, or visitor, simply enter your credentials to explore and engage with the platform. Robust security measures ensure your information remains protected for a safe and enjoyable experience.
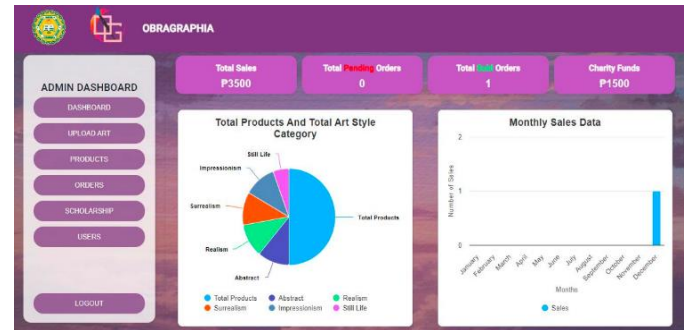
Figure 5: Admin Dashboard

Figure 5 shows the admin dashboard which offers a detailed view of key metrics, including total sales, pending orders, charity funds, and monthly sales, all presented through interactive data visualizations. This centralized overview helps administrators manage operations efficiently and make informed, data-driven decisions.

3.4 Development Implementation

During this phase, the Obra Graphia Art4Cause: Web-Based Art Exhibit Management System with Data Visualization was developed and implemented. After completing the planning and design stages, developers transformed the detailed design specifications into a fully functional web-based system.

The development process utilized HTML, CSS, Angular, and Firebase to build a dynamic, responsive, and user-friendly platform. These technologies ensured seamless access and interaction for artists, organizers, and visitors.

Designed to streamline art exhibit management, the system includes features for artist registration, exhibit scheduling, and artwork management. Additionally, it offers interactive data visualization tools, providing organizers with valuable insights into exhibit performance, visitor engagement, and overall trends.

By replacing traditional exhibit management practices, Obra Graphia Art4Cause delivers an efficient, centralized, and data-driven solution that enhances collaboration and promotes artistic expression.

3.5 Testing

The Obra Graphia Art4Cause: Web-Based Art Exhibit Management System with Data Visualization underwent thorough testing to ensure it met the specifications established

during the planning and design phases. Comprehensive tests were conducted throughout the development process to promptly identify and resolve any issues, maintaining the system's quality and reliability.

The testing phase included functionality validation, user interaction testing, and feedback collection from simulated end-users. The results were highly positive, demonstrating the system's robustness, efficiency, and adherence to requirements. Key factors such as bug detection, performance stability, and system logic were carefully assessed.

These successful test results confirmed that the system is ready for real-world deployment, providing users with seamless, reliable, and user-friendly experience.

3.6 Deployment

The deployment phase involved preparing the Obra Graphia Art4Cause: Web-Based Art Exhibit Management System with Data Visualization for integration into its target environment. During this phase, user acceptance testing (UAT) was conducted, allowing end-users and technical experts to evaluate the system's functionality and reliability in real-world scenarios.

Following these assessments, the results confirmed that the system successfully met all acceptance criteria. The deployment process was carefully planned, involving collaboration with stakeholders to ensure a smooth transition. Additional testing was performed to validate the system's stability and compatibility within its operational environment. Special attention was given to user onboarding, system configuration, and addressing any final adjustments. With the system now ready for implementation, it is set to streamline the art exhibit management process, offering a centralized, efficient, and data-driven solution that supports the platform's goals.

3.7 System Evaluation and Maintenance Considerations

To ensure the effectiveness and usability of the Obra Graphia Art4Cause: Web-Based Art Exhibit Management System with Data Visualization, a user evaluation was conducted involving 25 student participants. The goal was to assess the system's performance based on key quality attributes aligned with industry standards for web-based platforms.

The evaluation yielded the following results:

Efficiency: Scored at 94%, indicating that the system delivers high performance with minimal resource consumption, ensuring a smooth and responsive experience.

Security: Earned a score of 90%, reflecting the system's robust data protection measures and defenses against unauthorized access.

User Friendliness and Usability: Both received scores of 96%, demonstrating that the platform is highly intuitive and easy to navigate for end-users, enhancing the digital art engagement experience.

Reliability: Scored at 82%, affirming the system's consistent ability to function as expected under standard usage conditions.

These results validate the system's readiness for deployment and its capability to support a wide range of users effectively.

In terms of maintenance, the platform was designed with scalability and adaptability in mind. Future updates, bug fixes, and enhancements can be implemented efficiently due to the modular structure of the system and its use of modern web development frameworks. The integration with Firebase also ensures real-time database updates and simplified backend management. A maintenance protocol will be established to monitor performance metrics, manage security updates, and respond promptly to user feedback, ensuring long-term sustainability and continued user satisfaction.

4. CONCLUSION

The "Obra Graphia4Cause" web-based management system demonstrates exceptional quality and readiness for deployment in real-world art exhibit management scenarios. It aligns with ISO 25010 standards, achieving high performance across critical quality attributes such as reliability, compatibility, and performance efficiency. The system is designed to manage large data volumes effectively, provide quick responses, and ensure seamless integration with other platforms. Its robust security measures protect sensitive data, while its maintainability supports straightforward updates and modifications. Additionally, the system's adaptability and usability highlight its scalability and flexibility in addressing evolving user requirements, delivering significant value to both users and stakeholders.

REFERENCES

1. Brown, D. (2023). **Correspondence, not just Transaction: Exhibiting Asian Art Collections at the Art Gallery of NSW.** Southeast of Now: Directions in Contemporary and Modern Art in Asia, 7(2), 165-178.
2. Habelsberger, B. E., & Bhansing, P. V. (2021, July). **Art galleries in transformation: is COVID-19 driving digitisation?**. In Arts (Vol. 10, No. 3, p. 48). MDPI.
3. Van Miegroet, H. J., Alexander, K. P., & Leunissen, F. (2019, June). **Imperfect data, art markets and internet research.** In Arts (Vol. 8, No. 3, p. 76). MDPI.
4. KRYŃSKA, E. J. (2023). **The State of Research on the National Education Commission in the Context of Its Anniversaries.** Kultura i Edukacja, 142(4), 23-40.

5. Kultura Edukacja, 23-40. (2023). **Pros and Cons of Buying Art Online VS at a Traditional Art Gallery.** Singulart Magazine.

6. Schreiber, S. (2022). **Omnichannel marketing in art galleries for the next generation collector.**

7. Lee, J. W., & Lee, S. H. (2019). **User participation and valuation in digital art platforms: the case of Saatchi Art.** European Journal of Marketing, 53(6), 1125-1151.

8. Facunla, H. L., & Encarnacion, P. C. (2024). **Development of a Web Application for MLIS and BLIS Library Academic Resources.** International Journal, 13(3).