

# IMPACT SUMMARY REPORT



## COMPUTER-BASED CONSERVATION GAME (CONCEPT TO PLAYABLE PROTOTYPE)



Written by Fancia Ōsei Yeboah

Game Developer: Fred Halliwell

Supported by: Dr. Eric Hannel  
(Chipco Preserve)

# Executive Summary

This document summarizes the series of ideas on the development of the Puzzle Game. The project highlights the end-to-end development of a functional, educational video game prototype for Chipco Preserve, designed to be a dynamic, scalable extension of its mission. This initiative will move from the initial concept through to a playable digital experience built in the Godot game engine. The core objective is to operationalize Chipco's key pillars: ecosystem stewardship, Indigenous ecological knowledge, and community education into interactive game mechanics and narratives.

The game seeks to transform abstract conservation challenges, such as managing habitat corridors, balancing biodiversity, and understanding reciprocal land relationships, into tangible strategies and consequences within a simulated environment. Educational content in the Chipco Preserve games includes species facts and Indigenous-informed stewardship principles, woven directly into the gameplay loop, ensuring learning is experiential rather than passive.

The final prototype serves as a versatile tool for Chipco's outreach ecosystem. It will be a centerpiece for environmental workshops, a compelling asset for social media and streaming platforms to engage new audiences, and a foundation for future development. By making complex ecological and cultural lessons accessible and engaging, the game directly aims to amplify Chipco's educational footprint, inspire communities and schools toward conservation action, and create a lasting digital resource that supports the organization's long-term goals of advocacy and awareness.

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## Defining the Project

In the late 1840s, as the federal government moved to open Seminole lands to non-Native settlement, survey lines began cutting across a homeland already shaped by Indigenous presence, knowledge, and care. By the 1870s, settlement in a small part of Central Florida gave rise to a growing town called Chipco, named in honor of Seminole Chief Chipco. That history is more than a footnote—it is a reminder that this land has deep Indigenous roots, and that the spirit of stewardship tied to it continues today (About | Chipco Preserve, n.d.).

Building on this legacy, the proposed project centers on developing a computer-based conservation game that advances Chipco Preserve’s mission to protect vulnerable ecosystems, promote sustainable agriculture, and support Indigenous and Veteran communities through education, advocacy, and responsible land stewardship. Developed as an educational digital platform, the game will translate complex ecological issues—such as wildlife corridors, habitat loss, climate pressures, Indigenous stewardship principles, and keystone species—into an engaging and accessible interactive experience.

The completed game will serve as a versatile tool for Chipco Preserve, supporting environmental education workshops, public conservation awareness campaigns, and community outreach initiatives. It will also be featured across Chipco Preserve’s growing online platforms, including Twitch and YouTube, helping extend its impact beyond in-person programs. Through these combined efforts, the project aims to reach diverse local, national, and global audiences—especially those who might not otherwise encounter conservation education or Indigenous ecological knowledge.

The project will also provide a scalable, sustainable model for expanding Chipco Preserve’s educational reach and public engagement while strengthening community connections and supporting long-term conservation literacy rooted in Indigenous values and responsible land stewardship.

## Learning Objectives and Pedagogical Framework

The project's goal is to create a scalable, sustainable educational tool that expands Chipco Preserve's educational reach, deepens public engagement, strengthens community ties, and supports long-term conservation literacy rooted in Indigenous values and responsible land stewardship. It also seeks to foster civic responsibility and inspire transformative action through environmental education.

The game is designed around a participatory, transformative pedagogical framework and a place-based approach that bridges knowledge acquisition with action-oriented learning. Through this project, Chipco Preserve will help learners:

- **Develop ecological literacy:** Through the puzzle-based game, learners will build an understanding of human–nature interdependence and ecosystem dynamics. They will come to recognize the importance of protecting ecosystems to sustain ecological balance and community well-being. The project also moves beyond simple awareness by creating a framework that encourages systems-level thinking and change. By connecting gameplay to real-world ecological challenges and community sustainability practices, the game supports environmental education that is both meaningful and action-oriented.
- **Engage in place-based and Indigenous knowledge learning:** Because Chipco Preserve embeds stewardship practices into its work, the game will help learners explore Indigenous values and traditional ecological knowledge in a meaningful way. It will encourage players to appreciate diverse knowledge systems as essential to long-term conservation, not as optional or secondary perspectives. The project is designed as a kind of living classroom, where learners connect directly with ecosystems, conservation practices, and the relationships that sustain them. Through experiential gameplay, participants can develop a deeper understanding of—and emotional connection to—place. In its educational design, sustainable land stewardship practices and Indigenous perspectives are treated as core pedagogical pillars, embedded throughout the experience as living, relevant knowledge systems.
- **Foster civic engagement and collective action:** Through the game's story-driven design, learners will be encouraged to participate in community-based conservation initiatives and broader sustainability efforts. The experience will also help cultivate critical thinking, problem-solving, and decision-making skills, especially in relation to climate action and land stewardship.
- **Support participatory and community-centered learning:** Learners will be invited to co-create knowledge through reflection, dialogue, and shared learning experiences. The project also emphasizes collaboration with community members, conservation partners, and educators, strengthening local ownership and helping build a foundation for long-term sustainability.

The project aims to develop an adaptable digital learning tool that can be replicated beyond Chipco Preserve while remaining responsive to local contexts. This flexibility supports long-term educational impact, broader accessibility, and sustained public engagement. To support durability over time, the game is designed for iterative development, allowing it to evolve as community needs, technologies, and conservation priorities change. The framework also aligns with the ADKAR Model of Change, which emphasizes effective change management and stakeholder buy-in at every level (Hiatt, 2006; Fullan, 2007). In addition, the project incorporates principles of sustainable organizational learning through knowledge transfer, drawing on the SECI Model (Socialization, Externalization, Combination, and Internalization) as a structured approach for capturing, sharing, and embedding knowledge among stakeholders (Cheng, 2014).

- Tacit knowledge capture: Encourage the internal documentation of insights throughout implementation (for example, through reflection logs and debrief sessions).
- Case study creation: Document implementation practices from early adopters to build a library of applied strategies and lessons learned.
- Shared repository: Maintain a living, open-access knowledge base for Chipco Preserve members that includes tools, FAQs, and success stories.
- Community of practice: Establish regional or sector-based communities of practice that promote peer learning, collaboration, and innovation.

This learning objective and pedagogical framework bring together Chipco Preserve's social, educational, and environmental goals into a coherent, purpose-driven approach supported by structured monitoring and evaluation. By applying Kirkpatrick's evaluation model to assess the effectiveness of the game and its related initiatives, the framework ensures that outcomes are measured systematically across learning, behavior change, and community impact.

By integrating environmental education with principles of ecological transition, this approach promotes long-term conservation literacy, fosters stewardship behaviors, and strengthens community engagement and partnerships. In doing so, it supports the development of scalable educational practices aligned with broader sustainability goals.

# Research on the Project

Digital games play a highly influential role in modern society. As Chatfield defines them, games are “structured activities carried out for pleasure, according to certain written or unwritten rules” (2010, p. 4). They exist across cultures and take many forms, each shaped by its own conventions and systems. Games also follow recognizable structures and formats, whether physical, symbolic, or digital (e.g., Barbie dolls; Alvarez & Djaouti, 2010).

Advances in digital technology over recent decades have created entirely new spaces for play, driving the rapid growth of digital games and the platforms used to access them (Alpert, 2007). By around 2010, the global digital games industry was valued at approximately \$42 billion and was growing at an estimated annual rate of 10% (Chatfield, 2010). As a result, gaming has become a significant part of everyday life for large populations around the world.

Additionally, gaming encompasses a wide range of genres and audiences, challenging the common perception that they are predominantly violent and primarily played by adolescent males (Sandbrook et al., 2014).

## **Conservation Games**

Video games present a wide range of interpretations of nature, from the bleak, post-apocalyptic urban landscapes of *Fallout 3* to the idealized, tranquil environments of *Flower*. In many games, nature serves primarily as a visual backdrop. In others, however, gameplay mechanics connect more directly to ecological systems, resource use, and biodiversity-related themes.

Some games communicate conservation ideas indirectly by treating natural resources as limited, consumable assets required for progress. For example, in *Civilization*, intensive resource use can contribute to environmental degradation, including deforestation and desertification (Golebiewski, 2013). Even when games are not explicitly designed to teach conservation, they can still increase awareness of environmental pressures and the consequences of human decision-making.

Games can also support conservation more directly as part of a broader spectrum of conservation activities (Salafsky et al., 2002). As Sandbrook et al. (2014) note, they can contribute through several key pathways, including supporting research, fostering education and behavior change, raising funds, and strengthening planning and monitoring efforts.

Consequently, effective educational tools increasingly recognize the value of digital games, especially for audiences already drawn to gaming (McGonigal, 2014). Games offer distinctive learning opportunities by supporting experiential learning, which can be more impactful than traditional lecture-based instruction. Their interactive and repetitive nature allows players to revisit concepts multiple times, reinforcing understanding in ways that are often less common in conventional educational settings.

Games are also an established tool in conservation research and monitoring. They can support research by enabling players to contribute data, and they can be designed to explore or test potential solutions to real-world conservation challenges. These approaches align with the broader concept of citizen science, in which public participation helps advance scientific and conservation research (Dickinson et al., 2012).

## **Godot Engine**

As video game development has evolved, the methods and tools used to build games have changed significantly. As early as the 1980s, many companies relied on proprietary in-house engines. For example, Nintendo used a fast-scrolling game engine originally developed for Excitebike (1984) in the development of Super Mario Bros. (1985).

Compared with older, more established engines, the Godot ecosystem is relatively small, largely because it is newer. Even so, Godot has grown quickly and is widely recognized for its flexibility, especially for both 2D and 3D development. It supports cross-platform export, allowing developers to build games for PC, mobile devices, and web platforms (Godot's Design Philosophy, n.d.).

Godot's primary scripting language is GDScript, which was designed specifically for the engine and has a Python-like syntax. The engine also officially supports C# and includes GDExtension/GDNative-style functionality for creating bindings to other programming languages (What Is GDNative?, n.d.). In addition, the broader Godot community has developed unofficial support for languages such as Nim, Python, D, Kotlin, and Rust.

According to the Godot Engine project materials (n.d.), Godot has attracted interest not only from smaller studios but also from larger technology players and networks, including Microsoft, Meta's Reality Labs, and Epic Games. In 2020, Godot received a \$250,000 Epic MegaGrant from Epic Games to support projects that strengthen the open-source 3D graphics ecosystem.

Taken together, these developments suggest that Godot is a practical and credible choice for this project. It is well-suited to the project's relatively simple technical requirements, has shown steady improvement in recent years, and offers a realistic path for completing development within the proposed 12-week timeframe.

# Prototype Conception

The project requirements were not fully defined at the outset, in part because the team initially considered three different game concepts before selecting one. The resulting prototype is a 2D, computer-based conservation simulation game developed in the Godot Engine, chosen for its performance, simplicity, and ease of future expansion.

In the game, players take on the role of a conservation steward responsible for managing a protected ecosystem. They make strategic decisions, balance biodiversity with environmental pressures across multiple in-game cycles, and respond to a built-in feedback system that reflects the consequences of their choices. The prototype demonstrates a complete, playable core game loop built entirely in Godot.

Godot was chosen in large part because it was a feasible engine for completing the project within the stipulated 11-week timeframe. The game's structure and mechanics are designed as a puzzle experience in which players create paths—representing wildlife corridors—to guide different animals safely to their habitats.

The concept draws inspiration from Railbound, a proven puzzle format with broad appeal and mechanics that translate well to mobile devices. At the same time, the game is designed to increase in complexity as players advance, introducing greater challenge while reinforcing core ecological concepts.

As the prototype evolved, its visual layout was developed first through GIF-based demonstrations and later through animations and interactive path placement. The game includes a “Start” button that activates the movement phase once paths are placed, along with an indicator showing how many paths remain available. Together, these mechanics help teach players the importance of wildlife corridors in a clear, engaging way.

## Theme Development

The prototype's first corridor theme and story assets (Realm, 2025) were developed through research on real-world wildlife corridor examples in Florida, as well as case studies from countries such as Canada, Nepal, and Kenya. These examples informed the project's story-to-level mapping process and helped ground the game design in conservation practice.

This research also supported the creation of an infographic deliverable titled “Sets of Corridor Stories,” which maps corridor narratives to specific game levels. In addition, a table was drafted linking target species to recommended corridor types, followed by an expanded version that included key threats and management considerations.

## **Story-to-Level Mapping Document**

The Story-to-Level Mapping document identifies the game's learning objectives by drawing on Florida wildlife and selected international case studies as thematic guides for level design. These examples served as key sources of inspiration during development of the initial prototype and helped shape the educational foundation of the game.

By linking real-world conservation stories to specific gameplay levels, the document provides a clear and structured framework for aligning game mechanics with learning outcomes.

## Updates of the Prototype Conception

Project updates were shared by email among team members throughout development. For the main game build, the developer (Fred) provided progress updates on key milestones using illustrated GIFs and, later, clips showing animations and path placement. Chipco Preserve, serving as coordinator, also provided detailed feedback on these updates and helped guide next steps to support the game's successful development.

The prototype includes a “Start” button that activates gameplay after paths are placed, along with an indicator showing how many paths remain. These mechanics support the game's educational purpose by teaching players the importance of wildlife corridors through direct interaction. The team also shared GIFs of the core gameplay concept—including the pathing system and improved lighting and shadow effects—to keep everyone informed and familiar with the production process.

Additional email updates tracked improvements to the game's path functionality, including the ability for animals to travel in either direction and expanded path placement options. These updates highlighted one of the most technically complex parts of development: building a flexible pathing system. Although some improvements did not dramatically change the visuals, they significantly strengthened the system's underlying functionality.

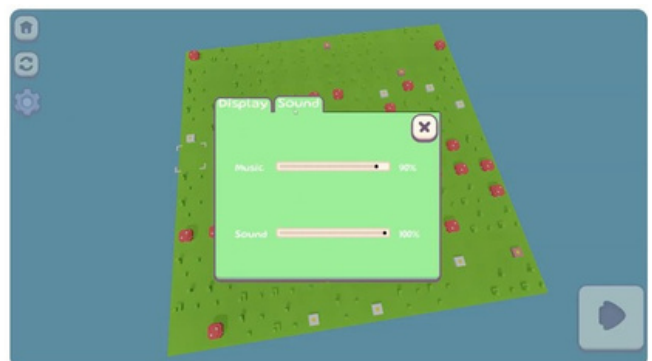
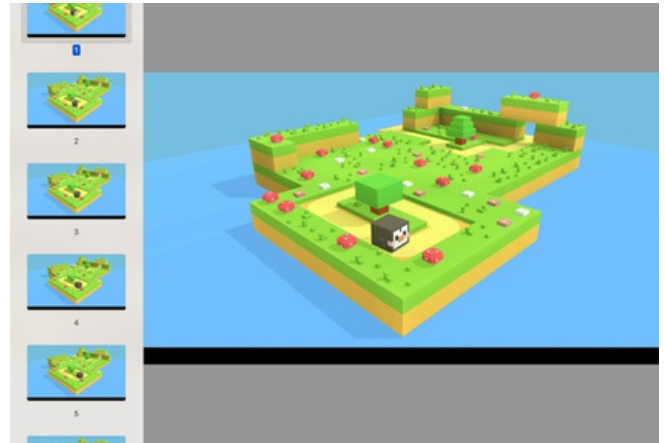
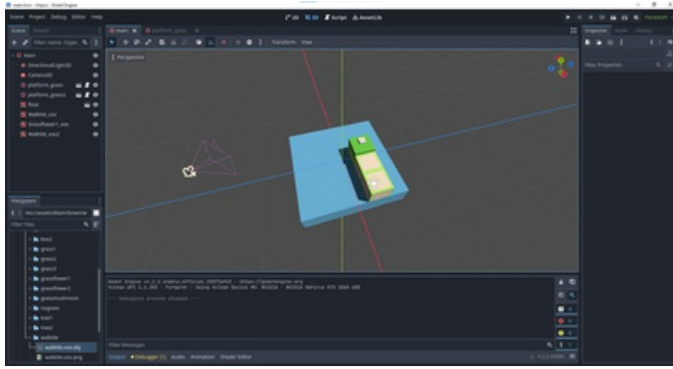
As shown in the GIFs, the developer also added turns and three-way path options, along with click-and-drag path placement. This streamlined the control scheme and made the game easier to play, especially on mobile devices. Because the pathing system was particularly complex, the developer noted that it had to be redesigned several times before arriving at an effective solution.

Beyond gameplay mechanics, weekly updates also covered progress on the project's educational deliverables, including learning objectives, real-world corridor stories, and educator support materials. The completed puzzle game features 20 progressive levels that illustrate how bears move through their environment and the important role they play in maintaining ecological balance.

Finally, project reviews were conducted across the full set of deliverables, including the Godot project files, playable builds, story content archive, and this impact summary prepared for reporting.

The materials below illustrate the project's development journey—from early concept screenshots and GIFs of the pathing system to later improvements in lighting and shadow design—alongside the wildlife case studies and educational guide that shaped the game's learning framework.

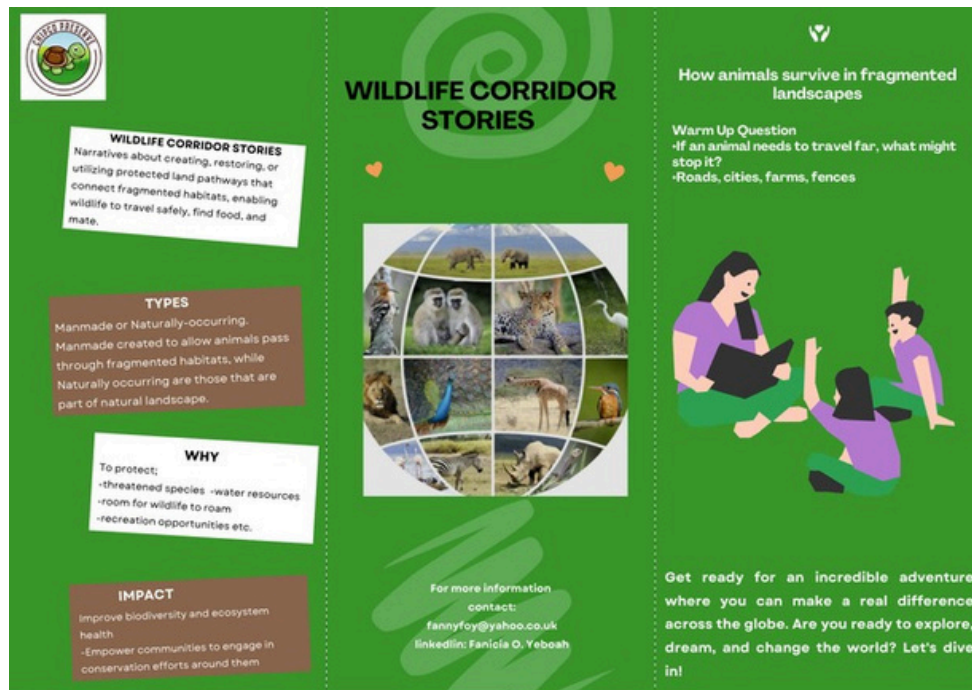
# Samples of Some Updates in Screenshots



MondayUpdate5  
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MondayUpdate5

# Samples of Some Updates in Screenshots



**WILDLIFE CORRIDOR STORIES**

**WILDLIFE CORRIDOR STORIES**  
Narratives about creating, restoring, or utilizing protected land pathways that connect fragmented habitats, enabling wildlife to travel safely, find food, and mate.

**TYPES**  
Manmade or Naturally-occurring.  
Manmade created to allow animals pass through fragmented habitats, while Naturally occurring are those that are part of natural landscape.

**WHY**  
To protect;  
-threatened species -water resources  
-room for wildlife to roam  
-recreation opportunities etc.

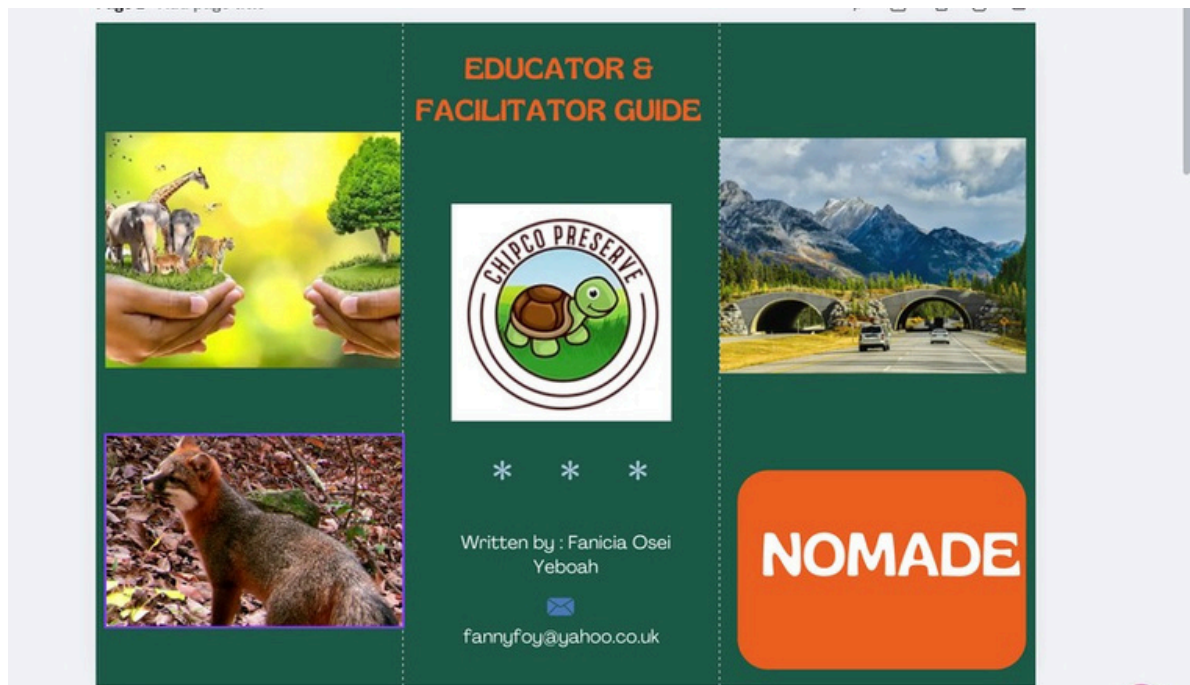
**IMPACT**  
Improve biodiversity and ecosystem health  
-Empower communities to engage in conservation efforts around them

**How animals survive in fragmented landscapes**


**Warm Up Question**  
-If an animal needs to travel far, what might stop it?  
-Roads, cities, farms, fences

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fannyfoy@yahoo.co.uk

**NOMADE**

# Stakeholder Perspective

## **Stakeholder Perspective**

The project's primary stakeholder was Chipco Preserve's coordinator, Dr. Hannel, who provided in-depth guidance from the outset on the project's purpose, framing, and expected direction. For the playable prototype, the team did not rely on primary data collection; instead, the game was built from scratch by the developer (Fred), whose familiarity with the Godot Engine enabled efficient development.

Fred's role focused on building the game and keeping the team informed through regular email updates. These communications included clear progress notes and brief explanations of each development stage. The ongoing updates not only supported team coordination but also strengthened this report by adding detail, transparency into processes, and analytical depth.

Stakeholder interaction primarily occurred via email, with Dr. Hannel providing targeted feedback and strategic guidance throughout the project. His input helped shape the project's direction in several key areas.

## **Deliverables Conception**

The project's deliverables were designed and developed through a combination of prior technical knowledge of the chosen engine and secondary research. Early in the process, the team faced the challenge of selecting the right prototype concept and design direction. That challenge was resolved by choosing a concept that is market-aligned, equity-driven, and educationally sustainable.

Each deliverable reflects a structured design process that integrates the key components for developing a Godot-based puzzle game, including technical implementation, educational goals, and conservation content.

## **Responding to partner priorities**

The deliverables were designed to align directly with the organization's core mandate, specifically addressing the priority areas identified in the production schedule.

## **Project Deliverable Approaches**

Each deliverable corresponds directly to one of the project's core objectives, ensuring that project outputs are actionable, evidence-based, and responsive to stakeholder needs. The deliverable approach includes:

### **Why These Deliverables?**

These deliverables were designed to be comprehensive, capturing each stage of the project process through regular weekly updates and feedback. Together, they document not only the final outputs, but also the iterative development, decision-making, and collaboration that shaped the project.

### **Why Are They Important?**

These deliverables are foundational to the project because they directly support the specifications outlined by the organization. Together, they provide the analytical and design backbone for the final game builds, the educational documentation pack, and the in-game help and accessibility text. Just as importantly, they ensure that the project remains future-oriented, practical, and equity-driven as it grows.

### **What Makes Them High Quality?**

These deliverables are high quality because they are grounded in robust, interdisciplinary research spanning education, wildlife conservation, and sustainability. They are also informed by relevant policy frameworks and real-world wildlife corridor case studies, which strengthen both their credibility and practical value.

The methodology combines evidence-based design with validated tools and applied research practices, ensuring that each deliverable is both analytically sound and usable in practice. Together, they highlight the urgency of advancing conservation education through accessible, game-based learning.

# Key Success Factors

The Key Success Factors identify the essential conditions required for the initiative to succeed. Without them, the project is likely to face significant hurdles and may struggle to achieve its intended outcomes.

## **School and community buy-in:**

Schools and communities that use the developed game should understand the initiative's value, see it as aligned with their goals, and feel motivated to actively engage with the tools, strategies, and training. Without this buy-in, the project may face resistance, delays, and disengagement.

## **Capacity-building and technical support infrastructure**

a. Technical assistance: Because the project depends on digital tools, reliable technical support will be essential during and after implementation to ensure smooth use. Minimizing technical issues will strengthen user confidence, support adoption, and encourage sustained engagement with the game.

b. Knowledge support system: It is critical that schools and communities feel supported throughout the entire process—not just at the beginning. Establishing a system for regular collaboration, troubleshooting, and ongoing support from Chipco Preserve will help ensure they remain confident, engaged, and able to use the provided deliverables effectively.

## **Evaluation System with Clear Roles to Ensure Impact and Develop Improvements**

a. Evaluation system before rollout: Establishing an evaluation process before rollout will help Chipco Preserve assess impact early and make necessary adjustments during implementation. A strong iterative evaluation system will support responsiveness to the diverse needs of schools and communities while helping the team identify and address emerging challenges.

b. Clearly defined roles: Because this initiative involves multiple interconnected and collaborative components, Chipco Preserve should establish clear roles, responsibilities, and implementation procedures—including how the game's purpose and value are communicated to users. Doing so will support smoother implementation and make it easier to identify and address issues as they arise.

# Project Management Methodology

To support effective implementation of the deliverables, I recommend a hybrid approach that combines the European Commission's PM<sup>2</sup> project management methodology (European Commission: Directorate-General for Digital Services, 2023) with selected elements of PM<sup>2</sup>-Agile (European Commission: Directorate-General for Digital Services, 2021). Together, these approaches provide a practical framework for clear planning, continuous feedback, and a realistic path from design to delivery.

PM<sup>2</sup> is a project management methodology developed by the European Commission for EU-funded and public-sector projects. It offers a structured project lifecycle with four main phases—Initiating, Planning, Executing, and Closing—along with defined governance roles and standardized templates that support consistency, documentation, and accountability. The methodology is further strengthened by openly available templates and free online training, making it accessible and practical for public institutions and mission-driven organizations.

This methodology is especially well suited to the Chipco Preserve project because it is designed for collaborative, multi-stakeholder environments and aligns well with the project's planning, coordination, and reporting needs. Using PM<sup>2</sup>, with Agile elements where appropriate, will help keep implementation focused, adaptable, auditable, and clearly tied to broader strategic goals.

Additionally, PM<sup>2</sup>-Agile builds on the core PM<sup>2</sup> framework by introducing short, iterative work cycles that support faster feedback and continuous improvement. It keeps stakeholders actively involved and makes it easier to test, refine, and strengthen outputs during development.

By integrating Agile elements, Chipco Preserve can pilot tools and frameworks early, adjust content based on real-time feedback from users and partners, and involve staff and collaborators more directly in shaping final outputs. At the same time, PM<sup>2</sup> provides the structure needed to maintain alignment with institutional goals, documentation requirements, and oversight expectations.

This hybrid PM<sup>2</sup> and PM<sup>2</sup>-Agile approach is especially well aligned with the practical demands of the project. PM<sup>2</sup> provides the overarching project lifecycle—with clearly defined roles, planning tools, and documentation processes that support consistency and accountability—while Agile practices can be applied during execution through short work cycles, regular check-ins, and continuous feedback loops. Together, these elements allow deliverables to be refined in response to real-time stakeholder input without losing strategic direction.

Together, these two approaches support implementation that is both focused and flexible. PM<sup>2</sup> project management tools—such as the Project Charter and Work Plan—provide clarity, structure, and oversight, while Agile-style sprint reviews support rapid iteration, adaptation, and continuous improvement.

This combination also strengthens evaluation. PM<sup>2</sup> includes formal review points and standardized templates, such as the Phase Exit Report and Lessons Learned Log, which help track progress and assess outcomes at key stages. These structured checkpoints are complemented by shorter, feedback-driven cycles that make it easier to refine content in real time and respond to emerging needs.

By combining both methodologies, the project can remain well organized, context-sensitive, and responsive to challenges as they arise.

# Implementation Plan and Timeframe

The implementation plan outlines a structured yet responsive approach to implementing the project's deliverables. It follows the PM<sup>2</sup> project lifecycle while incorporating Agile elements to support adaptability, ongoing feedback, and meaningful user engagement.

Evaluation is embedded throughout the implementation process rather than treated as a final step. Built-in checkpoints provide structured opportunities to assess progress, capture insights, and guide next actions. In parallel, Agile-style feedback loops enable real-time reflection and adjustment during delivery, helping ensure that outputs remain relevant, practical, and responsive to user needs.

Progress will be measured using both process indicators and evidence of institutional uptake, with findings used to refine support strategies as needed. The implementation is organized into phases with regular review points to guide progress, support evaluation, and allow timely adjustments. The development timeline spans 11 weeks, with team members assigned weekly tasks tied to the creation and refinement of specific deliverables.

## **Conclusion**

As the Godot puzzle game moves toward full implementation, it offers an engaging way for players to interact with wildlife corridor mechanics, guide animals safely through ecosystems, and learn real conservation stories that highlight ecological challenges and land stewardship.

By identifying likely implementation challenges—such as outdated training approaches or limited digital pedagogical capacity—the project's deliverables provide practical, research-informed responses. Together, these deliverables translate the game's concept into clear, usable strategies for development, education, and rollout.

Ultimately, this approach helps position the game as a resilient, equitable educational tool capable of serving diverse learners while advancing conservation awareness and stewardship.

## **AI-Use Disclaimer**

During the preparation of this report, generative AI tools—specifically ChatGPT by OpenAI (GPT-5.2)—were used in a limited capacity for brainstorming, feedback, and drafting support. All AI-generated content was critically reviewed and substantively edited by the authors to ensure accuracy, originality, and alignment with the project's intent. Grammarly was also used to support grammar and language editing.

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