GREAT Case Study GCS1

United Nations Development Programme Exploratory Study

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Deliverable Information

Reviewers	<Name> <E-mail>, <Name> <E-mail> & <Name> <E-mail>
Status	[ ] Plan [ ] Draft [ ] Working [x] Final [ ] Approved
Abstract (for public dissemination only)	Click or tap here to enter text.
Keywords	Case Study, Games, Climate
Statement of originality	This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation, or both.

Document History

Version	Date	Comment (Examples)
0.1		Draft 0.1 document created
0.2	14 October 2024	Final Draft Completed
0.3	Click or tap to enter a date.	Peer review and detailed feedback on overall structure and specific content
0.4	Click or tap to enter a date.	Integration of peer review comments and final editing
1.0		Document complete and submitted

Funded by the European Union

UK Research and Innovation

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List of Abbreviations

CA	Consortium Agreement
CO	Confidential
DIH	Digital Innovation Hub
DI	Digital Innovation
DMP	Data Management Plan
DoA	Description of Action
DOI	Digital Object Identifier
EB	Editorial Board
EC	European Commission
EGE	The European Group on Ethics in Science and New Technologies
GA	Grant Agreement
GDPR	General Data Protection Regulations
GREAT	Games Realising Effective Affective Transformation
H2020	Horizon 2020 program of the European Union
IPR	Intellectual Property Rights
UKRI	United Kingdom Research & Innovation
UNDP	United Nations Development Programme
WP	Work Package

1. Executive Summary

This report provides a detailed summary of a United Nations Development Programme (UNDP) exploratory Case Study (GCS1), conducted as part of the EU Horizon-funded Games Realising Effective and Affective Transformation (GREAT) project. UNDP1 Case Study (GCS1) is the first in a series of eight that are undertaken by the project team, engaging with authentic policy stakeholders. Each case study iteratively contributes to the refinement of GREAT case study documentation, research methodology and overall project design.

GCS1 started in December 2023 and was finalised in March 2024, involving the case study sponsor UNDP, and the GREAT project research team, coordinated by The Leibniz Institute for Research and Information in Education (DIPF). This exploratory study adopted the GREAT case study cycle design (figure 1.0), representing an eight-stage process of inquiry underpinned by an established mixed-methods research (MMR) methodology. This case study aimed to explore innovative ways to engage young, digitally literate individuals in policy discussions on the climate emergency.

This case study sought to provide a scalable model for integrating citizen voices into policy-making processes, contributing to more representative and informed decision-making, through utilising games-based activities and collaborations with games studios to create an interactive, accessible and impactful public engagement platform. This approach leveraged the wide popularity and high levels of engagement in video games to reach audiences that are traditionally less engaged in policy discussions. By embedding surveys into popular commercial video games, the case study captured natural user behaviours. In stark contrast to traditional public engagement strategies, this approach embedded policy-related content directly within an environment in which people are already very engaged, leading to higher response rates and richer data compared to that provided by traditional outreach methods. The collaboration with games studios aligned with their corporate social responsibility goals, providing an avenue for these companies to positively contribute to the climate emergency, whilst developing a sense of community involvement within their player base.

Our approach poses a model for future initiatives, offering a scalable cost-effective solution that can be adapted to suit a variety of policy areas, bridging the gap between policymakers and citizens. Success with this case study indicates the

potential for similar collaborations across different sectors, particularly as digital innovation and popular culture bear enormous potential for shaping inclusive and representative discussions within public policy.

2.   Introduction

This document presents the first full GREAT case study (GCS1), drawing on lessons learned from the initial Frankfurt pilot cycle, and focusing on work with authentic policy stakeholders. The study centred on Nationally Determined Contributions (NDC), outlining individual government commitments to CO_2 reductions as set out in the Paris Climate Agreement. The purpose of the case study was to explore the interaction between citizens and policymakers regarding these NDC commitments, examining how citizens could be better engaged in sustainability efforts and the potential of this engagement to influence government action on climate change.

The key objectives:
- Engage citizens in one market on the NDCs.
- Empower citizens to influence policy by facilitating their engagement with governments.
- Support policymakers in taking bold and ambitious action by providing them with better insights into citizens' views and priorities.
- Raise awareness of the importance of systemic change through NDCs, which reflect individual government commitments to CO_2 reductions under the Paris Climate Agreement.

By focusing on these objectives, the case study aimed to contribute to better mutual understanding between citizens and policymakers, aiming to foster more collaborative approaches toward tackling the climate crisis.

The main aim of this research was to investigate the potential for games-based activities to operate as a bridge between citizens and policy makers. The ambition is to present insights on citizens' views in connection to various climate-related objectives to the participating policy stakeholders. To meet this objective, the case study intended to answer the following research questions defined within the GREAT project:
- RQ1: Which games-based activities can be used to elicit, represent and communicate citizens' views on policy dilemmas?

- RQ2: How effective are games-based activities in eliciting, representing and communicating citizens' views on policy dilemmas?
- RQ3: How efficient is the use of games-based activities in eliciting, representing and communicating citizens' views on policy dilemmas?

2.1 Research Methodology

The research methodology for the GREAT project case study utilised a multiple-case design, an increasingly popular strategy in the social sciences for investigating complex phenomena (Zainal, 2007; Grassel and Schirmer, 2006; Johnson, 2006). This design facilitated the collection of diverse data sources through replication, rather than sampling. The selected methodology was suitable to address the research questions due to its capacity to elicit both implicit and explicit data, it is also able to adhere to scientific conventions by recording evidence both quantitatively and qualitatively. The case study methodology was designed to appraise multidisciplinary challenges relevant to climate change and sustainable development problems, aiming to achieve the research objective of better informing policy and improving engagement and decision-making processes of citizens. Data analysis was contextually set; hence, the findings presented are systematically linked with the overall aims of the study. This approach ensured a thorough exploration of key themes, with the data collection process following the procedures established in the project's MMR methodology. communicating citizens' views on policy dilemmas?

2.2 Case Study Design Methodology

The case study design followed an eight-step process, as outlined by the GREAT project, linking citizens and policy stakeholders through games-based activities; at the same time, integrating activities across multiple work packages to ensure consistency throughout all case studies. This methodology is framed as a cyclical process (figure 1.0), with detailed descriptions of the expected activities and outputs for each step defined in the case study cycle. A framework was established with instruments for the design of individual case studies to ensure robustness in the evaluation. This is an exploratory approach to examine the potential for the methodology and identify how to best utilise the infrastructure for larger-scale case

studies in the future. Each case study required coordination between a case study sponsor, an academic lead, and representatives of the stakeholder community through a structured sequence of planning, collaborative design, data collection, and evaluation. The systematic approach ensured coherence and alignment across the range of case studies developed within this project.

Steps 1 to 3 were supported by work package 2 (WP2), which focused on defining the case study's goals and designing game-based activities, these were made possible through work package 3 (WP3), while collaborative analysis and evaluation of data fell under work package 4 (WP4). The latter stages of the cycle, including community and policy stakeholder engagement, are overseen by work package 6 (WP6). The dynamic nature of this approach allowed activities to be revised as circumstances evolved, a reflection of the project's adoption of an agile approach. The cycle included ethical approval processes, consent, and data management procedures to ensure institutional and legal standards were met in each case study cycle.
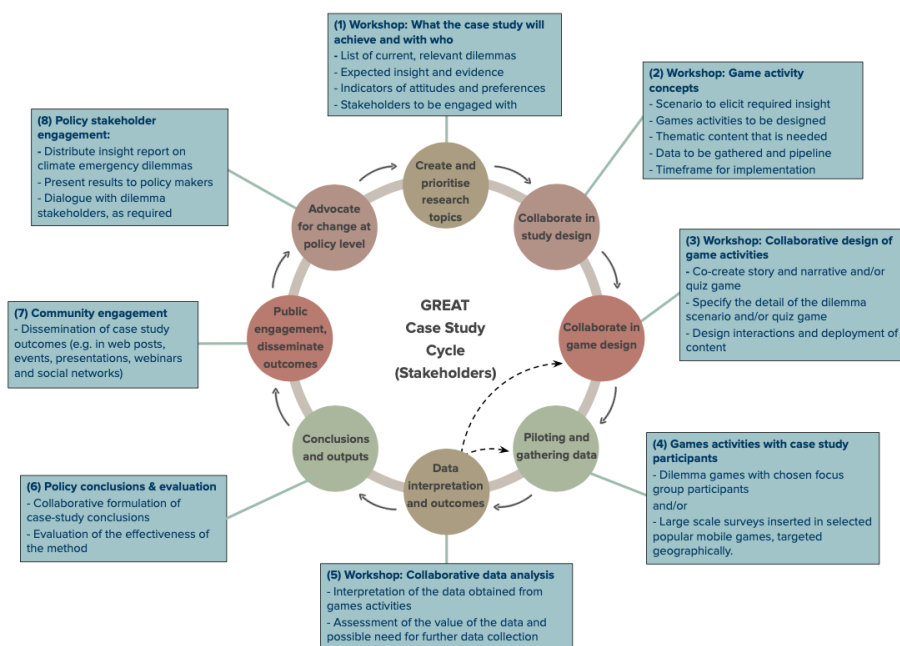
Figure 1: GREAT Case Study Cycle

3. Background to Case Study

The case study engaged citizens in discussions around their country's Nationally Determined Contributions, with an emphasis on improving public understanding of government commitments to CO2 reductions and encouraging active participation in climate-related dialogues. Citizens were encouraged to engage with their government, providing feedback and contributing to discussions on how NDC goals could be realised in practical terms.

While the case study aimed to empower citizens and policymakers alike, the GREAT project acknowledges that directly causing policy change is a complex and multifaceted process. Consequently, our focus was on enhancing citizens' ability to influence policymakers, encouraging them to take bolder actions by elevating public awareness and priorities. This approach recognises that while immediate change may not always occur, long-term policy leadership is shaped by accumulated informed citizen engagement.

The case study brings insights gained to inform subsequent activities and case studies under the GREAT project, in particular, in refining techniques of engagement and in assessing the degree of influence on citizen participation on government climate actions.

4. Create and Prioritise Research Topics (step 1)

The team addressed the first step of the case study cycle by drawing on work initiated by an earlier UNDP study. Rather than generating new research topics, they inherited those from the earlier study, which had been through the process of validation in several contexts. This continuity was essential in allowing the research team to focus attention on methodologies and systems to be tested without any requirement for revisiting or redefining research topics. In the previous study, UNDP had identified the research topics, which were then adapted to specific needs in this case study. This was necessary to ensure the newly developed infrastructure and methodologies captured these pre-identified topics well, instead of just matching them. This phase was pivotal in determining how well these methods would work in real-world conditions, through

data gathered using tools such as surveys and Google Ads. Practical testing was instrumental in refining both data collection processes and the approach of the research, laying a solid foundation for the subsequent stages of the case study.

The involvement of games studios added further complexity, in this case, greater emphasis was placed on integrating the tools and infrastructure needed for the research, rather than on a significant collaborative design process with UNDP. Instead of devising new ways to do things together, the collaboration focused more on ensuring the infrastructure was present and working, drawing on insights from the preliminary study to guide this process.

Infrastructure testing also included the thorough analysis of integrated data and visual tools. There was a need for deeper insight into the analysis to improve the engagement of the policy stakeholders by using such tools as Microsoft Power BI. This process was crucial in ensuring the effectiveness of the tools and accurate data interpretation. During the case study, the team also collaborated with games developers to determine how key elements, including visuals, messaging, and methods of collecting data, could be seamlessly integrated into an online game platform in a manner that would reach and engage the intended audience.

Although the themes of the research were pre-determined by UNDP, the first step of the case study cycle focussed on refining and piloting the methodologies and infrastructure necessary to investigate these topics. This process was practical, in an effort to ensure the tools and processes were robust enough to capture meaningful insights in the case study. This pragmatic approach allowed the team to effectively fine-tune both the data collection methods and the overall research strategy taken, laying a strong foundation for the subsequent phases of the case study.

5. Collaborate in Study Design (step 2)

The second step of the case study cycle encompassed a collaborative effort to design game-based activities and develop thematic content for the survey. The objective was to seamlessly integrate the survey into the game environment, ensuring it effectively engaged players whilst preserving the integrity of the gameplay experience. Strategic

placing of the survey within the game was paramount to the success of this case study, as visibility and access were required to achieve adequate participation. The team evaluated various options for embedding the survey into the game, contemplating aesthetic design whilst considering the behavioural model of most gamers. The thematic content of the survey was focused on climate change, with the initial questions developed by the United Nations Development Programme (UNDP) for the People's Climate Change Vote in consultation with various stakeholders. These questions were further refined by the GREAT team in partnership with ZSI and the University of Bolton to ensure their suitability for integration within a gaming context. This stage extended beyond question refinement to include the adaptation of the survey's visual identity, ensuring the climate change-related content would be both engaging to the players and consistent with the overall aesthetic of the game.

The study's design placed an emphasis on high quality data collection; thus, considerable consideration was given to player behaviour patterns when planning the survey's launch and duration. Data.di (Data DI, 2024) provided the team with a system that tracked player activity to collect key metrics across gaming platforms, giving reason to confirm assumptions about moments of activity of players and when to launch the survey. Beyond this, the team ran informal consultations with a wide range of game studios, approximately 60 in total, including major platforms. These discussions provided further background regarding player behaviour and assisted in the overall design of the study. While such consultation was not always formally documented, they were considered integral to refining the approach. Drawing on data demonstrating engagement peaks typically being observed within the first few of days a survey going live, and then steadily declining, the team estimated an optimal open window of four to seven to maximise participation. Anecdotally, the team understand that player engagement is usually higher towards the end of the week, and especially over weekends. This assumption will be examined over the duration of the case studies, thus, launching surveys during the beginning of the week where player activity can be decreased was avoided, instead, the team targeted Friday through Sunday when gaming is more prominent.

The most significant challenge in this phase was surrounding the adaptation of the survey to each game's technical and design limitations. This included the need in certain games for unique tweaks to the survey's visual identity and placement due to the scarcity of available spaces within the game environments. Such modifications

were made in an iterative manner to ensure the survey remained functional and engaging across multiple games.

The team recognised early on that there was a need for improved documentation of consultation processes. While the team had regular consultations with studios and gathered valuable insights from these discussions, they were not always keeping accurate records of which studios had been consulted and what specific input they had provided. For future projects, the team recognises that systematic documentation of consultations would have provided support for many of the choices made in the case study design.

The second step of the case study cycle is an iterative and collaborative phase, where gameplay activities and thematic content were carefully selected to ensure maximum player engagement, and valuable data. Although challenges were encountered when adopting the survey into various games, and with ongoing documentation processes, the team successfully navigated these obstacles and set a good premise for data collection via the survey.

6. Collaborate in design of games-based activities (step 3)

The third step of the case study cycle focussed on the collaboration of stakeholders, policy makers, and game designers in the design of the interactive elements of the game; these were to be designed in such a way as to effectively elicit and communicate citizen views about policy dilemmas. The main objective being to design and implement game activities to encourage user engagement whilst providing valuable data regarding public sentiment. This design also included specific survey questions co-developed with the UNDP on the topics of climate change policies related to energy; transport; food security; and responses to natural disasters. Two different methods of embedding these questions into the game were tested (table 1.0). Method 1 used in-game, paid-for advertising (Instagram ads), within this, two distinct visual approaches were conceptualised and implemented (figure 2.0). These adverts were designed to be appealing for the players but at the same time, seamlessly integrate into the playing experience. Interestingly, there was no preference of one design over the other among the players, indicating that both designs were effective in keeping the player's engagement without being intrusive to the gameplay. This insight can inform future

design advertisements on similar interactive platforms. Approach 2 was a direct in-game rollout requiring negotiation with studios to make the activity part of the experience within the game itself. In the direct in-game rollout, engagement rates were substantially higher: 58% of players interacted with the content, versus an insignificant 5% for the paid adverts. Completion rates were similarly higher at 84% for the in-game rollout, compared to 45% for Instagram ads.

Figure 2: Visual approaches of Instagram ads embedded within the game activities, developed by the GREAT project.

	Instagram Ads	In-Game Roll out
Reach/First page load	7,257	4,352
Engagement	398 (5%)	2,539 (58%)
Completion	179 (45%)	2,148 (84%)
Community Sign Up	18 (10%)	282 (13%)

Table 1: Results from strategies for embedding questions within the game

The collaborative design of game activities began with a workshop involving all stakeholders-game developers, policy makers, researchers, and target audiences. Such interdisciplinarity ensured the game content not only met the project objectives but would also be engaging and appealing for players. Typically, game design involves the following:

- The collaborative process generally takes place in a workshop format, where stakeholders co-create the core ideas of the serious game. Such an arrangement will allow for the storming of ideas in which every participant may provide their views on the structure, the goals, and the mechanics the game is

to have. This process ensures the communication needs of policy are balanced with those of the player's experience.

- Storytelling is a powerful game design methodology; it is necessary to develop a story that captures the players and weaves into it key policy messages. The story needs to be meaningful and engaging, framed around real-world dilemmas such as climate change, social justice, or public health.
  - o The co-creative process builds up a story corresponding to the policy issues at hand. For example, if the policy dilemma involves climate change, a story could revolve around a community or city under environmental stress in which players will have to make choices which involve sustaining energy consumption or responding to disasters.
  - o Running parallel to the story will be the integration of quiz-style activities. These quizzes are to be designed on testing knowledge on the policy issues but also encourage players to reflect on how such policy matters are related to their own real-life implications. Such quizzes may be connected to the different stages of the narrative, and hence, perhaps appear natural in regard to the game's progress.

    The in-game characters, settings, and challenges will be designed to reflect the dilemma scenario in a way that will facilitate interaction of the players with the key policy questions. For example, characters could come from the various stakeholders in the policy process such as citizens, business owners, government officials, etc., all having their own interests and views.

The core of the design was based on the dilemma scenario, a set of choices presented to the player modelling real-world complexity in policymaking. The dilemma needed to be carefully crafted to represent the policy issue at discussion, allowing players to explore several solutions and consequences:

- The core of the game is the policy dilemma. For example, assuming there was a climate change scenario, one would have to decide either to impose more stringent environment regulations at the cost of hurting short-run economic growth, or to foster the economy at the price of slack environment control. Each of these moves can involve an implication that could be emulated on this game, such as surroundings or resources changed for the player character.
  - o The dilemma needs to introduce complex, multi-dimensional choices where player needs to take into consideration certain trade-offs against others. For example, in a city-building game, a player could be made to decide between a decrease in carbon emissions or continuation of economic stability. In order to

accurately model the complex decisions entailed in real policy decision-making, there should be no right or wrong answers to these hypothetical scenarios.

- o Dilemmas should also incorporate ethical dimensions, so players can reflect on issues relating to fairness, social justice, and long-term sustainability. For example, a decision that looks to benefit the wealthier citizens in the short term might have disastrous implications for the poorer communities in the longer term.
- The quiz game reiterated the messages of the policy in a more structured type of question-and-answer format. Questions can be set up to align with real-world data encouraging players to engage in critical thinking regarding policy options.
- o Questions can be tied directly to the scenarios the player has encountered in the game. For example, immediately after a decision regarding environmental regulation, a quiz question could be posed to the player such as 'What doe a more restrictive policy on carbon emissions do to manufacturing jobs?'
- o The quiz can implement some form of dynamic difficulty where questions get progressively more difficult as the player progresses through the game. Later questions ask players to think through long-term policy implications of their in-game decisions, while the early ones might test basic policy area knowledge.

The design of interactions along with the method of deployment of content was crucial for maintaining player engagement while data collection remained seamless and unobtrusive.

- Designing interactions played a critical role in keeping the player engaged while collecting meaningful data.
- o The interactive decision points are embedded within the narrative, and the player must choose between several policy options. The decisions can be represented visually through the game, for example by use of graphics or dialogue explicitly setting out the consequences of each of the different choices.
- o There can be real-time feedback in-game mechanisms for the players, showing them in real-time the implications of what they do. This can be done by having a city-building game show changes in pollution levels, energy use, or citizen satisfaction.
- o Global leaderboards put player's choices into a far broader perspective, and community discussion forums may inspire further deliberation about policy issues. Social features also enable players to feel part of a community in which they share experiences and may discuss implications of in-game decisions.

- The deployment of game content must be carefully managed to ensure new data, features, and updates are able to integrate seamlessly.
  - Content can be published in modular format for periodic updating, which keeps the game fresh and constantly engaging. For example, new problem scenarios or quiz questions can be posed over time, inviting the player back into the game.
  - Notifications and in-game mail can be used to inform players of content updates. These notifications could also let players know there is something new to do or try. These should be unobtrusive yet clearly visible.
  - The infrastructural architecture design for the game should be such that it can support hundreds of players at once without issue. It would be more effective if the system uses cloud-based services for data storage and processing so that scaling efficiently occurs as the number of respondents grows.

    The game selected for GCS1 was SMITE, a multiplayer online battle arena game with more than 10 million players globally (figure 3.0). The competitive, mythologically themed environment was selected because it could involve players in several complex situations to mimic real-world policy dilemmas. With its large community and collaboration modes, SMITE fitted all goals set by the project. GCS1 also used the Playmob platform (figure 4.0) to embed social impact questions and collect data.

Figure 3: SMITE, the game selected for GCS1.
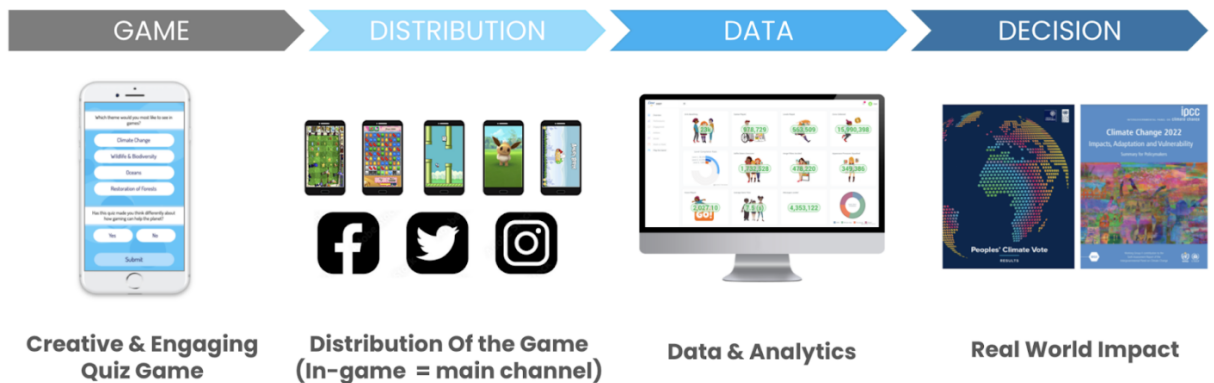
Figure 4: The Playmob Platform

Game design workshops, narrative development, and scenario development are critical aspects for effective integration of policy communication into game environments. The success of this process relies on sustained interest and participation from stakeholders and effective interaction and content development. Future work could include providing an opportunity to expand the scope of the policy dilemmas available, the use of other game genres, and careful consideration of the strategies employed to ensure outreach and effect.

7. Piloting and gathering data (step 4)

Piloting and data gathering comprise a core element of the case study cycle, as it pilots the games and questionnaires developed with participants to establish their effectiveness in capturing and representing citizens' opinions on the policy dilemmas presented. This step encompasses the implementation of various game-based activities, targeted at both small scale and large-scale collection of data including, but not limited to, focus groups for dilemma games as well as mobile game surveys.

During this stage, game-based interventions were conducted with selected case study participants. In most instances, each of these games was specifically designed to focus on one specific policy challenge and allowed participants to engage with interactive storytelling and to make decisions in relation to various eventualities. This pilot allowed

the researchers to gather preliminary information about how participants engage with the content, make decisions, and face challenges while working with the game.

Utilising dilemma-based games enables nuanced data collection. These games involve participants being asked to make a moral, ethical, or logistical decision in relation to a policy area under scrutiny. For example, issues relating to climate change may be approached by crafting a scenario for a trade-off between short-term economic gain versus long-term benefits to the environment. Participants responses reflect their attitudes, values, and knowledge in relation to the issue at hand, which can then be translated into data that is both qualitative and quantitative in nature. In this interactive way, researchers can capture a range of responses showing participant preference and highlighting trends. Focus groups give a qualitatively in-depth insight into the data collected from the piloting phase.

Focus groups can further add a detailed qualitative outlook to data collected during piloting. Here, certain groups of participants, usually matched on demographic or geographic bases, go through specially crafted dilemma games. The setting of a focus group allows the researchers to observe interactions among the participants and decision-making more closely. Researchers can also elicit immediate feedback regarding participants' reasoning about the dilemmas presented to them and the efficiency of the game.

Dilemma games are especially appropriate when researchers are tackling complex, multi-dimensional policy questions. The participants are taken through narratives whereby they are constrained to make trade-offs and face the consequences of those actions-replicating kinds of real-world complexity infused into policy decisions. This method allows researchers to trace how participants' opinions change as they are exposed to various scenarios, thus painting a more dynamic picture of public opinion. Furthermore, a focused environment allows immediate changes in gameplay mechanics to ensure that the content is transparent and relevant.

Surveys have been embedded into popular mobile games to reach more people and collect data on a larger scale. This method capitalises on the high levels of engagement within these platforms, using their existing infrastructure to deploy surveys in a cost-effective and efficient manner. Designs for the survey format were made in such a way that they would not interfere with the gaming experience and would be highly unobtrusive in nature, ensuring high response rates.

There were no geographical boundaries in this case study, although data gathered through the game showed responses from different parts of the world (figure 5.0). This international approach agreed with the objective of this project in obtaining diverse opinions on climate policy. Geographic targeting might be necessary in future research, depending on issues of policies under consideration since regional differences on many aspects of public opinion are distinct. For example, attitudes toward environmental policy may vary between city and countryside, or even between cultural backgrounds. The embedding of questionnaires into location-based games enabled the authors to gather data that was geographically relevant, adding to the contextual completeness of the findings.

Country	Sessions
United States	2,119
Canada	289
Brazil	225
United Kingdom	184
Mexico	157
Spain	156
Argentina	138
Germany	126
France	114
Russia	93
Colombia	50

Figure 5: Individual sessions undertaken identified by country geographic location.

City	Sessions
Buenos Aires (Argentina)	27
Chicago (United States)	27
Lima (Peru)	26
Los Angeles (United States)	22
São Paulo (Brazil)	22
(no city) United States	21
Moscow (Russia)	21
Bogotá (Colombia)	21
Montreal (Canada)	21
Houston (United States)	19

Figure 6: Individual sessions undertaken identified by geographic location.

Piloting and the collection of data revealed a set of insights and challenges. Firstly, and positively, game-based approaches proved successful in the high level of engagement, especially mobile game questionnaires when respondents had already invested in the platform. However, the application of dilemma games showed the difficulty in capturing real opinions within a controlled, game-like environment. Reactions during the focus group discussions showed the games can be quite interesting, at the same time, some scenarios may be too simple or detached from reality. Thus, limiting the depth of the data collected.

A challenge arose from balancing the level of engagement required with meaningful data collection. While games are a very useful mechanism for holding the interest of participants, one concern may be that the game-like nature could result in superficial responses due to players focusing more on 'winning' the game rather than reflecting their opinion. Such tools need to be designed and set with due consideration so that the games are both entertaining yet preserve research validity.

Piloting and gathering data through games-based interventions offers a unique opportunity to engage participants with complex policy dilemmas in an interactive,

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engaging format. By incorporating both small-scale, focused tests through dilemma games and broader, geographically targeted surveys within popular mobile games, this diversity in datasets within the case study serves to inform subsequent stages of the research. However, these methods must be calibrated with care to avoid the over-gamification trap, and ensure the findings obtained are a fair reflection of public opinion.

8. Data interpretation and outcomes (step 5)

Data interpretation and outcomes form the fifth critical stage of the case study cycle. Coming after substantial data has been collected from the game-based activities, this step focussed on collaborative data analysis, interpreting results to evaluate significance, and an assessment of the quality and reliability of the findings. It also involves determining whether further data collection is necessary due to observed gaps or limitations.

This is an essential element in ensuring the interpretation of results is rigorous and representative of diverse perspectives. Typically, this stage would consist of holding a workshop assembling stakeholders, including researchers, game developers, policy experts, and other relevant participants, who would jointly analyse the data. The workshop format stimulates incorporation of various competencies and different perspectives to ensure no important features of the data are overlooked. Participants review the raw data resulting from the game-based activities, such as dilemma games and large-scale surveys, and engage in a structured interpretation of the data. Guiding analytical questions include: What patterns or trends can be seen? How do the responses reflect the original policy dilemmas? Do any of the demographic data jump out in the results? For example, any age, gender, or other location-based anomalies? This ensures the analysis is informed by insights stemming from different disciplines and, therefore, enhances the robustness and validity of the interpretations.

Once collation was completed, data analysis focussed on the interpretation of these data in relation to the research objectives and policy questions. Data obtained from the game-based activities, for example, the decisions made in dilemma games and survey responses, provides the value added of a lens into how citizens perceive and respond to complex policy issues. One of the most important outcomes of this process

is to understand how well the game activities have elicited meaningful and representative responses. In the case of dilemma games, this includes subject choice analysis to see whether it truly reflects real decision-making processes or if it was swayed by the context of gamification. In the case of large-scale surveys nestled within mobile games, the researchers look at the response and completion rates, and the quality of data based on, for example, how consistently people have interacted with the content. During the interpretation of data attention is also paid to the biases or distortions that may be involved. For example, games-based data collection might be biased to certain demographics, such as young males, for which the game may appear most interesting. Workshop participants reviewed these biases, evaluating their potential impact on the validity of the results, and made judgments about the modification of study design or data interpretation that may be required.

Examining depth, breadth, reliability, and accuracy of data collected with respect to answering the original research questions is a major activity undertaken in this phase. The collaborating team reaches a judgment about whether data is informative with respect to the citizens' views concerning the policy dilemmas set forth through the games. High-quality data typically shows a balance of perspectives across different demographic groups and provides rich information on participants' reasoning behind their decisions. The data quality is also assessed based on the level at which such data supports the policy stakeholder's goals. For example, where the research dealt with the change in the climate, then the data should give actionable insights that can help in informing the development or adjustment of a certain policy. The team considers whether such findings are robust enough to influence discussions on policy or whether such data needs further refinement before it can be used within that context. At this point, data verification may also be carried out, for example, data resulting from games can be checked against other data sources, like previous surveys or research within the same policy area, to check if the results obtained through games would appear consistent, or if any discrepancies arise. Such triangulation is an essential element in the process of establishing credibility of the results.

An important outcome of this step is determining whether further data collection is required. If the preliminary analysis presents gaps, inconsistencies, or biases in the data, or if the data is inadequate to answer the research questions, then the team may decide more rounds of data collection are required. For this, refinement may need to take place in the game mechanics, survey questions, or balancing out the pool of respondents, targeting a different demographic altogether. For example, if the

activities based on games resulted in a biased sample such as a dominance of young, urban males, then subsequent data gathering could be tailored to capture underrepresented groups, such as older citizens or those from outside metropolitan centres. If the dilemma games fail to generate substantive responses or data is sparse in certain areas, it may be necessary to conduct further rounds of gameplay with adjustments to either the framing of scenarios or questions to elicit more substantive participant engagement.

The data interpretation and outcomes phase form a crucial process in which the raw data collected from games-based activities is translated into meaningful insights informing policy development. This collaborative workshop setting allows the pulling together of diverse expertise to interpret the data, assess its value, and identify any gaps. The team, through critical examination of the quality of the data and its relevance to the research questions, are able to establish whether the findings are robust enough to influence policy or whether further data collection is needed to ensure full comprehension of citizens' views on the presented policy dilemmas. This step is thus a key turning point in the case study cycle, bridging the gap between data collection and actionable outcomes.

9. Conclusions and Outputs (step 6)

The sixth step cycle is the process of translating data and their interpretations into concrete policy suggestions. It is at this stage findings will be collaboratively developed, and the research methods' efficacy appraised, yielding reflections regarding implications for future research and policy formation. These are compiled and appraised in terms of value to inform policy, and guide the methodological approach.

As with other phases in the case study cycle, collaboration is the foundation of this approach. This usually takes the form of a workshop, or series of workshops during which researchers, policy experts, game developers, and representatives from various governmental and non-governmental organisations meet to formulate findings. The objective of this type of workshop is to discuss the data together in the context of original research questions and policy dilemmas and to come to an agreement on what should be done based on that data. These findings were based on a rich dataset developed from game-based activities. They provide guidance on how these findings

better inform policy, reflect on the implications of findings for policy, and summarise key lessons we learned from citizens' perspectives.

Step six of the case study cycle once again included a reflective process of the strengths and weaknesses of the case study itself, for example, whether the research questions are being adequately addressed, and if the data collection techniques correspond to the available data. These retrospective events support the elaboration of conclusions in addition to bringing suggestions for further research of alterations to the policy approach.

A central component of this phase is assessing the degree to which the games-based strategy was successful in gathering opinions from the public. This entails assessing the methodological approach and its effectiveness in contributing to policy.

The methodological evaluation denotes the extent to which the games-based activities have elicited high-quality data from a representative sample of respondents. Several factors are considered, including:

- Engagement: Was it possible to engage participants by embedding dilemma games and large surveys in mobile games? High response rates and high qualities of engagement would suggest this method was indeed effective.
- Data quality: Was the data obtained appropriate to answer the research questions? The study review considers whether the available data portrayed a sufficient sample of the population, or if stereotypes such as age or gender bias cut down on the study's objectives.
- Technical execution assessment: How well did the system handle the scale of data collection? The review covers the sufficiency of the game mechanics and infrastructure, while also mentioning the issues that were encountered in or post-deployment while running the game mechanics in the study.

The review also analyses the extent to which the more in-depth approach achieved its aim, which is the provision of information that can be used in a policy-making process. Important questions in this domain include:

- Alignment to policy: Was the information acquired to accord value addition to the policy stakeholders such as the UNDP, other government bodies among others? Were citizen's views captured in a manner that could reasonably be considered while addressing the policies or new policy initiatives that could be formulated?

- Scalability: Was the method scalable and relevant in other policy contexts? In this example, for instance, would the games-based approach be used in other policy problems aside from that of climate change to other parts of the world and with different population demography?
- Efficiency: Was the How effective was the process in terms of time, use of resources, and cost? This concern about the method's efficiency was not only based on how technical implementation could get but also the effort of partner engagement to game studios and soliciting wide participants.
- <u>Efficiency: Was the process effective in terms of use of resources, and cost? Concerns about the efficiency of the methods extended beyond the technical complexity of implementation to include the efforts involved in engaging partners, reaching out to games studios, and recruiting a broad range of participants.</u>

This evaluation is crucial in determining whether this method should be recommended for future use.

The last of the recommendation's rests on the interpretation of the data or the impacts of the possible intervention, how effectively the approach would function in practice as an intervention. These proposed recommendations are intended to raise the professional level of decision makers by offering them viable reasonably designed measures based on opinions and preferences of citizens who have participated in the games. These recommendations may be on how to move forward in changing policies to better accommodate the view of citizens, or even point out areas requiring more public participation. Additionally, recommendations may provide more detailed feedback regarding extensions to the model, such as how to make more use of citizen inputs within the policy-making process in the future, with respect to the technology and games and other methods of mass engagement that are available.

Calibration or deterministic optimisation is sometimes insufficient, and some consequences may also point to new questions requiring further research or collection of other available data, if any, particularly in cases where biases or certain gaps were alleviated during the evaluation. Such anticipations would serve to improve on the methodology in subsequent versions, making it possible for the tool to be used effectively in policy consultations and in the formulation of policies.

The final step of this phase allows reflections on the overall process and considerations for the future. The team evaluated lessons learned regarding the use of games as a research method. This created an opportunity for the establishment of best practices for future studies, in turn setting the groundwork for more in-depth exploration in the future on how digital engagement techniques can be used to support policy development processes. Future work may focus on broadening the methodology to examine how different types of games could be utilised to engage different demographic groups. The reflections may be focussed on new insights concerning possible improvements in the partnership model, particularly in promoting smoother collaboration between policymakers and the gaming industry.

We refer to the policy conclusions and evaluation stage as the moment of truth in the case study cycle, akin to the last stepping stone converting game-based insights into real-life outcomes. This phase elaborates the implications for policies after taking a thorough examination of general applicability of the case study, assessment of effectiveness, and method of results collection through applied analysis. This is followed by an evaluative component to create a holistic picture of the games-based approach in terms of what it can and cannot do, in concrete terms, to ensure conclusions are underpinned by an expansive range of expertise.

10. Public Engagement and Dissemination of Outcomes (step 7)

The seventh step of the case study cycle involved the dissemination of results to the largest extent possible in order to ensure that data and insights obtained from activities in games and play are effectively communicated to wider audiences and other stakeholders. The findings and recommendations are communicated via web-based mediums, particularly the GREAT website, and open-access repositories such as Zenodo, whereby all during the intermediate stages of the project, the deliverables, datasets, analysis summaries, and academic papers can be uploaded to provide transparency and foster further research collaboration. These repositories not only serve as archives, but also provide a gateway to citations in future academic discussions.

A main source of dissemination activity has been community engagement, which has seen the project and findings presented in webinars and numerous presentations to a variety of stakeholders. For example, webinars which have targeted policymakers, climate activists, and industry professionals, such as those in the gaming sector, allow for direct discussions regarding how games-based activities may influence policy and public awareness of climate change dilemmas. The webinars also allowed for a far more conversational format than would be found in writing, whereby attendees could ask questions, and thus better engage with the subject matter. Events and presentations have also formed the basis of the engagement strategy, with case study results presented at conferences related to climate change, game studies, and public policy. Featured either in person or as a virtual event, these events become places to offer feedback that may feed into research efforts rather than a point to simply supply information.

The effort of engagement has been directed to pursue broad and varied coverage for the case study results, yet in channels capable of preserving an academic quality of communication. Results are communicated in formats that are friendly to the public at large and, simultaneously, valid in academic and policymaking circles. This not only increases the dissemination and visibility of the research but also potentially drives impact on policy decisions and future projects

11. Conclusions and outputs (step 8)

This is the final step of the case study cycle, requiring structured efforts in actively distributing the results derived during the game-based activities to policy stakeholders. This phase concentrated on devising an inclusive dialogue between policymakers and the public regarding urgent dilemmas during climate emergency crises. The engagement process was designed to ensure the emerging data, conclusions, and possible policy recommendations from the case study are communicated in a way that informs and influences decision-making.

An output of this phase is the Insight Report, pulling together learning from games-based activities, surveys, and dilemma games throughout the project. This report serves to enable policy makers to understand how citizens think about and respond to complex climate-related policy challenges. Raising the alarm on major trends in popular opinion, distinctions between demographic groups, and any observed level of

bias. The insight report will be diffused at multiple times in the process through various media channels to a diverse audiences and stakeholders, such as the direct end users in the case study, UNDP, or other international organisations involved in climate policy. The report will also be shared more widely via open access platforms such as Zenodo, to ensure accessibility to a greater audience of both policymakers, researchers, and the general public.

Results of the case study will be presented to policymakers in special briefing sessions as a means of achieving dissemination and action of results. These will be tailor-made for various audiences, from the international level such as UNDP, right down to local government representatives. This aims to offer an overview of the approach, results, and potential policy implications regarding how best to formulate climate change policies and environmental governance. These presentations allow the team to demonstrate the potential innovative policy uses of game-generated insights, such as information on trade-offs between economic growth and environmental sustainability, or long-term inter-generational impacts, data might allow policymakers to make more informed choices about how the public considers them. Presentations also offer an opportunity for policymakers to ask questions and ensure a two-way dialogue to allow further refinement of the report and its recommendations.

Other than formal presentations, an ongoing dialogue with dilemma-stakeholders was necessary in the process of creating engagement. This dialogue took the form of focus groups, workshops, and one-on-one meetings with a variety of policymakers and representatives of industry leaders facing climate dilemmas. These discussions help set the data from the case study into relevant policy landscapes and allow an opportunity to demonstrate how perspectives from within society ought to play into attention to nuance inside useful public policies. The collaborative aspect of this engagement is critical in ensuring insights arising from the games-based activities do not just exist as academic findings but are translated into actionable policy recommendations. This can help stakeholders think critically about how data can be used to inform decision making, whilst also giving them tools with which to interact and engage with the public more thoroughly, possibly incorporating games-based methods into their own outreach efforts.

12. Discussion: Case Study Alignment with GREAT Objectives and Research Questions

The GREAT project research questions are detailed in deliverable D4.2. in this section we provide detail on how the activities described in this report align with the GREAT project research questions.

GCS1 United Nations Development Programme (UNDP) Mapping of the Case Study focus and contribution to the GREAT project research questions as proposed in (D4.2)	
Objective 1. Establish ways in which games can be designed to provide a link between citizens and policymakers.	
RQ 1.1: Which methods in digital games can be used to create an information exchange between attitudes and preferences of citizens on societal challenges (e.g., climate change) and policy makers working on these challenges?	Yes
RQ 1.2: How effective and efficient is the use of games in creating an information exchange between attitudes and preferences of citizens on societal challenges (e.g. climate change) and policy makers?	No
RQ 1.3: How can games be used to foster dialogue and collaboration on societal challenges (e.g. climate change)?	Yes
Objective 2. Understand the actual and potential impact that games can have on citizens' engagement in social issues and challenges, and on policy stakeholders' awareness of citizens' attitudes and preferences.	
RQ 2.1: What are the affordances of games in developing citizens' engagement with challenges and dilemmas arising from societal challenges like climate crisis?	No
RQ 2.2: What are the affordances of games in informing policy on the societal challenges like climate crisis?	Yes

RQ 2.3: What is the value to policy stakeholder groups of the information on citizens' attitudes and preferences generated through games-based activities?	No
RQ 2.4: What is the value to citizens of enabling them to engage in policy discourse through the design of and engagement in games-based activities?	No
RQ 2.5: How generalisable are the GREAT methods to other global challenges or other fields of research and innovation?	No
Objective 3. Provide practical guidance for games developers and policy stakeholders.	
RQ 3.1: Which are the key interventions in the GREAT method which lead to its effectiveness and efficiency?	No
RQ 3.2: Which variables need to be taken into consideration when adapting the method to new contexts?	Yes
RQ 3.3: What documentation and/or training is required for games developers, policy stakeholder groups?	Yes
Objective 4. Assess the benefits and risks to individuals and society of using games to promote engagement with societal challenges.	
RQ 4.1: What are the benefits and risks experienced by citizen participants, policy stakeholders, games designers and providers, as well as policy makers and organisations, when they participate in the GREAT method?	No

Table 2: Mapping of Research Questions within GCS1

Objective 1. Establish ways in which games can be designed to provide a link between citizens and policymakers.

RQ 1.1: Which methods in digital games can be used to create an information exchange between attitudes and preferences of citizens on societal challenges (e.g., climate change) and policy makers working on these challenges?

The pilots, together with the structured development of the case study cycle, form initial approaches to answer this research question. Although the methods identified in RQ 1.1 fit within the overall step cycle, it should be acknowledged that steps forming the early stages were not produced solely within the GREAT project but rather built upon previously validated activities and frameworks of UNDP, thus forming a base from which   to   explore.

In the case study presented here, a Playmob approach was applied, without the inclusion of Dilemma-Based Learning (DiBL). The use of off-the-shelf digital games made for a pragmatic piloting of the method and demonstrated that this model allows for efficient information flow from citizens to policy makers. Although this was not an inclusive engagement process, it did give the stakeholders some early indication of public preferences and created a proof of concept to be further refined. The findings suggest that while the method holds potential, future iterations could benefit from integrating more interactive, dilemma-based elements to enhance engagement and dialogue between citizens and decision-makers.

RQ 1.2: How effective and efficient is the use of games in creating an information exchange between attitudes and preferences of citizens on societal challenges (e.g. climate change) and policy makers?

The case study presented quantitative data regarding the number of participants logging into the game and completing accompanying questionnaires. As described on page [xx] of this report, that data shows that the approach was successful in terms of engaging the target audience. However, the assessment of 'efficiency' remains inconclusive, as no formal comparative analysis was conducted.

While the data indicates the method successfully captured citizen input and conveyed it to policymakers, the absence of qualitative insights limits our understanding of the depth of the exchange. Since this approach has not been benchmarked against other methods, nor the resource input analysed in relation to the outcomes, it is premature to identify the overall efficiency of the approach. Qualitative measurement and comparison studies should be incorporated in future studies on the same topic to assess the effectiveness and overall efficiency.

RQ 1.3: How can games be used to foster dialogue and collaboration on societal challenges (e.g. climate change)?

The project's approach to fostering dialogue can be understood on two levels:
- Direct interactions: Conversations among stakeholders during the case study activities.
- Information exchanges: Indirect interactions between policymakers and citizens facilitated by the GREAT project activities.

This case study focused on the latter—using gaming as a medium for fostering dialogue and collaboration on societal challenges. Two models were applied, one in which the advertising space was bought through Google Ads and another whereby game development studios were hired to directly integrate the approach into gameplay.

Data related to engagement and completion rates shows that the latter model-in which the game was integrated directly into gameplay-was more effective in facilitating meaningful dialogue between citizens and policymakers. This shows that the inclusion of the approach within the game environment makes individuals contribute more and continued discussion is allowed. The results also provide evidence that games bear much potential in fostering continued participation and deliberation on issues that are affecting society. Further research may thus use more forms of direct and indirect dialogue to achieve the complete potential of games as a medium for collaborative problem-solving.

Objective 2. Understand the actual and potential impact that games can have on citizens' engagement in social issues and challenges, and on policy stakeholders' awareness of citizens' attitudes and preferences.

RQ 2.1: What are the affordances of games in developing citizens' engagement with challenges and dilemmas arising from societal challenges like climate crisis?

While this case study anecdotally indicates potential affordances that games have in fostering citizens' engagement with societal challenges, it lacks substantial evidence to establish such claims. The quantitative data collected provides some insights, however, it is limited in scope and may not be sufficient to present a compelling case for the effectiveness of games in this regard.

Key observations from the case study include:

- Although the case study collected data on citizen engagement, there are no clear indications that participants meaningfully engaged in addressing the challenges presented. There is a need for more robust measures for strengthening such claims.
- Vagueness of 'affordances': The research question does not clearly define the term 'affordances', making it difficult to assess whether this is an appropriate framework for analysing engagement. A clearer conceptualisation of affordances, grounded in the context of digital games and societal challenges, would provide a more focused direction for inquiry.
- Overlap with other RQs: There is a very large overlap with Research Questions 1.1, 1.2, and 1.3, in particular around how engagement will be measured and how games will facilitate discussion. This indicates a need to revisit these questions to clarify differences between their focus, or to consider a more integrated approach to answering them.

While this case study hints at the potential affordances of games, more robust and targeted evidence is needed to substantiate these findings. Future research should aim to clarify the concept of 'affordances' and develop more rigorous methods for measuring citizen engagement with societal challenges through gaming.

RQ 2.2: What are the affordances of games in informing policy on the societal challenges like climate crisis?

Games offer several affordances which could inform policy on societal challenges, such as the climate crisis, via unique mechanisms not provided by traditional methods.

- Simulation and Scenario Exploration: Games can simulate complex environmental and societal systems, allowing exploration of outcomes based on different interventions. This helps the visualisation of long-term impacts of policies in a way that is both interactive and immersive.
- Data Generation and Public Sentiment Analysis: Through gameplay that requires decision making, games can collect real-time data on citizen attitudes, behaviours and preferences, providing policymakers with nuanced insights into public sentiment, and allowing policies to align with citizen priorities and concerns.
- Engagement and Awareness: Games can deeply engage the public with complex challenges such as the climate crisis, raising awareness and promoting a sense

of agency, resulting in better-informed citizens, whose perspectives offer relevant insights that might otherwise be overlooked in surveys or traditional consultations.

- Inclusive Dialogue: Collaborative and multiplayer games facilitate dialogue between diverse stakeholders, fostering an inclusive discourse on climate policy, where participants from various expertise levels can contribute to the conversation in a non-hierarchical manner.

RQ 2.3: What is the value to policy stakeholder groups of the information on citizens' attitudes and preferences generated through games-based activities?

While there were stakeholder consultations in the case study, they were direct results of earlier activities beyond the scope of the GREAT project. Given that, this study does not answer the research question directly. Consultation with the UNDP, however, as the sponsor of the activity, at least gives an initial indication of stakeholder engagement.

In future case studies, where feasible, it would be beneficial to ask UNDP about the qualitative 'value' they assign to the information provided through this research, and specifically how the data generated from the games-based activities is utilised. For example, feedback from organisations such as the UNDP on how they actually make use of the data produced through these activities may provide more concrete observations of how effectively game-generated data informs policy. This might relate to how such data informs decision-making, influences policy development, or underlines areas of policy attention.

This research question is related to 'policy stakeholders', participants who may not be policy owners or general participants. While the case study gathered data on this group, there is a clear need to distinguish these users more explicitly. Identification of specific roles and their relevance to policy-making will enable more focused analysis regarding how these stakeholders perceive and apply information generated from game-based activities.

RQ 2.4: What is the value to citizens of enabling them to engage in policy discourse through the design of and engagement in games-based activities?

This case study was not explicitly focused on ascertaining the perceived value of citizens in terms of what they gained through engaging in games-based activities within policy discourse. To properly understand this, future studies would need to survey participants for insights on the experiences and perceived benefits. Although the current case study lacks direct qualitative data on this, the completion rates of participants, specifically, players of SMITE, suggest citizens found some value in the activity, as evidenced by their willingness to complete the associated questionnaire.

A more robust approach will be taken in future case studies (scheduled for April/May 2024), where redesigned questions will be incorporated to evaluate the perceived value of participation in policy discourse. These questions will explore whether citizens feel empowered, informed, or otherwise positively impacted by their engagement in games-based activities.

For the GREAT project to meaningfully answer this question, it will be important to clearly define the concepts of 'value' and 'discourse'. This will allow for a more precise evaluation of how games contribute to citizens' involvement in policymaking, and whether they feel their participation influences real-world outcomes or policy decisions.

RQ 2.5: How generalisable are the GREAT methods to other global challenges or other fields of research and innovation?

This question falls within the wider ambit of the GREAT project, GCS1 does not provide a direct answer. However, it does offer some evidence of the method being applied in the context of global climate change challenge. This question will be fully answered by reviewing the project in its entirety, since it is based on how the adaptation of the GREAT method(s) to various case study contexts is documented in detail, along with the processes involved. Only through detailed examination of such adaptations can we determine how far the GREAT approach is transferable to other contexts than those tried so far, for example to different societal issues or other areas of research and innovation.

In future case studies, it will be important to note and document the specific elements of the method which prove flexible and scalable, and those which may need modification in light of the particular characteristics of each challenge or field. This will give far stronger evidence for the potential generalisability of the GREAT methods.

Objective 3. Provide practical guidance for games developers and policy stakeholders.

RQ 3.1: Which are the key interventions in the GREAT method which lead to its effectiveness and efficiency?

This question is not directly answered from the case study; however, interventions with game characteristics are implicitly recognised within the GREAT approach. For example, access to large volumes of players might be regarded as an effective characteristic of the intervention. Additionally, consultation to co-create engaging question sets might also be a valuable asset, as is the association with large-scale and successful commercial games.

The next UNDP case study could undertake a comparative study incorporating future refinements and improvements based on insights from GCS1. This could be integrated into the research cycle where applicable for ongoing activities with the GREAT case study sponsors.

Each case study could explicate a theory about the context (i.e. participant characteristics and circumstances) and detail which characteristics of the intervention were responsible for the success or failure, for example, an explanatory mechanism. These insights could be compiled to guide future use, with an awareness of the key decisions to be made. Further insights may be gained through internal evaluation by the GREAT team, supplemented by documented reflections from stakeholders and sponsors. Additional valuable input might be obtained through….-

Although this case study does not directly answer which key interventions in the GREAT method lead to its effectiveness and efficiency, a number of important factors can be read between the lines. For example, one key intervention is access to large player bases through the partnership with commercial games such as SMITE, allowing for broad engagement and wide data collection. Furthermore, the co-creation of relevant question sets with the involvement of stakeholders creates an effective intervention by activities that are relevant and resonate with participants. Finally, there is an association with successful, established games, enabling the recruitment of pre-existing engagement and trust in well-developed gaming ecosystems.

A comparative analysis can be embedded in any forthcoming casework, such as the one with UNDP, to better understand efficacy and efficiency of the interventions. This

would further enable the refinement of the GREAT method beyond insights gained within the case study of GCS1 and apply improvements within successive research cycles. Such comparisons may, therefore, have the power to tease out which constituent part of the interventions-the scale of participation or the nature of engagement-accounts for success.

For the future, each case study might be designed to explicate a theory about the context in which the intervention takes place. This would include participant characteristics, game design elements, and other influences on outcomes. This would enable the researchers to outline which particular aspects of the intervention are working best by documenting these very elements. Internal evaluations within the GREAT team and feedback from stakeholders and sponsors could also provide more insight into the strengths and weaknesses of various interventions. These would be extremely useful in developing practical guidance for games developers and policy stakeholders, better informing future uses of the GREAT method.

RQ 3.2: Which variables need to be taken into consideration when adapting the method to new contexts?

In adapting the GREAT method for new contexts, a number of key variables must be considered to assure the relevance and effectiveness of the approach. First, participant demographics are crucial, as the age, cultural background, and familiarity with games can determine the manner in which citizens engage in the games-based activities. Participants who are younger or have more experience playing games may respond differently to digital interventions compared to their more senior or less experienced counterparts.

The nature of societal challenge being addressed will require thoughtful adaptation. Issues such as climate change, public health, and social inequality could demand different forms of engagement, contents, or communication styles. Some challenges may benefit from dialogue-driven interactions, while others might necessitate higher levels of data collection or awareness-raising efforts.

Another critical variable pertains to the local policy environment and the level of relationships between citizens and policymakers in any given context. The level of trust of the policy institutions may be higher or lower in different countries or regions; which could affect the way in which citizens engage with policy discourse through games. In

addition, stakeholder needs must be carefully considered, for both the policymakers who are receiving the information and the citizens who are providing it. The data must be useful and actionable for policymakers, while also being presented in a way that motivates and empowers citizens to engage.

Access to technology, internet connectivity, and digital infrastructures influence how well the GREAT method can be deployed. In regions with limited access to technology, alternative methods of engagement may need to be designed.

Finally, game design variables need to be contextualised, for example, the genre of the game, the mechanics, and the incentives, as some game genres may resonate more with a culture or an age group than others. Mechanics used to encourage participation must also be aligned with the objectives of the societal challenge being addressed.

By considering these variables, the GREAT approach can be effectively adapted to new contexts, ensuring continued relevance and impact.

RQ 3.3: What documentation and/or training is required for games developers, policy stakeholder groups?

Tailored documentation and training are required for games developers and policy stakeholder groups to apply the GREAT method in practice. Detailed documentation is needed for games developers describing the objectives of the societal challenges being addressed, the types of mechanics and dynamics the game should include, and how the game will facilitate interaction between active citizens and policymakers. This should include clear guidelines on how to design the games to be conducive to dialogue, the collection of meaningful data on citizens' attitudes, and the alignment of game mechanics with the goals of policy engagement. Documentation should also include case studies and best practices from past successful uses of the GREAT method, allowing developers to learn how the method has been applied in different contexts.

Training programmes for developers should also focus on the ethical dimensions of game design in relation to addressing societal challenges. It is relevant that, within policy discourse, developers be made aware of data privacy, inclusivity, and other risks related to gamification. Ensuring the games are accessible to diverse audiences,

including those with limited gaming experience, or from different socio-economic backgrounds, should be emphasised within the training materials.

For policy stakeholder groups the documentation should cover how to interpret and use data captured through games-based activities, including guiding on the validation of data, the translation of citizens' preferences into actionable policy recommendations, and communicating transparently back to participants. The training for stakeholders should be centred on valuing games as an interactive tool and as a policy development methodology; the training should emphasise how interactive experiences have the potential to provide deeper insights into public attitudes than may be garnered through traditional surveys or focus groups.

Stakeholders should be trained in collaborative ways of working with the games developers. They need to understand the process of co-designing the games to keep the content relevant for the policy questions and also to maintain the interest of the players. For this kind of training, practical sessions on data interpretation from game-based data can also be included and how such data can inform policy decisions.

The games developers and policy stakeholders should have continuous support, one method might be to allow access to a repository of resources including design templates, examples of past projects, and technical guidelines. An approach like this would ensure both parties can iterate their methods and adjust to new challenges or technological advances within the GREAT method.

By providing comprehensive documentation and training addressing these areas, the GREAT method can be implemented effectively, ensuring both developers and policymakers are equipped to foster meaningful citizen engagement and policy innovation through games.

Objective 4. Assess the benefits and risks to individuals and society of using games to promote engagement with societal challenges.

RQ 4.1: What are the benefits and risks experienced by citizen participants, policy stakeholders, games designers and providers, as well as policy makers and organizations, when they participate in the GREAT method?

When assessing the benefits and risks of the GREAT method, it is essential to consider the diverse perspectives of all participants involved—citizens, policy stakeholders, games designers, providers, and policymakers.

For citizen participants, one of the key benefits is the enhanced engagement with societal issues such as climate change. Games provide an interactive and often enjoyable way to understand complex problems, allowing citizens to feel more involved in policymaking processes. Through game mechanics, citizens can visualize the impact of their choices, which can foster a deeper sense of agency and responsibility in addressing societal challenges. However, there's potential for risk, particularly around data privacy and gamification fatigue. Through game mechanics, citizens can imagine the consequences of their choices, fostering a deeper sense of agency and responsibility in solving societal challenges. Games that require personal information or any long commitment raise suspicions among citizens as to how their information may be used, or the scale of their commitments may reduce efficiency.

To the policy stakeholders, the benefit also consists in getting real-time data about citizens' attitudes and preferences, which is collected in an engaging, accessible way. This could promote better decision-making and narrower gaps between the policy makers and the public. However, there is a risk of misinterpreting data from the games if those are not carefully designed to accurately reflect the input of citizens. If policymakers became overdependent on the data arising due to games without considering the general perspective, then the policy decisions might come out to be biased or superficial.

For games designers and providers, the GREAT method offers the benefit of collaboration with policy-driven projects, providing opportunities to innovate and design games that have real-world impact. Designers can also benefit from the challenge of creating games that are not only entertaining but also educational and informative. For designers, there is the risk that such collaboration might exert pressure to prioritise engagement over accuracy. It sometimes is challenging to find the balance between the game being entertaining and not corrupting the information exchange; there is a danger of oversimplifying complex issues to maintain player interest.

Policymakers and organizations benefit from the ability to engage citizens in a more dynamic and interactive way than traditional surveys or public consultations. Games

can also be used to raise citizen awareness of particular issues and allow participation that otherwise might otherwise be difficult to achieve. The risk, however, is that using games as a tool for engagement might not be taken seriously by all policy stakeholders, especially if the approach is perceived as lacking rigour or if the games themselves do not accurately represent the nuances of policy issues. Resource limitations might arise for organisations particularly if the development and deployment of games require significant investment in technology and training.

Although the GREAT method has considerable advantages regarding citizen engagement, data collection, and policy impact, risks have to be managed cautiously. Ethics should form part of the design process of the game itself, while clearly briefing all participants is important for the purpose and limits of the game-based approach.

13 Summary

The case study under the GREAT project aimed to delve into the UNDP, involving citizens in discussions on climate emergency dilemmas with novel games-based approaches. The process of this eight-stage case study-from collaborative design to active engagement-involves interesting insights into how game mechanics can effectively facilitate public discourse on complex issues. This approach demonstrated the potential of games to act as a dynamic medium for bridging the gap between citizens' concerns and policymaking, fostering deeper engagement, and influencing policy development. The case study also revealed opportunities for refining the method to enhance both the reach and impact of future game-based interventions, particularly in addressing global challenges beyond climate change.

13.1 UNDP Case Study Significance

The UNDP case study provides compelling evidence that games-based methodologies can serve as a powerful tool for crowdsourced policy advocacy, particularly on social issues such as climate change. This is significant as this research explores innovative approaches to fostering improved dialogue between citizens and policymakers, promoting a more inclusive and informed process of policymaking. This case study not only highlighted the effectiveness of using games to engage diverse stakeholders but

also paved the way for greater incorporation of novel digital tools in future policymaking efforts.

By demonstrating the potential of this approach, this case study encourages exploration of interactive methodologies that can enhance public participation and influence policy outcomes. This research has implications beyond climate change, suggesting similar games-based frameworks could be applied to other critical issues, such as public health, education, and social justice. Further research is needed to determine if there are any long-term effects of such activities on policy-making and civic involvement, in addition to exploring best practices for integrating these tools into existing policy frameworks. By fostering an ongoing dialogue about the role of games in policy advocacy, this study lays the groundwork for a more participatory and effective democratic process.

13.2 UNDP Case Study Impact:

This case study has far-reaching impacts both on public policy research and the general discourse of climate change. Through embedding dilemma games in widely popular mobile games, the study further expanded its reach to an otherwise elusive young and digitally literate audience that are normally underrepresented in traditional policy discussions. This novel approach not only enhanced the level of engagement in critical social issues but also generated a far more heterogeneous and inclusive debate, with the concurrent encouragement of participation from demographics that tend to remain disengaged from traditional policymaking processes.

In this respect, the case study extends the argument to how game-based methodologies can reveal real-time public sentiment as a source of insight into the attitudes and preferences of younger citizens regarding climate action. This is not only a practice that serves to increase the awareness of climate issues but also one that grants young audiences a sense of agency in intervening actively into the policy debate. The study demonstrates active and technology-driven approaches may have the potential to reshape public discourse, amplify the voices of non-traditional actors, and spur more effective, inclusive climate-related policymaking.

13.2.1 Context of Study

The purpose of this study arises against the background of the growing global imperative to combat climate change effectively. Conventional approaches to public engagement often fail to connect with certain populations, particularly younger demographics and gamers, who are frequently underrepresented in discussions surrounding climate action. This case study specifically addresses the need to amplify the voices of these groups in navigating complex policy challenges related to climate change.

By leveraging innovative game-based methodologies, the research not only engaged participants in a compelling manner, but also elicited a high volume of responses while maintaining the quality of engagement. The approach shows the potential of games to provide accessible entry points for meaningful dialogue, enabling deeper participation from demographics that might otherwise remain disengaged.

Gamification strategies including interactive scenarios and competitive elements, can make climate-related discussion more relevant and enjoyable to participants. This case study gives an opportunity to usually underrepresented voices to express their views and concerns, making the policy dialogue more inclusive; ultimately leading to more robust and representative climate action initiatives. The findings underscore the importance of continuously evolving engagement strategies to resonate with diverse audiences and to harness their insights for more effective policymaking.

13.2.2 Impact

The case study instigated fundamental changes in the approach to public engagement in climate policy. This case study piloted a new approach to citizen engagement, increasing the reach and diversity of participants, where engagement rates showed a statistically significant increase, with 58% participation for in-game rollouts, as compared with just 5% via traditional paid placements. This shift demonstrates the power of gamification to attract and include a broader audience in climate discourse.

Insights collected further informed UNDP policy discussions and reached a variety of policymakers, playing a crucial role in shaping a new approach to tackling climate emergency dilemmas. This demonstrates the value of integrating public sentiment into policy frameworks.

The case study catalysed enhanced collaboration between game studios and policy stakeholders, cultivating a partnership fostering socially responsible practices. This partnership further nurtured the development of games and gave policymakers insights into public perspectives about climate policy and more informed decision-making.

The case study demonstrates that this approach has the potential to be applied on a wider scale. The flexibility and efficacy of games-based approaches are indicative of their transformative potential in the ongoing fight against climate change.

This case study indicates a potential paradigm shift in how public engagement with climate policy could be approached. By incorporating interactive and inclusive methodologies within the policy environment, stakeholders could foster a more informed, collaborative, and dynamic policy environment that responds to the needs and concerns of all citizens.

13.3 Strengths, Weaknesses, Opportunities, Threats Analysis

A SWOT analysis of CGS1 case study reveals the following:

STRENGTHS

- High engagement rates through innovative methods.
- Clear link established between public opinion and policy formulation.
- Effective collaboration with game studios, using their platform to reach broad audiences.
- Low technical effort required for data collection through pre-existing infrastructure such as Playmob's PlanetPlay.

WEAKNESSES

- Data skewed heavily towards a younger male demographic, which may not fully represent society's views.
- Challenges in tailoring in-game rollouts for highly localised policy enquiries due to global reach of many games.
- Significant effort required to establish collaborations with game studios, making it resource-intensive.

SWOT ANALYSIS

OPPORTUNITIES

- Potential for future studies to address the demographic skew by selecting games with more diverse player bases.
- Method could be applied to other policy areas beyond climate change, offering policymakers a new tool for public engagement.
- Increased visibility and credibility for games studios by contributing to social responsibility initiatives.

THREATS

- Reliance on partnerships with game studios may limit scalability or replication of the study without access to such collaborations.
- Potential backlash from players or game communities if the integration of surveys and games is perceived as intrusive or irrelevant.
- Generalisability of findings may be compromised if the methodology cannot sufficiently reach diverse demographic groups.
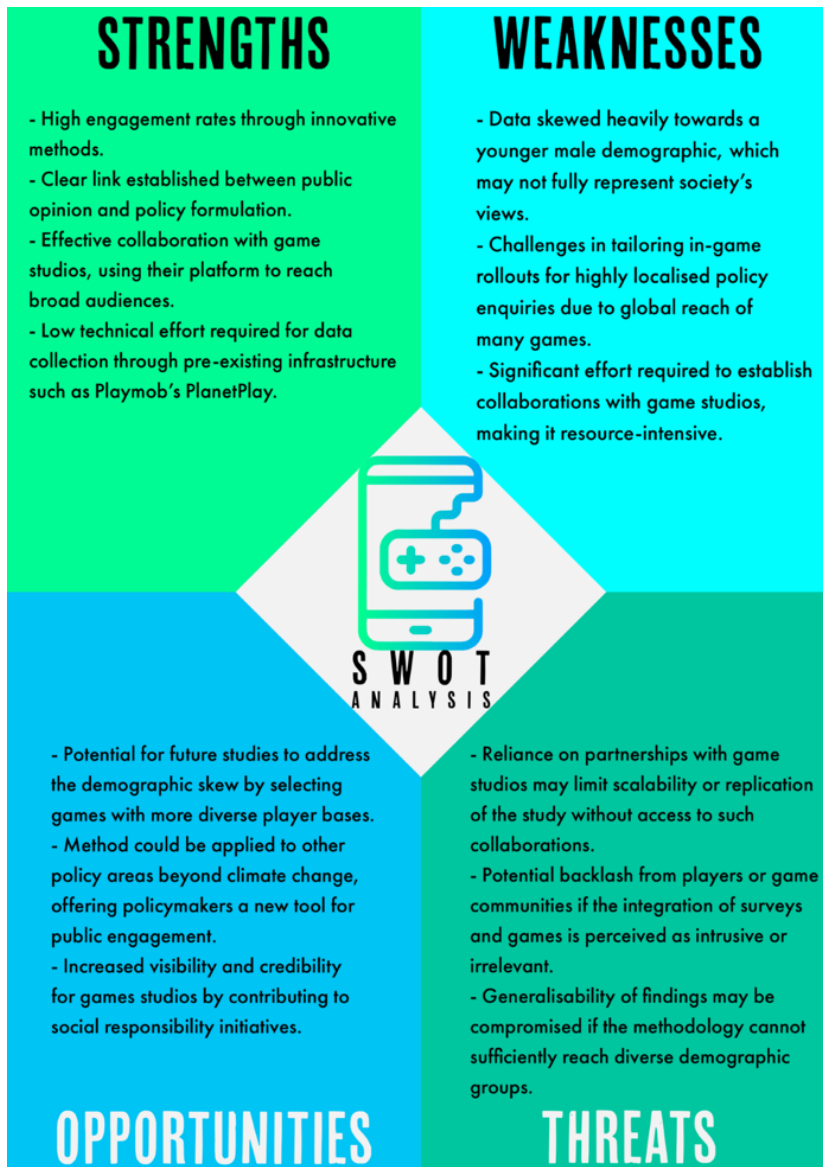
Figure 7: SWOT Analysis of GCS1

14. Conclusions

This case study provides the GREAT project with important insights into how new methodologies, specifically games-based activities, can effectively engage citizens in policy debates on pressing issues such as the climate emergency. Not only does this research demonstrate that combining polls and questions within commercially popular games is an effective and promising approach to eliciting public opinion among younger, technologically savvy audiences that are often harder to reach, it also

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demonstrates the emerging potential of gamification to enable civic engagement and responsibility.

Partnering with game studios has been proven to significantly increase response rates, empower target audiences and commit to corporate social responsibility. In-game rollouts have been extremely effective compared with more traditional paid placements, which suggests that these interventions could be scaled to answer much larger policy questions. However, this approach also brings challenges, including human bias and the nature of gathering source data through collaboration with game studios. Addressing these issues will be important in the future to ensure the inclusiveness and representativeness of the data collected.

The tangible impact of this case study on the policy landscape is noteworthy, as the dialogues surrounding climate emergencies are currently informing UNDP policy and establishing a scalable model for future public engagement. This highlights the necessity for ongoing collaboration between policy stakeholders and the gaming industry to ensure that future public policies reflect a diverse range of citizen voices. Such collaboration can lead to the development of strategies for integrating game-based approaches into traditional policy processes, thereby promoting participatory governance.

Future iterations of this approach should focus on mitigating demographic challenges through a broad selection of games and targeting specific populations where appropriate. Additionally, lessons learned from this case study can extend beyond climate policy, providing a roadmap for engaging citizens in a wide variety of policy areas through using digital participatory approaches.

This case study represents significant progress in modernising public engagement methods, bridging the gap between politics and society, exploring how digital innovation can effectively inform public policy. There is vast potential for progress and development, offering opportunities to reshape how governments, organisations, and the public interact on critical societal challenges. By continuing to explore and refine these approaches, stakeholders can be better equipped to address a multitude of pressing social issues, fostering more informed and engaged citizens who actively participate in shaping their futures.

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Annex